वार्षिक प्रतिवेदन २०२१
ANNUAL REPORT 2021

ICAR-ATARI
Bengaluru




Azadi Ka Amrit Mahotsav

भाकृअनुप - कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान
ICAR-Agricultural Technology Application Research Institute
Zone XI, Hebbal, Bengaluru - 560024

A view of paddy field (KVK, Kodagu)

Drone demonstration (KVK, Wayanad)

Art work by

Siddappa C.Angadi
(KVK, Bagalakote)

वार्षिक प्रतिवेदन २०२१
ANNUAL REPORT 2021
ICAR-ATARI, Bengaluru

भाकृअनुप - कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान

ICAR-Agricultural Technology Application Research Institute

Zone XI, Hebbal, Bengaluru - 560024

ICAR - Agricultural Technology Application Research Institute, Zone XI
H.A. Farm Post, Hebbal, Bengaluru - 560 024, Karnataka, India

Phone : 080-23510616, 234101614
Fax : 080-23410615
Email : atari.bengaluru@icar.gov.in
Website : https://ataribengaluru.icar.gov.in

Published by

Dr. V. Venkatasubramanian
Director, ICAR-ATARI, Bengaluru

Year of Publication
July, 2022

Editorial Board

Dr. M. J. Chandre Gowda
Dr. D. V. S. Reddy
Dr. B.T.Rayudu
Dr. Thimmappa K
Dr. D. V. Kolekar
Dr. Mallikarjun B Hanji

Layout, Design and Print Coordination

Dr. M. B. Hanji
Dr. B. T. Rayudu
Dr. Thimmappa K
Dr. D. V. Kolekar
Dr. Sagar S Pujar

Hindi Translation

Dr. S. Kumar
Principal Scientist (Retd.)
ICAR-Sugarcane Breeding Institute
Regional Centre, Karnal

Citation

Annual Report 2021, ICAR-Agricultural Technology Application Research Institute, Zone XI, Bengaluru, Karnataka, India

Printed at

Precision Fototype Services
No 13, SNT Street
Guptha Layout, Halasuru,
Bengaluru-560 008
Ph: -80-25364349/ 080-25546146

Contents

Preface

The Government of India has taken a number of developmental and technological initiatives, and policies to double the farmers' income by 2022–23. Some of these are Pradhan Mantri Krishi Yojana; Fasal Bima Yojana; e-National Agricultural Market (e-NAM); extending high support price to pulses and other commodities to promote crop diversification; cluster-based facilities consisting of collection centres, grading and sorting centre; infrastructures such as cold storage, packaging unit and quality control facility will minimize post-harvest losses and reduce transport cost of agro-produce; and price discovery through agro–commodity exchanges thereby acting as incentive for increasing productivity and enhance farm income.

In this scenario, KVKs of Karnataka, Kerala and Lakshadweep played a lead role in providing necessary knowledge in five broad dimensions: i) knowledge about relevant agriculture technologies, farming and production system, and about markets and policies ii) therein facilitating the critical technical resources and capacity development iii) problem solving consultancy and critical technology products (e.g. seed, planting material, bioagents, small tools/equipment/ machinery, etc.), iv) organizing farmers - for exchange of information and support in decision making; and the ultimate but most critical, v) inculcating the very competence in individual farmer/ entrepreneur to themselves evaluate technologies, appreciate the requirements of agri-logistics, develop market intelligence, harness synergies from group dynamics (FPOs), and be ready to capture opportunities and manage any possible threats in their business of farming and related sectors. It is evident from the reported array of activities in this year Annual report.

Some of the significant milestone activities carried out during the year are; Shri Rajnath Singh, Hon'ble Union Defence Minister declared the entire Union Territory of Lakshadweep as the Fully Organic Territory while inaugurating the Mahatma Gandhi's Statue during the celebrations of 152nd Birth Anniversary of Mahatma Gandhi organized by the Administration of Union Territory of Lakshadweep at Kavaratti, Lakshadweep on October 02, 2021. Hon'ble Union Minister of State for Agriculture and Farmers' Welfare Sushri Shobha Karandlaje inaugurated the programme by distributing sapling of fruit plants to the students and farmers to mark the launch of campaign to promote nutri-garden and tree plantation at KVK Udupi. A total of 5171 successful cases of farmers whose income was doubled due to KVK interventions were documented which include 3631 cases from Karnataka and 1540 cases from Kerala. ICAR-ATARI, Bengaluru organized a wide spectrum of programmes during the year *viz.*, annual review (2020) cum action plan workshops (2021-22) of KVKs in different phases, inauguration of administrative building of ICAR-KVK Vijayapura-II and Kolar, live telecast of National Horticulture Fair 2021, celebration of World Women's Day, review-cum ZPMC meeting of Farmer FIRST programme, special swachhata campaign, institute foundation day and participation of KVK farmers in live telecast of Hon'ble Prime Minister etc.

During the year, KVKs in the zone have conducted 281 On Farm Tests (OFTs) through which 641 technologies were assessed and a total of 5395 Frontline Demonstrations (FLDs) were organized in crops, livestock and enterprises in the states of Karnataka, Kerala and Lakshadweep Islands as an effort to promote adoption of improved technologies. KVKs have also organized 5524 capacity development courses which includes 4098 courses for farmers, 535 courses for rural youth, and 313 courses for extension personnel. Vocational development courses were mostly organized on capacity building and group dynamics (29 courses and 949 participants) followed by 29 courses on areca palm climbing through machine, FOCT, RAWE, PDM and ornamental fish farming with 399 participants to promote self-employment. Seventeen KVKs have organized one programme each under skill development involving 392 participants to promote entrepreneurship in agriculture.

A total of 1.15 lakh frontline extension activities were organized to create awareness among 12.45 lakh farmers and 0.38 lakh extension personnel on varieties, production technologies, integrated pest and disease management, animal health and nutrition, poultry production, fisheries management and human nutrition. To support technology uptake, produced and supplied 2824.21 q of seeds of different crop varieties, 30.24 lakh planting material of different crops and hybrids, 3.14 lakh livestock strains and fish fingerlings benefiting 2.19 lakh farmers, besides production and supply of 4415.56 q of bio-products through which 1.21 lakh farmers were motivated to adopt bio-control by reducing use of chemicals by the KVKs under ATARI, Bengaluru.

Further, KVKs published extension literature (590) and popular articles (432) besides newspaper coverage (2261), radio coverage/talks (472), T V coverage/ talks (255) and development of CDs/DVDs/short videos (162) with a view to create mass awareness among the farming community on the improved technologies.

To support farmers in adoption of climate resilient technologies, NICRA project has been extended to three more districts in Karnataka namely, Chamarajanagara, Chitradurga and Haveri, five more districts in Kerala namely, Kannur, Wayanad, Palakkad, Kozhikode and Kottayam and Lakshadweep Islands during the year. The special programmes such as CFLDs in pulses and oilseeds, ARYA and Farmer FIRST programme are being implemented several interventions at the field level in crops, horticulture, livestock, natural resource management, enterprises and integrated farming system modules.

The KVK Kalaburgi bagged the National Best KVK Pandit Deendayal Upadhyay Rashtriya Krishi Vigyan Protshahan Puraskar 2020 and Shri. Sharanabasappa Patil s/o Shri. Peerappa Patil, Kalaburagi has been awarded with ICAR-Jagjivan Ram Innovative Farmer Award. Our hearty congratulations to both award winning KVK Kalaburagi-I and farmer Shri. Sharanabasappa Patil.

The activities carried out by ICAR-ATARI, Bengaluru and its constituent KVKs during the year 2021 were compiled and presented here with good illustrations and photos. My hearty congratulations to our ATARI and KVK team for giving their best efforts and support to prepare this holistic and focused report.

It is my honour and pleasure to bring out the Annual Report 2021 of ICAR-ATARI, Bengaluru as a testimony of the valuable contribution made by the KVKs of Karnataka, Kerala and Lakshadweep towards farmers' prosperity through sustainable agricultural development.

11 July 2022

(V. VENKATASUBRAMANIAN)
DIRECTOR

Executive Summary

Executive summary is presented in Hindi followed by English.

कार्यकारी सारांश

भारतीय कृषि अनुसंधान परिषद (भा.कृ.अनु.प.), नई दिल्ली द्वारा स्थापित उपक्रमों का अग्रिम विस्तार करने के लिए भारतीय कृषि अनुसंधान परिषद-कृषि विज्ञान केंद्र (के.वी.के.) एक राष्ट्रव्यापी नेटवर्क हैं। राष्ट्रीय स्तर पर कृषि विस्तार प्रभाग और क्षेत्रीय स्तर पर भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान (अटारी), बेंगलुरु के.वी.के की गतिविधियों का निरीक्षण और उनमें समन्वय का कार्य उप महानिदेशक (डी.डी.जी.), कृषि विस्तार, भा.कृ.अनु.प., नई दिल्ली के मार्गदर्षन एवं उनके सहयोग से कर रहा है। 11वें जोन (क्षेत्र) के अन्तर्गत 48 कृषि विज्ञान केंद्र (के.वी.के.) आते हैं जिसमें कर्नाटक राज्य के 33, केरल राज्य के 14 और लक्षद्वीप का एक कृषि विज्ञान केंद्र आता है जिनका निरीक्षण भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान (अटारी), बेंगलुरु कर रहा है जो राज्य कृशि विष्वविद्यालय (33 के.वी.के.), गैर सरकारी संगठनों (8 के.वी.के.) एवं भारतीय कृषि अनुसंधान परिषद् संस्थानों (के.वी.के.) के प्रशासनिक नियंत्रण के अन्तर्गतं आता है।

कृशि विज्ञान केन्द्र का अधिदेश इसके अनुप्रयोग और विकास क्षमता के लिए प्रौद्योगिकी मूल्यांकन और प्रदर्शन है। यह अधिदेष फार्म परीक्षण, अग्रिम प्रदर्शन, विकास क्षमता, विस्तार गतिविधियों और कृषि सलाह, प्रौद्योगिकी उत्पादों के उत्पादन एवं आपूर्ति के माध्यम से प्राप्त किया जाता है जिससे जिला स्तर पर ज्ञान और संसाधन केंद्र के रूप में वैज्ञानिक खेती का कार्य किया जाता है।

अटारी बेंगलुरु की प्रमुख गतिविधियाँ:

- प्रौद्योगिकियों नवीन दृष्टिकोणों के साथ कृशि विज्ञान केन्द्र को मजबूत करके किसानों की आय को दोगुना करने के विशय पर भा.कृ.अनु.प.-अटारी, बेंगलुरू द्वारा समावेशी आयोजित 11वें जोन (क्षेत्र) के कृशि विज्ञान केन्द्र के लिए क्षेत्रीय कार्यशाला 2021 जिसके अन्तर्गत कर्नाटक, केरल और लक्षद्वीप राज्य सम्मिलित हैं जिसका उद्घाटन दिनांक 30 जुलाई, 2020 को डॉ. अशोक कुमार सिंह, उप महानिदेशक (कृषि विस्तार), भा.कृ.अनु.प. नई दिल्ली के कर कमलों द्वारा किया गया।
- माननीय केंद्रीय कृषि एवं किसान कल्याण राज्य मंत्री सुश्री शोभा करंदलाजे ने दिनांक 17 सितंबर, 2021 को कृशि विज्ञान केन्द्र उडुपी में कटहल का पौधा रोपण करके कार्यक्रम का उद्घाटन किया। पौधा रोपण कार्यक्रम को बढ़ावा देने के अभियान के शुभारंभ के अवसर पर छात्रों और किसानों को फलों के पौधों का वितरण भी किया।
- दिनांक 02 अक्टूबर 2021 को माननीय केंद्रीय रक्षा मंत्री श्री राजनाथ सिंह जी ने लक्षद्वीप के कवरत्ती में केंद्र शासित प्रदेश लक्षद्वीप के प्रशासन द्वारा आयोजित महात्मा गांधी की 152वीं जयंती के समारोह के दौरान महात्मा गांधी की प्रतिमा का उद्घाटन करते हुए केंद्र शासित प्रदेश लक्षद्वीप को पूरी तरह से जैविक क्षेत्र घोषित किया।
- भा.कृ.अनु.प.-अटारी, बेंगलुरू ने वर्ष 2020-21 के दौरान व्यापक स्तर पर कृशि विज्ञान केन्द्रो की वार्षिक समीक्षा बैठक (2020) और कार्य योजना कार्यशाला (2021-22), भा.कृ.अनु.प.-के.वी.के. विजयपुरा-II और कोलार के प्रशासनिक भवन का उद्घाटन, राष्ट्रीय बागवानी मेला 2021 का सीधा प्रसारण, विश्व महिला दिवस का उत्सव, किसान पहल कार्यक्रम की समीक्षा बैठक, सह जिला पंचायत समिति बैठक, विशेष स्वच्छता अभियान, संस्थान स्थापना दिवस एवं माननीय प्रधानमंत्री के लाइव प्रसारण में कृशि विज्ञान केन्द्र के किसानों की भागीदारी के कार्यक्रमों का आयोजन किया गया।

कृशि विज्ञान केन्द्र की प्रमुख उपलब्धियाँ:

प्रौद्योगिकी मूल्यांकन

- पूरे वर्श के दौरान कुल 281 आनलाईन प्रक्षेत्र परीक्षण (ओएफटी) आयोजित किए गए थे जिसके अन्तर्गत 211 फसलों के, 44 पशुधन के एवं 26 उद्यम परीक्षण शामिल हैं। इस प्रक्रिया के दौरान 641 प्रौद्योगिकियों का मूल्यांकन किया गया। जिसके अन्तर्गत 503 फसलों के, पशुधन के अन्तर्गत 88 और उद्यमों के अन्तर्गत 50 प्रौद्योगिकियों शामिल थे। प्रौद्योगिकी मूल्यांकन का संचालन करने के लिए कुल 1336 परीक्षण किए गए थे। जिसके अन्तर्गत 951 फसलों के, 258 पशुधन के अन्तर्गत और 127 उद्यमों के अन्तर्गत षामिल है।
- विभिन्न फसलों पर किए गए कुल 211 आनलाईन प्रक्षेत्र परीक्षण हुए जिसके अन्तर्गत कर्नाटक राज्य द्वारा 151, केरल राज्य द्वारा 57 एवं लक्षद्वीप द्वारा तीन प्रक्षेत्र परीक्षण संचालित किए गए। इस प्रक्रिया में 503 प्रौद्योगिकी विकल्पों के परीक्षण का मूल्यांकन किया गया। जिसके अन्तर्गत कर्नाटक में 359, केरल में 141 और लक्षद्वीप में 3 प्रक्षेत्र परीक्षण संचालित किए गए। कर्नाटक राज्य के कृशि विज्ञान केन्द्र द्वारा 629 परीक्षण किए गए और इसी प्रकार केरल राज्य के कृशि विज्ञान केन्द्र द्वारा 307 और लक्षद्वीप राज्य के कृशि विज्ञान केन्द्र द्वारा 15 परीक्षण किए गए तथा जिसके अन्तर्गत कुल 951 परीक्षण हुए।
- पशुधन के अन्तर्गत केवीके ने कुल 44 प्रक्षेत्र परीक्षण संचालित किए गए जिसके अन्तर्गत कर्नाटक में 22, केरल में 20 और लक्षद्वीप में 2 प्रक्षेत्र परीक्षण संचालित किए गए। यह उपलब्धि 258 परीक्षणों के माध्यम से प्राप्त की गयी थी। जिसके अन्तर्गत कर्नाटक में 126, केरल में 122 और लक्षद्वीप में 10 प्रक्षेत्र परीक्षण संचालित किए गए। कुल 88 प्रौद्योगिकी विकल्पों का

मूल्यांकन करके आगे की गतिविधियों को बढाया गया जिसके अन्तर्गत कर्नाटक में 49, केरल में 35 और लक्षद्वीप में चार प्रक्षेत्र परीक्षण संचालित किए गए।

- उद्यमों के अन्तर्गत प्रौद्योगिकी विकल्पों का मूल्यांकन कुल 26 प्रक्षेत्र परीक्षणों के द्वारा आकलन किया गया। 50 प्रौद्योगिकी विकल्पों का आकलन कुल 127 परीक्षणों की द्वारा किया गया था। जिसके अन्तर्गत कर्नाटक में 44, केरल में 66 और लक्षद्वीप में 17 षामिल थे।

अग्रिम (फ्रंटलाइन) प्रदर्शन:

- अनाज और बाजरा की फसल पर 1188, तिलहन पर 330, दालों पर 467, वाणिज्यिक फसलों पर 98, रेषा फसलों पर 51, चारा फसलों पर 148, सब्जी फसलों पर 647, कँद फसलों पर 65, और फल फसलों पर 247 सहित कुल 5409 अग्रिम पंक्ति प्रदर्शन आयोजित किए गए। कर्नाटक, केरल और लक्षद्वीप द्वीप समूह राज्यों के उद्यमों पर प्रदर्शन के अन्तर्गत फल फसलों पर 65, वृक्षारोपण फसलों पर 165, मसालों पर 236, औषधीय फसलों पर 5, विभिन्न फसलों के संकरों पर 348 प्रदर्शन किए गए। इसके अतिरिक्त कृषि उपकरणों पर 223 प्रदर्शन, पशुधन पर 719, मत्स्य पालन पर 147 और उद्यमों पर 249 प्रदर्शन किए गए। कर्नाटक राज्य के केवीके द्वारा 1071 अग्रिम प्रदर्षन 399 हेक्टेयर क्षेत्र में एवं 303 अग्रिम पंक्ति प्रदर्षन केरल के कृशि विज्ञान केन्द्रों द्वारा 44.89 हेक्टेयर क्षेत्र में विभिन्न फसलों के अन्तर्गत प्रदर्षन संचालित किए गए जो डेटा संकलन के समय प्रगति पर हैं।
- कर्नाटक राज्य में धान की उन्नत प्रौद्योगिकियाँ जैसे मशीनीकृत खेती, आईसीएम, आईएनएम, आईपीडीएम, आईडीएम, आईपीएम, नैनो प्रौद्योगिकी, एलसीसी द्वारा वास्तविक समय पर नाइट्रोजन प्रबंधन, उन्नत किस्में जैसे प्रतीक्षा, केएमपी-220, आरएनआर-15048, गंगावती सोना, श्याद्री पंचमुखी, एमएसएन 99, करी कग्गा और खरपतवार प्रबंधन प्रौद्योगिकियों ने संबंधित मानक की तुलना में अनाज की उपज में 17.28 प्रतिशत की समग्र वृद्धि दर्ज की। इसी तरह केरल राज्य में, आईसीएम, आईएनएम, आईडीएम, कृषि में आईसीटी, खरपतवार प्रबंधन और प्रजाति प्रदर्शन (मनुरत्ना) ने (46.96 क्विंटल प्रति हेक्टेयर) की तुलना में औसतन 57.54 क्विंटल प्रति हेक्टेयर उपज दर्ज की।
- कर्नाटक राज्य में आईसीएम और गेहूँ की उन्नत किस्मों (यूएएस-304 और डाइकोकम (डीडीके 1029) ने मानक (26.52 क्विंटल प्रति हेक्टेयर) की तुलना में 31.44 क्विंटल प्रति हेक्टेयर की उच्च औसत उपज दर्ज की। रबी मोसम की फसल ज्वार में, आईसीएम, आईपीएम, एन.आर.एम. और उन्नत किस्मों (एसपीवी-2217 और जीएस-23) की प्रौद्योगिकियों ने अपने मानक (12.32 क्विंटल प्रति हेक्टेयर) की तुलना में 14.74 क्विंटल प्रति हेक्टेयर की उच्च औसत उपज दर्ज की। मक्का की फसल में आईपीडीएम और आईपीएम प्रौद्योगिकी ने अपने मानकों की तुलना में क्रमशः 80.00 क्विंटल प्रति हेक्टयर और 65.33 क्विंटल प्रति हेक्टयर की उच्च उपज दर्ज की। किस्म केएमआर-360 किस्मों के प्रदर्शन ने मानक में 26.67 क्विंटल प्रति हेक्टेयर की तुलना में 29.56 क्विंटल प्रति हेक्टेयर की उपज दर्ज की। रागी (फिंगर मिलेट), ब्राउन टॉप (कंगनी) और चेना बाजरा (प्रोसो मिलेट) किस्मों ने उनके मानक की तुलना में (क्रमशः 14.00 क्विंटल प्रति हेक्टयर, 22.70 क्विंटल प्रति हेक्टयर और 22.50 क्विंटल प्रति हेक्टयर) उच्च उपज दर्ज की।
- कर्नाटक राज्य के कृशि विज्ञान केन्द्र द्वारा मूंगफली, अलसी, नाइजर, सूरजमुखी, तिल, कुसुम और सोयाबीन की फसलों के अन्तर्गत कुल 330 प्रदर्शन किए गए। आईसीएम, आईपीडीएम, आईएनएम और उन्नत किस्मों के अन्तर्गत मूंगफली की फसल ने मानक (16.36 क्विंटल प्रति हेक्टयर) की तुलना में 19.92 क्विंटल प्रति हेक्टयर की ज्यादा उपज दर्ज करके बेहतर प्रदर्शन किया। नाइजर उन्नत किस्म केबीएन-1, आईसीएम के अन्तर्गत अलसी, आईडीएम के अन्तर्गत तिल और खरपतवार प्रबंधन के अन्तर्गत सूरजमुखी ने उच्च उपज और शुद्ध मुनाफा दर्ज किया। सोयाबीन की फसल आईसीएम, आईपीडीएम, आईएनएम और उन्नत किस्मों (डीएसबी-34, डीएसबी-34 और डीएसबी 21) ने मानक (15.07 क्विंटल प्रति हेक्टेयर) की तुलना में 19.67 क्विंटल प्रति हेक्टयर उच्च उपज दर्ज की।
- कर्नाटक और केरल राज्य के कृशि विज्ञान केन्द्र द्वारा किसानों के खेतों में 177.20 हेक्टेयर क्षेत्र में प्रमुख दालों वाली फसलों पर कुल 477 प्रदर्शन किए गए। कर्नाटक राज्य में अरहर की उच्चतम उपज (20.25 क्विंटल प्रति हेक्टेयर) दर्ज की गई। उसके बाद उन्नत किस्म जीआरजी-811 के अन्तर्गत 13.60 क्विंटल प्रति हेक्टेयर उपज दर्ज की गई। उर्द की फसल में आईसीएम, आईपीएम और किस्म टीआरसीआरयू-22 के कारण कुल उपज में 29.84 प्रतिशत वृद्धि अधिक थी। आईसीएम प्रौद्योगिकी के अन्तर्गत लोबिया, फलियों की किस्म एचए-3, मूँग की किस्म डीजीजीवी-2 और धान की फलियों की किस्म केबीआर-1 ने मानक की तुलना में अधिक उपज और शुद्ध लाभाँस दर्ज किया। रबी के मौसम के दौरान चने की फसल में आईसीएम, आईडीएम, आईपीएम और आईपीडीएम की किस्मों के प्रदर्शन ने अपने मानकों की तुलना में 19.28 क्विंटल प्रति हेक्टेयर की औसत उपज में वृद्धि दर्ज की गई। इसी तरह केरल राज्य में धान उगाए गए खेतों में उर्द और मूँग के प्रदर्शन ने क्रमशः 1.47 और 1.51 के लाभ मूल्य

अनुपात (बी.सी.आर.) के साथ 8.06 क्विंटल प्रति हेक्टेयर और 8.36 क्विंटल प्रति हेक्टेयर की उपज दर्ज की।

- कर्नाटक और केरल राज्य के कृशि विज्ञान केन्द्र द्वारा पूरे वर्श के दौरान 27.2 हेक्टेयर क्षेत्र के अन्तर्गत आने वाली प्रमुख व्यावसायिक फसलों जैसे शहतूत, गन्ना और सुपारी पर कुल 98 प्रदर्शन किए गए। गन्ने की फसल में आईसीएम, आईपीएम, आईएनएम, किसानों के खेत में प्रदर्शित मृदा उर्वरता प्रबंधन जैसी प्रौद्योगिकीयों की औसत उपज 1022.63 क्विंटल प्रति हेक्टेयर दर्ज की गई है। शहतूत में मानक की तुलना में आईएनएम और आईपीएम प्रौद्योगिकियों के कारण उपज में 17.44 प्रतिशत की वृद्धि दर्ज की गई। आईपीडीएम प्रौद्योगिकी के अन्तर्गत पान की बेल ने 96,1809 प्रति हेक्टेयर की उपज दर्ज की जो मानक (73,1787 प्रति हेक्टेयर) की तुलना में 31.43 प्रतिशत अधिक थी। इसी तरह केरल राज्य में आईडीएम प्रौद्योगिकी के अन्तर्गत सुपारी फसल की उपज में 114.29 प्रतिशत तक की वृद्वि दर्ज की गई।
- कर्नाटक राज्य में कृशि विज्ञान केन्द्र द्वारा कपास की फसल पर कुल 51 प्रदर्शन आयोजित किए गए। किसानों के खेतों में आईडीएम, आईएनएम, अन्तःखेती और आईपीएम जैसी प्रौद्योगिकीयों का प्रदर्शन किया गया है। जिसमें कपास की औसत उपज मानक (क्रमशः 15.30 क्विंटल प्रति हेक्टेयर और 3.01) की तुलना में 16.94 क्विंटल प्रति हेक्टेयर और लाभ मूल्य अनुपात (बीसीआर) 3.56 ज्यादा दर्ज की गई है।
- कर्नाटक और केरल राज्य के कृशि विज्ञान केन्द्र द्वारा 27.9 हेक्टेयर क्षेत्र में चारे की फसलों पर कुल 148 प्रदर्शन किए गए। किसानों के खेतों में आई.सी.एम. चारा-सीओएफएस-31 की उन्नत किस्मों की खेती, मिश्रित चारा (स्टाइलो घास, हेज ल्यूसर्न और चारा फसल) मार्वल घास, हरे चारे मॉडल की पूरे साल आपूर्ति और छायादार सहिष्णु गुनिया घास के संरक्षण जैसी प्रौद्योगिकीयाँ का प्रदर्शन किया गया।
- कर्नाटक, केरल और लक्षद्वीप द्वीप समूह के कृशि विज्ञान केन्द्र द्वारा 91.8 हेक्टेयर क्षेत्र के अन्तर्गत 647 किसानों के खेतों पर सब्जियों की फसलें जैसे ऐमरैंथस, बैंगन, करेला, ब्रोकली, पत्ता गोभी, गाजर, मिर्च, खीरा, गवारफली, सहजन, फील्ड बीन, फ्रेंच बीन, मटर, प्याज, भिंडी, पोल बीन, टमाटर, तुरई, लंबी सेम एवं न्यूट्री-गार्डन को उन्नत प्रौद्योगिकियाँ के साथ प्रर्दषित किया गया।
- कर्नाटक और केरल राज्यों के कृशि विज्ञान केन्द्रों द्वारा 6.78 हेक्टेयर क्षेत्र में कँद फसलों जैसे आलू, शकरकंद एमोरफोफैलस, कसावा और जिमीकंद में 67 अग्रिम प्रौद्योगिकीयों का प्रदर्शन किया गया। आईएनएम प्रौद्योगिकी के अन्तर्गत कसावा की श्रीपवित्रा और श्रीरक्षा ने केरल में किसानों की परम्परागत पद्वति की तुलना में 26.26 प्रतिशत से 50.51 प्रतिशत तक की उच्च उपज दर्ज की गई।
- केला, अमरूद, अंगूर, नींबू, आम, पपीता, अनार, कीनू (कुर्ग मैंडरिन), स्ट्रॉबेरी और खरबूजा (स्नैप मैलन) जैसी प्रमुख फल फसलों पर कुल 247 प्रदर्शनों का संचालन 72.94 हेक्टेयर क्षेत्र में किया गया था। आईसीएम प्रौद्योगिकी के अन्तर्गत केले की फसल ने अपने मानक की तुलना में उच्च आर्थिक लाभ के साथ 427.00 क्विंटल प्रति हेक्टेयर की उच्चतम उपज भी दर्ज की। अँगूर की फसल में आईपीएम प्रौद्योगिकी ने मानक की तुलना में 212.00 क्विंटल प्रति हेक्टेयर उपज दर्ज की। अमरूद की फसल में आईएनएम प्रौद्योगिकी ने मानक की तुलना में 24.95 प्रतिशत अधिक उपज (161.50 क्विंटल प्रति हेक्टेयर) दर्ज की। नींबू में आईपीडीएम और आईएनएम प्रौद्योगिकियों ने क्रमशः 211 क्विंटल प्रति हेक्टेयर और 204.80 क्विंटल प्रति हैक्टर की ज्यादा उपज दर्ज की। जिससे किसानों की परम्परागत पद्वति की तुलना में अधिक शुद्ध लाभ प्राप्त हुआ। आम की फसल में आईसीएम प्रौद्योगिकी ने मानक (101.13 क्विंटल प्रति हेक्टेयर) की तुलना में 120.40 क्विंटल प्रति हेक्टेयर की ज्यादा उपज दर्ज की। अनार की फसल में आईपीएम प्रौद्योगिकी ने मानक की तुलना में 26.08 प्रतिशत अधिक उपज (181.30 क्विंटल प्रति हेक्टेयर) दर्ज की। इसी तरह केरल राज्य में केले में प्रदर्शित आईसीएम, आईडीएम, आईएनएम, आईपीडीएम और आईपीएम प्रौद्योगिकियों ने अपने स्थानीय मानक (191.07 क्विंटल प्रति हेक्टेयर) की तुलना में 280.09 क्विंटल प्रति हेक्टेयर की ज्यादा औसत उपज के साथ बेहतर प्रदर्शन किया है।
- कृषि विज्ञान केंद्रों द्वारा प्रमुख वृक्षारोपण वाली फसलों जैसे सुपारी, नारियल और कॉफी पर 46.20 हेक्टेयर क्षेत्र के अन्तर्गत पर कुल 165 प्रदर्शन किए गए। कर्नाटक राज्य में अंतःफसल प्रणाली प्रौद्योगिकी के अन्तर्गत नारियल में नट्स (9100 नट प्रति हेक्टेयर प्रति वर्ष) की उच्च उपज दर्ज की गयी। इसके बाद आईपीएम प्रौद्योगिकी (8781 नट प्रति हेक्टेयर प्रति वर्ष) मानक की तुलना में ज्यादा उपज दर्ज की गई। केरल राज्य में नारियल की फसल के अन्तर्गत आईएनएम, आईडीएम और प्राकृतिक संसाधन प्रबंधन पर प्रदर्शन ने 11878 नट प्रति हेक्टेयर प्रति वर्ष मानक (8548 नट प्रति हेक्टेयर प्रति वर्ष) की तुलना में ज्यादा औसत उपज दर्ज की जिसके कारण प्रदर्शनों में सकारात्मक लाभाँस प्राप्त हुआ।
- कर्नाटक राज्य में 40.40 हेक्टेयर क्षेत्र के अन्तर्गत मसाला वाली फसलों जैसे काली मिर्च, मिर्च, अदरक और हल्दी में 141 प्रदर्शनों का संचालन किया गया और केरल के कृषि विज्ञान केंद्रों द्वारा काली मिर्च, अदरक, छोटी इलायची और हल्दी की फसलों में 95 प्रदर्शन संचालित किए गए।

- कर्नाटक के कृशि विज्ञान केन्द्र द्वारा 8.70 हेक्टेयर क्षेत्र में फूलों की फसलें जैसे बैचलर बटन, चाइना एस्टर, गुलदाउदी, गेंदा, रजनीगंधा और उडुपी मल्लिगे (जैस्मिनम सम्बक) पर प्रदर्शन किया गया। आईसीएम प्रौद्योगिकी के अन्तर्गत बैचलर बटन किस्म एजीएस 12, चाइना एस्टर, गुलदाउदी किस्म को-1 तथा आईसीएम प्रौद्योगिकी के अन्तर्गत गेंदा, रजनीगंधा, उडुपी मल्लिगे (जैस्मिनम सम्बक) ने अपने मानक की तुलना में फूलों की उच्च उपज दर्ज की।
- 11वें जोन (क्षेत्र) के केवीके द्वारा 119.40 हेक्टेयर क्षेत्र में मक्का, बीटी कपास, सूरजमुखी, अरंडी, भिंडी, बैंगन, करेला, तुरई, गोभी, शिमला मिर्च, मिर्च, पोल बीन, प्याज, टमाटर, पपीता, रजनीगंधा, तरबूज जैसी विभिन्न फसलों के संकरों पर कुल 348 प्रदर्शनों का संचालन किया गया था।
- कर्नाटक के कृशि विज्ञान केन्द्र द्वारा कृषि यांत्रीकरण के अन्तर्गत गुलदाउदी, बैगन और सब्जी फसलों में पोर्टेबल उर्वरक डिस्पेंसर, प्याज में भंडारण व्यवस्था, ट्रैक्टर संचालित कपास को कुतरने वाली मषीन, धान के भूसे के लिए ट्रैक्टर संचालित लेजर लेवलर और धान पुआल के लिए बेलर मषीन, चना में सौर संचालित निपिंग मशीन और बहु-उपयोग टेलीस्कोपिक मॉडल हार्वेस्टर सुपारी में उपकरण का प्रदर्शन किया गया। केरल के कृशि विज्ञान केन्द्र द्वारा ड्रोन तकनीक, लघु चावल मिल और धान में सोलर टनल ड्रायर, जायफल बीज शेलर, नारियल में पावर टिलर संचालित बेसिन लिस्टर, चारे में रेन गन और सेमी-मैनुअल सुपारी हार्वेस्टर का प्रदर्शन किया गया।
- कर्नाटक और केरल राज्य के 418 किसानों/कृषि महिलाओं को लाभान्वित करने वाले मधुमक्खी पालन, सब्जी उत्पादन, खाद उत्पादन, मशरूम, मुर्गी पालन, रेशम उत्पादन, मूल्य संवर्धन, और अन्य कृषि उद्यमों पर कुल 249 प्रदर्शन इकाइयाँ स्थापित की गई।
- कर्नाटक के कृशि विज्ञान केन्द्र द्वारा पशुधन में कुल 593 प्रदर्शन इकाइयों के अन्तर्गत 369 डेयरी में, 10 भैंस में, भेड़ और बकरी में 204 और सुअर पालन में 10 प्रदर्शित किए गए और इसी तरह डेयरी में 57, भेड़ और बकरी में 41 सहित 113 प्रदर्शनों का प्रदर्शन किया गया। केरल राज्य के कृशि विज्ञान केन्द्र द्वारा कुक्कुट पालन भी किया गया। जिसमें 127 किसानों के 342 पशुओं को शामिल किया गया था। वर्ष के दौरान 147 किसानों को लाभान्वित करते हुए मत्स्य पालन में कुल 147 प्रदर्शन इकाइयाँ स्थापित की गई।
- कर्नाटक के कृशि विज्ञान केन्द्रों द्वारा 18344 महिला प्रतिभागियों के अन्तर्गत महिला सशक्तिकरण के लिए 599 कार्यक्रमों का आयोजन किया गया। इसी प्रकार 3867 बच्चों की भागीदारी के साथ स्वास्थ्य एवं पोषण तथा अन्य बच्चों से संबंधित पहलुओं पर 79 कार्यक्रम आयोजित किए गए। केरल राज्य के कृशि विज्ञान केन्द्रों द्वारा 15,819 महिलाओं की भागीदारी के साथ महिला सशक्तिकरण पर 445 कार्यक्रम आयोजित किए गए। इसी प्रकार 50 कार्यक्रम स्वास्थ्य और पोषण तथा अन्य बच्चों से संबंधित पहलुओं पर संचालित करके कुल 2662 बच्चों को शामिल किया गया।

विकास क्षमता

- कृशि विज्ञान केन्द्र द्वारा 5,524 विकास क्षमता पाठ्यक्रमों का आयोजन किया गया जिसके अन्तर्गत किसानों के लिए 4,098 पाठ्यक्रम, ग्रामीण युवाओं के लिए 535 पाठ्यक्रम और विस्तार कर्मियों के लिए 313 पाठ्यक्रम शामिल हैं। कुल 2,00,529 प्रतिभागियों को प्रशिक्षित किया गया जिसके अन्तर्गत 1,55,518 किसान, 15,717 ग्रामीण युवा और 11,399 विस्तार कर्मी शामिल थे और इसके अतिरिक्त 383 प्रायोजित और 195 व्यावसायिक पाठ्यक्रम आयोजित भी किए गए।
- विकास क्षमता का प्रमुख क्षेत्र फसल उत्पादन था जिसके अन्तर्गत 25,418 किसानों को शामिल करते हुए 741 पाठ्यक्रम संचालित किए गए। पशुधन उत्पादन और प्रबंधन (341 पाठ्यक्रम) के बाद विकास क्षमता पाठ्यक्रम गृह विज्ञान/महिला सशक्तिकरण (615), पादप सुरक्षा (555) सबसे अधिक मांग वाले पाठ्यक्रम रहे थे।
- ग्रामीण युवाओं को जैविक खेती, रेशम उत्पादन, कृषि और पर्यावरण, सूक्ष्म सिंचाई, गुणवत्ता बीज उत्पादक, शहतूत की खेती और रेशमकीट पालन, औषधीय पादप उत्पादन, धान मशीनीकरण, पोषण सुरक्षा, मिट्टी और जल परीक्षण, सब्जी की खेती, षाकवाटिका (किचन गार्डनिंग) बागवानी, एकीकृत कीट प्रबंधन, जैव-नियंत्रण कारक (ऐंजेट) उत्पादन, युवाओं की उद्यमशीलता विकास, आईसीटी, काली मिर्च और नारियल की खेती (91 पाठ्यक्रम, 2422 प्रतिभागी) और मूल्यवर्धित उत्पादों (61 पाठ्यक्रम, 2404 प्रतिभागी) के महत्व पर प्रशिक्षित किया गया।
- विस्तार कर्मियों को रेशम उत्पादन, नर्सरी प्रबंधन, बीज उत्पादन, किसानों की आय दोगुनी करने के लिए पशुपालन, दुधारू पशुओं में रोग प्रबंधन, रबी फसलों में कटाई के बाद प्रबंधन, एफपीओ के गठन और प्रबंधन, प्राकृतिक खेती, जल प्रबंधन, वृक्षारोपण फसलों में उत्पादकता वृद्धि, खाद तकनीक, आत्मा परियोजना के कर्मियों के लिए मासिक प्रौद्योगिकी सलाह (एमटीए), मूल्यवर्धन, प्रसंस्करण, आईएफएस, कृषि पोषक अभियान, मूल्यवर्धन, खाद्य सुरक्षा और जैविक खेती के साथ आईपीएम प्रौद्योगिकी (47 पाठ्यक्रम, 1,536 प्रतिभागी)

का अनुसरण करते हुए 79 पाठ्यक्रम और कुल 2,622 प्रतिभागियों को प्रषिक्षित किया गया।

- जैव ईंधन, प्याज की फसल में आईसीएम प्रौद्योगिकी, वैज्ञानिक मधुमक्खी पालन, आईएफएस, ऊर्जा सक्षम पंप सेट और जल संरक्षण, किसान उत्पादक संगठन, नारियल पेड़ के मित्र, रॉ, उद्यमियों की स्थापना, आईएनएम प्रौद्योगिकी के विशयों पर बड़ी संख्या में प्रायोजित पाठ्यक्रम (57) आयोजित किए गए थे। आईएमसी, डीएईएसआई और पीएमएफएमई ने 2,085 किसानों/ग्रामीण युवाओं/विस्तार कर्मियों की भागीदारी के साथ 36 कार्यक्रमों और 1,425 प्रतिभागियों के साथ फसलों के उत्पादन और उत्पादकता में सुधार किया।
- व्यावसायिक विकास पाठ्यक्रम मुख्यतः क्षमता निर्माण और समूह गतिशीलता के विशय पर 949 प्रतिभागियों के लिए 29 पाठ्यक्रम आयोजित किए गए और इसी का अनुसरण करते हुए 399 प्रतिभागियों के लिए मशीन, एफओसीटी, रॉ, पीडीएम और सजावटी मछली पालन के माध्यम से पाम चढना के विषयों पर 29 पाठ्यक्रम आयोजित किए गए थे।

सीमावर्ती विस्तार कार्यक्रम

- कृशि विज्ञान केन्द्र द्वारा कुल 1.15 लाख अग्रिम विस्तार गतिविधियों का संचालन किया गया और 12.45 लाख किसानों (11.10 लाख सामान्य किसानों और 1.35 लाख एससी/एसटी किसानों) और 0.38 लाख विस्तार कर्मियों के बीच किस्मों, उत्पादन प्रौद्योगिकियों, एकीकृत कीट और रोग प्रबंधन, पशु स्वास्थ्य और पोषण, कुक्कुट उत्पादन, मत्स्य प्रबंधन और मानव पोषण के विशयों पर जागरूकता पैदा की।
- कृशि विज्ञान केन्द्र द्वारा समाचार पत्र कवरेज (2261), रेडियो कवरेज/वार्ता (472), टीवी कवरेज/वार्ता (255) और सीडी/डीवीडी/लघु वीडियो (162) के विकास के अलावा विस्तार साहित्य (590) और लोकप्रिय आलेख (432) प्रकाशित किए गए।

तकनीकी आदानों का उत्पादन

- विभिन्न फसल किस्मों के 2824.21 क्विंटल बीज, विभिन्न फसलों और संकरों की 30.24 लाख रोपण सामग्री, 3.14 लाख पशुधन नस्लें और मछली बीज का उत्पादन एवं आपूर्ति 2.19 लाख किसानों को लाभान्वित करती है।
- 4415.56 क्विंटल जैव उत्पादों का उत्पादन और आपूर्ति की जिसके माध्यम से 1.21 लाख किसानों को रसायनों के उपयोग को कम करके जैव नियंत्रण अपनाने के लिए प्रेरित किया गया।

किसान मोबाइल सलाहकार सेवाएँ

- अँचल के पैंतीस कृशि विज्ञान केन्दों द्वारा 10.89 लाख किसानों को 19,903 पाठय संदेश भेजे। संदेश के अन्तर्गत फसलों के (9,052), मौसम के (4,436), पशुधन के (3,086), अन्य उद्यमों के (1669), जागरूकता के (1,218) और विपणन के (442) विशयों से संबंधित थे।

मृदा, जल और पौधों का विश्लेषण

- कृशि विज्ञान केन्दों द्वारा 14,838 गांवों के 27,759 किसानों से प्राप्त मिट्टी, पानी, पौधे और जैविक खाद के 31,342 नमूनों का विश्लेषण किया जिसके आधार पर किसानों को 1,26,385 मृदा स्वास्थ्य कार्ड वितरित किए गए।

वर्षाजल संचयन इकाइयाँ

- 11 कृशि विज्ञान केन्दों में स्थापित वर्षा जल संचयन और पुनर्चक्रण इकाइयों का उपयोग 25 विकास क्षमता कार्यक्रमों एवं 38 प्रदर्शनों के आयोजन के लिए किया गया था। इस सुविधा कृशि विज्ञान केन्दों में उपयोग के लिए और किसानों को प्रदान करने के लिए और 1,50,819 रोपण सामग्री का उत्पादन करने के लिए किया गया था। इन इकाइयों का 9,775 किसानों और 483 अधिकारियों ने भ्रमण किया और वर्षा जल संचयन प्रौद्योगिकियों से परिचित हुए।

केवीके का अभिसरण और जुड़ाव

- आत्मा परियोजना द्वारा अभिसरण के हिस्से के रूप में कृशि विज्ञान केन्दों ने आत्मा परियोजना द्वारा आयोजित 851 कार्यक्रमों में भाग लिया और साथ ही कृशि विज्ञान केन्द्र ने आत्मा परियोजना के सहयोग से 482 कार्यक्रमों का आयोजन भी किया।
- राष्ट्रीय कृषि विकास योजना (आरकेवीवाई), राष्ट्रीय बागवानी मिशन (एनएचएम), विभिन्न भा.कृ.अनु.प. संस्थानों की परियोजनाएं और राष्ट्रीय कृषि और ग्रामीण विकास बैंक (नाबार्ड) की प्रमुख एजेंसियाँ थीं जिन्होंने विभिन्न कार्यक्रमों और गतिविधियों को आयोजित करने के लिए केवीके को वित्त पोषित/समर्थित किया गया।

किसानों की आय दुगनी करना

- कृशि विज्ञान केन्द्र के हस्तक्षेप के कारण किसानों के कुल 5,171 सफल मामले जिनकी आय दोगुनी हो गई थी उनका दस्तावेजीकरण किया गया। जिसके अन्तर्गत कर्नाटक के 3,631 और केरल के 1,540 किसानों के सफल मामले शामिल हैं।

सफलता की कहानियां और बड़े पैमाने पर स्वीकृति

कृशि विज्ञान केन्दों द्वारा सूचना वर्ष के दौरान उत्पादकता एवं किसानों की आय बढ़ाने के संदर्भ में प्रौद्योगिकियों के प्रदर्शन के आधार पर कई सफलता की कहानियों का दस्तावेजीकरण किया है। उनमें से कुछ नीचे दिए गए हैं जिनका विवरण इस प्रकार है।

- अरहर की फसल में उर्द की अंतःफसल लेने से 0.4 हेक्टेयर से 7008 रुपये की अतिरिक्त आय प्राप्त हुई और साथ ही उर्द (केवीके बेलगावी-I) की कटाई के लिए आठ श्रम-दिवस का रोजगार भी प्रदान किया गया।
- कृशि विज्ञान केन्द्र बीदर द्वारा आम की खेती के व्यवसाय से किसान बनने और 11 वर्श पुराने 400 आम के पेड़ से 2.57 लाख रुपये का लाभ अर्जित करने वाले युवक को बढ़ावा दिया।
- कृशि विज्ञान केन्द्र हावेरी द्वारा स्थापित जीवकोशा डेयरी फार्म जिसके अन्तर्गत 22 गिर प्रजाति की गायें थी जिनकी सहायता से सॉफ्टवेयर इंजीनियर दंपत्ति डेयरी उद्यमी बने और उन्होंने प्रति माह 86,000 शुद्ध आय प्राप्त की।
- 2.60 हेक्टेयर भूमि पर एकीकृत कृषि प्रणाली ने 9.76 लाख रुपये का शुद्ध लाभ दिया और साथ ही प्रति वर्ष 515 श्रम दिवस रोजगार प्रदान किया और 410 किसानों को अपने खेतों में इसी तरह के आईएफएस मॉडल को अपनाने के लिए प्रेरित भी किया।
- उत्तर कन्नड़ के कृशि विज्ञान केन्द्र द्वारा महिला स्वयं सहायता समूह द्वारा डेयरी फार्मिंग में 1,00,000 रुपये का निवेश करके रूप्ये 50,000 प्रति माह का शुद्ध लाभ अर्जित किया ।
- विजयपुरा जिले की शुष्क भूमि में ड्रैगन फ्रूट ने 0.80 हेक्टेयर भूमि में इसकी खेती की और चार वर्षों के अंदर 11 लाख रुपये का शुद्ध लाभाँस प्राप्त किया। (कृशि विज्ञान केन्द्र विजयपुरा-I)
- महाविद्यालय में अध्ययन करने वाले छात्र ने अवधारणा का पालन करते हुए खेती की और रुपये 20,000 प्रति माह की राशि अर्जित की तथा कृशि विज्ञान केन्द्र कोल्लम द्वारा एक श्रमिक को सम्पूर्ण वर्श रोजगार भी प्रदान किया।
- किसान ने पर्ल स्पॉट (एट्रोप्लस सुरटेन्सिस) के माध्यम से औसतन 1.00 लाख रुपये की मासिक आय अर्जित की और केरल राज्य में पर्ल स्पॉट (केवीके कोट्टायम) के नियमित बीज आपूर्तिकर्ता के रूप में मान्यता भी प्राप्त की।
- बागवानी नर्सरी आधारित नवीन गतिविधियों ने केवल 36 सेंट भूमि से 25 लाख रुपये की औसत वार्षिक आय अर्जित करने के लिए एक परिवार को बनाया और 2019 (कृशि विज्ञान केन्द्र (केवीके) कोझीकोड) में शुरू हुए "टेकफ्लोरा" नामक अपने यू टयूब चैनल द्वारा 90,000 ग्राहक भी जोडे।

पुरस्कार और मान्यता

- श्री. शरणबसप्पा पाटिल, कलबुर्गी को भा.कृ.अनु.प.-जगजीवन राम अभिनव किसान पुरस्कार से सम्मानित किया गया।
- केवीके कलबुर्गी-I ने राष्ट्रीय सर्वश्रेष्ठ केवीके पंडित दीनदयाल उपाध्याय राष्ट्रीय कृषि विज्ञान प्रोत्साहन पुरस्कार वर्श 2020 जीता।

विशेष कार्यक्रम

- कर्नाटक और केरल के कृषि विज्ञान केंद्रों द्वारा अग्रिम प्रदर्षनों के अन्तर्गत दलहन फसलों जैसे उर्द, मूँग, अरहर, चना और लोबिया पर किसानों के 946 हेक्टेयर क्षेत्र में कुल 2365 प्रदर्शन किए गए।
- कर्नाटक और केरल के कृषि विज्ञान केंद्रों द्वारा अग्रिम प्रदर्शनों के अन्तर्गत तिलहन की फसलों जैसे मूंगफली, सोयाबीन, सूरजमुखी, कुसुम, नाइजर, अरंडी, अलसी, सरसों और तिल पर किसानों के 785 हेक्टेयर क्षेत्र में कुल 1962 प्रदर्शन किए गए।
- केवीके के आठ बीज केन्द्रों द्वारा 1851.71 क्विंटल दालों का उत्पादन किया गया। जिसके अन्तर्गत चना (621.98 क्विंटल), अरहर (816.69 क्विंटल), उर्द (218.94 क्विंटल), मूँग (154.32 क्विंटल), लोबिया (23.05 क्विंटल), अवारे (12.43) और कुलथी (हॉर्सग्राम) (4.30 क्विंटल) ने उत्पादन किया।
- भा.कृ.अनु.प.-अटारी और उसके कृषि विज्ञान केंद्रों द्वारा दिनांक 16-31 दिसंबर, 2021 के दौरान स्वच्छता पखवाड़ा मनाया और 16,505 प्रतिभागियों की भागीदारी के साथ स्वच्छता, स्वास्थ्य और स्वच्छता से संबंधित विभिन्न गतिविधियों का आयोजन भी किया।
- दिनांक 5 दिसंबर, 2021 के दौरान 5592 किसानों, 331 वैज्ञानिकों और 1209 छात्रों की भागीदारी के साथ 46 केवीके द्वारा ''मृदा लवणता को रोकना, मिट्टी की उत्पादकता को बढ़ावा देना'' जैसे विषय के साथ विश्व मृदा दिवस मनाया गया। इस मौके पर 56 अति महत्वपूर्ण व्यक्ति (वीआईपी) और जनप्रतिनिधियों ने हिस्सा लिया।
- छह कृशि विज्ञान केन्द्र द्वारा कृषि में युवाओं को आकर्षित करने और उनको कृशि के क्षेत्र में बनाए रखने को (आर्या) कार्यान्वयन किया जा रहा है। इस अवधि के दौरान 121

प्रशिक्षण कार्यक्रम आयोजित किए गए और जिनमें 1400 ग्रामीण युवाओं को विभिन्न कृषि और संबद्ध उद्यमों पर प्रशिक्षित भी किया गया।

- क्षेत्र स्तर पर किसान पहल कार्यक्रम के अन्तर्गत फसल, बागवानी, पशुधन, प्राकृतिक संसाधन प्रबंधन, उद्यम और एकीकृत कृषि प्रणाली मॉड्यूल में कई हस्तक्षेपों को लागू किया गया है। इस कार्यक्रम के अन्तर्गत 28 गांवों/वार्डों के कुल 5,245 परिवार लाभान्वित हुए।
- जलवायु अनुकूल कृषि पर राष्ट्रीय पहल कार्यक्रम के अन्तर्गत (निक्रा) जलवायु परिवर्तन प्रौद्योगिकी हस्तक्षेप केरल राज्य के जिला अलाप्पुझा और कर्नाटक राज्य के जिले जैसे गडग, कलबुरागी, तुमकुरु, चिक्काबल्लापुरा जो जलवायु रूप से अतिसंवेदनशील जिले हैं, उन जिलों में किसान भागीदारी मोड में संचालित किया जा रहा है। वर्श 2021-22 के दौरान चरण-2 परियोजना के अन्तर्गत कर्नाटक राज्य के तीन जिले नामषः चामराजनगर, चित्रदुर्ग एवं हावेरी तथा केरल राज्य के पांच जिले नामषः कन्नूर, वायनाड, पलक्कड़, कोझीकोड और कोट्टायम एवं लक्षद्वीप द्वीप समूह में विस्तार किया जा रहा है। पांच अतिसंवेदनषील जलवायु वाले जिलों में चार अलग-अलग कृषि प्रणाली के अन्तर्गत 408.20 हेक्टेयर क्षेत्र में जलवायु में अनुकूलता लाने के लिए कुल 1400 प्रदर्शन संचालित किए गए थे। निक्रा प्रदर्षन के अन्तर्गत जलवायु अनुकूल किस्में जैसे अरहर बीआरजी-5, टीएस-3 आर, बीआरजी-2 और डीजीजीवी-2, रागी एमएल-365 और केएमआर-630, मूंगफली-के6, टमाटर-साहू और अभिनव-1148 विमोचित हुई। इन सूखा प्रवृत जिलों के लिए अनुकूल किस्में रबी ज्वार-एसपीवी-221, चना-जाकी-9218 और बीजीडी 103 को निक्रा जिलों की जिला योजनाओं में खरीफ-2021 और रबी-2021 मौसम के अन्तर्गत शामिल किया गया है। कर्नाटक राज्य के चिक्कबल्लापुरा, गडग, कलबुर्गी और तुमकुरु जिलों में राज्य के कृषि विभाग के माध्यम से कुल 1,16,620 हेक्टेयर क्षेत्र को जलवायु अनुकूल किस्मों के अन्तर्गत पाया गया है।
- सत्रह कृशि विज्ञान केन्द्र द्वारा कौशल विकास के अन्तर्गत कुल 392 प्रतिभागी में से 340 पुरुष एवं बाकी महिलाएँ शामिल हुई थी। केरल राज्य के 70 प्रतिभागियों की तुलना में कर्नाटक राज्य में 322 प्रतिभागी शामिल थे।

कृषि प्रौद्योगिकी सूचना केंद्र

- कुल 1,65,034 किसानों ने कृषि प्रौद्योगिकी सूचना केंद्रों (एटीआईसी) का भम्रण किया। कृषि प्रौद्योगिकी सूचना केंद्रों ने 60,553 किसानों को खेती के विभिन्न पहलुओं से संबंधित विशयों की जानकारी प्रदान की। इसी अवधि के दौरान विवरण के अन्तर्गत इन केन्द्रों में उपलब्ध प्रौद्योगिकी उत्पादों का क्रय प्रतिवेदन 92,850 किसानों द्वारा किया गया।

विस्तार निदेशालय द्वारा प्रौद्योगिकी का निरीक्षण

- विस्तार निदेशक द्वारा नियमित रूप से कृशि विज्ञान केन्द्र का निरीक्षण किया जाता है। विस्तार निदेशालय ने 38 वैज्ञानिक सलाहकार समिति की बैठकों, 115 क्षेत्र दिवसों, 106 कार्यशालाओं/संगोश्ठीयों, 19 प्रौद्योगिकी सप्ताहों और 545 प्रशिक्षण कार्यक्रमों में भाग लिया। कृशि विज्ञान केन्द्र (केवीके) द्वारा संचालित 99 आनलाईन प्रक्षेत्र परीक्षणों (ओएफटी) और अग्रिम प्रदर्षन (एफएलडी) के 234 भूखंडों का क्षेत्र स्तर पर भ्रमण करके निरीक्षण किया गया।

अनुसंधान परियोजनायें

- कर्नाटक और केरल राज्य के कृशि विज्ञान केन्द्रों द्वारा संचालित संस्थान अनुसंधान परियोजनाएँ जैसे अर्का प्रौद्योगिकियों उत्पादों के प्रभाव का मूल्यांकन, युवाओं के बीच कृषि आधारित उद्यमिता विकास पर अध्ययन, किसान पहल परियोजना के अन्तर्गत डेयरी उत्पादन हस्तक्षेप की प्रभावशीलता, प्रशिक्षुओं एवं प्रशिक्षकों द्वारा परेषानियों का मुकाबला करने की क्षमता एवं प्रतिभागियों की महत्वकांक्षा को पूरा करने के लिए कृशि विज्ञान केन्द्र द्वारा कौशल विकास प्रशिक्षण कार्यक्रम आयोजित करके विश्लेषण किया गया। आवश्यकता आधारित प्रौद्योगिकी अनुप्रयोग और विकास क्षमता के लिए कर्नाटक राज्य में विभिन्न कृषि-जलवायु स्थितियों में एकीकृत कृषि प्रणालियों का विश्लेषण किया गया। कर्नाटक राज्य में डेयरी किसानों और विस्तार कर्मियों के लिए प्रौद्योगिकियाँ की क्षमता की जरूरतों का आकलन एवं पहचान तथा कर्नाटक, केरल और लक्षद्वीप राज्य में कृषि प्रौद्योगिकियों के उन्नयन के लिए कृशि विज्ञान केन्द्र के माध्यम से कृषि उद्यमी का विकास और कृषि-उद्यमिता एवं वैकल्पिक आजीविका को बढ़ावा देने पर आर्या के प्रभाव पर एक नेटवर्क परियोजना भा.कृ.अनु.प.-अटारी, बेंगलुरु के वैज्ञानिकों द्वारा सूचना अवधि के दौरान की गई।

प्रकाशन

- भा.कृ.अनु.प.-अटारी बेंगलुरु के वैज्ञानिकों द्वारा 5 शोध पत्र, राष्ट्रीय/अंतर्राष्ट्रीय सम्मेलनों में एक शोध पत्र एवं एक रिपोर्ट प्रकाशित की गयी। कृशि विज्ञान केन्द्र के कर्मचारियों द्वारा कृषि और इसके संबद्ध उद्यमों के विभिन्न तकनीकी पहलुओं पर 111 शोध पत्र, 26 शोध साराँष, 29 प्रशिक्षण पुस्तिका और तकनीकी बुलेटिन, 432 लोकप्रिय लेख और 590 विस्तार साहित्य प्रकाशित किए गए।

मानव संसाधन विकास

- भा.कृ.अनु.प.-अटारी, बेंगलुरु ने अटल इनक्यूबेशन केन्द्र-एस. आर.एस.-भा.कृ.अनु.प. -राष्ट्रीय डेयरी अनुसंधान संस्थान फाउंडेशन, बेंगलुरु के सहयोग से भा.कृ.अनु.प. के कृशि विज्ञान केन्द्र द्वारा नामित 33 प्रगतिशील डेयरी किसानों के लिए दिनांक 1-5 अक्टूबर, 2021 के दौरान ''डेयरिंग में उद्यमिता विकास'' के विशय पर पांच दिवसीय प्रशिक्षण कार्यक्रम का आयोजन किया गया। दक्षिणी क्षेत्रीय स्टेशन, भा.कृ.अनु.प राश्ट्रीय डेयरी अनुसंधान संस्थान, बेंगलुरु पर इस कार्यक्रम का उद्घाटन सुश्री शोभा करंदलाजे, माननीय केंद्रीय कृषि और किसान कल्याण राज्य मंत्री, भारत सरकार द्वारा किया गया।
- दिनांक 17-18 दिसंबर, 2021 के दौरान भा.कृ.अनु.प.-अटारी, बेंगलुरु ने भा.कृ.अनु.प.-भारतीय बागवानी अनुसंधान संस्थान, बेंगलुरु के सहयोग से ''भा.कृ.अनु.प.- भारतीय बागवानी अनुसंधान संस्थान प्रौद्योगिकी'' पर 11वें जोन (क्षेत्र) के अटारी कृशि विज्ञान केन्द्र के पेशेवरों के लिए एक ऑनलाइन प्रशिक्षण कार्यक्रम का आयोजन किया गया। कुल 70 कृशि विज्ञान केन्द्र के विशय विषेशज्ञ पेशेवरों द्वारा प्रशिक्षण कार्यक्रम में सक्रिय रूप से भाग लिया।

किसानों की प्रतिक्रिया

- कृशि विज्ञान केन्द्र द्वारा प्रौद्योगिकियों के प्रदर्शन पर किसानों की प्रतिक्रिया का मूल्यांकन किया गया जो कि दर्शाता है कि फसल की किस्मों, कृषि संबंधी पद्धतियाँ, कीट और रोग प्रबंधन पद्धतियाँ, कृषि उपकरणों और बेहतर पशुधन प्रबंधन पद्धतियाँ ने मानक की तुलना में उच्च उपज और आय दर्ज की।

Executive Summary

The ICAR-Krishi Vigyan Kendras (KVKs) are nation-wide network for undertaking frontline extension by Indian Council of Agricultural Research (ICAR), New Delhi. Agricultural Extension Division at the national level and the ICAR-Agricultural Technology Application Research Institute (ATARI) at the Zonal level monitor and coordinate the activities of KVKs under the overall guidance and support of Deputy Director General (DDG), Agricultural Extension, ICAR, New Delhi. The ICAR-ATARI Bengaluru, Zone XI is monitoring 48 KVKs of which 33 in Karnataka, 14 in Kerala and one in Lakshadweep under the administrative control of SAUs (33 KVKs), NGOs (8 KVKs) and ICAR Institutes (7 KVKs).

The mandate of KVKs is Technology Assessment and Demonstration for its Application and Capacity Development. This mandate is achieved through on-farm testing, frontline demonstration, capacity development, extension activities and farm advisories, production and supply of technological products thereby serving as the knowledge and resource centre on scientific farming at the district level.

Major Activities at ICAR-ATARI Bengaluru

- Dr. Ashok Kumar Singh, Deputy Director General (Agricultural Extension), ICAR inaugurated the Zonal Workshop 2021 for KVKs of Zone XI comprising of Karnataka, Kerala and Lakshadweep organized by ICAR-ATARI, Bengaluru on July 30, 2020 with the theme of 'Doubling the Farmers Income through Strengthening KVKs with Inclusive Technologies and Innovative Approaches.'
- Hon'ble Union Minister of State for Agriculture and Farmers' Welfare Sushri Shobha Karandlaje inaugurated the programme by planting jackfruit plants and distributing sapling of fruit plants to the students and farmers to mark the launch of campaign to promote nutri-garden and tree plantation at KVK Udupi on September 17, 2021.
- Shri Rajnath Singh, Hon'ble Union Defence Minister declared the entire Union Territory of Lakshadweep as the Fully Organic Territory while inaugurating the Mahatma Gandhi's Statue during the celebrations of 152nd Birth Anniversary of Mahatma Gandhi organized by the Administration of Union Territory of Lakshadweep at Kavaratti, Lakshadweep on October 02, 2021.
- ICAR-ATARI, Bengaluru organized a wide spectrum of programmes during the year *viz.*, annual review (2020) cum action plan workshop (2021-22) of KVKs in different phases, inauguration of administrative building of ICAR-KVK Vijayapura-II and Kolar, live telecast of National Horticulture Fair 2021, celebration of World Women's Day, review-cum ZPMC meeting of Farmer FIRST programme, special swachhata campaign, institute foundation day and participation of KVK farmers in live telecast of Hon'ble Prime Minister.

Major Achievements of KVKs

Technology Assessment

- A total of 281 On Farm Tests (OFTs) were conducted during the year which included 211 under crops, 44 under livestock and 26 enterprises. During the process, 641 technologies were assessed including 503 under crops, 88 under livestock and 50 under enterprises. Technology assessment was implemented by taking up 1336 trials, 951 under crops, 258 under livestock and 127 under enterprises.
- Out of 211 OFTs taken up on various crops, 151 OFTs were implemented in Karnataka, 57 OFTs were implemented in Kerala and three OFTs in Lakshadweep. In the process, 503 technological options were tested / assessed, 359 in Karnataka, 141 in Kerala and three in Lakshadweep. Karnataka KVKs conducted 629 trials followed by 307 trials by Kerala KVKs and 15 trials by Lakshadweep KVK, making up a total of 951 trials.

- In livestock component, KVKs conducted 44 OFTs, 22 in Karnataka, 20 in Kerala and two in Lakshadweep. This was achieved through 258 trials, 126 in Karnataka, 122 in Kerala and 10 in Lakshadweep. Activities led to assessment of 88 technological options, 49 in Karnataka, 35 in Kerala and four in Lakshadweep.
- Technological options under enterprises were assessed by taking up a total of 26 OFTs that assessed 50 technological options by setting up 127 trials consisting of 44 in Karnataka, 66 in Kerala and 17 in Lakshadweep.

Frontline Demonstrations

- A total of 5408 frontline demonstrations were conducted including 1188 on cereals and millets, 330 on oilseeds, 477 on pulses, 98 on commercial crops, 51 on fibre crops, 148 on fodder crops, 647 on vegetable crops, 65 on tuber crops, 247 on fruit crops, 65 on flower crops, 165 on plantation crops, 236 on spices, five on medicinal crops, 348 on hybrids of various crops, besides 223 demonstrations on farm implements, 719 demonstrations on livestock, 147 on fisheries and 249 demonstrations on enterprises in the states of Karnataka, Kerala and Lakshadweep Island. Out of which, 1071 FLDs conducted by KVKs of Karnataka covering an area of 399 ha and 303 FLDs conducted by KVKs of Kerala in 44.89 ha under various crops are in progress at the time of data compilation.
- In paddy, improved technologies such as mechanized cultivation, ICM, INM, IPDM, IDM, IPM, nano technology, real time nitrogen management by LCC, improved varieties *viz.*, Pratheeksha, KMP-220, RNR-15048, Gangavathi Sona, Shyadri Panchamuki, MSN 99, Kari Kagga and weed management technologies gave an overall increase in grain yield of 17.28 per cent over their respective checks in Karnataka. Similarly, in Kerala, ICM, INM, IDM, ICT weed management and varietal demonstration (Manuratna) gave an average yield of 57.54 q/ha as compared to check (46.96 q/ha).
- In Karnataka, ICM and improved varieties of wheat (UAS-304 and dicoccum (DDK 1029)) recorded an increased average yield of 31.44 q/ha as compared to 26.52 q/ha under check. In *Rabi* sorghum, technologies of ICM, IPM, NRM and improved varieties (SPV-2217 and GS-23) gave an average yield of 14.74 q/ha over their checks (12.32 q/ha). IPDM and IPM in maize gave higher yield of 80.00 q/ha and 65.33 q/ha, respectively as compared to their checks. Varietal demonstration in finger millet with KMR-360 gave an average yield of 29.56 q/ha as compared to 26.67 q/ha in check. Improved little millet, brown top and proso millet varieties recorded higher yield (14.00 q/ha, 22.70 q/ha and 22.50 q/ha, respectively) as compared to their checks.
- Under oil seeds, a total of 330 demonstrations were conducted by KVKs of Karnataka covering groundnut, linseed, niger, sunflower, sesamum, safflower and soybean. The groundnut crop performed better under ICM, IPDM, INM and improved varieties by recording an increased average yield of 19.92 q/ha as compared to check (16.36 q/ha). Niger improved variety KBN-1, linseed under ICM, sesamum under IDM and sunflower under weed management recorded higher yield and net returns. Soybean, under ICM, IPDM, INM and improved varieties (DSB-34, DSB-34 and DSB 21) resulted in higher yield of 19.67 q/ha over check (15.07 q/ha).
- A total of 477 demonstrations were undertaken on major pulses in 177.20 ha area of farmers' fields by KVKs of Karnataka and Kerala. In Karnataka, highest yield of pigeon pea was recorded (20.25 q/ha) followed by 13.60 q/ha under improved variety GRG-811. In black gram, overall yield increases due to ICM, IPM and variety TRCRU-22 was 29.84 per cent over check. Cowpea under ICM, field bean variety HA-3, green gram variety DGGV-2 and rice bean variety KBR-1recorded higher yield and net return as compared to check. During *Rabi* season, varietal demonstration, ICM, IDM, IPM and

IPDM in Bengal gram recorded an average increased yield of 19.28 q/ha over their checks. Similarly, in Kerala, demonstration of black gram and green gram in rice fallows recorded the yield of 8.06 q/ha and 8.36 q/ha with the BCR of 1.47 and 1.51 respectively.

- A total of 98 demonstrations were conducted on commercial crops such as mulberry, sugarcane and betelvine covering an area of 27.20 ha by the KVKs of Karnataka and Kerala. In sugarcane, technologies like ICM, IPM, INM and soil fertility management demonstrated in the farmers' field have recorded an average yield of 1022.63 q/ha. In mulberry, leaf yield increased by 17.44 per cent due to INM and IPM technologies as compared to check. Betelvine under IPDM recorded a yield of 9.61 lakh leaves/ha, which was 31.43 per cent higher as compared to check (7.32 lakh leaves/ha). Similarly, in Kerala, betelvine yield was obtained to the extent of 114.29 per cent under IDM technology.
- A total of 51 demonstrations on cotton were conducted by KVKs in Karnataka. Technologies like IDM, INM, intercropping and IPM were demonstrated in farmers' field have recorded an average cotton yield of 16.94 q/ha and BCR of 3.56 as compared to check (15.30 q/ha and 3.01 respectively).
- A total of 148 demonstrations were conducted on fodder crops covering an area of 27.90 ha by the KVKs of Karnataka and Kerala. Technologies like ICM, cultivation of improved varieties of fodder-CoFS-31, mixed fodder (stylo grass, hedge lucerne and fodder trees) marvel grass, perennial supply of green fodder model and preservation of green fodder and shade tolerant guinea grass were demonstrated in farmer's field.
- Vegetable crops such as amaranthus, brinjal, bitter gourd, broccoli, cabbage, carrot, chilli, cucumber, cluster bean, drumstick, field bean, french bean, garden pea, onion, okra, pole bean, tomato, ridge gourd, yard long bean and nutri-garden were demonstrated with improved technologies under 647 farmers' fields covering an area of 91.80 ha by KVKs of Karnataka, Kerala and Lakshadweep Island.
- In tuber crops, 67 frontline technologies were demonstrated in potato, sweet potato amorphophallus, cassava and elephant foot yam in 6.78 ha area by KVKs of Karnataka and Kerala. In cassava, demonstrations on INM and varietal demonstration (Sree Pavithra and Sreeraksha) recorded higher yield ranging from 26.26 to 50.51 per cent over farmers' practice in Kerala.
- A total of 247 demonstrations on major fruit crops like banana, guava, grapes, lime, mango, papaya pomegranate, coorg mandarin, strawberry and snapmelon were conducted by KVKs of Zone XI covering an area of 72.94 ha. Banana under ICM recorded a highest yield of 427.00 q/ha with higher economic benefits as compared to their checks. IPM in grapes gave 212.00 q/ha yield as compared to check. INM in guava gave 24.95 per cent higher yield (161.50q/ha) over check. IPDM and INM technologies in lime gave average yield of 211 q/ha and 204.80 q/ha respectively leading to higher net profit as compared to farmers' practice. ICM in mango recorded higher yield of 120.40 q/ha as compared to check (101.13 q/ha). IPM technology in pomegranate gave 26.08 per cent higher yield (181.30 q/ha) over check. Similarly in Kerala, ICM, IDM, INM, IPDM and IPM technologies demonstrated in banana have performed better with an average yield of 280.09 q/ha against their checks (191.07 q/ha).
- A total of 165 demonstrations were undertaken by KVKs of Zone-XI on major plantations like arecanut, coconut and coffee covering an area of 46.20 ha. In Karnataka, coconut under intercropping system technology recorded highest nuts (9100 nuts/ha/year) followed by IPM technology (8781 nuts/ha/year) as compared to check. In Kerala, demonstration on INM, IDM and natural resource management in coconut

gave an average yield of 11,878 nuts/ha/year over check (8,548 nuts/ha/year) leading to positive net returns in demonstrations.

- In spices, 141 demonstrations were conducted in black pepper, chilli, ginger and turmeric covering an area of 40.40 ha in Karnataka and 95 demonstrations were implemented in black pepper, ginger, small cardamom and turmeric crops by KVKs of Kerala covering an area of 6.00 ha.
- KVKs of Karnataka conducted demonstrations on flower crops *viz.*, bachelors button, china aster, chrysanthemum, marigold, tuberose and Udupi mallige covering an area of 8.70 ha. Bachelors button variety AGS 12, china aster under ICM technology, chrysanthemum variety Co-1and marigold, tuberose, Udupi mallige under ICM recorded higher flower yield as compared to their checks.
- A total of 348 demonstrations on hybrids in various crops like maize, Bt. Cotton, sunflower, castor, bhendi, brinjal, bitter gourd, ridge gourd, cabbage, capsicum, chilli, pole bean, onion, tomato, papaya, tube rose, watermelon were conducted by KVKs of Zone XI covering an area of 119.40 ha.
- Under farm mechanization, portable fertilizer dispenser in chrysanthemum, brinjal and vegetable crops, storage structure in onion, tractor operated cotton shredder, tractor operated laser leveller and baler for paddy straw, solar operated nipping machine in chick pea bengalgram and multi-use telescopic model harvester tool in arecanut were demonstrated by KVKs of Karnataka. Drone technology, mini rice mill and solar tunnel drier in paddy, nutmeg seed sheller, power tiller operated basin lister in coconut, rain gun in fodder and semi -manual cassava harvester were demonstrated by KVKs of Kerala.
- A total of 249 demonstration units were established on farm enterprises such as apiculture, vegetable production, compost production, mushroom, poultry, sericulture, value addition, and others benefiting 418 farmers/farm women in Karnataka and Kerala.
- A total of 593 demonstration units in livestock comprising 369 in dairy, 10 in buffalos, 204 in sheep and goat and 10 in piggery were demonstrated by KVKs of Karnataka. Similarly, 113 demonstrations comprising 57 in dairy, 15 in sheep and goat, 41 in poultry were conducted by KVKs of Kerala. A total of 147 demonstration units in fisheries were established benefiting 147 farmers during the year by KVKs of zone XI.
- KVKs of Karnataka have organized 599 programmes for the empowerment of women covering 18,344 women participants. Similarly, 79 programmes on health and nutrition and other children related aspects with the participation of 3,867 children. Kerala KVKs have organized 445 programmes on empowerment of women with the participation of 15,819 women. Similarly, 50 programmes on health and nutrition and other children related aspects were organized covering 2,662 children.

Capacity Development

- KVKs organized 5,524 capacity development courses which includes 4,098 courses for farmers, 535 courses for rural youth and 313 courses for extension personnel. A total of 2.01 lakh participants were trained comprising of 1.56 lakh farmers, 15,717 rural youth and 11,399 extension personnel. In addition, 383 sponsored and 195 vocational courses were organized.
- Major area of capacity development was crop production in which 741 courses were conducted involving 25,418 farmers. Capacity development courses on home science/women empowerment (615) and plant protection (555) were the next most demanded courses followed by livestock production and management (341 courses).
- Rural youth were trained on importance of organic farming , sericulture, agriculture and environment, micro irrigation, quality seed

grower, mulberry cultivation & silkworm rearing, production of medicinal plants, paddy mechanization, nutrition security, soil and water testing, vegetable farming, kitchen gardening, integrated pest management, bio-control agent production, entrepreneurial development of youth, ICT, cultivation of pepper and coconut (91 courses, 2422 participants) and value addition (61 courses, 2404 participants).

- Extension functionaries were trained on advanced technologies in sericulture, nursery management, seed production, animal husbandry for doubling of farmers' income, disease management in milch- animals, post-harvest management in *rabi* crops, formation and management of FPOs, natural farming, water management, productivity enhancement in plantation crops, composting techniques, monthly technological advice for ATMA field staff, value addition, processing, IFS, agri nutri campaign, value addition, food safety and organic cultivation with 79 courses and 2,622 participants followed by IPM (47 courses, 1,536 participants).
- Sponsored courses (57) were organized on bio-fuels, ICM in onion, scientific beekeeping, IFS, energy efficient pump-sets and water conservation, Farmer Producer Organization, friends of coconut tree, RAWE, setting up of entrepreneurs, INM, IMC, DAESI and PMFME with the participation of 2,085 farmers/rural youth/extension functionaries followed by production and productivity improvement of crops with 36 programmes and 1,425 participants.
- Vocational development courses were mostly organized on capacity building and group dynamics with 29 courses and 949 participants followed by equal number of courses in topics on areca palm climbing through machine, FOCT, RAWE, PDM and ornamental fish farming with 399 participants.

Frontline Extension Programmes

- KVKs carried out a total of 1.15 lakh frontline extension activities and created awareness among 12.45 lakh farmers including 1.35 lakh SC/ST farmers and 0.38 lakh extension personnel on varieties, production technologies, integrated pest and disease management, animal health and nutrition, poultry production, fisheries management and human nutrition.
- KVKs published extension literature (590) and popular articles (432) besides newspaper coverage (2261), radio coverage/talks (472), T V coverage/ talks (255) and development of CDs/DVDs/short videos (162).

Production of Technological Inputs

- Produced and supplied 2824.21 q of seeds of different crop varieties, 30.24 lakh planting material of different crops and hybrids, 3.14 lakh livestock strains and fish fingerlings benefiting 2.19 lakh farmers.
- Produced and supplied 4415.56 q of bio-products through which 1.21 lakh farmers were motivated to adopt bio-control practices by reducing use of chemicals.

Kisan Mobile Advisory Services

- Thirty-five KVKs of the zone sent 19,903 text messages to 10.89 lakh farmers. Messages were related to crops (9,052), weather (4,436), livestock (3,086), other enterprises (1,669), awareness (1,218), and marketing (442).

Soil, Water and Plant Analysis

- KVKs analysed 31,342 samples of soil, water, plant, and organic manure received from 27,759 farmers belonging to 14,838 villages based on which 1,26,385 soil health cards were distributed to farmers.

Rainwater Harvesting Units

- Rainwater harvesting and recycling units established in 16 KVKs were utilized to organize 25 capacity development programmes and 38 demonstrations. The facility was used to produce 150819 planting materials for use in KVKs and to provide to farmers. These units were visited

by 9775 farmers and 438 officials and got acquainted with the rainwater harvesting techniques.

Convergence and Linkages of KVKs

- As part of convergence with ATMA, KVKs participated in 851 programmes organized by ATMA and at the same time KVKs organized 482 programmes in collaboration with ATMA.
- Rashtriya Krishi Vikas Yojana (RKVY), National Horticultural Mission (NHM), projects of different ICAR Institutes and National Bank for Agriculture and Rural Development (NABARD) were the major agencies that funded/supported KVKs to organize various programmes and activities.

Doubling of Farmers Income

- A total of 5,171 successful cases of farmers whose income was doubled due to KVK interventions were documented which include 3,631 cases from Karnataka and 1,540 cases from Kerala.

Success Stories and Cases of Large-Scale Adoptions

KVKs have documented many success stories based on the performance of technologies in terms of enhancing productivity and augmenting income of farmers during the reporting year. Some of them are given below:

- Blackgram intercropping in pigeon pea gave an additional income of ₹.7008 from 0.4 ha as well as provided eight man-days of employment for harvesting of black gram (KVK, Belagavi-I).
- Mango cultivation has motivated a youth engaged in business to become a farmer and earning a net profit of ₹.2.57 lakh from 400 mango trees of 11 years old (KVK, Bidar).
- Software engineer couple turned into dairy entrepreneurs and earning ₹. 86,000 net income per month from dairy farm with 22 Gir cows established by them (KVK, Haveri).
- Integrated Farming System on 2.60 hectares of land gave a net profit of ₹.9.76 lakh as well as providing 515 man-days of employment per year and motivated 410 farmers to adopt similar IFS model in their farms (KVK, Shivamogga).
- Dairy farming by women SHG earning a net profit of ₹. 50,000 per month by investing ₹.1,00,000 (KVK, Uttara Kannada).
- Dragon fruit in dryland of Vijayapura district gave a net profit of ₹.11 lakh within four years of its cultivation from 0.80 ha of land (KVK, Vijayapura-I).
- Farmer earning average monthly income of ₹.1.00 lakh through Pearl spot (*Etroplus suratensis*) and also got recognition as regular seed supplier of Pearl spot in Kerala (KVK, Kottayam).
- Horticultural nursery based innovative activities made a couple to earn average annual income of ₹.25 lakh from a mere 36 cents of land and got 90,000 subscribers for their YouTube channel named as "Techflora" started in 2019 (KVK, Kozhikode).

Awards and Recognition

- Shri. Sharanabasappa Patil Kalaburagi has been awarded with ICAR-Jagjivan Ram Innovative Farmer Award.
- KVK, Kalaburgi bagged the National Best KVK Pandit Deendayal Upadhyay Rashtriya Krishi Vigyan Protshahan Puraskar 2020.

Special Programmes

- Under cluster frontline demonstrations on pulses, a total of 2365 demonstrations on different pulse crops *viz.*, black gram, green gram, pigeon pea, chickpea and cowpea were conducted by KVKs of Karnataka and Kerala in an area of 946 ha of farmers' field.
- Under cluster frontline demonstrations on oilseeds, a total of 1962 demonstrations on groundnut, soybean, sunflower, safflower, niger, castor, linseed, mustard and sesame were conducted by KVKs of Karnataka and Kerala in 785 ha of farmers' field.

- Under seed hub programe eight KVKs produced 1851.71 q seeds of pulses, which included chickpea (621.98 q), pigeon pea (816.69 q), black gram (218.94 q), green gram (154.32 q), cowpea (23.05 q), avare (12.43) and horse gram (4.30 q).
- The ICAR-ATARI and its KVKs observed Swachhta Pakhwada during 16 to 31 December, 2021 and organized various activities related to cleanliness, health and hygiene with the participation of 16505 participants.
- World Soil Day was celebrated on December 5th, 2021 with a theme "Halt soil salinization, boost soil productivity" at 46 KVKs of the zone with the participation of 5592 farmers, 331 scientists, and 1209 students. On the occasion, 56 VIPs and public representatives have participated.
- Attracting and Retaining Youth in Agriculture (ARYA) is being implemented by six KVKs. During the period, 121 training programmes were organized and 1400 rural youth were trained on various agricultural and allied enterprises.
- Farmer FIRST programme implemented several interventions at the field level in crop, horticulture, livestock, natural resource management, enterprise and integrated farming system modules. A total of 5245 households in 28 villages/wards were benefited under this programme.
- Under National Innovations in Climate Resilient Agriculture (NICRA), climate resilient technological interventions are being implemented in farmer participatory mode in five most climatically vulnerable districts namely Alappuzha in Kerala and Gadag, Kalaburagi, Tumakuru, Chikkaballapura in Karnataka. In phase-II, the project is being extended to three more districts in Karnataka namely, Chamarajanagara, Chitradurga and Haveri, five more districts in Kerala namely, Kannur, Wayanad, Palakkad, Kozhikode and Kottayam and Lakshadweep Island during 2021-22. A total of 1400 demonstrations were implemented in four different farming system typologies covering 408.20 ha area in order to build climate resilience in cluster of villages covering five climate vulnerability districts. Climate resilient varieties emerged under NICRA demonstrations such as pigeon pea BRG-5, TS-3R, BRG-2 and DGGV-2, finger millet ML-365 and KMR-630, groundnut K6, tomato-Sahoo and abinava-1148, *Rabi* sorghum SPV-221, Bengalgram JAKI-9218 and BGD 103 suiting these drought prone districts have been incorporated in *Kharif* 2021 and *Rabi* 2021 in the district plans of NICRA districts. A total of 116620 ha have been brought under climate resilient varieties through state department of agriculture in Chikkaballapura, Gadag, Kalaburagi and Tumakuru districts of Karnataka.
- Seventeen KVKs organized one programme each under skill development involving 392 participants, out of which, 340 were male and rest were women. In Karnataka, 322 participants were involved as compared to 70 participants in Kerala.

Agriculture Technology Information Centers

A total of 165034 farmers visited Agriculture Technology Information Centers (ATICs) in the Zone. ATICs provided information related to various aspects of farming to 60553 farmers. Technological products available in these centers were purchased by 92850 farmers during the period under report.

Technological Backstopping by Directorate of Extension

Directors of Extension regularly monitored the KVKs. Directorates of Extension participated in 38 scientific advisory committee meetings, 115 field days, 106 workshops/seminars, 19 technology weeks and 545 training programmes. Field level monitoring was done by visiting 99 OFTs and 234 plots of FLDs conducted by the KVKs.

Research Projects

The following research projects are being implemented by the scientists of ICAR-ATARI, Bengaluru:

- Effectiveness of dairy production interventions under Farmer FIRST Project.
- Study on agri based entrepreneurship development among youth.
- Analysis of skill development training conducted by KVKs for the aspirations of participants and constraints faced by trainees and trainers.
- Analysis of Integrated Farming Systems in different agro-climatic situations in Karnataka for need based technology application and capacity development.
- Assessment of technological and capacity needs perceived by dairy farmers and extension functionaries in Karnataka state.
- Impact assessment of ARKA technological products implemented by KVKs of Karnataka and Kerala.
- Identification and development of farm leaders through KVKs for up-scaling agricultural technologies in Karnataka, Kerala and Lakshadweep.
- Network research project on impact of ARYA on promotion of agri-preneurship and alternative livelihoods. Six other network research projects wherein ICAR-ATARI, Bengaluru is co-operating centres with Co-PIs.

Publications

Scientists of ICAR-ATARI, Bengaluru published research papers (3), presented papers at national/ international conferences (1), edited books/ chapters (7) and reports (1). KVK staff published 111 research papers, 26 research abstracts, 29 training manuals and technical bulletins, 432 popular articles and 590 extension literatures on various technological aspects of agriculture and allied enterprises.

Human Resource Development

- ICAR-ATARI, Bengaluru in collaboration with Atal Incubation Centre-SRS-ICAR-NDRI Foundation, Bengaluru organized a five-day training programme on "Entrepreneurship Development in Dairying" during October 1-5, 2021 for 33 progressive dairy farmers nominated by ICAR-KVKs of Karnataka. The programme was inaugurated by Sushri Shobha Karandlaje, Hon'ble Union Minister of State for Agriculture and Farmers Welfare, GoI at Southern Regional Station, ICAR-NDRI, Bengaluru.
- ICAR-ATARI, Bengaluru in collaboration with ICAR-IIHR, Bengaluru organized an online training programme for the KVK professionals of ATARI, Zone XI on "ICAR-IIHR Technologies" during December 17-18, 2021. A total of 70 KVK Subject Matter Specialists have actively participated in the training programme.

Farmers Feedback

Farmers feedback on performance of technologies assessed by KVKs indicated that crop varieties, agronomic practices, pest and disease management practices, farm implements and improved livestock management practices gave higher yield and income as compared to the checks.

Chapter - 1

About ICAR - Agricultural Technology Application Research Institute (ATARI)

The office of ICAR-ATARI, Bengaluru is located at 0.5 kms away from western side of Hebbal flyover, 3 kms from Mekhri circle, 12 kms from railway station (Bengaluru Central), 6 kms from railway station (Yashwanthpur), 12 kms from majestic bus stand and 25 kms from international airport, Bengaluru. The institute has established 48 KVKs of which 33 KVKs in Karnataka, 14 KVKs in Kerala and one KVK in Lakshadweep through different host organizations such as SAUs, ICAR institutes and NGOs.

This chapter consists of following heads:

1.1 Mandate

1.2 About ICAR-ATARI, Zone XI, Bengaluru and it's activities

1.3 Budge

1. About ICAR - Agricultural Technology Application Research Institute

The Agricultural Extension Division under Indian Council of Agricultural Research (ICAR), New Delhi has established a nation-wide network of Krishi Vigyan Kendras (KVKs) since IV Five Year Plan in the country. These KVKs are hosted by ICAR institutes, State Agriculture Universities (SAUs), State Government Departments and Non-Government Organizations (NGOs) with the financial support of Government of India. The Agricultural Extension Division headed by Deputy Director General (Agricultural Extension) monitors and reviews the KVKs through eleven ICAR-Agricultural Technology Application Research Institutes (ATARIs) located in the country. The jurisdiction of ICAR-ATARIs is illustrated in Table 1.

1.1 Mandate

The mandate of ICAR-ATARIs are as follows:

- Coordination and monitoring of technology application and frontline extension education programmes.
- Strengthening agricultural extension research and knowledge management.

1.2 About ICAR-ATARI, Zone-XI, Bengaluru and it's activities

1.2.1 Genesis

The ICAR established eight Zonal Coordinating Units (ZCUs) in 1979 to monitor and coordinate Lab to Land Programme (LLP) launched on the occasion of ICAR's Golden Jubilee. To begin with, Zonal Coordinating Unit-Zone VIII functioned from its office at Tamil Nadu Agricultural University (TNAU), Coimbatore and was shifted to the campus of the Regional Station of National Dairy Research Institute (NDRI), Bengaluru in September, 1981. The jurisdiction included was Karnataka, Kerala, Tamil Nadu, Puducherry and Lakshadweep. The unit was converted as a Plan Scheme with additional staff and added objective of monitoring the other Transfer of Technology projects of ICAR *viz.*, KVK, Trainers Training Centre (TTC), National Demonstration Scheme (NDS), Operational Research Project (ORP), Scheduled Caste and Scheduled Tribe Project and Special Project on Oilseeds in 1986. During 1990-91, another objective of implementing and monitoring of National Pulse Project was added, besides addition of Goa to the jurisdiction of the zone. The ZCU was upgraded as Zonal Project Directorate (ZPD) in March, 2009 and as Agricultural Technology Application Research

Table 1: States and UTs covered by ICAR-ATARIs in the country

Zones	States/ UTs (No.)	Name of States/Union Territories
I	5	Punjab, Uttarakhand, Himachal Pradesh and UT of Jammu & Kashmir and Ladakh
II	3	Rajasthan, Haryana and NCT of Delhi
III	1	Uttar Pradesh
IV	2	Bihar and Jharkhand
V	3	West Bengal, Odisha and UT of Andaman & Nicobar
VI	3	Assam, Arunachal Pradesh and Sikkim
VII	5	Tripura, Nagaland, Manipur, Mizoram and Meghalaya
VIII	5	Maharashtra, Gujarat, Goa, UT of Daman & Diu & UT of Dadra and Nagar Haveli
IX	2	Madhya Pradesh and Chhattisgarh
X	4	Andhra Pradesh, Telangana, Tamil Nadu and UT of Puducherry
XI	3	Karnataka, Kerala and UT of Lakshadweep

Institute (ATARI) since July 2015. With the creation of three new zones and the reorganization of zones, ATARI, Bengaluru became Zone-XI w.e.f. April, 2017 covering Karnataka, Kerala and Lakshadweep.

1.2.2 Staff

Total sanctioned staff strength of ICAR-ATARI, Zone -XI, Bengaluru is 18, out of which 12 are currently filled (Table 2).

Table 2: Staff strength of ICAR-ATARI, Zone -XI, Bengaluru as on 31.12.2021

Category	Sanctioned (No.)	Filled (No.)
Director (RMP)	1	1
Scientific	6	5
Technical	2	2
Administrative	8	4
SSS (Gr-II)	1	0
Total	**18**	**12**

1.2.3 Organizational structure

The organizational structure of ICAR-ATARI, Zone-XI and KVKs functioning under this institute is depicted in Fig.1.

1.2.4 Major Activities

1.2.4.1 KVK Farmers Participated in Live Telecast of National Horticulture Fair 2021

The ICAR-Indian Institute of Horticultural Research, Bengaluru, Karnataka organized the five-day "National Horticulture Fair 2021" on the theme "Start-Up & Stand-Up India" from February 8-12, 2021 in collaboration with ICAR-ATARI, Bengaluru and other stakeholders. KVKs of ICAR-ATARI, Zone-XI along with KVKs of other zones across the country actively took part in the live telecast of various demonstrations on horticultural crops to the farmers.

In his inaugural address, the Chief Guest, Shri Shri Ravishankar stressed the need for natural farming,

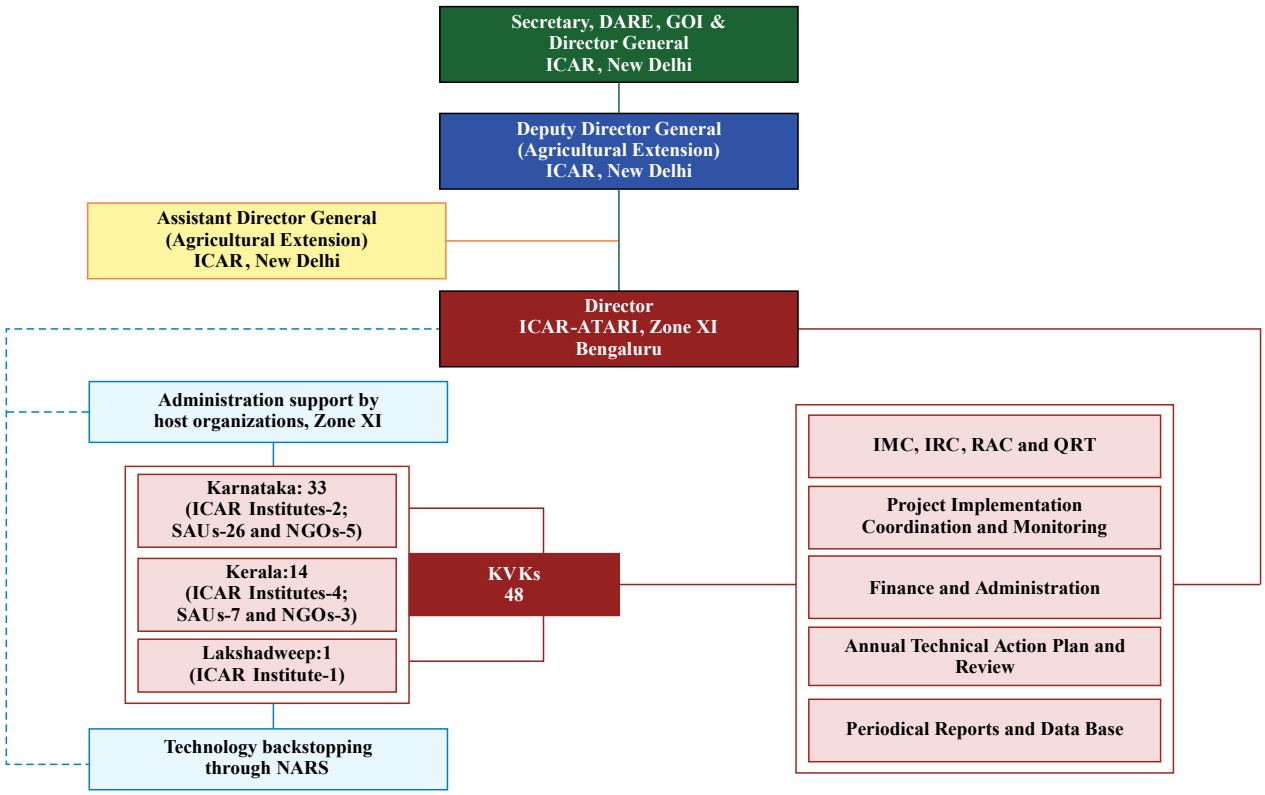


Fig 1: Organizational structure of ICAR-ATARI, Zone-XI, Bengaluru

which is environmentally safe and provides nutritional security and health benefits. He urged farmers to get connected in greater numbers with such types of fairs. He said that all horticulture-based ICAR institutes and state departments should join together to make the country nutritionally secured. The Chief Guest released "Jacolate", jackfruit-based chocolate product that was licensed to a women entrepreneur during the occasion.

The Guest of Honor, Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR) emphasized on creating awareness for nutrition security among consumers through use of fruits and vegetables. The Director General released a Mobile App "Árka Vyapar" developed in collaboration with the Society for Promotion of Horticulture to connect the buyers and sellers of horticulture produce and products.

Chief Guest, Shri Shri Ravishankar inaugurated the National Horticulture Fair 2021

Dr. M.R. Dinesh, Director, ICAR-IIHR, Bengaluru, addressing National Horticulture Fair 2021

Dr. A K Singh, DDG (Horticulture), ICAR stressed on the importance of horticulture and its growing contribution to the Indian economy. Dr. M.R. Dinesh, Director, ICAR-IIHR, Bengaluru explained how to promote horticulture as an enterprise. The senior officials of ICAR, Directors of ICAR Institutes and ATARIs, Vice-Chancellors of State Horticultural Universities, Directors of Horticultural Departments, representatives from private industries, farmers and students also virtually participated in the event.

KVK, Tumakuru-II

KVK, Kozhikode

KVK, Gadag

1.2.4.2 Administrative Building of ICAR-KVK, Vijayapura-II Inaugurated

Administrative Building of ICAR-KVK, Vijayapura-II was inaugurated on February 22, 2021 by Shri. B. C. Patil, Hon'ble Agriculture Minister, Government of Karnataka. During inaugural address, he emphasized the capacity development of rural youth by KVKs and appreciated the role of ICAR and KVKs in supporting farmers and rural youth during COVID 19 pandemic. Hon'ble Yeshwantaraya Gowda Patil, MLA Indi, expressed happiness for additional KVK in Vijayapura district and thanked ICAR, New Delhi. Shri Shankargouda Patil, special representative of state Government lauded the efforts of Government for developmental activities. On this occasion, an exhibition highlighting appropriate technologies and live specimen of major crops and fertilizer, seed and farm equipment stall were arranged.

1.2.4.3 Celebration of World Women's Day

KVKs of ICAR-ATARI, Zone XI, Bengaluru celebrated International Women's Day on March 8, 2021 with the participation of 3627 participants. Smt. Rehka T was nominated by ICAR- KVK, IISR, Kozhikode for felicitation by ICAR, New Delhi during World Women's day 2021. She was selected one among six farm women of India for felicitation due to her innovative integration of fish and agriculture to increase farm income. Smt. Rekha T, has been one of the pioneer aquaponics farmers in Kozhikode district, Kerala. She is practicing Integrated Farming System for the past seven years at her backyard with 0.016 ha protected area having 0.004 ha fish pond and 0.012 ha of raised bed area for vegetable cultivation. The yearly fish production from this unit is 1500 Kg of tilapia and 500 Kg of vegetables, providing a net annual income of ₹. 6.50 lakh.

Smt. Rekha T, a Fish Farm Woman from Kozhikode Felicitated by ICAR, New Delhi

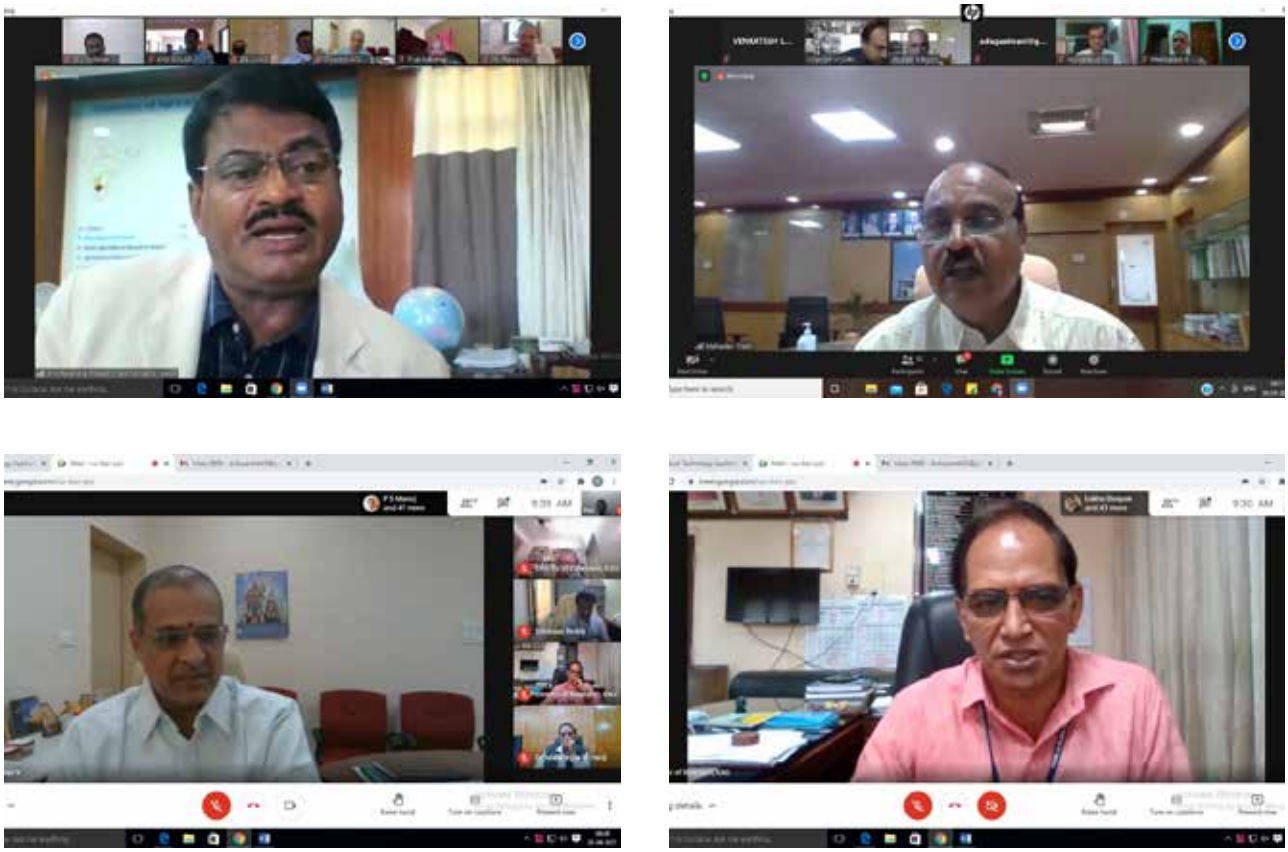
Shri. B. C. Patil, Hon'ble Agriculture Minister, Government of Karnataka inaugurated the Administrative Building of ICAR-KVK, Vijayapura-II (Indi)

She has a dairy unit with two indigenous dwarf cows (Vechure and Kasaragod dwarf) and a calf. The cow dung, milk and urine from this dairy unit are being converted to commercial products such as bio pesticide, plant immune modulator which is packed in 200 ml bottles and marketed by MVR company, Kozhikode. The dairy unit provides her a net profit of ₹.1.80 lakh per year. She also provide trainings to new entrepreneurs on aquaponics at her farm "Annapurna Aquaponics" at nominal rate inviting applications through social media.

When she faced difficulty in marketing of fresh fish, she switched to its value addition by developing ready to cook and eat products such as marinated dressed fish and dry roasted fish. Even the vegetables from aquaponics unit were converted into value added products such as cleaned ready to cook vegetables in pouches giving safe to eat product label ensuring her a premium price as she obtained a FSSAI certificate. She powered her unit with solar energy to reduce the high operational cost. She has many awards and honors to her credit and authored a book on aquaponics in Malayalam based on her experience.

1.2.4.4 Annual Review cum Action Plan Meetings of KVKs

Due to COVID-19 pandemic, the annual review cum action plan meetings of 48 KVKs of Zone-XI comprising Karnataka, Kerala and Lakshadweep were conducted in five phases through virtual mode. During the meetings, the progress of KVKs for the year 2020 were reviewed, and action plan for the period 2021-22 were discussed and finalized. Presentation of individual KVK was reviewed by the experts from respective Agricultural Universities, ICAR Institutes and ICAR-ATARI, Bengaluru under the Chairmanship of Dr. V. Venkatasubramanian, Director, ICAR-ATARI, Bengaluru. Dr. S. Prabhu Kumar, Former Zonal Project Director (Zone-VIII and Zone-I), Dr. M.R. Hegde, Former Zonal Coordinator (Zone-V) and Dr. Rajinder Parshad, Former ADG (AE), ICAR were invited as Experts. Details are given below:



A view of dignitaries in the meeting

Phase-I: Two-days virtual meeting was organized for 10 KVKs in the jurisdiction of UAS, Bengaluru *viz.*, Bengaluru Rural, Chamarajanagara, Chikkaballapura, Hassan, Kolar, Mandya, Mysuru, Ramanagara, Tumakuru-I and Tumakuru-II during 15 to 16 April, 2021. Dr. S. Rajendra Prasad, Vice Chancellor, UAS, Bengaluru inaugurated the meeting. Dr. M. Byregowda, Director of Extension, UAS, Bengaluru, Dr. M.J. Chandre Gowda, Principal Scientist and Dr. D. V. Kolekar, Scientist, ICAR-ATARI, Bengaluru coordinated the event.

Phase-II: Five-days virtual meeting was organized for 15 KVKs *viz.*, Alappuzha, Ernakulam, Idukki, Kannur, Kasaragod, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad, Pathanamthitta, Thiruvananthapuram, Thrissur, Wayanad and Lakshadweep under the jurisdiction of KAU, Thrissur during 20 to 23 April, 2021 and 28 April, 2021. Dr. Madhu Subramanian, Director of Research, KAU, Thrissur inaugurated the meeting. Dr. Jiju P. Alex, Director of Extension, KAU, Thrissur, Dr. D.V.S. Reddy, Principal Scientist, and Dr. M.B. Hanji, CTO, ICAR-ATARI, Bengaluru coordinated the meeting.

Phase-III: Four-days virtual meeting was organized for the seven KVKs *viz.*, Chikkamagaluru, Chitradurga, Davanagere, Dakshina Kannada, Kodagu, Shivamogga and Udupi under the jurisdiction of UAHS, Shivamogga on 11 to 12 May, 2021 and 19 to 20 May, 2021. Dr. M. K. Naik, Vice Chancellor, UAHS, Shivamogga inaugurated the meeting. Dr. K.C. Shashidhar, Director of Extension, UAHS, Shivamogga, Dr. B.T.Rayudu and Dr. Thimmappa K., Principal Scientists, ICAR-ATARI, Bengaluru coordinated the meeting.

Phase-IV: Three-days virtual meeting was organized for the nine KVKs *viz.*, Bagalkote, Belagavi-I, Belagavi-II, Dharwad, Gadag, Haveri, Uttara Kannada, Vijayapura-I and Vijayapura-II under the jurisdiction of UAS, Dharwad during 26 to 28 May, 2021. Dr. M.B. Chetti, Vice Chancellor, UAS, Dharwad inaugurated the meeting. Dr. Ramesh Babu, Director of Extension, UAS, Dharwad, Dr. B.T.Rayudu and Dr. Thimmappa K., Principal Scientists, ICAR-ATARI, Bengaluru coordinated the meeting.

Phase-V: Two-days virtual meeting was organized for seven KVKs *viz.*, Ballari, Bidar, Kalaburagi-I, Kalaburagi-II, Koppal, Raichur and Yadgir under the jurisdiction of UAS, Raichur during 9-10 June, 2021. Dr. K.N. Kattimani, Vice Chancellor, UAS, Raichur inaugurated the meeting. Dr. D.M. Chandaragi, Director of Extension, UAS, Raichur and Dr. M.J. Chandre Gowda, Principal Scientist of ICAR-ATARI, Bengaluru coordinated the meeting.

1.2.4.5 KVK Farmers Participated in the Programme of Virtual Interaction with Hon'ble Prime Minister

KVKs of ICAR-ATARI, Zone-XI actively took part in the programme of virtual interaction with Hon'ble Prime Minister Shri Narendra Modi on September 28, 2021. A total of 2959 farmers viewed the telecast programme at their respective KVKs. On the occasion, the Hon'ble Prime Minister, Shri Narendra Modi dedicated 35 crop varieties having special traits and the newly established campus of the National Institute of Biotic Stress Management, Raipur to the Nation. He also presented the Green Campus Award to Agricultural Universities. He interacted with innovative farmers, appreciated their innovative methods and addressed the gathering.

Hon'ble Prime Minister Shri Narendra Modi interacting with farmers during release of PM Kisan Samman Nidhi funds

Shri Narendra Singh Thomar Hon'ble Minister of Agriculture and Farmers Welfare, Govt. of India graced the occasion

Addressing the farmers, the Hon'ble Prime Minister said in the last 6-7 years, science and technology has been used on a priority basis to solve the challenges related to agriculture. Our focus is very high on more nutritious seeds, adaptation to new conditions, especially in changing climates, said the Hon'ble Prime Minister. He recalled the massive locust attack in various states last year, in the midst of the Corona pandemic. India had tackled this attack by making a lot of efforts, saving farmers from incurring too much damage, he said.

The Hon'ble Prime Minister stressed that whenever farmers and agriculture get a safety net, their growth becomes rapid. He informed that 11 crore Soil Health Cards were issued for the protection of the land. He listed the farmer-friendly initiatives of the Government such as campaigns to complete about 100 pending irrigation projects for providing water security to the farmers, providing new varieties of seeds to farmers to protect crops from diseases thus getting a higher yield. He added that along with increasing the MSP, the procurement process was also improved so that more and more farmers can get the benefit.

The Hon'ble Prime Minister said by connecting farmers with technology, we have made it easier for them to get help from banks. Today farmers are getting weather information in a better way. Recently, more than two crore farmers have been given Kisan Credit Cards. He remarked that due to climate change, new types of pests, new diseases and epidemics are emerging, because of this, there is a big threat to the health of humen and livestock and crops are also being affected. Intensive continued research on these aspects is necessary. He remarked that when science, government and society work together, results will be better. Such an alliance of farmers and scientists will strengthen the country in dealing with new challenges.

The Hon'ble Prime Minister said efforts are being made to take the farmer out of the crop-based income system and encourage them for value-addition. He asked people to be prepared to use the opportunities provided by the UN declaring the coming year as the International Year of Millets. He said along with our ancient farming traditions, marching towards the future is equally important. He also said modern technology and new farming tools are at the core of future farming.

KVK, Kozhikode

KVK, Chitradurga

KVK, Udupi

1.2.4.6 Hon'ble Miniter of State for Agriculture and Farmers Welfare Sushri Shobha Karandlaje Inaugurated the Campaign on Nutri Garden and Tree Plantation

The Nutri-cereals multi-stakeholder's mega convention and poshan vatika and tree plantation campaign event for International Year of Millets 2023 was organized at ICAR-Indian Institute of Millets Research, Hyderabad on September 17, 2021. Shri Narendra Singh Thomar Hon'ble Minister of Agriculture and Farmers' Welfare, Govt. of India launched the programme which was webcasted live at 48 Krishi Vigyan Kendras of ICAR-ATARI, Bengaluru for the benefit of the local farmers, researchers and policy makers. Total five MPs, four MLAs, 2724 girls and 4158 farmers participated wherein 15758 plants and 6287 packets of vegetable seeds were provided to farmers.

Sushri Shobha Karandlaje Hon'ble Minister of State for Agriculture in her inaugural address said that, a plan is in the offing to bring a paradigm shift in the farming approach, from water guzzling crops like rice and wheat to millet production and expressed that India aspired to become a global millet exporter by 2023 and also the nation will be witnessed as the hub for the production of organic and quality millets in the world. The Hon'ble Minister stated that based on the proposal from India, United Nations has agreed to observe 2023 as "International year of Millets" and millets will be recognized on a global scale in future.

The Hon'ble Minister also emphasized the production and marketing of good quality, pesticide-free millets. To avoid any health issues, there is a need to go back to our old food practices and also added that millet production will be predominantly promoted in the states like Karnataka, Maharashtra, Andra Pradesh and Tamil Nadu. She said that fallow land should be brought under cultivation in order to increase the area under cultivation in India. Despite the fact that the monsoon season is unpredictable, the introduction of weather-based crop insurance is assisting farmers to a great extent. She also said that there is a need to establish Agriculture Cooperative Societies (ACS) and Farmer Producer organizations (FPOs) in all village clusters.

Hon'ble Minister of State for Agriculture and Farmers' Welfare Sushri Shobha Karandlaje inaugurated the programme by planting Jack fruit plant at KVK, Udupi

Distributing sapling of fruit plants to the students and farmers at KVK, Udupi

Tree plantation at KVK, Kozhikode

1.2.4.7 Zonal Workshop 2021 for KVKs of ICAR-ATARI, Bengaluru

Dr. Ashok Kumar Singh, Deputy Director General (Agricultural Extension), ICAR, New Delhi inaugurated the Zonal Workshop 2021 for KVKs of Zone-XI comprising of Karnataka, Kerala and Lakshadweep organized by ICAR-ATARI, Bengaluru on July 30, 2020 on the theme 'Doubling the Farmers' Income through Strengthening KVKs with Inclusive Technologies and Innovative Approaches'.

Dr. A. K. Singh emphasised the need for research system to take advantage of KVK system for technology dissemination. New varieties and technologies which are to be tested or put to trial can be taken up through KVKs. Research and Extension should go hand in hand and the KVK system should be treated as an important partner in the technology development continuum. Crop and technology cafeteria consisting of both newly developed crops/technologies and traditional crops and practices can be established in the KVKs so that farmers are provided comprehensive and holistic information. Similarly, KVKs can demonstrate the

A view of participant dignitaries in zonal workshop, 2021

technologies related to indigenous breeds as well as improved breeds. Science focus should be the centrality in all spheres of KVK activities. KVKs must strive to have modern diagnostic facilities and processing and value addition technologies with additional financial support from sponsoring, wherever possible. KVKs can promote use of Kisan Sarathi App among farming community so that farmers' needs and feedback are documented and mainstreamed. KVKs were urged to continue the good work being done in the use of ICT tools and approaches to enhance the reach.

Dr. V. Venkatasubramanian, Director, ICAR-ATARI, Bengaluru gave welcome and briefed about the important activities being done by the KVKs of Zone-XI. He emphasized the importance of convergence with the Agricultural Universities, ICAR Institutes and State Development Departments for the benefit of KVKs and farmers.

Vice-Chancellors of SAUs in Karnataka and Kerala namely Dr. M.K.Naik, VC, UAHS, Shivamogga; Dr. S. Rajendra Prasad, VC, UAS, Bengaluru; Dr. M.B.Chetti, VC, UAS, Dharwad; Dr. K.N. Kattimani, VC, UAS, Raichur; Dr. R. Chandra Babu, VC, KAU, Thrissur; and Dr. K.M.Indiresh, VC, UHS, Bagalkot participated and interacted in panel discussion on the above theme under the chairmanship of Dr. A. K. Singh, DDG (AE), ICAR, New Delhi.

1.2.4.8 Lakshadweep Islands Declared Organic: A Game Changing Effort by KVK Lakshadweep

After Sikkim State, Lakshadweep is the second territory in the country to declare whole territory as organic and getting the Large Area organic certification. Ladakh also now in the process of going organic after Lakshadweep. KVK Lakshadweep with the guidance of ICAR-ATARI, Bengaluru, actively associated with administration of Lakshadweep Union Territory in the process of getting Scope Certificate (large area organic farming) from PGS – India, Ministry of Agriculture and Farmer Welfare, Govt. of India for different crops cultivated by the farmers in Kadmat, Andrott, Agatti, Kalpeni, Minicoy, Kavaratii, Kiltan, Amini, Chetlat islands of Lakshadweep Union Territory. The standards given to the farmers by PGS India are in tune with National Standards for Organic Production (NSOP) prescribed under National Programme for Organic Production (NPOP) maintaining uniformity in organic production process and quality of organic products. This will enable the Lakshadweep farmers to obtain global recognition for their produce and get more remuneration/premium prices.

After detailed deliberation with the Lakshadweep Administration and other stakeholders, ICAR-ATARI, Bengaluru initiated the process of channelizing technologies of ICAR Institutes located in Karnataka, Kerala and Tamil Nadu. ICAR Institutes under their TSP programmes are extending technological support to KVK, Lakshadweep for different commodities.


PGS-India

Scope Certificate

PGS-India National Standards For Organic Production

This Scope Certificate

Scope Certificate (large area organic farming) from PGS – India, Ministry of Agriculture and FarmersWelfare, Government of India for different crops in Lakshadweep Union Territory

1.2.4.9 Review cum ZPMC meeting of Farmer FIRST Programme

The ICAR-Agricultural Technology Application Research Institute, Bengaluru organized the Review cum Action Plan Workshop and Zonal Programme Management Committee (ZPMC) meeting of Farmer FIRST Programme on August 6, 2021.

A view of participant dignitaries in review-cum ZPMC meeting of Farmer FIRST programme

Dr. V. Venkatasubramanian, Chairman, ZPMC & Director, ICAR-ATARI, Bengaluru in his opening remarks, emphasized the need for strengthening of all basic farm components which move beyond production and productivity, and address the issues which are related to post harvest technology, value addition, marketing and strengthening the farmers farming system. Technology assemblage based on changing needs of farmers should be taken care. Action plan must give attention to integration of technologies with respect to specific FFP objectives. Farmer-scientist interface to be ensured and include climate resilient technologies for strengthening the resource integration of zameen, jal, jungle, janvar and jan for doubling of farmers income.

Dr. S. Prabhu Kumar, Member PMC & Former ZPD (Zone-VIII and Zone-I), applauded the achievements of FFP centres from Zone-XI and asked for proper documentation to publicize at national level. Dr. A. K. Mehta, Member, ZPMC & Former ADG (AE), ICAR, New Delhi appreciated the work done by FFP centers and suggested that all technological modules should be implemented effectively. Dr. H. Phillip, Member, ZPMC & Former DE, TNAU, Coimbatore highlighted the importance of documentation with exact data and standardized methodology. He suggested assessing the effectiveness of interventions in terms of gain in knowledge and extent of adoption. Non-adoption must be carefully looked into for reasons and for initiating appropriate activities. He further suggested documentation of success stories in both print and video form. Shri H. Sadananda & Shri Vijayendra Gurunath Nadajoshi, farmer representatives and Members, ZPMC participated and provided this valuable feedback. FFP centres ICAR-CPCRI, Kasaragod (Regional Station, Kayamkulam), ICAR-IIHR, Bengaluru and ICAR-NIANP, Bengaluru presented the progress for the year 2020-21 and action plan 2021-22. The scientists from ICAR-ATARI, Bengaluru participated and interacted during the meeting.

1.2.4.10 Banana Flour Finding a Place in Indian Food Recipe

Indian stakeholders are now taking food items prepared with banana flour. Realizing the immense potential and opportunities available with banana flour, workshop on "Banana flour (BaKaHu) value addition and competition" was organized by ICAR-Krishi Vigyan Kendra, Uttara Kannada in collaboration with Uttara Kannada Organic Federation, Sirsi, Department of Horticulture, Sirsi and State Department of Agriculture (ATMA) on August 11, 2021 at KVK, Uttar Kannada, Karnataka as a part of the "*Azadi Ka Amrut Mahotsav*" to commemorate 75 Years of India's Independence. Over 350 participants including farmers, farm women, entrepreneurs, SHGs and other stakeholders participated in the workshop from various districts of Karnataka and fifteen persons from different parts of the country, connected through online platform.

A view of dignitaries in the meeting

A view of BaKaHu value added products

The main attraction of the workshop was exhibition cum competition of BaKaHu value added products. Nearly 56 farm women and SHG members participated, prepared and exhibited more than 175 BaKaHu products in sweet, spicy and daily usable category. The exhibition highlighted the importance of banana powder products diversity and nutritional importance. Products were evaluated as excellent, very good and good categories; accordingly, certificates were issued to all the participants. The products such as bakahu chocolate, bakahu jalebi, bakahu cake, bakahu sanjivini, bakahu kurkure, bakahu bhakarwada, bakahu khakhra, bakahu uppittu, bakahu burfi, bakahu kare, bakahu chakli, bakahu idli, bakahu mudde etc. were rated as excellent products.

1.2.4.11 KVK Farmers Participated in Live Telecast of Hon'ble Prime Minister during National Conclave on Natural Farming

The Hon'ble Prime Minister Shri Narendra Modi addressed farmers at the National Conclave on Natural Farming as a part of Pre-Vibrant Gujarat Summit 2021, Anand through a video conference on December 16, 2021. KVKs of ICAR-ATARI, Zone-XI actively took part in the programme of Virtual Interaction with Hon'ble Prime Minister. A total of 3393 farmers viewed telecast programme at their respective KVKs. Addressing the farmers, the Hon'ble Prime Minister called for adaptation of agriculture in accordance with new requirements and new challenges of the journey till 100 years of independence. The Hon'ble Prime Minister noted that in the last six-seven years, several steps have been taken, from seed to market, to increase income of the farmers. Soil testing, new seeds, PM Kisan Samman Nidhi, MSP at 1.5 times the cost

The Hon'ble Prime Minister Shri Narendra Modi addressing farmers at the National Conclave on Natural Farming held on December 16, 2021

of production, irrigation and a strong network of Kisan Rail are a few that have taken the sector in that direction. He greeted the farmers from all over the country and expressed his happiness over their contribution in achieving self-sufficiency on food production.

While acknowledging the important role of chemicals and fertilizers in the green revolution, the Hon'ble Prime Minister emphasized the need for working on its alternatives simultaneously. He warned against the dangers of pesticides and imported fertilizers which lead to increased costs and also cause damage to health. He stressed that this is the right time to take big steps before the problems related to agriculture become even worse. "We have to take our agriculture out of the lab of chemistry and connect it to the lab of nature. When I talk about nature's laboratory, it is completely science-based", he said. The Hon'ble Prime Minister said the more modern the world is becoming, the more it is moving towards 'back to basic'. "It means connecting with roots. Only farmers can understand this better than anyone else. The more we water the roots, the more the plant grows".

The Hon'ble Union Ministers Shri Amit Shah, Shri Narendra Singh Tomar, His Excellency Governor of Gujarat, the Hon'ble Chief Minister of Gujarat and Uttar Pradesh were among those present on the occasion. Addressing the conclave prior to the Hon'ble Prime Minister, his Excellency the Governor of Gujarat spoke about his experience with natural farming and how earthworms and natural resources like desi cow dung, jaggery and other items can lead to an increase in the nutritional content of the soil and result in increased crop production.

1.2.4.12 The Hon'ble Minister for Defence released Organic Certificate for Lakshadweep Islands

Shri Rajnath Singh, Hon'ble Defence Minister declared the entire Union Territory of Lakshadweep as the Fully Organic Territory while inaugurating the Mahatma Gandhi's Statue during the celebrations of 152nd Birth Anniversary of Mahatma Gandhi organized by the Administration of Union Territory of Lakshadweep at Kavaratti, Lakshadweep on October 02, 2021. Hon'ble Defence Minister also applauded the four major programmes of the Krishi Vigyan Kendra, Lakshadweep of ICAR-Central Marine Fisheries Research Institute, Kochi during the occasion. The Hon'ble Minister presented the Certificate of Declaration to the Shri Praful Patel, Administrator, Union Territory of Lakshadweep. The Lakshadweep is the Second Union Territory / State to be declared fully organic after Sikkim.

The certification is under the PGS-India, a Participatory Organic Guarantee Programme of the Department of Agriculture & Farmers Welfare, Government of India. The certification will enhance coconut production and coconut value-addition enterprises in the Islands paving the way for increased value-addition and local employment generation bringing in big economic gains for the Islands. The Hon'ble Minister commissioned the 'Poultry Feed and Organic Manure Making Unit' of the ICAR-CMFRI, KVK, Lakshadweep established in association with the ICAR-CIFT, Kochi as a part of demonstrating the ICAR - CIFT's technology for the production of poultry

The Hon'ble Defence Minister Shri Rajnath Singh presenting Organic Certificate granted to UT of Lakshadweep to Shri Praful Patel, Hon'ble Administrator, UT of Lakshadweep

The Hon'ble Defence Minister Shri Rajnath Singh handed over Portable Coconut Sap Chiller to the farmer of KVK, Lakshadweep

The Hon'ble Defence Minister Shri Rajnath Singh handed over Coconut Tree Climbing Machine to farmer of KVK, Lakshadweep

The Hon'ble Defence Minister Shri Rajnath Singh Virtually Commissioned Fish Waste Management Machine at Fishermen Cooperative Society

feed and organic manure from fish waste. The Unit can produce one tonne feed / manure per day and will be operated by the Fishermen Cooperative Society, Kavaratti on commercial basis. The Tuna fishery of Lakshadweep generates nearly 3000 tonnes of waste annually which can yield nearly 4000 tonnes of poultry feed / manure every year.

The ICAR-CMFRI, KVK-Lakshadweep under the ICAR-Agricultural Technology Application Research Institute, Bengaluru is the Regional Centre that is responsible for registering the farmers besides capacity building and issuance of certificates to the farmers / groups from time to time. Nearly 8,000 farmers have been registered with the KVK, Lakshadweep with the active support of the Department of Agriculture, U.T. of Lakshadweep.

1.2.4.13 Administrative Building of KVK, Kolar Inaugurated

The Hon'ble Minister of State for Agriculture and Farmers Welfare, Sushri Shobha Karandlaje inaugurated the Administrative Building of KVK, Kolar on October 10, 2021. During the inaugural speech, the Hon'ble Minister said that Krishi Vigyan Kendras serve as knowledge and information hub for regional problems of various crops and other allied agriculture sectors in the locality. She also said that KVKs carry out soil and water analysis and advise farmers to apply optimum nutrients to crops that only based on soil health card reports. She opined that the Union Government's soil health card distribution scheme has helped to educate farmers in this direction. She informed the gathering that the KVKs help in diagnosis of pest and diseases of various crops and give suitable advises for their management.

The Hon'ble Minister noted that the United Nations has decided to celebrate the year 2023 as International Year of Millets. Millets are best suited for dry regions like Kolar and in future there would be great demand for millets because of their health benefits thus encouraged farmers to grow more and more millets which require

The Hon'ble Minister of State for Agriculture and Farmers Welfare Sushri Shoba Karandlaje inaugurated the administrative building of KVK, Kolar on October 10, 2021

minimum management practices. Declaring 2023 as International Year of Millets will create more demand and better marketing avenues for millets like ragi, sorghum, bajra and other minor millets, she opined. The Hon'ble Minister also emphasized that under the flagship programme of ODOP of the Union Government, tomato has been identified for Kolar district and stressed on the need to establish suitable storage facilities, processing units and proper marketing facilities. Finding avenues for export opportunities for such products through APEDA would help in doubling of farmers' income. The Hon'ble Minister also stressed on the need to bring more area under oilseed crops which helps to reduce the import of edible oils and also help farmers to realize better returns. She advised farmers to take up several agri related activities as subsidiary enterprise along with field and horticulture crops in an integrated approach so that farmers will realize sustainable income.

As a Chief Guest, Deputy Director General (Agricultural Extension), ICAR, New Delhi, Dr. A. K. Singh joined the event online and addressed the gathering on various activities of KVKs and their role in dissemination of new agricultural technologies to farmers. The Hon'ble Member of Parliament, Kolar Shri. S.Muniswamy; Member of Legislative Assembly, Kolar Shri. K. Srinivasa Gowda; Vice Chancellor of UHS, Bagalkot Dr. K. M. Indiresh; Director of ICAR-ATARI, Bengaluru Dr. V. Venkatasubramanian; and Director of Extension, UHS, Bagalkot Dr. S. I. Athani were present in the event.

1.2.4.14 Institute Foundation Day Celebrated

The Hon'ble Minister of State for Agriculture and Farmers Welfare, Sushri Shobha Karandlaje inaugurated the Institute Foundation Day of ICAR-ATARI, Bengaluru on November 01, 2021 along with celebration of Kannada Rajyotsava. Dr. V. Venkatasubramanian, Director highlighted the achievements of ICAR-ATARI, Bengaluru and its KVKs for upliftment of farming community in Zone-XI. Dr. Raghavendra Bhatta, Director, ICAR – NIANP, Bengaluru graced the occasion as chief guest and lauded the efforts of ICAR-ATARI and its KVKs in transfer of technology.

On the occasion, staff and retired staff of ICAR–ATARI, Bengaluru shared their experiences about the Institute's functioning, developments and achievements over the decades. Ms. K. Roopakala, LDC (Administration) and Mr. N. Vinod Kumar, LDC (Accounts) of ICAR-ATARI, Bengaluru bagged Foundation Day Award 2021 for their best performance during the year 2020.

The Hon'ble Minister in her address appreciated the work done by KVKs and said that new varieties and technologies assessed and demonstrated by KVKs are helpful for the farmers for increasing their farm income. A plan is necessary to bring a paradigm shift in the farming approach, from water guzzling crops like rice and wheat to millet production. Further she expressed that India aspired to become a global millet exporter by 2023 and also the nation will be witnessed as the hub for the production of organic and quality millets in the world.

The Hon'ble Minister of State for Agriculture and Farmers Welfare Suhri Shobha Karandlaje addressing foundation day of ICAR-ATARI

Celebration of Kannada Rajyotsava

Flag hoisting on the occasion of Kannada Rajyotsava

The Hon'ble Minister presented Foundation Day Award 2021 to Ms. K. Roopakala, LDC (Administration) and Mr. N. Vinod Kumar, LDC (Accounts) of ICAR-ATARI, Bengaluru for their best performance during the year 2020.

1.2.4.15 Awareness Programme on Agriculture and Environment: The Citizen Face

As a part of Azadi Ki Amrut Mahotsav India @75, KVKs of ICAR-ATARI, Bengaluru organized awareness programme on "Agriculture and Environment: The Citizen face" on November 26, 2021. On this occasion, the programme on orientation of college students towards opportunities in agriculture sector on entrepreneurship, exposure visit to different demonstration plots at the campus, drawing and rangoli competitions were organized to the students by KVKs of Karnataka and Kerala. An orientation was given to the students on various aspects of agriculture production, environment, opportunities for self employment and entrepreneurship. Quiz programme was conducted for the students and winners were given mementos as token of appreciation and motivation. Seeds and seedlings were distributed to students to encourage homestead agriculture. Drawing competition on Integrated Farming System was conducted. Students were exposed to technologies related to soil fertility management, organic farming and livestock. KVKs of ATARI, Bengaluru organised 31 orientation programmes with 1468 participants, 599 farmers visited 16 demonstration plots, 24 debate/quiz/drawing competition were organised for 748 students and nine exhibitions were conducted for 546 participants.

KVK, Chikkmagaluru

KVK, Shivamogga

KVK, Chikkaballapur

KVK, Palakkad

1.2.4.16 Special Swachhata Campaign

KVKs of ATARI, Bengaluru organised Special Swachhata Campaign in adopted villages on 6 and 12 October, 2021. KVKs created awareness among the farming community of adopted villages about importance of general cleanliness at home and farm and adoption of quality farm products for higher returns and profitability, COVID related precautions to be taken, crop residue management, protection and conversation of soil, water, air and other natural resources and weather advisory by KVK District Agro-Meteorology Units.

During the programme, a cleaning drive was conducted in the villages and seed kits were provided to the farmers. All 48 KVKs from Zone-XI and ICAR-ATARI, Bengaluru conducted Special Swachhata Campaign programme wherein 1895 farmers and 834 school children were participated.

1.3 Budget

A total of ₹. 10168.46 lakh budget was sanctioned to ICAR-ATARI, Zone-XI, Bengaluru for the year 2021-22 of which ₹. 9078.06 lakh for recurring, 459.45 lakh for non-recurring and ₹. 630.95 lakh for special programmes. Head-wise details of budget are furnished in Table 3.

Table 3: Head-wise budget of ICAR-ATARI, Zone XI, Bengaluru for 2021-22

Heads	Sanction (Rs. in Lakh)			
	ATARI	KVKs	Support to DEE at SAUs	Total
(A) Recurring				
Pay & Allowance	299.56	8057.42	0	8356.98
T. A	8.96	27.77	3.35	40.08
HRD	3.30	0	4.01	7.31
Contingencies	55.99	602.60	15.10	673.69
Total (A)	**367.81**	**8687.79**	**22.46**	**9078.06**
(B) Non-Recurring				
Works	0	131.38	0	131.38
Furniture & Equipment	9.84	318.23	0	328.07
Total (B)	**9.84**	**449.61**	**0**	**459.45**
Total (A+B)	**377.65**	**9137.40**	**22.46**	**9537.51**
(C) Special Programmes				
ARYA	17.75	119.09	0	136.84
NICRA	4.90	155.44	0	160.34
NFSM	9.91	91.50	0	101.41
NMOOP	9.65	71.60	0	81.25
FFP	4.06	61.50	0	65.56
DAMU	0	85.55	0	85.55
Total (C)	**46.27**	**584.68**	**0**	**630.95**
Total (A+B+C)	**423.92**	**9722.08**	**22.46**	**10168.46**

Chapter - 2

About Krishi Vigyan Kendras (KVKs)

The Indian Council of Agricultural Research, New Delhi has established Krishi Vigyan Kendra in each district and additional KVK in larger districts in the country. The ICAR-ATARI is playing a vital role in orienting the KVKs to function as knowledge and resource centres at the district level for serving the farmers, farmwomen, rural youth, extension functionaries and other stakeholders through selected agricultural technologies.

This chapter consists of following heads:

2.1 Establishment

2.2 Vision, mission, mandate and activities

2.3 Staff strengt

2.4 Infrastructur

2.5 Scientific Advisory Committee

2.6 Revolving fund

2.7 Thrust areas

2. About Krishi Vigyan Kendras (KVKs)

Krishi Vigyan Kendra (KVK) is the agricultural knowledge and resource centre for farmers, farmwomen, rural youth, extension functionaries and other stakeholders involved in agriculture development. This is an innovative district level institution meant for promoting science-based practices in agriculture and allied sectors in a problem-solving mode. KVKs accomplish this through assessment, demonstration and capacity development on location specific technology modules. Besides, they also perform related activities keeping in view the needs of farmers and other stakeholders.

2.1 Establishment

Based on the recommendation of Education Commission (1964-66), consideration/review by Planning Commission and Inter-Ministerial Committee, and further recommendation by a committee headed by Dr. Mohan Singh Mehta appointed by ICAR in 1973, the idea of establishment of Farm Science Centre (Krishi Vigyan Kendra) was evolved. First KVK was established in 1974 at Puducherry on pilot basis under the administrative control of Tamil Nadu Agricultural University, Coimbatore. The XI Five Year Plan envisaged establishing additional KVK in larger districts. Zone-XI had the privilege of establishing the first additional KVK in India at Tumakuru district, Karnataka. With effect from April 2017, under reorganization of zones, ATARI Bengaluru became Zone-XI with jurisdiction of Karnataka, Kerala and Union Territory of Lakshadweep with 48 KVKs hosted by State Agricultural Universities (33), Non-Governmental Organizations (08) and Indian Council of Agricultural Research (07). State and host organization wise distribution of KVKs is given in Table 4.

Table 4: State and host organization wise KVKs in Zone-XI

States/UT	Host organization wise KVKs (No.)			Total KVKs (No.)
	SAUs	NGOs	ICAR Institutes	
Karnataka	26	05	02	33
Kerala	07	03	04	14
Lakshadweep	00	00	01	01
Total	**33**	**08**	**07**	**48**

2.2 Vision, Mission, Mandate and Activities

2.2.1 Vision

Science and technology-led growth leading to enhanced productivity, profitability and sustainability of agriculture.

2.2.2 Mission

Farmer-centric growth in agriculture and allied sectors through application of appropriate technologies in specific agro-ecosystem perspective.

2.2.3 Mandate

Technology assessment and demonstration for its application and capacity development.

2.2.4 Activities

- On-farm testing to assess the location specificity of agricultural technologies under various farming systems.
- Organize frontline demonstrations to establish production potential of technologies on the farmers' fields.
- Capacity development of farmers and extension personnel to update their knowledge and skills on modern agricultural technologies.
- Production and supply of quality seeds and planting materials to the farmers.
- Function as knowledge and resource centre of agricultural technologies for supporting initiatives of public, private and voluntary sector in improving the agricultural economy of the district.
- Provide farm advisories using ICT and other media means on varied subjects of interest of farmers.

2.3 Staff Strength

The approved strength of manpower at each KVK is 16, which includes one Head of KVK at Senior Scientist level, six Scientists /Subject Matter Specialists, three Programme Assistants,

two administrative staff, two drivers and two supporting staff. Accordingly, the total sanctioned staff for 48 KVKs of Zone-XI is 768, out of which 553 (72.00%) were in position. Details of state-wise and category-wise staff strength of KVKs are furnished in Table 5.

2.4 Infrastructure

State-wise details of infrastructure in KVKs of Zone XI are presented in Table 6. As on December, 2021, 47 KVKs have administrative building,42 KVKs have farmers hostel, 28 KVKs have staff quarters, 16 KVKs have established rain water

Table 5: State-wise and category wise staff strength of KVKs (as on 31.12.2021)

Category	Staff Strength of KVKs (No.)							
	Karnataka (33 KVKs)		Kerala (14 KVKs)		Lakshadweep (1 KVK)		Total (48 KVKs)	
	S	F	S	F	S	F	S	F
Heads of KVKs (Senior Scientists)	33	30	14	14	1	1	48	45
Scientists (Subject Matter Specialists)	198	151	84	74	6	1	288	226
Programme Assistants	99	74	42	22	3	0	144	96
Administrative staff	66	40	28	21	2	0	96	61
Drivers	66	45	28	22	2	0	96	67
Supporting staff	66	34	28	23	2	1	96	58
Total	**528**	**374**	**224**	**176**	**16**	**3**	**768**	553
Filled (%)	**70.83**		**78.57**		**18.75**		**72.00**	
S = Sanctioned posts; F = Filled posts								

Table 6: State wise details of infrastructure in KVKs

Type of infrastructure	Infrastructure (No.)			
	Karnataka	Kerala	Lakshadweep	Total
Administrative buildings	33	14	00	47
Farmers hostels	30	12	00	42
Staff quarters	19	09	00	28
Demonstration units	49	31	00	80
Rainwater harvesting units	10	06	00	16
E-connectivity	11	10	00	21
Soil and water testing labs	24	13	01	38
Portable carp hatcheries	04	03	00	7
Minimal processing units	01	02	00	3
Plant health diagnostic labs	09	05	00	14
Four wheelers	33	14	00	47
Two wheelers	63	28	03	94

harvesting units, 21 KVKs have e-connectivity, 38 KVKs have soil and water testing labs, seven KVKs have portable carp hatchery, three KVKs have minimal processing unit and 14 KVKs have plant health diagnostic labs. All together there are 80 demonstration units, 94 two-wheelers and 47 four-wheelers in KVKs.

2.5 Scientific Advisory Committee

Scientific Advisory Committee (SAC) is the advisory body, which guides and reviews KVK activities every year. Head of host organization is the Chairman and members include Director of ICAR-ATARI, Director of Extension in the jurisdiction of KVK, district level officials from all development departments of respective district, and representatives of farmers/farmwomen from respective district. SAC discusses the progress of work done as per mandate and provide guidance for future activities. Total 30 KVKs conducted SAC meeting during the reporting period.

2.6 Revolving Fund

Revolving fund provided by ICAR is in operation at 47 KVKs of the Zone and the remaining three have revolving fund of their own. KVKs are utilizing revolving fund for production of technological products and the net available balance as on December 31, 2021 was ₹.13.54 crore. Twenty-two KVKs had closing balance of more than ₹.20.00 lakh, 12 KVKs had a balance in the range of ₹.10.00 to 20.00 lakh, eight KVKs had closing balance in the range of ₹.4.00 to 10.00 lakh and five KVKs had closing balance less than ₹.4.00 lakh.

Administrative building (KVK, Davanagere)

Campus (KVK, Wayanad)

Farm unit (KVK, Bengaluru Rural)

Home science laboratory (KVK, Kottayam)

Training hall (KVK, Udupi)

Demo unit (KVK, Idukki)

2.7 Thrust Areas

Based on the agro-ecological situation and prevailing cropping and farming systems, KVKs are broadly working on the following thrust areas keeping in view the strategy for Doubling of Farmers Income (DFI) as set by the Hon'ble Prime Minister:

- Introduction and up-scaling of improved varieties/hybrids of crops and livestock breeds through technical and quality input back-up.
- Sustainable crop production through integrated nutrient, pest and disease management and organic farming strategies.
- Development and promotion of crop diversification and alternate land use systems.
- Empowerment of women and youth in terms of improved nutrition, income generation and drudgery reduction through technology interventions.
- Scientific management of ruminants and poultry.
- Promotion of horticulture as a mechanism of crop diversification and augmenting family income.
- Value addition, processing and market facilitation of enterprises.
- Soil health management, soil & water conservation for drought proofing and sustainable rainfed farming.
- Small scale mechanization for saving time, reducing cost and drudgery reduction.
- Capacity building of rural youth and women to establish self-employment units.
- Human resource development in fishery sector through training and capacity building.

Chapter - 3

Achievements

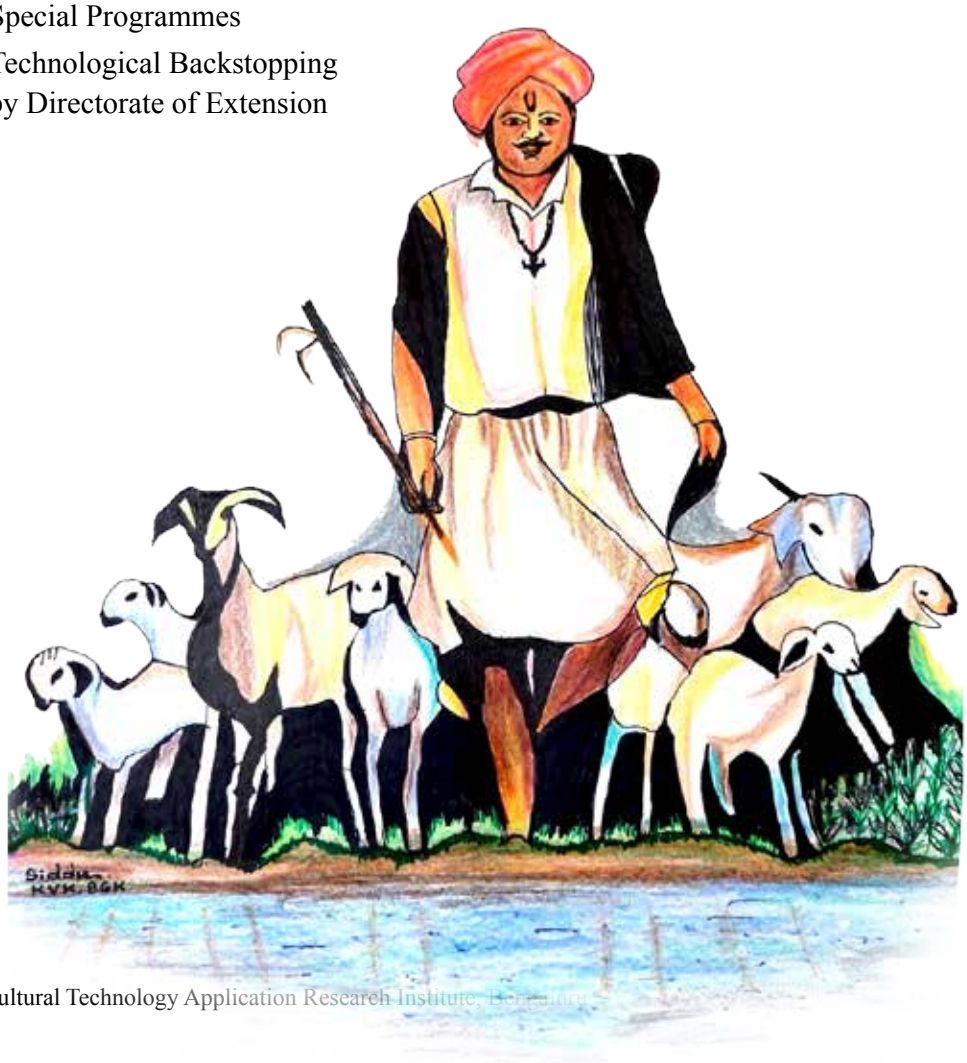
The ICAR-ATARI, Bengaluru is guiding its KVKs in terms of technology and methodology backstopping for implementation of mandated activities through formulation of various technical programmes. Further, the ICAR-ATARI is structuring the technical programme of KVKs through SAUs level and state level annual action plan workshops in association with the Directorate of Extension Education of State Agricultural Universities before start of kharif season every year wherein technical programmes for each KVK are discussed and finalized. Accordingly, KVKs are implementing the action plan under the technical guidance of ICAR-ATARI, respective Directorate of Extension and host organization.

This chapter consists of the following heads:

3.1 Krishi Vigyan Kendras

3.2 Special Programmes

3.3 Technological Backstopping by Directorate of Extension



3.1 Krishi Vigyan Kendras

3.1.1 Technology Assessment

KVKs in the Zone carried out technology assessment through 281 On Farm Tests (OFTs) which included 211 OFTs on crops, 44 on livestock and 26 on enterprises (Table 7). Under crops, 503 technological options were assessed involving 1000 farmers. In livestock category, 88 technological options were put to test through 258 trials. Under enterprises, 127 trials were carried out for assessing 50 technological options. In Karnataka, KVKs carried out 181 OFTs which included 151 on crops followed by livestock (22) and enterprises (8). Total 90 OFTs were conducted by KVKs in Kerala, of which 57 tests were on crops followed by livestock (20) and enterprises (13). Ten OFTs were carried out by KVK Lakshadweep.

KARNATAKA

a. Crop wise technology assessment

Under crops, KVKs in Karnataka conducted 151 OFTs, of which 38 OFTs were taken up on vegetables, followed by cereals (26), pulses (23), commercial corps (19), oilseeds (14), species (9) plantation crops (8), fruits (7), medicinal (2) and tuber crops (1). Varietal evaluation was the major thematic area with 56 OFTs followed by integrated nutrient management (36). Details are provided in Table 8.

Table 7: Summary of OFTs conducted by KVKs

States/UT	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/locations (No.)
Karnataka				
Crops	151	359	629	630
Livestock	22	49	126	107
Enterprises	8	18	44	14
Total	**181**	**426**	**799**	**751**
Kerala				
Crops	57	141	307	355
Livestock	20	35	122	150
Enterprises	13	25	66	70
Total	**90**	**201**	**495**	**575**
Lakshadweep				
Crops	3	3	15	15
Livestock	2	4	10	10
Enterprises	5	7	17	16
Total	**10**	**14**	**42**	**41**
Zone XI				
Crops	**211**	**503**	**951**	**1000**
Livestock	**44**	**88**	**258**	**267**
Enterprises	**26**	**50**	**127**	**100**
Grand Total	**281**	**641**	**1336**	**1367**

Table 8: Crop category and thematic area wise number of OFTs conducted by KVKs of Karnataka

Thematic areas	Cereals	Oilseeds	Pulses	Commercial	Vegetables	Fruits	Flowers	Plantation	Tubers	Spices	Medicinal	Total
Cropping systems			2	1	1							4
Drudgery reduction			2									2
Farm machineries			1					2				3
Integrated Crop Management	1	1	4	3	1				1	1		12
Integrated Disease Management			2	1	4	5				1		13
Integrated Farming System					1							1
Integrated Nutrient Management	13	1	2	5	11	2	1			1		36
Integrated Pest Management	2			8	4			1				15
Resource conservation technology	1			1	1			5				8
Seed / Plant production					1							1
Varietal evaluation	9	12	10		14		3			6	2	56
Total	**26**	**14**	**23**	**19**	**38**	**7**	**4**	**8**	**1**	**9**	**2**	**151**

Thematic area-wise further details of OFTs conducted by KVKs in Karnataka are provided in Table 9. Total of 151 OFTs on various crops were carried out in 11 different thematic areas, in which KVKs assessed 359 technological options by involving 630 farmers. Large number of OFTs were conducted under the theme varietal evaluation for assessing 141 technological options in 230 farmers fields. Integrated Nutrient Management was the next major thematic area wherein 81 technological options were tested by implementing 147 trials. Integrated Pest Management (39 technologies and 64 trials), Integrated Disease Management (29 technologies and 51 trials) and Integrated Crop Management (24 technologies and 53 trials), were the other major thematic areas where the assessment was carried out.

b. Livestock wise technology assessment

Livestock thematic area wise technology assessment by KVKs of Karnataka is presented in Table 10. Details indicated that 49 technologies were assessed in seven thematic areas by involving 107 farmers through 126 trials. Out of 22 OFTs implemented under livestock, more number of tests were carried out for evaluation of breeds (6) followed by feed and fodder management (5), disease management and varietal evaluation

Table 9: Thematic area wise technology assessment under crops by KVKs of Karnataka

Thematic areas	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Cropping system	4	9	10	10
Drudgery reduction	2	3	10	10
Farm machineries	3	6	30	30
Integrated Crop Management	12	24	53	53
Integrated Disease Management	13	29	51	47
Integrated Farming System	1	2	4	4
Integrated Nutrient Management	36	81	147	146
Integrated Pest Management	15	39	64	64
Resource conservation technology	8	22	32	34
Seed / Plant production	1	3	2	2
Varietal evaluation	56	141	226	230
Total	**151**	**359**	**629**	**630**

Table 10: Thematic area wise technology assessment under livestock by KVKs of Karnataka

Thematic area	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Disease management	3	6	30	21
Evaluation of breeds	6	13	22	22
Feed and fodder management	5	10	24	21
Varietal evaluation	3	9	11	11
Nutrition management	2	4	15	15
Processing and value addition	1	3	10	3
Production and management	2	4	14	14
Total	**22**	**49**	**126**	**107**

(3 each), nutrition management (2) and production and management (2 each) and processing and value addition (1).

c. Enterprise wise technology assessment

Under enterprises, KVKs of Karnataka conducted eight OFTs, out of which more number of OFTs were taken up on drudgery reduction (3) as detailed in Table 11. Altogether assessed 18 technologies under six different thematic areas through 44 trials.

Kerala

a. Crop wise technology assessment

Crop-category and thematic area wise number of on farm tests conducted by KVKs of Kerala and the details are presented in Table 12. The data indicated that the KVKs of Kerala have done the technology assessment through 57 crops under 10 thematic areas. Maximum number of OFTs were recorded in vegetable crops (20), followed

by plantation crops (8), cereals, pulses and spices (6 each). Varietal evaluation was the major theme (27), followed by Integrated Disease Management (11) and Integrated Pest Management (8).

The thematic area wise technology assessment on crops taken up by KVKs in Kerala was presented in Table 13. Data indicated that the Kerala KVKs have done the technology assessment through 57

Table 11: Thematic area wise technology assessment under enterprises by KVKs of Karnataka

Thematic area	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Drudgery reduction	**3**	**7**	**20**	**5**
Health and nutrition	1	2	4	2
Organic farming	1	3	10	1
Processing and value addition	1	1	5	**3**
Small-scale income generation	1	2	2	2
Storage techniques	1	3	3	1
Total	**8**	**18**	**44**	**14**

Table 12: Crop-category and thematic area wise number of OFTs conducted by KVKs of Kerala

Thematic areas	Cereals	Oilseeds	Pulses	Commer-cial	Vege-tables	Fruits	Flowers	Planta-tion	Tubers	Spices	Medici-nal	Total
Cropping systems								1				1
Farm machineries								2				2
Integrated Crop Management											1	1
Integrated Disease Management					5			5	1			11
Integrated Nutrient Management	1				3							4
Integrated Pest Management	2				3	2				1		8
Resource conservation technology										1		1
Seed / Plant production						1						1
Varietal evaluation	2		6		9	1	1		3	4	1	27
Weed management	1											1
Total	**6**		**6**		**20**	**4**	**1**	**8**	**4**	**6**	**2**	**57**

Table 13: Thematic area wise technology assessment under crops by KVKs of Kerala

Thematic areas	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Cropping systems	1	1	5	5
Farm machineries	2	4	10	10
Integrated Crop Management	1	1	5	5
Integrated Disease Management	11	23	58	100
Integrated Nutrient Management	4	5	20	20
Integrated Pest Management	8	18	41	49
Resource conservation technology	1	3	5	5
Seed / Plant production	1	1	2	2
Varietal evaluation	27	59	156	154
Weed management	1	2	5	5
Total	**57**	**141**	**307**	**355**

OFTs with 141 technology options and they were assessed on ten thematic areas by involving 355 farmers through 307 trials. Large number of OFTs (27) and technology options (59) were assessed under thematic area varietal evaluation, followed by Integrated Disease Management and Integrated Pest Management.

b. Livestock wise technology assessment

The thematic area wise technology assessment under livestock taken up by KVKs of Kerala are presented in Table 14. Data indicated that KVKs have done the technology assessment through 20 OFTs with 35 technology options and they were assessed through five thematic areas by involving 150 farmers/locations through 122 trials. More number of OFTs were conducted on production and management (6), followed by evaluation of breeds (5). Large number of technology options were also assessed on production and management and evaluation of breeds (10 each) followed by disease management.

Table 14: Thematic area wise technology assessment under livestock by KVKs of Kerala

Thematic area	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Disease management	4	8	41	41
Evaluation of breeds	5	10	22	22
Nutrition management	4	6	18	18
Processing and value addition	1	1	5	5
Production and management	6	10	36	64
Total	**20**	**35**	**122**	**150**

c. Enterprise wise technology assessment

Thematic area wise details of number of technologies assessed, number of trials and farmers involved under enterprises OFTs by KVKs of Kerala were presented in Table 15. Data indicated that KVKs have done technology assessment under enterprises through 13 OFTs with 25 technology options and they were assessed through 4 thematic areas by involving 70 farmers/locations through 66 trials. Large number of OFTs and technology options were assessed under thematic area value addition (6), which was followed by health and nutrition (4).

Lakshadweep

a. Crop wise technology assessment

Crop category and thematic area wise OFTs conducted by KVK of Lakshadweep is presented in Table 16. Data revealed that three OFTS were conducted of which, two tests were conducted in varietal evaluation followed by integrated pest management (1). Among crop category two OFTs were carried out in vegetables followed by fruits.

Data depicted in Table 17 revealed that the KVK, Lakshadweep assessed three technologies through three OFTs with 15 trails by involving 15 farmers

Table 15: Thematic area wise technology assessment under enterprises by KVKs of Kerala

Thematic area	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Drudgery reduction	2	3	6	6
Health and nutrition	4	7	38	20
Small-scale income generation	1	2	5	5
Value addition	6	13	17	39
Total	**13**	**25**	**66**	**70**

Table 16: Crop-category and thematic area wise OFTs conducted by KVK, Lakshadweep

Thematic areas	Cereals	Oilseeds	Pulses	Commer-cial	Vege-tables	Fruits	Flowers	Planta-tion	Tubers	spices	Medici-nal	Total
Integrated Pest Management						1						1
Varietal evaluation					2							2
Total					2	1						3

Table 17: Thematic area wise technology assessment under crops by KVK, Lakshadweep

Thematic areas	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Integrated Pest Management	1	1	5	5
Varietal evaluation	2	2	10	10
Total	**3**	**3**	**15**	**15**

Table 18: Thematic area wise technology assessment under livestock by KVK, Lakshadweep

Thematic area	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Evaluation of breeds	1	2	5	5
Nutrition management	1	2	5	5
Total	**2**	**4**	**10**	**10**

Table 19: Thematic area wise technology assessment under enterprises by KVK, Lakshadweep

Thematic area	OFTs (No.)	Technologies (No.)	Trials (No.)	Farmers/ locations (No.)
Mushroom cultivation	1	2	5	5
Small-scale income generation	3	3	7	6
Value addition	1	2	5	5
Total	**5**	**7**	**17**	**16**

in two thematic areas, of which two OFTs were on the theme of varietal evaluation followed by integrated pest management (1).

b. Livestock wise technology assessment

KVK Lakshadweep carried out two OFTs through ten trails by involving ten farmers under livestock. Four technologies were assessed under two thematic areas *viz.*, evaluation of breeds (2) and nutrient management (2) (Table 18).

c. Enterprise wise technology assessment

KVK, Lakshadweep, conducted five OFTs through 17 trials by involving 16 farmers. More number of OFTs (3) were under small- scale income generation theme with three technologies, followed by mushroom cultivation and value addition (one technology each) (Table 19).

3.1.1.2 Location Specificity of Technologies

Three KVKs *viz.*, Belagavi II, Dharwad and Uttara Kannada assessed eight paddy varieties namely RNR-15048, GNV-1089, Mugadsiri, Jyoti, Sahyadri Megha, Sahyadri Panchamukhi, Sahyadri Kempumukhi and Sahyadri Jyoti Biliya along with farmers practice (BPT-5204) under rainfed condition and results are presented in Table 20.

Table 20: Assessment of paddy varieties under rainfed condition

Paddy Varieties	Belagavi II		Dharwad		Uttara Kannada	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice (BPT-5204)	21.70	1.50	25.83	2.44	38.50	1.64
RNR-15048	30.10	2.20	29.05	2.74	-	-
GNV-1089	27.70	2.10	-	-	-	-
Mugadsiri	-	-	27.10	2.56	-	-
Jyoti	-	-	-	-	38.50	1.64
Sahyadri Megha	-	-	-	-	41.70	1.78
Sahyadri Panchamukhi	-	-	-	-	52.10	2.14
Sahyadri Kempumukhi	-	-	-	-	60.20	2.37
Sahyadri Jyoti Biliya	-	-	-	-	47.00	2.01

Results indicated that Sahyadri kempumukhi variety recorded highest yield of 60.20 q/ha, followed by Sahyadri Panchamukhi 52.10 q/ha in Uttara Kannada district. Highest BCR (2.74) was recorded in Dharwad with RNR-15048.

Three KVKs *viz.*, Hassan, Mysuru and Shivamogga assessed five paddy varieties *viz.*, Gangavati Sona, RNR-15048, KMP-225 and KMLT-4 along with farmers practice under irrigated condition and results are given in Table 21. Results revealed that KMP-225 variety recorded highest yield of 67.10q/ha in Mysuru. However, at Shivamogga, KMLT-4 variety gave higher yield of 60.73 q/ha followed by RNR-15048 (60.32 q/ha) in Hassan. Highest BCR (2.86) was recorded in Hassan with variety RNR-15048.

Four KVKs *viz.*, Ballari, Tumakuru-I, Tumakuru-II and Vijayapura-I assessed six chilli varieties *viz.*, G-4, GPM 120-S-1, Arka Sanvi, Arka Gagan, Arka Meghana and Arka Khyati along with farmers practice against disease incidence and findings are given in Table 22. Results revealed that the variety Arka Khyati yielded maximum of 350.00 q/ha in Vijaypura-I district followed by GPM 120-S-1 335.60 q/ha with highest BCR of 3.56 in Ballari.

Five KVKs *viz.*, Belagavi-I, Shivamogga, Davanagere, Gadag and Tumakuru-II assessed seven groundnut varieties *viz.*, G2-52, KDG-128, GPBD-4, TG-37A, DGRMB-24, DGMRB-32 and Kadri Lepakshi along with farmers practice for drought tolerance and findings are given in Table 23. Results indicated that the variety G2-52 recorded maximum yield of 25.90 q/ha with highest BCR of 2.72, followed by GPBD-4 (25.23 q/ha) in Davangere with 2.65 BCR.

Ten KVKs *viz.*, Bengaluru Rural, Chamarajanagara, Chikkamagaluru, Chikkaballapura, Chitradurga, Davanagere, Haveri, Mandya, Mysuru and

Table 21: Assessment of Paddy varieties under irrigated condition

Paddy varieties	Hassan		Mysuru		Shivamogga	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	-	2.64	66	2.33	45.64	1.58
Gangavati Sona	50.23	2.44	-	-	54.10	1.66
RNR-15048	60.32	2.86	-	-	55.18	1.70
KMP-225	-	-	67.10	2.37	-	-
KMLT-4	-	-	-	-	60.73	1.81

Table 22: Assessment of chilli varieties against disease incidence

Chilli variety	Ballari		Tumakuru-I		Tumakuru-II		Vijaypura-I	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	221.30	2.84	198.00	2.19	164.20	2.20	240.00	1.26
G-4	301.40	3.20	-	-	-	-	-	-
GPM 120-S-1	335.60	3.56	-	-	-	-	-	-
Arka Sanvi	-	-	210.00	2.49	189.20	2.65	-	-
Arka Gagan	-	-	213.50	2.66	193.20	2.74	-	-
Arka Meghana	-	-	-	-	-	-	300.00	1.67
Arka Khyati	-	-	-	-	-	-	350.00	1.75

Table 23: Assessment of groundnut varieties for drought tolerance

Groundnut varieties	Belagavi-I		Shivamogga		Davanagere		Gadag		Tumakuru-II	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	14.97	0.11	15.30	1.61	22.10	2.30	4.84	1.43	7.90	1.62
G2-52	20.33	2.42	19.42	1.85	25.90	2.72	-	-	-	-
KDG-128	21.07	2.51	-	-	-	-	-	-	-	-
GPBD-4	-	-	18.34	1.82	25.23	2.65	5.29	1.52		
TG-37A	-	-	-	-	-	-	6.24	1.78		
DGRMB-24	-	-	-	-	-	-	6.80	1.93	10.33	2.12
DGMRB-32	-	-	-	-	-	-	-	-	9.85	1.92
Kadri Lepakshi	-	-	-	-	-	-	-	-	11.79	2.21

Table 24: Assessment of Nano fertilizers (N and Zn) on growth and yield of maize

KVKs	Farmer practice (TO1)		Technology options					
			TO2		TO3		TO4	
	Yield (q/ha)	B:C	Yield (q/ha)	B:C	Yield (q/ha)	B:C	Yield (q/ha)	B:C
Bengaluru Rural	58.69	2.04	66.75	2.24	62.59	2.18	68.40	2.27
Chamarajanagara	55.30	1.99	66.75	2.03	63.00	2.20	-	-
Chikkamagaluru	53.30	1.91	57.90	2.01	64.20	2.05	-	-
Chikkaballapura	56.20	2.08	62.60	2.15	65.82	2.20	-	-
Chitradurga	54.50	2.63	61.90	2.94	60.50	2.89	-	-
Davangere	46.36	1.97	49.84	2.13	50.88	2.21	-	-
Haveri	12.08	3.09	13.16	3.53	13.88	3.70	-	-
Mandya	57.98	1.62	63.51	1.72	66.47	1.76	-	-
Mysuru	31.25	1.54	36.50	1.54	33.75	1.54	38.50	1.58
Shivamogga	54.23	1.97	61.00	2.10	67.13	2.20	-	-

TO1: Application of NP fertilizers as basal dose and top dressing with N fertilizer, no or low K fertilizer use.

Chamarajanagara: DAP, Urea and Straight each + 2.5 bag mixed and applied per ha during sowing. 30 to 35 DAS apply straight DAP, Ammonium Sulphate and MOP each + 2.5 bag mixed and applied per ha (total N:P:K = 60:40:30 Kg).

Chitradurga: Basal dose 125 kg DAP and 62.5 kg MOP, top dressing urea- 125 kg per ha at 100 DAS.

TO2: RDF: 10 t/ha FYM, 100:50:25 NPK & 10 kg Zn/ha, 50% N & K, full P as basal, 25% N at 30 DAS, 25 & 50 % N at tasseling stage.

Chamarajanagara: Soil test based nutrient management (RDF: 40:20:10 Kg NPK/acre). 50% N, full P and K as basal, remaining 50 % N topdressing at 3 to 4 weeks after sowing.

TO3: RDF: 10 t/ha FYM, 50:50:25 NPK kg/ha, application of 50 % N & full P, K as basal, N and Zn Nano fertilizer spray at 30 DAS (4 ml/l) & 20 days after first spray

TO4: RDF: 12.5 t/ha FYM, 60:30:30 NPK kg/ha, 50% N, full P and K as basal, 50 % N at tasseling stage

Shivamogga assessed three technological options along with farmers practice and results are presented in Table 24. Technology option-4 performed better in maximization of yield 68.40q/ha in Bengaluru Rural followed by technology option-3 with yield of 67.13 q/ha in Shivamogga. Highest BCR of 3.70 was recorded in technology option-3 in Haveri.

Two KVKs *viz.*, Belagavi II and Dharwad assessed three technology options for management of fall armyworm (*Spodoptera frugiperda)* in Maize *viz.*, spraying with *Metarhiziumrileyi, Pseudomonas entomophila* and *Spinetoram* along with farmers practice and results are given in Table 25. Spraying of *Spinetoram* found to contribute higher yield of 54.60 q/ha with highest BCR 3.10 followed by spraying of *Metarhizium rileyi* 49.65 q/ha with BCR of 2.90 in Dharwad.

Table 25: Assessment of Entomopathogens for management of fall army worm (*Spodoptera frugiperda)* in maize

Technology options	Belagavi - II		Dharwad	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	46.50	1.51	43.75	2.50
Metarhiziumrileyi spray	49.05	1.85	49.65	2.90
Pseudomonas entomophila spray	47.60	1.76	-	-
Spinetoram spray	-	-	54.60	3.10

Table 26: Assessment of high yielding okra varieties

Okra varieties	Belagavi-II		Davangere		Vijayapura-II	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	172.10	2.19	148.26	2.42	171.00	2.46
Co-4	160.90	2.03	206.50	3.76	182.10	2.74
Arka Nikita	195.10	2.53	183.48	3.29	187.80	2.86

Three KVKs *viz.,* Belagavi-II, Davanagere and Vijayapura-II assessed two varieties of okra *viz.,* Co-4 and Arka Nikita along with farmers practice and as per the details given in Table 26. Results revealed that Co-4 variety recorded maximum yield of 206.50 q/ha with highest BCR of 3.76 in Davanagere followed by Arka Nikita with yield of 195.10 q/ha by KVK Belagavi-II.

Two KVKs *viz.*, Bengaluru Rural and Chitradurga assessed six pigeonpea varieties *viz.*, BRG-1, BRG-3, Ujwala, BRG-2, BRG-5 and BSMR-736 under rainfed condition along with framers practice and results are presented in Table 27. Findings indicated that variety BRG-1 recorded maximum yield of 30.50 q/ha, followed by BRG-3 (29.30 q/ha) in Bengaluru Rural. Highest BCR of 2.90 was recorded in Chitradurga district with BSMR-736 variety.

Three KVKs *viz.*, Chikkaballapura, Kolar and Ramanagara in Karnataka assessed three technological options along with farmers practice for hastening the nutrient status of the crop and results are presented in Table 28. Technological option-2 (Application of recommended NPK and FYM + supply of liquid microbial consortia through drip (3lts /acre/crop) @8 DAP and 25 DAP) have shown better results with leaf yield of 602.58 q/ha/yr in Kolar followed by 600.83 q/ha/yr leaf yield with highest BCR of 3.73 in Chikkaballapura with TO2.

Three KVKs *viz.*, Bengaluru Rural, Ramanagara

Table 27: Assessment of pigeonpea varieties under rainfed

Pigeon pea varieties	Bengaluru Rural		Chitradurga	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	26.70	1.69	-	-
BRG-1	30.50	1.79	-	-
BRG-3	29.30	2.23	-	-
Ujwala	23.50	2.16	-	-
BRG-2	-	-	7.30	2.30
BRG -5	-	-	9.10	2.75
BSMR-736	-	-	9.80	2.90

Table 28: Assessment on effectiveness of different liquid microbial consortia in mulberry

KVKs	Farmers practice (TO1)		Technology options					
			TO2		TO3		TO4	
	Leaf yield (q/ha/yr)	BCR	Leaf yield (q/ha/yr)	BCR	Leaf yield (q/ha/yr)	BCR	Leaf yield (q/ha/yr)	BCR
Chikkaballapura	490.17	2.83	600.83	3.73	593.33	3.68	586.67	3.44
Kolar	511.80	2.76	602.58	3.63	599.03	3.58	574.81	3.48
Ramanagara	416.25	2.34	552.69	2.99	548.06	2.93	524.94	2.85

TO1: Application of recommended NPK (140:56:56 kg/acre/yr) and FYM (10t/acre).
TO2: Application of recommended NPK and FYM + supply of liquid microbial consortia through drip (3lts /acre/crop) @8 DAP and 25 DAP.
TO3: Application of recommended NPK and FYM + supply of Arka microbial consortia through drip (3lts / acre/crop) @8 DAP and 25 DAP.
TO4: Application of recommended NPK and FYM (Acre/yr) + Supply of Waste decomposer through drip (20g in 400 liters/acre/crop) @8 DAP and 25 DAP.

and Chamarajanagara assessed five technological options on management of mites and thrips in mulberry with farmers practice and results are presented in Table 29. Results revealed that technological option-3 (spraying of dimethoate 30% EC (0.3%) at 8 DAP and fenzaguin (1.5 ml/l) (20 days)/ cyenopyrafen (0.5 ml/l) (15 days) / wettable sulphur (80%) 3 g/l. (5 days) performed better in controlling mites and thrips infestation and maximization of yield 567.00 q/ha in Chamarajanagara followed by 485.60 q/ha in Ramanagara. Highest BCR of 5.58 was recorded in Bengaluru Rural with technology option-3.

Two KVKs *viz.*, Bengaluru Rural and Chamarajanagara assessed nutrient management in potato with three technology options along with farmers practice and results are presented in Table 30. Technology option-3 (FYM@ 15 t/ha, NPK-120:240:120 kg/ha,2 kg Azospirillum, 2 kg Phosphobacterium and 60 kg/ha MgSO4, 50% NPK and 100 % MgSO4 at the time of planting, 50% NPK at 30 days after planting) performed better in increasing yield (239.50 q/ha) followed by technology option-4 (FYM@ 15 t/ha, NPK-140:60:60 kg/ha, Ca – 8 kg/ha and Sulphur 30 kg/ha, 2/3rd N, 100% P&K at the time of planting,

Table 29: Assessment on management of Mites and Thrips in mulberry

KVKs	Farmers practice (TO 1)		Technology options							
			TO2		TO3		TO4		TO5	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Bengaluru Rural	288.70	4.70	372.90	4.92	476.10	5.58	414.80	5.45	413.90	5.46
Ramanagara	305.60	4.46	384.00	4.64	485.60	5.37	432.60	5.19	424.40	5.15
Chamrajnagara	465.00	1.32	547.50	1.55	567.00	1.59	542.50	1.56	-	-

TO1: Spraying of Dichlorvos (0.2%), Dimethoate 30 EC (0.2%) at 12-15 DAP.

TO2: Spraying of Dimethoate 30% EC (0.2%) at 8 DAP and Propargite 57 EC (0.15%) at 15 DAP.

TO3: Spraying of Dimethoate 30% EC (0.3%) at 8 DAP and Fenzaguin (1.5 ml/l) (20 days)/ Cyenopyrafen (0.5 ml/l) (15 days) / wettable sulphur (80%) 3 g/l. (5 days).

TO4: Spraying of fungus (Shatpada-All rounder) - @ 20 gm/litre (4 sprays at 5 days interval after pruning).

TO5: Bacteria (Shatpada-Master Blaster) - @ 20 gm/litre (4 sprays at 5 days interval after pruning).

Table 30: Assessment of nutrient management in potato

KVKs	Farmers practice (TO1)		Technology options					
			TO2		TO3		TO4	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Bengaluru Rural	177.20	1.51	218.30	2.78	239.50	2.96	218.50	3.00
Chamarajanagara	151.00	2.40	167.00	2.40	194.00	2.90	180.00	3.10

TO1: Farmer practice

TO2: FYM@ 25 t/ha, 2 kg Azospirillum, 2 kg Phosphate solubilizing bacteria, Soil test based nutrient application (RDF - 125:100:125 kg/ha), 50% N, 100% P&K as basal dose at the time of planting, 50% N at 4 weeks after planting.

TO3: FYM@ 15 t/ha, NPK-120:240:120 kg/ha,2 kg Azospirillum, 2 kg Phosphobacterium and 60 kg/ha $MgSO_4$, 50% NPK and 100 % $MgSO_4$ at the time of planting, 50% NPK at 30 days after planting.

TO4: FYM@ 15 t/ha, NPK-140:60:60 kg/ha, Ca - 8 kg/ha and Sulphur 30 kg/ha, 2/3rd N, 100% P&K at the time of planting, 1/3rd of N at 25 days after planting.

1/3rd of N at 25 days after planting.) with yield of 218.5 q/ha in Bengaluru Rural. Higher BCR (3.10) was recorded in Chamarajanagara district.

Two KVKs *viz.*, Vijayapura-II and Dharwad assessed three technologies for nipping in chickpea along with farmers practice and results are presented in Table 31. Technological option-4 (solar operated nipping machine with foliage collector) recorded highest yield of 19.40 q/ha followed by technology option -3 (solar operated nipping machine) with yield of 17.80 q/ha in Dharwad. However, technology option-3 was found to be more profitable with BC ratio of 2.71 in Vijayapura-II.

Two KVKs *viz.*, Bagalkot and Gadag assessed safflower variety ISF-764 along with farmers practice (A-1) and results are presented in Table 32. Variety ISF-764 recorded maximum yield of 13.46 q/ha with BCR of 2.35 in Gadag followed by 11.33 q/ha with 2.01 BCR in Bagalkot.

Two KVKs *viz.*, Ballari and Kalaburagi-I assessed fodder varieties for yield maximization and results are presented in Table 33. Results revealed that the Super Napier performed better with yield of 394.65 q/ha in Ballari and 386 q/ha in Kalaburagi-I. B.C ratio (7.89) was also high in Super Napier in Ballari as compared to other fodder varieties.

Three KVKs *viz.,* Idukki, Kozhikode and

Table 31: Assessment of solar operated nipping (young tip/shoot collecting) machine for Chickpea

Technology options	Vijayapura-II		Dharwad	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR
TO1: Farmers practice	10.50	2.43	16.20	2.38
TO2: Hand nipping	11.42	2.29	-	-
TO3: Solar operated nipping machine	12.30	2.71	17.80	2.58
TO4: Solar operated nipping machine (with foliage collector)	-	-	19.40	2.67

Table 32: Assessment of safflower varieties

KVKs	Farmers practice (A-1)		Safflower variety	
			ISF-764	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Bagalkot	6.00	1.80	11.33	2.01
Gadag	7.80	2.12	13.46	2.35

Table 33: Assessment of fodder varieties

Fodder varieties	Ballari		Kalaburagi-I	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	129.35	5.11	142.00	3.13
Hybrid Napier	149.12	5.20	192.00	3.41
Super Napier	394.65	7.89	386.00	5.95

Table 34: Assessment of yard long bean varieties under irrigated condition

Yard long bean varieties	Idukki		Kozhikode		Pathanamthitta	
	Yield (q/ha)	BCR	Yield (q/ha)	BCR	Yield (q/ha)	BCR
Farmers practice	130.00	1.20	158.00	1.92	-	-
Arka Mangala	210.00	2.30	178.00	2.14	217.20	1.94
Manjari	230.00	2.50	180.00	2.14	-	-
Githika	-	-	-	-	236.80	2.65
Mithra	-	-	182.00	2.14	194.40	2.17

Pathanamthitta in Kerala assessed four high yielding varieties of yard long bean under irrigated condition *viz.*, Arka Mangala, Manjari, Githika and Mithra along with farmers practice for yield maximization and results are presented in Table 34. Variety Githika performed better in Pathanamthitta (236.80 q/ha) whereas variety Manjari yielded 230.00 q/ha in Idukki. Higher BCR was also recorded at Pathanamthitta (2.65) with Githika variety.

3.1.2 Frontline Demonstrations (FLDs)

Frontline demonstrations on field crops, horticulture crops, livestock and fisheries, farm implements and other allied enterprises were taken up to demonstrate the production potential of newly released crop varieties, natural resource conservation technologies, crop production and protection technologies, improved technologies in livestock and fisheries and other activities in problem solving mode. A total of 5,408 frontline demonstrations were conducted including 1,188 on cereals and millets, 330 on oilseeds, 477 on pulses, 98 on commercial, 51 on fibre, 148 on fodder, 647 on vegetables, 65 on tubers, 247 on fruits, 65 on flowers, 165 on plantation, 236 on spices, 5 on medicinal, 348 on hybrids of various crops, besides it includes 223 demonstrations on agricultural farm implements, 719 demonstrations on livestock, 147 on fisheries and 249 demonstrations on enterprises in Karnataka, Kerala and Lakshadweep Islands (Table 35). Out of which, 1,071 FLDs conducted by KVKs of Karnataka covering an area of 399 ha and 303 FLDs conducted by KVKs of Kerala in 44.89 ha under various crops are in progress at the time of data compilation.

Table 35: State-wise frontline demonstrations including CFLD Pulses and Oilseeds conducted by KVKs in Zone-XI

Crop category	Karnataka		Kerala		Lakshadweep		Total	
	Demo (No.)	Area (ha)	Demo (No)	Area (ha)	Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
Cereals and millets	1063	411.60	125	44.10	0	0	1188	455.70
Oilseeds	330	123.20	0	0	0	0	330	123.20
Pulses	459	171.70	18	5.50	0	0	477	177.20
Commercial	78	27.20	20	1.00	0	0	98	28.20
Fibre	51	16.40	0	0	0	0	51	16.40
Fodder	138	27.50	10	0.40	0	0	148	27.90
Vegetables	514	86.70	133	5.05	0	0	647	91.75
Tubers	15	6.00	50	1.80	0	0	65	7.74
Fruits	151	58.70	96	11.60	0	0	247	70.30
Flowers	65	8.70	0	0	0	0	65	8.70
Plantation	130	39.00	35	7.20	0	0	165	46.20
Spices	141	40.40	95	6.00	0	0	236	46.40
Medicinal	5	0.50	0	0	0	0	5	0.50
Hybrids	323	118.70	25	0.70	0	0	348	119.40
Farm implements	93	39.00	130	66.30	0	0	223	105.30
Livestock (units)	593	593	113	113	13	13	719	719
Fisheries (units)	77	77	60	60	10	10	147	147
Enterprises (units)	148	148	101	101	0	0	249	249
Total	**4374**	**1175.3 818 units**	**1011**	**149.65 274 units**	**23**	**23 units**	**5408**	**1324.89 1115 units**

3.1.2.1 Cereals and millets

A total of 1,188 demonstrations were conducted in various cereals and millets covering an area of 455.70 ha during the year by KVKs in Zone-XI. The state wise break up includes 1,063 in Karnataka and 125 in Kerala. State wise results are presented in the foregoing discussions.

Karnataka

During the year 2021, a total demonstrations of 408 in paddy, 41 in wheat, 274 in maize, 125 in sorghum, 130 in finger millet, 10 in little millet, 45 in foxtail millet, 20 in brown top millet and 10 in proso millet were demonstrated in farmers' fields, covering an area of 411.60 ha (Table 36). In paddy, improved technologies such as mechanized cultivation, ICM, INM, IPDM, IDM, IPM, nano technology, real time nitrogen management by LCC, improved varieties *viz*., Pratheeksha, KMP-220, RNR-15048, Gangavathi Sona, Shyadri Panchamuki, MSN 99, Kari Kagga and weed management technologies gave an overall increase in grain yield of 17.28 per cent over their respective checks. The highest BCR (2.89) and net return (**₹.**87,285/ha) were recorded with KMP-220 variety. Real time nitrogen management by LCC recoded highest yield of 82.00 q/ha and lowest was 13.40 q/ha in Kari Kagga variety. The wheat crop performed better under ICM and improved varietal introduction (UAS-304 and dicoccum (DDK 1029) by recording an increased average yield of 31.44 q/ha as compared to 26.52 q/ha under check. The improved wheat variety UAS-304 recorded 33.18 q/ha under demonstration. In *Rabi* sorghum, ICM, IPM, NRM and improved varieties such as SPV-2217 and GS-23 technologies gave an average of 14.74 q/ha over their checks (12.32 q/ha). IPDM and IPM in maize gave higher yield of 80.00 q/ha and 65.33 q/ha, respectively as compared to their checks. Varietal demonstration in finger millet with KMR-630 gave an average yield of 29.56 q/ha as compared to 26.67 q/ha in check. Improved little millet, brown top and proso millet varieties recorded higher yield (14.00 q/ha, 22.70 q/ha and 22.50 q/ha, respectively) as compared to their checks.

Red rice paddy variety Sahyadri Panchamuki (KVK, Udupi)

INM in Paddy (KVK, Idukki)

Integrated crop management in Rabi Sorghum (KVK, Vijayapura-I)

Finger millet variety – KMR 630(KVK, Tumakuru-II)

Table 36: Frontline demonstrations conducted on cereals and millets by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics(₹./ha)			
								Demo		Check (₹./ha)	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Paddy	Mechanized cultivation	2	25	9.00	49.99	44.27	12.93	59915	2.56	46305	2.13
	ICM	8	92	34.80	60.51	53.93	12.19	63575	2.14	48732	1.82
	INM	3	35	14.00	54.44	38.01	43.22	57904	2.29	42804	2.49
	IPDM	4	33	13.20	63.96	56.69	12.82	63485	1.84	47182	1.64
	IPM	4	40	16.00	63.28	58.10	8.92	68126	1.82	50526	1.63
	Aerobic rice	1	10	4.00	31.30	24.80	26.21	25200	2.16	16950	1.84
	Nano technology	1	10	4.00	71.00	69.00	2.90	62800	1.97	54200	1.77
	Nutrient management-LCC	1	20	4.00	82.00	76.12	7.72	82600	2.27	67016	1.96
	Organic farming	1	10	4.00	75.10	63.10	19.02	79040	2.32	80200	2.15
	Pratheeksha (Red rice for for *Rabi)*	1	5	2.00	40.00	38.00	5.26	30632	1.70	28850	1.9
	Gangavathi Sona	1	10	4.00	50.50	41.50	21.69	60500	2.10	36800	1.68
	Sayyadri Kempu mukthi	1	5	2.00	46.25	38.00	21.71	43125	2.21	29100	1.82
	KMP 220	1	10	4.00	55.45	45.45	22.00	87285	2.89	61711	2.33
	RNR-15048	1	10	4.00	75.10	63.10	19.02	79040	2.32	80200	2.15
	Sahyadri Panchamukhi (red rice variety)	2	21	8.00	40.75	32.93	23.77	39715	2.17	23053	1.73
	Kari Kagga paddy in Gajani land of coastal area	1	25	10.00	13.40	11.20	19.64	14896	2.24	10432	1.87
	MSN 99	2	25	10.00	56.92	46.51	22.38	48477	1.98	23987	1.47
	Weed management	3	22	8.00	63.08	57.55	9.61	63517	2.16	49837	1.86
	Total / Average		**408**	**155.00**	**55.17**	**47.68**	**17.28**	**57213**	**2.17**	**44327**	**1.90**
Wheat	ICM	2	21	7.20	31.00	24.05	28.90	39023	2.39	24067	1.86
	UAS-304	1	10	2.40	33.18	30.20	9.87	60492	4.16	52590	3.64
	Dicoccum (DDK-1029)	1	10	2.40	30.15	25.30	19.17	81875	4.46	65700	3.88
	Total / Average		**41**	**12.00**	**31.44**	**26.52**	**19.31**	**60463**	**3.67**	**47452**	**3.13**

Sorghum	ICM	4	35	14.00	20.09	16.75	19.97	29462	2.44	23432	2.24
	IPM	2	20	8.00	11.84	10.03	18.05	27004	2.30	21019	2.02
	NRM	1	20	8.00	11.67	9.24	26.30	20258	2.49	13272	2.05
	SPV-2217	2	40	16.00	14.58	12.08	20.70	26245	2.27	20995	2.12
	GS 23	1	10	4.00	15.5	13.5	14.81	32500	3.32	26500	2.89
	Total / Average		**125**	**50.00**	**14.74**	**12.32**	**19.97**	**27094**	**2.56**	**21044**	**2.27**
Maize	ICM	4	85	34.00	52.62	44.17	19.14	53119	2.21	38754	1.91
	INM	3	25	10.00	55.48	49.00	13.22	602	1.01	225	1.00
	Maize + Pigeon pea (6:1) intercropping	2	100	40.00	60.88	50.77	19.90	62054	2.32	39922	1.88
	IPDM	1	25	10.00	80.00	62.00	29.03	96500	3.33	60550	2.30
	IPM	4	39	15.6	65.33	54.20	20.54	52826	2.00	44846	2.01
	Total / Average		**274**	**109.60**	**62.86**	**52.03**	**20.37**	**53020**	**2.17**	**36859**	**1.82**
	Total		**848**	**326.60**							
Finger millet	ICM	4	50	20.00	25.78	21.63	19.15	35042	2.98	26849	2.46
	INM	1	10	4.00	29.20	24.70	18.22	31500	2.05	24000	1.86
	KMR 630	5	50	20.00	25.65	20.77	23.48	44757	2.45	29685	1.96
	KMR 360	1	10	4.00	29.56	26.67	10.84	41856	2.20	36342	2.10
	ML 365	1	10	4.00	18.40	13.20	39.39	27591	2.49	16025	1.94
	Total / Average		**130**	**52.00**	**25.72**	**21.40**	**22.22**	**36149**	**2.43**	**26580**	**2.06**
Little millet	HS-1	1	10	4.00	14.00	12.0	16.67	17800	2.37	13400	2.03
Foxtail millets	HN 46	1	25	10.00	5.06	5.59	-9.48	5850	1.55	7441	1.69
	ICM, Processing and value addition	3	20	7.00	13.19	11.32	16.52	23787	2.04	13839	1.64
Brown top	HBr-2	1	10	8.00	22.70	18.5	22.70	23320	2.79	16600	2.28
	ICM, processing and value addition	1	10	8.00	10.50	-	-	6500	2.44	-	-
Proso millet	HB-1	1	10	4.00	22.50	19.4	15.98	32000	3.46	25800	2.98
	Total / Average		**85**	**33.00**	**14.27**	**11.51**	**23.83**	**18869**	**2.43**	**15416**	**2.13**
	Grand total		**215**	**85.00**							

Kerala

A total of 125 demonstrations on paddy covering an area of 44.10 ha were conducted during the year (Table 37). The technologies such as ICM, INM, IDM, ICT in agriculture, weed management and varietal demonstration (Manuratna) gave on an average 57.54 q/ha yield as compared to check (46.96 q/ha). The highest yield was recorded under ICM with 78.10 q/ha followed by IDM technology (64.00 q/ha).

Table 37: Frontline demonstrations on cereals conducted by KVKs of Kerala

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Paddy	ICM	2	16	11.00	78.10	57.85	35.00	130180	2.47	75180	1.86
	ICT in agriculture	1	5	4.00	40.00	32.00	25.00	32000	1.35	6560	1.07
	IDM	2	29	5.10	64.00	57.25	11.79	48682	1.57	34915	1.43
	INM	2	25	8.00	58.35	45.65	27.82	88925	2.12	52206	1.64
	Manuratna	3	45	12.00	54.82	47.98	14.24	77207	1.55	67090	1.61
	Weed management	1	5	4.00	50.00	41.00	21.95	65000	1.86	47220	1.69
	Total / Average		**125**	**44.1**	**57.54**	**46.96**	**22.63**	**73666**	**1.82**	**47195**	**1.55**

3.1.2.2 Oilseeds

During the year, 330 demonstrations were conducted by KVKs of Karnataka covering groundnut, linseed, niger, sunflower, sesamum, safflower and soybean under 123.20 ha area in farmers' fields. The crop-wise results are presented in the forgoing discussion.

Karnataka

During the year, a total demonstrations of 146 in groundnut,10 in linseed, ten in niger, five in safflower, 12 in sesamum, 125 in soybean and 22 in sunflower were conducted by KVKs of Karnataka under oilseeds in an area of 123.20 ha (Table 38). The groundnut crop performed better under ICM, IPDM, INM and improved varieties by recording an increased average yield of 19.92 q/ha as compared to farmers practice (16.36 q/ha). The highest yield of 27.43 q/ha was recorded by variety Dh-256, which was higher than check by 34.11per cent. Demonstration of niger variety KBN-1 recorded higher yield (4.71 g/ha) as compared to check (4.13 q/ha). Demonstration of linseed under ICM technology recorded a yield of 7.50 q/ha, which was 10.29 per cent higher as compared to check (6.80 q/ha). Sesamum under IDM recorded higher yield of 8.15 q/ha as compared to check (7.00 q/ha). In soybean, technologies like improved varieties such as DSB-34, DSB-34, DSB 21, ICM, IPDM and INM resulted in higher yield of 19.67 q/ha over farmers practice (15.07 q/ha). This also led to higher net returns of ₹. 89,605/ha as compared to only ₹. 61,440/ha under farmers' practice.

Sunflower (KVK, Kalaburgi-I)

Niger variety KBN-1 (KVK, Hassan)

Table 38: Frontline demonstrations on oilseeds conducted by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹./ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Groundnut	ICM	2	20	6.0	15.20	11.15	36.32	70188	2.80	38019	2.08
	IDM	1	5	1.0	8.94	6.47	38.18	17150	1.54	11558	1.48
	INM	5	56	22.0	19.13	17.21	11.11	68679	2.83	56217	2.54
	IPDM	3	30	12.0	26.08	22.43	16.27	82342	2.58	59645	2.06
	IPM	2	15	2.0	22.73	20.44	11.21	57125	1.49	55450	1.61
	Dh 256	2	20	8.0	27.43	20.45	34.11	104072	3.39	66959	2.57
	Total / Average		**146**	**51.0**	**19.92**	**16.36**	**24.53**	**66593**	**2.44**	**47975**	**2.06**
Linseed	ICM	1	10	2.0	7.50	6.80	10.29	16700	2.13	14600	2.04
Niger	KBN-1	1	10	4.0	4.71	4.13	14.04	34700	3.71	21480	2.86
Safflower	ICM	1	5	2.0	15.00	12.50	20.00	46750	2.50	36800	2.25
Sesamum	IDM	1	12	5.0	8.15	7.00	16.43	37500	4.13	31000	3.82
Soybean	ICM	1	77	30.8	18.63	14.11	32.03	87966	4.19	58652	3.03
	IPDM	1	5	2.0	14.85	8.05	84.47	56894	3.30	5720	1.20
	IPM	1	25	10.0	22.50	18.95	18.73	110597	7.08	88529	5.54
	Dsb-21	1	12	5.0	24.50	20.00	22.50	112950	3.20	95150	2.87
	Dsb-34	1	6	2.4	17.85	14.25	25.26	79617	3.90	59150	3.24
	Total / Average		**125**	**50.2**	**19.67**	**15.07**	**36.60**	**89605**	**4.33**	**61440**	**3.18**
Sunflower	Weed manage-ment	1	10	4.0	17.00	15.00	13.33	81000	4.86	65000	3.60
	ICM	1	12	5.0	15.25	13.50	12.96	74500	5.38	64800	5.00
	Total / Average		**22**	**9.0**	**16.13**	**14.25**	**13.15**	**77750**	**5.12**	**64900**	**4.30**
	Grand total		**330**	**123.2**							

Sunflower under weed management technologies gave a higher net profit of ₹. 81000/ha as compared to farmer practice.

3.1.2.3 Pulses

A total of 477 demonstrations were undertaken on major pulses in 177.2 ha area of farmers' fields by KVKs in Zone-XI. State and technology wise results are presented as below:

Karnataka

A total of 100 in chickpea, 37 in blackgram 10 in cowpea, 57 in fieldbean, 57 in greengram, 10 in horsegram 178 in pigeon pea and 10 in ricebean were demonstrated by KVKs of Karnataka during the year (Table 39). During *rabi* season, varietal demonstration, ICM, IDM, IPM and IPDM in chickpea recorded an average increased yield of 19.28 over their checks. The highest yield of 15.62q/ha was recorded in IPM technology demonstration followed by 14.57 q/ha in INM technology in chickpea. In blackgram, overall yield increase was due to ICM, IPM and variety TRCRU-22 was 29.84 per cent over check, wherein IPM recorded 14.81 q/ha. Demonstration of cowpea under ICM resulted in higher yield of 10.53 q/ha over farmers practice (8.17 q/ha). Demonstration of field bean variety HA-3 recorded a yield of 44.38 q/ha, which was 19.69 per cent higher as compared to check (37.08 q/ha). In green gram, improved variety DGGV-2 recorded highest yield of 12.96 q/ha as compared to 9.36 q/ha in check. The technologies like ICM, IDM, IPDM, IPM and improved varieties - BRG-5 & GRG-811 were demonstrated in pigeon pea. Among these technologies, integrated crop management recorded highest yield of 20.25 q/ha, which was followed by 13.60 q/ha under improved variety GRG-811. Demonstration of horsegram variety CRHG-19 recorded 8.70 q/ha as a contingent crop for late sowing. Introduction of ricebean variety KBR-1 recorded yield of 14.00 q/ha with net profit of ₹ 34000/ha.

Pigeon pea (KVK, Vijayapura-I)

ICM in greengram (KVK, Chitradurga)

Blackgram in rice fallow (KVK, Ernakulam)

Chickpea (KVK, Chikkamagaluru)

Table 39: Frontline demonstrations on pulses conducted by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹./ha)			
								Demo		Check	
					Demo	Check	(%) Increase	Net return	BCR	Net return	BCR
Chickpea	ICM	1	10	4.00	9.75	7.87	23.89	13080	1.50	7140	1.29
	IDM	1	10	4.00	11.37	9.26	22.79	37301	3.16	29330	2.94
	INM	2	35	14.00	14.57	13.27	9.80	26375	1.55	15063	1.36
	IPDM	1	10	4.00	14.15	12.15	16.46	40545	2.75	28965	2.13
	IPM	3	25	6.00	15.62	14.00	11.57	42338	3.85	34371	3.13
	JG 14	1	5	2.00	13.40	10.55	27.01	36970	2.18	22435	1.72
	JAKI 9218	1	5	2.00	12.65	10.25	23.41	41218	3.02	30789	2.61
	Total / Average		**100**	**36.00**	**13.07**	**11.05**	**19.28**	**33975**	**2.57**	**24013**	**2.17**
Blackgram	ICM	2	20	8.00	7.42	5.58	32.89	26913	1.92	17053	1.65
	IPM	1	12	5.00	14.81	10.93	35.50	65984	5.26	44891	3.94
	TRCRU-22	1	5	2.00	11.12	9.18	21.13	42900	3.20	28750	2.44
	Total / Average		**37**	**15.00**	**11.12**	**8.56**	**29.84**	**45266**	**3.46**	**30231**	**2.68**
Cowpea	ICM	1	10	4.00	10.53	8.17	28.89	55880	2.66	37320	2.16
Fieldbean	ICM	2	20	8.00	14.21	12.12	17.29	30450	2.37	8039	1.24
	Seed production	1	11	4.00	32.00	33.20	-3.61	48313	2.22	42730	2.06
	HA 4	1	10	4.00	25.00	21.62	15.63	48500	2.24	38470	2.03
	HA 3	1	6	1.20	44.38	37.08	19.69	47000	2.13	34592	1.87
	IPDM	1	10	1.00	22.05	17.71	24.51	51162	2.27	24923	1.52
	Total / Average		**57**	**18.20**	**27.53**	**24.35**	**14.70**	**45085**	**2.25**	**29751**	**1.74**
Greengram	ICM	2	15	6.00	6.93	5.16	34.34	20440	2.15	14834	2.09
	IDM	2	17	7.00	8.55	7.08	20.76	33000	2.80	22580	2.13
	DGGV 2	1	25	10.00	12.96	9.36	38.46	55018	3.17	34568	2.47
	Total / Average		**57**	**23.00**	**9.48**	**7.20**	**31.19**	**36153**	**2.71**	**23994**	**2.23**
Horsegram	CRHG-19	1	10	4.00	8.70	7.30	19.18	20368	2.03	15213	1.80
Pigeon pea	ICM	6	102	41.00	20.25	15.10	34.14	50751	2.72	40871	2.43
	IDM	2	11	4.50	9.84	9.75	0.92	45774	2.89	46685	3.06
	IPDM	2	25	8.00	10.57	8.82	19.85	41585	3.41	28685	2.14
	IPM	2	20	8.00	12.27	11.12	10.35	51553	3.13	33680	2.36
	GRG 811	1	10	4.00	13.60	11.85	14.77	60200	3.81	45600	2.20
	BRG 4	1	10	2.00	12.80	11.16	14.70	59720	2.64	8115	1.40
	Total / Average		**178**	**67.50**	**13.22**	**11.30**	**15.79**	**51597**	**3.10**	**33939**	**2.27**
Ricebean	KBR-1	1	10	4.00	14.00			34000	1.94		
	Grand total		**459**	**171.70**							

Kerala

During the year, 18 demonstrations were conducted by two KVKs of Kerala on pulses covering 5.50 ha area (Table 40). Demonstration of blackgram and greengram in rice fallows recorded 8.06 q/ha and 8.36 q/ha with the BCR of 1.47 and 1.51, respectively. This technology helped in conserving in- situ residual moisture after rice harvest and residue mulch helped in maintaining/conserving the soil moisture for longer period, thus enhancing the crop productivity.

3.1.2.4 Commercial crops

A total of 98 demonstrations were conducted on major commercial crops such as mulberry, sugarcane and betelvine covering an area of 28.20 ha during the year by the KVKs of Zone -XI. State and technology wise results are presented below:

Karnataka

A total of 78 demonstrations were conducted on major commercial crops such as mulberry, sugarcane and betelvine covering an area of 27.20 ha during the year by the KVKs of Karnataka (Table 41). In sugarcane, technologies like ICM, IPM, INM, soil fertility management demonstrated in the farmers' field have recorded an average yield of 1,022.63 q/ha and BCR of 5.63 as compared to only 874.48 q/ha sugar cane yield and BCR of 3.84 under the check. In mulberry, the results revealed that mulberry leaf yield increased by 17.44 per cent due to INM and IPM technologies as compared to check. The net return and BCR were ₹32298/ha and 3.10, respectively. Demonstration of betelvine under IPDM recorded a yield of 9.62 lakh leaves/ha, which was 31.43 per cent higher as compared to check (7.32 lakh leaves/ha).

Table 40: Frontline demonstrations on pulses conducted by KVKs of Kerala

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹./ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Black gram	Introduction of pulse in rice fallow	1	3	2.00	8.06	-	-	31100	1.47	11850	1.20
Green gram	Introduction of pulse in rice fallow	2	15	3.50	8.36	5.08	64.80	27605	1.51	12142	1.25
	Grand total		**18**	**5.50**							

Betelvine (KVK, Davanagere)

INM in Mulberry (KVK, Ramanagara)

Table 41: Frontline demonstrations on commercial crops conducted by KVKs of Karnataka

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹./ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Sugar-cane	Trash decomposition through *In-situ* Vermi-culturing	1	10	4.00	622.50	541.00	15.06	221497	8.15	177113	5.22
	ICM	1	10	4.00	1250.00	1050.00	19.05	231200	5.11	190000	4.69
	IPM	1	10	4.00	1070.00	950.00	12.63	415797	5.85	142441	2.49
	INM	1	8	3.20	1148.00	956.90	19.97	211750	3.44	164662	2.96
	Total / Average		**38**	**15.20**	**1022.63**	**874.48**	**16.68**	**270061**	**5.63**	**168554**	**3.84**
Mul-berry	INM	1	10	4.00	1115.00	878.00	26.99	41988	3.42	25298	2.48
	IPM	2	20	6.00	795.80	737.60	7.89	22607	2.78	16899	2.36
	Total / Average		**30**	**10.00**	**955.40**	**807.80**	**17.44**	**32298**	**3.10**	**21099**	**2.42**
Betel vine (leaves/ ha)	IPDM	1	10	2.00	961809	731787	31.43	192811	2.34	120950	1.89
	Grand total		**78**	**27.20**							

Kerala

A total of 20 demonstrations were conducted on betelvine covering an area of 1.00 ha during the year by one KVK of Kerala. Results indicated an increase of betelvine yield to the extent of 114.29 per cent under IDM technology with an average yield of 18.00 lakh leaves/ha under and net return of ₹9.41 lakh with 1.54 BCR under demonstration over check with 8.40 lakh leaves/ha and net return of ₹1.78 lakh with 1.16 BCR.

3.1.2.5 Fiber crops

During the year, 51 demonstrations on cotton were organized by KVKs in Karnataka covering 16.40 ha area. Technology wise results are discussed as below:

Karnataka

In cotton, technologies like IDM. INM, intercropping and IPM were demonstrated in the farmers' field have recorded an average yield of 16.94 q/ha and BCR of 3.56 as compared to the check (15.30 q/ha and 3.01, respectively). Among these technologies higher yield was recorded in IDM (22.65 q/ha) followed by INM (21.75 q/ha) (Table 42).

IPM in cotton (KVK, Vijayapura-II)

3.1.2.6 Fodder crops

During the year, 148 demonstrations were conducted on fodder crops in 27.9 ha in Zone-XI.

Table 42: Frontline demonstrations on fiber crops conducted by KVKs of Karnataka

Crop	Production technology	KVKs (No.)	Far-mers (N o.)	Area (ha)	Yield (q/ha)			Economics (₹./ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Cotton	IDM	2	16	2.40	22.65	19.50	16.15	207360	5.66	172200	5.04
	INM	1	10	4.00	21.75	20.59	5.63	88687	3.12	82840	3.04
	Inter cropping	1	10	4.00	12.00	11.60	3.45	150963	3.34	41128	1.89
	IPM	2	15	6.00	11.35	9.52	19.17	53911	2.13	46988	2.06
	Total / Average		**51**	**16.40**	**16.94**	**15.30**	**11.10**	**125230**	**3.56**	**85789**	**3.01**

State and technology wise results are presented below:

Karnataka

A total of 138 demonstrations were conducted on fodder crops covering an area of 27.5 ha by the KVKs of Karnataka (Table 43). The technologies like ICM, cultivation of improved varieties of fodder-CoFS-31, mixed fodder (stylo grass, hedge lucerne and fodder trees) marvel grass, perennial supply of green fodder and preservation of green fodder were demonstrated in farmer's field. The mixed green fodder yield under demonstrations was 1184.29 q/ha with net profit of ₹ 1,05,743/ ha. CoFS-29 recorded highest net profit (₹91,033/ ha) than check (₹54,196/ha) (Table. 43). Perennial supply of green fodder and preservation of green fodder as silage and feeding during lean period led to an increased milk yield.

Table 43: Frontline demonstrations on fodder crops conducted by KVKs of Karnataka

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Mixed fodder	ICM	6	55	15.00	1184.29	688.68	71.97	105743	2.09	-	-
Fodder sorghum	CoFS 31	5	60	11.00	573.20	331.32	73.00	91033	2.83	54196	2.21
Marvel grass	Marvel grass (milk yield liter/day)	1	5	1.00	8.00	5.00	60.00	17280	2.20	6120	1.52
Fodder (milk yield liter/ day)	Perennial supply of green fodder model	1	8	0.50	5.70	3.60	58.33	22143	1.46	23470	1.63
	Silage using silo bags	1	10	-	8.00	7.00	14.29	26840	1.46	27755	1.59
	Grand total		**138**	**27.50**							

Fodder variety CoFS 31 (KVK, Davanagere)

Fodder enrichment (KVK, Mysore)

Kerala

A total of 10 demonstrations were organized by one KVK of Kerala on fodder production technology covering an area of 0.40 ha. Demonstration of shade tolerant guinea grass recorded an average green fodder of 2753 q/ha/year with the net return of ₹.8500/ha.

3.1.2.7 Vegetable crops

Vegetable crops such as amaranthus, brinjal, bitter gourd, broccoli, cabbage, carrot, chilli, cucumber, clusterbean, drumstick, fieldbean, frenchbean, garden pea, onion, okra, polebean, tomato, ridge gourd, yard-long-bean and nutri-garden were demonstrated with improved technologies under 647 farmers' fields covering an area of 91.8 ha by the KVKs of Karnataka, Kerala and Lakshadweep Islands. State and technology wise results are presented below:

Karnataka

A total of 514 demonstrations were conducted in major vegetables covering an area of 86.73 ha by KVKs of Karnataka (Table 44). ICM technology demonstration in brinjal gave a yield of 354 q/ha with BCR of 4.91. Similarly, ICM technology demonstration recorded an increased yield in cabbage, cucumber, drumstick and green chilli (17.18%, 17.81%, 15.20% and 17.92%, respectively) over farmers' practice. In frenchbean, ICM technology recorded 111.26 q/ha under demonstration as compared to 90.68 q/ha in farmers' practice. Frenchbean intercropping in arecanut plantation recorded 43.77q/ha bean yield in addition to main crop yield. In onion, ICM, IDM, IPM and varietal introduction (Bheema Shakti) were demonstrated in 86 farmers' fields. All the technologies recorded higher yield ranging from 8.50 per cent to 25.10% over farmers' practice. Varietal demonstration of Bhima Shakti recorded higher yield of 288.35 q/ha as compared to check with 233.65 q/ha. In polebean, IPM and IDM technologies have led to increased yield to the tune of 13.88 per cent over their local check. In ridgegourd, ICM and varietal introduction (Arka Prasanna) technologies recorded higher yield of 253.45 q/ha and 119.58/ha respectively as compared to their checks. Demonstration of spinegourd under ICM resulted in higher yield of 110.50 q/ha over farmers practice (91.25 q/ha). In tomato, ICM, IPDM, IPM technologies resulted, an increased yield on an average by 16.94 per cent over check. The highest tomato yield of 718.20 q/ha was recorded in IPDM technology demonstration followed by 702.21q/ha in ICM and 402.98q/ha in IPM technology demonstration. In watermelon, the results revealed that yield increased by 16.68 per cent due to ICM, IPM and IDM technologies as compared to check. The net return and BCR were ₹. 3,05,983/ha and 4.05, respectively. Nutri-garden demonstrated with improved technologies under 245 farmers' fields covering an area of 1.43 ha helped to meet the household requirement of vegetable on daily basis.

IPM in tomato (KVK, Chikkaballapura)

Tomato (KVK, Ballari)

ICM in Frenchbean (KVK, Tumakuru-II)

Yard-long-bean variety Deepika (KVK, Kollam)

ICM in cucumber (KVK, Chikkaballapura)

Nutri-garden (KVK, Chikkamagaluru)

Table 44: Frontline demonstrations on vegetables crops conducted by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo (₹/ha)		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Brinjal	ICM	1	5	1.00	354.00	292.10	21.19	366290	4.91	190627	3.19
Cabbage	ICM	3	20	5.00	291.77	249.00	17.18	176185	2.66	107277	1.92
Cucumber	ICM	1	5	2.00	322.80	274.00	17.81	230850	3.51	184216	3.05

(Contd.... P-53)

Drumstick	ICM	4	16	4.60	237.24	205.94	15.20	345263	3.67	267121	3.03
French bean	Inter cropping in arecanut	1	10	2.00	43.77	-	-	56989	2.16	-	-
	ICM	2	7	1.50	111.26	90.68	22.70	165003	3.87	164476	3.98
	Total/ Average		**17**	**3.50**				0		0	
Green chilli	ICM	2	21	7.40	174.50	147.99	17.92	78046	1.25	27149	1.10
Onion	ICM	5	45	18.00	209.60	167.55	25.10	135410	2.63	83448	1.98
	IDM	1	10	4.00	115.80	105.30	9.97	143196	2.93	123346	2.65
	IPM	1	10	4.00	241.20	222.30	8.50	226330	4.59	201510	4.09
	Bheema Shakti	2	14	4.00	288.35	233.65	23.41	249585	4.84	176050	3.78
	Total/ Average				**213.74**	**182.20**	**16.74**	**188630**	**3.75**	**146088**	**3.12**
Onion	Seed production	2	7	3.00	27.83			398811	4.73	0	
	Total		**86**	**29.00**				0		0	
Pole bean	IPM	1	5	1.00	69.20	60.80	13.82	208000	2.51	179000	2.43
	IDM	1	5	2.00	379.10	332.90	13.88	591931	4.90	454353	3.15
	Total/ Average		**10**	**3.00**	**224.15**	**196.85**	**13.87**	**399966**	**3.76**	**316677**	**2.88**
Ridge gourd	ICM	2	10	2.00	253.45	202.85	24.94	259900	3.06	175250	2.31
	Arka Prasanna	2	20	5.00	119.58	88.62	34.94	121706	2.75	73109	2.06
			30	**7.00**	**186.52**	**145.74**	**29.94**	**190803**	**2.90**	**124180**	**2.18**
Spine gourd	ICM	1	10	0.20	110.50	91.25	21.10	383950	2.72	251650	2.50
Tomato	ICM	2	20	5.00	702.21	598.97	17.24	372612	3.26	269027	2.33
	IPDM	1	10	2.00	718.20	612.80	17.20	638060	3.16	480450	2.68
	IPM	4	25	6.00	402.98	346.25	16.38	306950	3.63	236671	2.89
			55	**13.00**	**607.80**	**519.34**	**16.94**	**439207**	**3.35**	**328716**	**2.63**
Water melon	ICM	1	3	1.20	80.00	65.50	22.14	218750	2.76	165331	2.43
	IPM	1	6	2.40	70.00	64.00	9.38	444400	5.09	390700	4.60
	IDM	1	5	2.00	64.00	53.90	18.74	254800	4.74	207100	4.32
			14	**5.60**	**71.33**	**61.13**	**16.68**	**305983**	**4.05**	**254377**	**3.66**
Nutri-garden	ICM	9	**245**	**1.43**							
	Grand total		**514**	**86.73**							

Kerala

A total of 133 demonstrations were implemented by KVKs of Kerala in vegetable crops such as amaranthus, bittergourd, broccoli, cabbage, chilli, clusterbean, carrot, garden pea, okra, onion, ridgegourd, and yard long bean, covering an area of 5.05 ha, mostly in the homestead farming situation (Table 45). In amaranthus, the Vaika variety recorded a green leaf yield of 190.27 q/ha as compared to 146.0 q/ha in farmers' practices. IPM technology demonstration in bittergourd gave 23.19 q/ha as compared to 19.38 q/ha in farmers' practice. However, net profit was negative due to virus attack during the cropping season. In broccoli, varietal demonstrations of Pusa Broccoli KTS-1 recorded an average yield of 92.90 q/ha over check with 79.55 q/ha. In cabbage, INM technology demonstration gave 600.00q/ha as compared to 450.00 q/ha in farmers' practices. Varietal demonstration of KAU Suruchi in clusterbean recorded a higher yield of 13.50 q/ha as compared to check with 10.50 q/ha. IPM technology demonstration in chilli gave a 23.47 per cent higher green chilli yield of 65.60 q/ha as compared to 53.13 q/ha in check. Varietal demonstration of Arka Apoorva in garden pea led

Table 45: Frontline demonstrations on vegetables conducted by KVKs of Kerala

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Amaranthus	Vaika	1	10	0.20	190.27	146.00	30.32	458380	2.48	275813	1.89
Bitter gourd	IPM	1	8	0.40	23.19	19.38	19.66	-75500	0.77	-153750	0.56
Broccoli	Pusa Broccoli KTS-1	1	10	0.20	92.90	79.55	16.78	111045	1.52	71425	1.35
Cabbage	INM	1	5	1.00	600.00	450.00	33.33	88650	1.69	78560	2.15
Carrot	ICM	1	3	0.10	122.00	98.00	24.49	63125	1.75	9600	1.09
Cluster bean	Intercropping in banana	1	10	0.20	9.00	8.00	12.50	52263	1.35	45000	1.31
	KAU Suruchi	1	10	0.10	13.50	10.50	28.57	247157	1.57	92474	1.21
			20	**0.30**	**11.25**	**9.25**	**20.535**	**149710**	**1.46**	**68737**	**1.26**
Chilly	IPM	1	12	0.20	65.60	53.13	23.47	73938	1.44	6938	1.04
Garden pea	Arka Apoorva	1	5	0.75	82.00	70.00	17.14	89739	2.17	42350	1.50
Okra	Organic farming	1	15	0.08	97.50	102.50	-4.88	175172	2.49	179937	2.41
Onion	Arka Kalyan	1	3	0.06	58.50	48.00	21.88	42000	1.56	21000	1.28
Ridge gourd	ICM	1	10	0.20	300.00	150.00	100.00	675000	4.00	250000	2.25
Yard long bean	ICM	1	10	1.00	180.00	143.50	25.44	890000	2.62	618000	2.17
	Deepika	1	10	0.20	120.50	100.90	14.68	682155	2.20	481958	1.85
	Total / Average		**20**	**1.20**	**150.25**	**122.2**	**20.06**	**786077.5**	**2.41**	**549979**	**2.01**
Nutrition garden	Household food security	1	2	0.00	0.026						
	Grand total		**133**	**5.05**							

to a 17.14 per cent increase in yield (82.00 q/ha) over check. Organic farming in okra resulted in a slightly lower yield (97.50 q/ha) as compared to conventional farming (102.50 q/ha) but higher BCR was recorded in organic farming (2.49) than the convention farming (2.41). Varietal demonstrations of Arka kalyan in onion recorded an average yield of 58.50 q/ha, over check with 48.00 q/ha. Crop production technology demonstration in ridge gourd gave 100 per cent higher yield of 300.00 q/ha as compared to only 150.00 q/ha in check. In yard long bean, technologies such as ICM and improved variety Deepika demonstrated in 20 farmers' fields gave increased yield ranging from 14.68 per cent to 25.44 per cent over their local check. The highest yield of 180.00 q/ha was recorded under ICM demonstration. Nutri-garden with improved technologies under two farmers' fields demonstrated by one KVK of Kerala has ensured household vegetable requirement throughout the year.

3.1.2.8 Tuber crops

A total of 67 demonstrations were conducted on major tuber crops like potato, cassava, sweet potato and lesser yam covering an area of 7.74 ha by KVKs of Zone-XI. State and technology wise results are discussed below:

Karnataka

A total of 15 demonstrations were conducted in potato and sweet potato covering an area of 6.00 ha in two KVKs of Karnataka (Table 46). Mechanized cultivation technology demonstration in potato led to 9.79 per cent increased yield (19.85q/ha) over check. In sweet potato the varietal demonstration of Sree Bhadra recorded higher yield of 13.00 q/ha as compared to check with 12.00 q/ha

IPM in Cassava (KVK, Pathanamthitta)

Kerala

A total of 52 frontline technologies were demonstrated in tuber crops like amorphophallus, cassava and elephant foot yam in 1.48 ha area by five KVKs of Kerala (Table 47). In cassava, demonstrations on INM and varietal demonstration (Sree Pavithra and Sreeraksha) recorded higher yield ranging from 26.26 per cent to 50.51 per cent over farmers' practice. INM practice has given highest yield of 213.00 q/ha with BCR of 2.31 in cassava as compared to 141.50 q/ha in check. Varietal demonstration of Sree Pavithra and Sree Raksha recorded higher yield of 375.00 q/ha and 625.00 q/ha, respectively as compared to their checks. IDM technology demonstrated in elephant foot yam gave 521.25q/ha tuber yield and net profit of ₹3,37,946/ha.

Table 46: Frontline demonstrations on tuber crops conducted by KVKs of Karnataka

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Potato	Mechanized cultivation	1	5	2.00	19.85	18.08	9.79	256100	2.86	51380	1.35
Sweet Potato	Sree Bhadra	1	10	4.00	13.00	12.00	8.33	200000	4.33	100000	2.00
	Total		**15**	**6.00**							

IDM in elephant foot yam (KVK, Kollam)

Cassava variety Sree Reksha (KVK, Kottayam)

3.1.2.9 Fruit crops

A total of 247 demonstrations on major fruit crops like banana, guava, grapes, lime, mango, papaya pomegranate, Coorg mandarin, straw berry and snap melon were conducted by KVKs of Zone-XI covering an area of 70.30 ha during the year. State and technology wise results are discussed in the foregoing discussions.

Karnataka

A total of 151 demonstrations on various fruit crops were conducted in farmers' fields covering 58.70 ha area (Table 48). Results indicated that the fruit yield was substantially higher under demonstrations of ICM and INM technologies in banana. Among the technologies demonstrated in banana, ICM registered a highest yield of

Table 47: Frontline demonstrations on tuber crops conducted by KVKs of Kerala

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Amorpho-phallus	Water management	1	4	0.40	378.00	324.00	16.67	128000	1.51	84000	1.35
Cassava	INM	2	15	1.20	213.00	141.50	50.51	206068	2.31	85053	1.59
	Varietal introduction-Sree pavithra	1	15	0.06	375.00	287.50	30.43	149906	1.67	59695	1.26
	Varietal introduction-Sreeraksha	1	10	0.08	625.00	495.00	26.26	375000	1.75	193000	1.39
	Total / Average		**40**	**1.74**	**356.50**	**266.38**	**39.43**	**234261**	**2.01**	**105700**	**1.46**
Elephant foot yam	IDM	1	5	0.01	521.25	377.5	38.08	337946	1.48	217500	1.40
	Planting material production	1	3	0.03	87.40	-	-	87000	1.48	-	-
	Grand total		**52**	**1.78**							

427.00q/ha followed by 310.73 q/ha in *elakki* with higher economic benefits as compared to their checks. In grapes, pest management technology demonstrations gave 212.00q/ha yield as compared to check with 186.00 q/ha. Demonstrated INM technology in guava gave 24.95 per cent higher yield (161.50q/ha) over check. In lime, IPDM and INM technologies demonstration gave lime yield of 211.00 and 204.80 q/ha, respectively leading to higher net profits as compared to farmers' practice. ICM technology demonstration in mango recorded higher yield of 120.40 q/ha compared to check (101.13 q/ha). Demonstrated IPM technology in pomegranate gave 26.08 per cent higher yield (181.30 q/ha) over check.

Stem borer management in Grape (KVK,Vijayapura-I)

ICM in mango (KVK, Kalaburgi-I)

Table 48: Frontline demonstrations on fruit crops conducted by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Banana	ICM in Elakki banana	3	20	3.40	310.73	257.70	20.58	288266	1.77	183583	1.54
	ICM	1	5	2.50	427.00	332.00	28.61	136575	2.60	85125	1.93
	INM- Putta bale	1	10	4.00	151.50	118.00	28.39	500205	2.68	339240	2.36
	Total / Average		**35**	**9.90**	**296.41**	**235.90**	**25.86**	**308349**	**2.35**	**202649**	**1.94**
Grape	IPM	1	10	4.00	212.00	186.00	13.98	484000	4.18	370000	2.97
Guava	INM	1	10	4.00	161.50	129.25	24.95	236215	5.34	182040	4.60
	ICM	1	10	4.00	153.00	98.00	56.12	138000	1.82	75300	1.68
	Total / Average		**20**	**8.00**	**157.25**	**113.63**	**40.54**	**187108**	**3.58**	**128670**	**3.14**
Lime	IPDM	1	10	4.00	211.00	186.00	13.44	205700	5.33	162800	4.19
	INM	1	10	3.20	204.80	176.20	16.23	158965	4.48	124508	3.58
	Total / Average		**20**	**7.20**	**207.90**	**181.10**	**14.84**	**182333**	**4.90**	**143654**	**3.89**
Mango	ICM	6	62	28.00	120.40	101.13	19.05	132756	3.00	40289	1.33
Pomegranate	IPM	1	4	1.60	181.30	143.80	26.08	560200	4.40	388950	3.09
	Grand total		**151**	**58.70**							

Kerala

A total of 96 demonstrations were conducted by KVKs of Kerala on banana, mango, strawberry and snapmelon covering 11.60 ha during the year. The technologies such as ICM, IDM, INM, IPDM and IPM technologies demonstrated in banana have performed better with an average yield of 280.09 q/ha as against their local checks (191.07 q/ha). IPDM demonstration in banana gave 390.00 q/ha fruit yield as compared to 250.00 q/ha with check. ICM in mango demonstration gave 46.15 per cent higher yield of 380.00/ha. Strawberry demonstration under IPM technology gave 98.50 q/ha fruit yield with higher net profit of ₹.3,81,500/ha. Snapmelon yield recoded higher under precision faming (178.50 q/ha) as compared to check 122.50 q/ha (Table 49).

Pseudo stem borer management in banana (KVK, Malappuram)

IPM in banana (KVK, Kannur)

Table 49: Frontline demonstrations on fruit crops conducted by KVKs of Kerala

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Banana	ICM	3	21	0.90	327.33	222.33	47.23	440580	2.21	164167	1.33
	IDM	1	10	1.50	305.00	202.00	50.99	730750	2.20	335250	1.66
	INM	1	5	0.60	184.42	145.94	26.37	347162	1.89	222276	1.61
	IPDM	1	3	2.00	390.00	250.00	56.00	697000	1.71	365000	1.53
	IPM	4	35	4.40	193.68	135.10	43.36	542158	2.10	1122826	1.53
	Total / Average		**74**	**8.90**	**280.09**	**191.07**	**44.79**	**551530**	**2.02**	**441904**	**1.53**
Mango	ICM	1	14	0.10	380.00	260.00	46.15	780000	14.00	318000	8.57
Strawberry	IPM	1	5	2.00	98.5	76.5	28.76	381500	1.65	156000	1.28
Snap melon	Precision farming	1	3	0.60	178.5	122.5	45.71	409550	2.52	256750	2.23
	Grand total		**96**	**11.60**							

3.1.2.10 Plantation crops

A total of 165 demonstrations were undertaken by KVKs of Zone-XI on major plantations like arecanut, coconut and coffee covering an area of 46.20 ha during the year. State and technology wise results are discussed below:

Karnataka

A total of 130 demonstrations on plantation crops like arecanut, coconut and coffee were conducted in 39.0 ha by KVKs of Karnataka (Table 50). Arecanut under ICM and INM technologies, resulted higher yield of 19.83 q/ha and 19.29 q/ha with net profit of ₹5,83,598 /ha and ₹6,51,387 /ha, respectively. Coconut was demonstrated under technologies such as IPM, INM and intercropping

INM in coffee (KVK, Kodagu)

Arecanut (KVK, Chitradurga)

Table 50: Frontline demonstrations on plantation crops conducted by KVKs of Karnataka

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	(%) Increase	Net return	BCR	Net return	BCR
Arecanut	ICM	3	35	11.00	19.83	14.82	33.83	583598	4.78	398693	3.80
	INM	3	30	10.00	19.29	16.48	17.05	651387	5.88	528402	4.79
	Total / Average		**65**	**21.00**	**19.56**	**15.65**	**25.44**	**617493**	**5.33**	**463547**	**4.29**
Coconut (nuts/ha/ year)	IPM	1	25	10.00	7000	5300	32.08	51100	2.55	35218	2.24
	INM	1	10	2.00	8781	7031	24.89	84300	2.59	58833	2.30
	Inter cropping	1	10	2.00	9100	8650	5.20	139100	3.02	84150	2.85
	Total / Average		**45**	**14.00**	**8294**	**6994**	**21.00**	**91500**	**2.72**	**59400**	**2.46**
Coffee Coffee	IDM	1	10	2.00	37.50	26.16	43.35	224360	3.70	33032	1.43
	INM	1	10	2.00	29.17	25.00	16.68	177150	4.15	145588	3.33
	Total / Average		**20**	**4.00**	**33.34**	**25.58**	**30.01**	**200755**	**3.92**	**89310**	**2.38**
	Grand Total		**130**	**39.00**							

in the fields of farmers covering an area of 14.00 ha during the year. Among different technologies, coconut under intercropping system technology recorded higher nuts (9100 nuts/ha/year) followed by IPM technology (8781 nuts/ha/year) as compared to check. In coffee, IDM and INM technologies demonstrated in farmers' fields has given an overall 43.35 per cent and 16.68 per cent higher yield with 37.50 q/ha/year and 29.17 q/ha/year, respectively.

Kerala

The important plantation crop of Kerala i.e., coconut was demonstrated under technologies such as INM, IDM and natural resource management in the fields of farmers covering an area of 7.2 ha during the year (Table 51). These technology demonstrations in coconut gave an average yield of 11,878 nuts/ha/year over check (8,548 nuts/ha/year) leading to positive net returns in demonstrations.

Table 51: Frontline demonstrations on plantation crops conducted by KVKs Kerala

Crop	Production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (Nuts/ha/year)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Coconut	IDM	3	25	4.20	6180	3350	84.48	521007	3.46	150465	2.11
	INM	1	5	1.00	10082	7520	34.07	116076	1.90	83750	1.77
	Natural Resource Management	1	5	2.00	19373	14774	31.13	134851	1.58	94663	1.53
	Total / Average		**35**	**7.20**	**11878**	**8548**	**49.89**	**257311**	**2.31**	**109626**	**1.80**

IDM in coconut (KVK, Palakkad)

3.1.2.11 Spice crops

A total of 236 demonstrations were undertaken in major spices like black pepper, ginger, turmeric, small cardamom and dry chilli covering an area of 46.04 ha by KVKs of Zone-XI. State and technology wise results are discussed below:

Bush pepper demonstration (KVK, Khozhikode)

Ginger field (KVK, Udupi)

Karnataka

In spices, a total of 141 demonstrations were conducted in black pepper, chilli, ginger and turmeric covering an area of 40.40 ha during the year (Table 52). ICM and IDM technologies demonstration in black pepper gave higher dry pepper yield of 20.26 q/ha and 13.40 q/ha, respectively as compared to the farmers' practice. In chilli, ICM, IDM, IPM and varietal introduction technologies were demonstrated in farmer's field. Among different technologies, IDM recorded 44.30 q/ha dry chilli yield, which was 23.06 per cent higher over check. In ginger, IDM technology demonstration was recorded 364.00 q/ha fresh rhizome yield followed by ICM technology (198.00 q/ha). In turmeric, IDM and inter cropping technologies were demonstrated in the farmers field. Among these, turmeric under IDM gave 23.71 per cent higher rhizome yield (426.00 q/ha) over check.

Table 52: Frontline demonstrations on spice crops conducted by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹./ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Black Pepper	ICM	2	15	2.40	13.40	10.57	26.77	304069	2.91	227038	2.63
	IDM	2	10	2.00	20.26	11.81	71.55	591750	4.86	298939	3.01
	Total / Average		**25**	**4.40**	**16.83**	**11.19**	**49.16**	**447909**	**3.89**	**262988**	**2.82**
Dry chilli	ICM	3	25	7.00	21.87	18.33	19.27	186178	2.99	141800	2.47
	IDM	1	3	2.00	44.30	36.00	23.06	539931	5.31	400441	3.86
	IPM	1	10	4.00	12.95	10.12	27.96	52050	1.37	6200	1.04
	Arka Khyati	1	5	1.00	28.50	21.70	31.34	316400	3.86	208500	2.81
	Total / Average		**43**	**10.00**	**26.90**	**21.54**	**25.41**	**273640**	**3.38**	**189235**	**2.54**
Ginger	ICM	2	20	5.00	198.00	155.00	27.74	361500	3.33	222250	2.29
	IDM	2	40	11.00	364.00	323.90	12.38	225863	1.75	157893	1.54
	Total / Average		**60**	**16.00**	**281.00**	**239.45**	**20.06**	**293681**	**2.54**	**190071**	**1.91**
Turmeric	IDM	1	5	2.00	527.00	426.00	23.71	382840	4.75	271590	3.26
	Inter cropping	1	8	8.00	324.00	221.00	46.61	-	-	-	-
	Total / Average		**13**	**10.00**	**425.50**	**323.50**	**35.16**	**191420**	**4.75**	**271590**	**3.26**
	Grand total		**141**	**40.40**							

IDM in black pepper (KVK, Udupi)

ICM in chilli (KVK, Yadgir)

Kerala

A total of 95 demonstrations were implemented in black pepper, ginger, small cardamom and turmeric crops by KVKs of Kerala covering 6.00 ha area (Table 53). Demonstration of ICM and INM technologies in black pepper recorded 15.00 per cent and 10.97 per cent increase in yield (11.50 q/ha and 26.70 q/ha dry pepper, respectively) over their control. Demonstration of IPM technology in small cardamom recorded higher yield of 11.50 q/ha compared to farmers practices (7.30 q/ha). In turmeric, IPM, IDM and Pragati varietal introduction demonstrations gave higher yield of 196.00 q/ha, 180.90 q/ha and 194.25 q/ha, which were 18.07, 87.13and 95.72 per cent increase over their checks, respectively.

Table 53: Frontline demonstrations on spice crops conducted by KVKs of Kerala

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Black pepper	ICM	1	10	1.00	11.50	10.00	15.00	467500	10.35	381500	9.29
	INM	2	25	2.00	26.70	24.06	10.97	556074	1.93	483345	1.86
	Total / Average		**35**	**3.00**	**19.1**	**17.03**	**12.99**	**511787**	**6.14**	**432423**	**5.58**
Ginger	ICM	1	5	0.20	138.50	92.70	49.41	157500	1.77	-114300	0.46
Small cardamom	IPM	1	5	2.00	11.50	7.30	57.53	790000	2.14	300000	1.55
Turmeric	IPM	1	5	0.10	196.00	166.00	18.07	134500	1.30	44500	1.10
	IDM	1	25	0.50	180.90	100.10	87.13	276500	2.15	39000	1.11
	Varietal introduction-Pragati	1	20	0.20	194.25	99.25	95.72	159008	1.38	32764	1.15
	Total / Average		**50**	**0.80**	**136.38**	**91.78**	**66.97**	**190003**	**1.61**	**38755**	**1.12**
	Grand total		**95**	**6.00**							

Rhizome maggot management in Turmeric (KVK, Alapuzzha)

Management of root grub in small cardamom (KVK, Idukki)

3.1.2.12 Medicinal and aromatic crops

In medicinal crops category, 10 demonstrations were conducted by one KVK in Karnataka on intercropping technology in citronella covering an area of 0.5 ha. Demonstration gave a yield of 12.55 q/ha with net profit of ₹.20,375/ha which is additional income as it was fallow.

3.1.2.13 Flower crops

A total of 65 demonstrations on flower crops covering an area of 8.70 ha were implemented by KVKs of Karnataka during the year. Crop and technology wise results are discussed below.

Karnataka

Demonstrations were conducted in flower crops such as bachelor's button, china aster, chrysanthemum, marigold, tuberose and Udupi mallige covering an area 8.70 ha by KVKs of Karnataka (Table 54). Demonstration of variety AGS 12 in bachelors button recorded higher yield of 2.30 q/ha with BCR of 3.20 as compared to check. ICM technology in china aster has given 22.19 per cent higher yield (16.74 q/ha) as compared to 13.70 q/ha in check. Demonstration of variety Co-1 and ICM technology in chrysanthemum recorded higher yield of 145.00 q/ha and 61.41 q/ha flower yield, respectively as compared to the check.

Table 54: Frontline demonstrations on flower crops conducted by KVKs of Karnataka

Crop	Variety/ production technology	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	(%) Increase	Net return	BCR	Net return	BCR
Bachelors button	AGS 12	1	10	2.00	2.30	2.00	15.00	110000	3.20	70000	2.75
China Aster	ICM	1	10	1.00	16.74	13.70	22.19	127533	2.74	86941	2.12
Chrysanthemum	Co-1	1	5	0.50	145.00	105.00	38.10	549500	4.13	333000	2.73
	ICM	1	20	2.00	61.41	49.14	24.97	258829	2.84	190420	2.48
	Total / Average		**25**	**2.50**	**103.21**	**77.07**	**31.53**	**404165**	**3.49**	**261710**	**2.61**
Marigold	ICM	1	5	2.00	81.15	69.73	16.38	41589	1.52	10703	1.11
Tube rose	ICM	1	5	1.00	73.60	58.50	25.81	203650	3.24	139450	2.47
Udupi mallige	ICM	1	10	0.20	7.60	6.84	11.11	185200	2.31	108200	1.93
	Grand total		**65**	**8.70**							

ICM in China Aster (KVK, Ramanagara)

Udupi mallige (KVK, Udupi)

Demonstration of ICM technology in marigold, tube rose, Udupi mallige have recorded higher yield 81.15q/ha, 73.60 q/ha and 7.60 q/ha, respectively as compared to their checks.

3.1.2.14 Hybrids

During the year, 348 demonstrations on hybrids in various crops like maize, Bt. cotton, sunflower, castor, bhendi, brinjal, bittergourd, ridgegourd, cabbage, capsicum, chilli, polebean, onion, tomato, papaya and tuberose and watermelon were conducted by KVKs of Zone –XI covering 119.4 ha. State crop and hybrid-wise results are presented here under.

Karnataka

Demonstrations on hybrids conducted by KVKs of Karnataka are presented in Table 55. In maize, hybrids gave higher yield ranging from 9.73 per cent to 33.19 per cent over check varieties. In sunflower, RSFH-1887 hybrid recorded higher yield of 13.47 q/ha as compared to check. Castor hybrid, ICH-66 recorded a yield of 15.45 q/ha as compared to 13.36 q/ha in farmers' variety. In cotton, hybrids demonstrated in 10 farmers' fields covering 4.00 ha performed superior by recording 16.96 per cent higher cotton yield with better BCR (3.68) as compared to check. In bittergourd and brinjal, private hybrid recorded higher

Table 55: Frontline demonstrations on hybrids conducted by KVKs of Karnataka

Crop	Name of hybrid	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Hybrid		Check	
					Demo	Check	% Change	Net returns	BCR	Net returns	BCR
Maize	MAH-14-5	1	10	4.00	67.50	50.68	33.19	111250	3.97	87000	3.11
	CP 818	2	15	5.00	54.85	50.17	9.73	52492	2.16	44782	1.97
	Dekalb 9141	1	5	1.00	74.30	65.58	13.30	82405	3.31	82405	2.24
	CP-108	1	10	4.00	40.33	30.65	18.63	41025	2.29	31871	1.94
	CP-808	1	10	4.00	40.95	35.35	15.84	20455	1.55	14865	1.43
Sunflower	RSFH-1887	2	25	10.00	13.47	11.84	13.87	54930	3.62	40625	2.60
Castor	ICH-66	1	10	2.00	15.45	13.36	15.64	48152	3.03	34912	2.65
Cotton	Pvt. Bt Hybrid	1	10	4.00	30.35	25.95	16.96	119370	3.68	82030	2.41
Bitter gourd	Pvt. Hy	1	5	2.00	162.20	139.80	16.02	72682	3.99	114794	2.21
Brinjal	Pvt. Hy	2	10	4.00	126.70	109.85	18.90	296123	5.66	278756	4.57
Cabbage	Unnathi	2	8	1.60	375.65	326.00	14.79	362447	5.10	256272	3.95
Capsicum	Indra	1	10	4.00	367.27	300.32	22.29	543196	5.61	414546	4.29
Chilli	Arka Khyati	3	26	8.40	63.92	55.69	15.80	347714	3.24	282819	2.92
	Pvt.Hybrid	2	15	5.00	168.38	148.28	10.79	452088	4.87	434161	4.37
	Arka Harita	1	5	1.00	238.50	194.20	22.81	199135	3.01	138500	2.33
Onion	Bhima Super	1	33	13.20	242.00	192.00	26.04	287303	3.89	213339	3.28
Tomato	Arka Abhed	4	31	8.50	648.15	540.70	20.61	489409	3.76	352521	2.84
	Arka Samrat	1	5	1.00	346.00	275.00	25.82	104305	2.52	73380	2.14
	Pvt hybrids	4	75	35.00	449.68	376.10	19.57	362434	4.16	222253	2.91
Tuberose	Arka Prajwal	1	5	1.00	73.60	58.50	25.81	203650	3.24	203650	3.24
	Grand Total		**323**	**118.70**							

Chilli hybrid Arka Harita (KVK, Tumakuru-II)

Onion hybrid Bhima Super (KVK, Chitradurga)

yield (162.20 q/ha, 126.70 q/ha, respectively) as compared to farmers' variety. In cabbage, Unnathi hybrid recorded 14.79 per cent higher yield (375.65 q/ha) as compared to check (326.00 q/ha). Capsicum hybrid Indra recorded 22.29 per cent higher yield of 367.27q/ha over farmers' variety. In chilli, hybrids Arka Kyathi (63.92 q/ha), Arka Haritha (238.50 q/ha) and private hybrid (168.38 q/ha) have performed superior to their check varieties. In onion Bhima Super (242.00 q/ha), has performed superior check (192.00 q/ha). IIHR hybrids of tomato over Arka Abhed (648.15 q/ha), Arka Samrat (346.00 q/ha) and also private hybrid (449.68 q/ha) have performed better than check varieties and gave better economic returns to the farmers. Arka Prajwal hybrid in tuberose demonstration gave higher yield of 73.60 q/ha with net returns of ₹.2,03,650/ha.

Kerala

A total of 25 demonstrations on hybrids conducted by KVKs of Kerala are presented in Table 56. In ridgegourd, KRH-1 hybrid demonstrated gave higher yield of 245.00 q/ha over check varieties (145.00 q/ha). Demonstration of watermelon hybrid Shonima recorded a higher yield of 164.00 q/ha as compared to 156.00 q/ha in farmers' variety.

3.1.2.15 Farm implements/machinery

Farm mechanization was encouraged through 223 demonstrations on nine farm implements/machinery covering an area of 105.30 ha during the year by KVKs of Zone-XI. State wise details of implements/machinery demonstrated are presented in the forgoing discussion.

Karnataka

Farm implements/machinery such as portable fertilizer dispenser in chrysanthemum, brinjal and vegetable crops, onion storage structure, tractor operated cotton shredder, tractor operated laser leveller and baler for paddy, solar operated nipping machine in bengalgram and multi-use telescopic model harvester in arecanut were demonstrated covering an area of 39.0 ha by involving 93 farmers by eight KVKs of Karnataka (Table 57).

Table 56: Frontline demonstrations on hybrids conducted by KVKs of Kerala

Crop	Thematic area	KVKs (No.)	Farmers (No.)	Area (ha)	Yield (q/ha)			Economics (₹/ha)			
								Demo		Check	
					Demo	Check	Increase (%)	Net return	BCR	Net return	BCR
Ridge gourd	KRH-1	2	15	0.30	245.00	145.00	82.50	377500	2.90	150000	1.78
Watermelon	Shonima	1	10	0.40	164.00	156.00	73.00	43000	1.81	39400	1.78
	Grand total		**25**	**0.70**							

Table 57: Frontline demonstrations on farm implements conducted by KVKs of Karnataka

Crop	Name of the implement	KVKs (No.)	Farmers (No.)	Area (ha)
Chrysanthemum	Portable fertilizer dispenser	1	5	2.00
Brinjal	Portable fertilizer dispenser	1	5	2.00
Vegetable crops	Portable fertilizer dispenser unit	1	10	4.00
Chrysanthemum and brinjal	Portable fertilizer dispenser unit	3	20	8.00
Onion	Onion storage structure	1	3	3.00
Cotton	Tractor operated cotton Shredder	1	10	4.00
Paddy	Tractor operated laser leveller	1	10	4.00
Paddy	Baler for paddy straw	1	10	4.00
Bengal gram	Solar operated nipping machine	1	10	4.00
Arecanut	Multi use telescopic model harvester tool	1	10	4.00
	Total		**93**	**39.00**

Kerala

Farm implements/machinery such as coleus skin peeler, drone technology, mini rice mill, solar tunnel drier in paddy, nutmeg seed sheller, power tiller operated basin lister in coconut, raingun use in fodder and semi -manual cassava harvester were demonstrated covering an area of 66.3 ha and 130 farmers by KVKs of Kerala (Table 58).

Drone technology in paddy (KVK, Palakkad)

Mini rice mill (KVK, Ernakulam)

Portable rain gun spray in fodder cultivation (KVK, Trivandrum)

Table 58: Frontline demonstrations on farm implements conducted by KVKs of Kerala

Crop	Name of the implement	KVKs (No.)	Farmers (No.)	Area covered (ha)
Coleus	Coleus skin peeler	1	5	0.10
Paddy	Drone technology	5	79	57.00
Paddy	Mini rice mill	1	1	0.40
Paddy	Solar tunnel drier	1	1	0.40
Nutmeg	Nutmeg seed sheller	1	20	5.00
Coconut	Power tiller operated basin lister	1	5	0.90
Fodder	Rain gun	1	3	0.40
Cassava	Semi -manual cassava harvester	1	6	0.10
Ginger, coleus and turmeric	Tractor drawn root harvester	1	10	2.00
Total			**130**	**66.30**

3.1.2.16 Farm enterprises

A total of 249 demonstration units were established on farm enterprises such as apiculture, vegetable production, compost production, mushroom, poultry, sericulture, value addition, and others benefiting 418 farmers/farm women in the states of Karnataka and Kerala during the year. KVK wise enterprises established are presented in Table 59.

Compost preparation by using seri farm residue (KVK, Kolar)

Entrepreneurship development in agro based food industry (KVK, Kollam)

Bee keeping (KVK, Ramanagara)

Value addition, branding and market linkage (KVK, Kodagu)

Table 59: Frontline demonstrations on farm enterprises conducted by KVKs of Karnataka

Category	Technology demonstrated	KVKs (No.)	Farmers (No.)	Units (No.)
Compost	Seri farm residue with waste decomposer consortia for quality compost production	1	10	10
Compost	Composting of areca husk	1	5	5
Value addition	Tamarind products	3	3	3
Value addition	Pineapple jam	2	8	8
Value addition	Millet rice, chakkulli, ladu, ragi malt etc.,	3	22	4
Value addition	Fish products	1	5	5
Value addition	Banana and banana pseudo stem ptoducts	1	1	1
Value addition	Home-scale enterprise with fig and its products	1	3	3
Value addition	Ginger candy cubes (CFTRI technology)	1	15	1
Value addition	Coconut products	1	1	1
Value addition	Coconut coir, ridge gourd fibre and lavancha root products	1	1	1
Value addition	Drumstick leaves- Value addition, branding and market linkage	1	2	2
Poultry	Low cost egg incubator and hatchery for self-help groups	4	6	6
Apiculture	Honey enterprise, processing, packing and labelling & marketing	1	2	2
Sericulture	Cocoon rearing	5	95	95
Tailoring	Production of seed packing bags	1	1	1
	Total		**180**	**148**

Karnataka

A total of 148 demonstration units were established under various small scale income generating enterprises such as compost production, value addition to tamarind, pineapple, millets, fish, banana, fig, ginger, coconut and drumstick, sericulture, poultry and bee keeping benefitting 180 farmers/farm women in Karnataka.

Kerala

A total of 101 demonstration units were established by KVKs of Kerala under various small-scale enterprises on branding and marketing, compost production, EDP, mushroom production, processing and value addition, vegetable production for higher income generation benefiting 238 farmers/farm women in the state of Kerala. KVK wise enterprises are presented in Table 60.

3.1.2.17 Livestock

A total of 719 demonstration units in livestock including poultry were established benefiting 733 farmers/farm women during the year by KVKs of Zone-XI. State and enterprise wise results are discussed in foregoing pages.

Table 60: Frontline demonstrations on farm enterprises conducted by KVKs of Kerala

Category	Technology demonstrated	KVKs (No.)	Farmers (No.)	Units (No.)
Branding and marketing	Vazhakkulam pineapple as cut fruit	1	1	1
Compost	Organic manure production	2	11	2
EDP	EDP in developing value chain for safe mangoes	1	1	1
Mushroom	Oyster mushroom , Pleurotus florida in Kollam district	1	15	15
Value addition	Product diversification in dehydrated mushroom	1	4	4
Value addition	Cassava – baked products	1	4	4
Value addition	By-products from beehive	1	4	4
Value addition	Iron and zinc rich pasta using sesame seeds for enhanced nutritional benefits	1	10	1
Value addition	Dehydration of elephant foot yam for 'Ready to cook' convenient product with better texture and cooking quality	1	10	1
Value addition	Vegetables products	1	15	9
Value addition	Osmo dehydrated locally available fruits	1	15	3
Value addition	Modified brining technology for shelf life enhancement of raw Jackfruit	1	16	3
Value addition	Coconut products	1	10	2
Value addition	Home scale parboiling of paddy (minimally milled red parboiled rice)	1	10	2
Value addition	Scientific dehydration techniques for locally available fruits and vegetables.	1	5	5
Value addition	Mussels products	1	10	2
Value addition	Turmeric boiler for quality enhancement	1	5	1
Value addition	Nutri cookies with inclusion of functional ingredients	1	10	2
Value addition	Small scale cashew nut processing	1	20	5
Value addition	Milk-Paneer and whey drink	1	5	1
Value addition	Banana products like- Shrikand, banana chips, banana jam, banana skin pickle, banana dried powder	2	32	8
Vegetable production	Vegetable cultivation in grow bags	1	25	25
	Total		**238**	**101**

Karnataka

A total of 593 demonstration units in livestock comprising 369 in dairy, 10 in buffalos, 204 in sheep and goat and 10 in piggery were demonstrated during the year. In dairy, technologies such as integrated management of reproductive disorders in dairy animals, impregnated nano fibers for induction of oestrus in repeat breeding cows/ Preventive protocols for subclinical and clinical mastitis, management of dairy cow during the transition phase through supplementation of bypass fat, integrated management of dairy animals, achieving optimum post weaning growth in calves with probiotics, integrated approaches for dairy calf management, clean milk production, integrated approach for management of periparturient diseases in cross bred cows including preventive protocols for subclinical and clinical mastitis, management of anestrus in heifers in dairy animal, nutrition management through suitable technologies in dairy animals for higher milk productivity were demonstrated benefiting 369 farmers and covering 460 animals. In buffalos, different approaches for thermal stress management in lactating buffaloes were demonstrated covering 10 animals owned by 10 farmers. In sheep and goat, upgradation of local sheep with Nari Suvarnaram, drums for silage production for stall fed goat/ sheep farming and region based mineral mixture for small ruminants in intensive system of rearing, probiotics for optimum growth in post weaning lambs, establishing fodder cafeteria for sheep and goat rearing, use of special feed pellets for calcium supplementation in lactating sheep, strategic health care practices in sheep flock from weaning till the age of maturity, integrated scientific management in sheep/goat were demonstrated covering 850 animals of 204 farmers. Control of ascariasis and anaemia in piglets (Yorkshire) was demonstrated in piggery covering ten farmers and 10 animals. Details and results are given in Table 61.

Table 61: Frontline demonstrations on livestock conducted by KVKs of Karnataka

Thematic area	Technology demonstrated	KVKs (No.)	Farmers (No.)	Units (No.)	Animals (No.)
Dairy					
Fertility management	Integrated management of reproductive disorders in dairy animals	2	15	15	15
	Impregnated nano fibres for injection of oystrus in repeat breeding cow/buffalo	1	20	20	20
Dairy management	Supplementation of Bypass fat	1	10	10	10
	Integrated dairy management	2	12	12	20
Dairy production	Probiotics for calves	1	20	20	20
	Integrated approaches for dairy calf management	2	26	26	52
	Clean milk production	5	45	45	50
Disease management	Integrated approach for management of periparturient diseases in cross bred cows including preventive protocols for subclinical and clinical mastitis	7	85	85	130
	Management of anestrus in heifers	1	20	20	20
Animal nutrition	Nutrition management through suitable technologies in dairy animals	11	116	116	123
	Total		**369**	**369**	**460**

(Contd..... P-71)

Buffalos					
Dairy management	Different approaches for thermal stress management in lactating buffaloes	1	10	10	10
Sheep and goat					
Breed upgradation	Upgradation of local sheep with Nari Suvarna Ram	1	10	10	20
Nutrition management	Drum silage for intensive sytem of sheep and goat rearing	4	50	50	80
	Probiotics for optimum growth in post weaning lambs	2	15	15	35
	Fodder cafeteria for sheep and goat rearing	5	45	45	90
	Special feed pellets for calcium supplementation in lactating sheep	1	20	20	40
Health care in grazing sheep	Strategic health care practices in sheep flock from weaning till the age of maturity	5	58	58	570
Scientific management	Integrated scientific management in sheep/goats	2	6	6	15
Total			**204**	**204**	**850**
Piggery					
Scientific piggery management	Demonstration on control of ascariasis and piglet anaemia in piglets-Yorkshire	1	10	10	10
Grand total			**593**	**593**	**1330**

Dairy management (KVK, Kalaburgi-I)

Scientific sheep farming (KVK, Ramanagara)

Kerala

A total of 113 demonstrations comprising 57 in dairy, 15 in sheep and goat, 41 in poultry were conducted during the year covering 342 animals of 127 farmers (Table 62). In dairy, estrous synchronization in cattle, bypass fat in feed to counteract negative energy balance of transition period and management of flukes in cows were

Production of low cholesterol eggs (KVK, Kollam)

implemented covering 140 animals of 57 farmers. In poultry, EVM for prevention of raniket disease, production of low cholesterol eggs and scientific management of Japanese Quail (egg production) were demonstrated involving 46 farmers covering 176 poultry birds. In sheep and goat, improved weight gain in kids by supplementing kid starter and vitamins and *Moringa Oleifera* leaves as feed for goat were demonstrated involving 15 farmers and covering 26 animals.

Table 62: Frontline demonstrations on livestock conducted by KVKs of Kerala

Thematic area	Technology demonstrated	KVKs (No.)	Farmers (No.)	Units (No.)	Animals (No.)
Dairy					
Fertility management	Estrous synchronization in cattle	2	11	11	11
Dairy management	Bypass fat in feed to counteract negative energy balance of transition period	1	10	10	10
Endo parasites management	Management of flukes in cows	1	5	5	25
Feed management	Complete ration for dairy cattle	6	31	29	94
	Total		**57**	**55**	**140**
Poultry					
Disease management	EVM for prevention of Raniket disease	1	10	10	10
Designer egg production	Production of low cholesterol eggs	2	11	11	61
Backyard poultry	Small scale income generating enterprises	3	20	15	100
Quail management	Scientific management of Japanese Quail (Egg Production) among rural women farmers	1	5	5	5
	Total		**46**	**41**	**176**
Sheep and goat					
Goat kids management	Improved weight gain in kids by supplementing kid starter and vitamins	1	16	5	16
Moringa as feed supplement	*Moringa oleifera* PKM-1 as feed for crossbreed malabari goats	1	10	10	10
	Total		16	15	26
	Grand total		**127**	**113**	**342**

Lakshadweep

Demonstration of sheep and goat farming as a source of family income was undertaken in 13 farmer's households in the Islands during the year (Table 63).

Table 63: Frontline demonstrations on livestock conducted by KVK, Lakshadweep

Thematic area	Name of the technology demonstrated	Farmers (No.)	Units (No.)
Sheep and goat			
Endo parasites management	Deworming techniques in goat	10	10
Nutrition management	Feed enrichment in goat by adding mineral mixture with probiotics	3	3
	Total	**13**	**13**

3.1.2.18 Fisheries

A total of 147 demonstration units in fisheries were established benefiting 147 farmers/farm women during the year by the KVKs of Zone-XI. State and technologies wise results are given below.

Karnataka

A total of 77 demonstrations were conducted on growth performance of stunted fingerlings in short duration seasonal ponds; mono culture of Amur common carp in farm ponds; composite fish culture in natural tank; Pangasius in farm ponds; demonstration of sea-bass; fast growing, short duration and high value all male tilapia fish in farm pond; and GIFT tilapia at high stocking density technologies were demonstrated by involving 77 farmers (Table 64).

Kerala

In fisheries, technologies such as CIFA- Carp starter as nursery feed for carp fry's for improved growth and survival, demonstration of Amur carp hungarian strain rearing in natural ponds, demonstration of GIFT tilapia in freshwater ponds, demonstration of species-specific pellet feed for red snapper, demonstration of probiotic-CIBAMOX to reduce ammonia level in brackish water ponds, demonstration of opheocephalus (Varal) fish in homestead ponds, Vannamei shrimp farming in artificial ponds, and use of live feed for ornamental fish rearing were demonstrated in 60 units and benefited 60 farmers (Table 65).

Tilapia (GIFT) (KVK, Kollam)

Release of fingerlings in farm pond (KVK, Mandya)

Table 64: Frontline demonstrations on fisheries conducted by KVKs of Karnataka

Category	Thematic area	Technology demonstrated	KVKs (No.)	Farmers (No.)	Units (No.)	Unit size (m^2)	Fingerlings (No.)
Common carps	Integrated fish farming	Stunted fingerlings in short duration seasonal ponds	1	5	5	12150 m^3	6000
	Aquaculture	Mono culture of Amur common carp in farm ponds	1	5	5	5000	4000
	Income augmentation	Composite fish culture in natural tanks	3	17	17	5000	31000
	Inland fisheries-species diversification	Pangasius in farm ponds	1	5	5	2400	5000
		Sea bass	1	3	3	1000	1000
Composite fish culture	Aquaculture	All male Tilapia fish in farm ponds	3	25	20	13000	4000
Thilapia	Varietal evaluation	GIFT Tilapia at High stocking density in farm ponds	3	22	22	4000 & 3600m^3	14160
		Total		**77**	**77**	**30400**	**92160**

Lakshadweep

In fisheries, demonstration on ideal icing practices for high quality tuna fish and seaweed farming in Lakshadweep was conducted by KVK, Lakshadweep by involving 10 farmers (Table 66).

3.1.2.19 Women and children empowerment programmes

Karnataka

A total of 1,173 programmes on empowerment of women and children were conducted by KVKs in the Zone XI with participation of 38,525 women and children and details are provided in Table 67. KVKs of Karnataka have organized 599 programmes for the empowerment of women during the year covering 18,344 women participants. Similarly, 79 programmes on health and nutrition and other children related aspects with the participation of 3,867 children. In case of Kerala, KVKs organized 445 programmes on empowerment of women during the year with participation of 15,819 women. Similarly, 50 programmes on health and nutrition and other children related aspects were organized covering 2,662 children.

Table 65: Frontline demonstrations on fisheries conducted by KVKs of Kerala

Category	Thematic area	Technology demonstrated	KVKs (No.)	Farmers (No.)	Units (No.)	Unit size (m^2)	Fingerlings (No.)
Common carp	Aquaculture	CIFA- Carp starter as nursery feed for carp fry's for improved growth and survival	1	2	2	200	10000
	Varietal evaluation	Amur Carp Hungarian Strain rearing in natural ponds	4	15	15	10960	34000
Tilapia	Aquaculture	Tilapia (GIFT) in freshwater ponds	4	18	18	1100	7750
Fin fish	Aquaculture	Species-specific pellet feed for Red snapper	1	2	2	320	200
Fish Farming	Aquaculture	Probiotic-CIBAMOX to reduce ammonia level in brackish water ponds	1	4	4	2000	10000
	Aquaculture	Opheocephalus (Varal) fish in homestead ponds	1	10	10	2000	100
Shrimps	Aquaculture	Vannamei shrimp farming in artificial ponds	1	4	4	800	48000
Ornamental fishes	Ornamental fishes rearing	Live feed for ornamental fish rearing	1	5	5	100	-
		Total		**60**	**60**	**17380**	**110050**

Table 66: Frontline demonstrations on fisheries conducted by KVK, Lakshadweep

Thematic area	Name of the technology demonstrated	Farmers (No.)	Units (No.)
Aquaculture	Ideal icing practices for high quality tuna fish	5	5
Seaweed farming	Seaweed farming in Lakshadweep	5	5
	Total	**10**	**10**

Table 67: Details of women and children empowerment programmes implemented by KVKs of Karnataka

Category	Name of the programme	Karnataka		Kerala		Total	
		Programmes (No.)	KVKs (No.)	Programmes (No.)	KVKs (No.)	Programmes (No.)	KVKs (No.)
Women	Awareness programmes	84	26	71	9	155	35
	Coconut tree climbing	3	03	3	3	6	6
	Drudgery reduction	23	13	9	5	32	18
	Enterprises	52	21	35	10	87	31
	Farming system	21	11	8	4	29	15
	Health and nutrition	63	23	32	8	95	31
	Kitchen garden	44	19	22	8	66	27
	Nutri garden	84	29	31	9	115	38
	Storage technique	13	08	10	3	23	11
	Value addition	64	27	170	10	234	37
	Women empowerment	51	21	31	10	82	31
	Others	97	09	23	5	120	14
	Total programmes - Women	599	-	445	-	1044	
Total women participants		18344	-	15819		34163	
Children	Health and nutrition	53	24	20	7	73	31
	Others	26	18	30	7	56	25
	Total programmes- Children	79	-	50	-	129	
Total children participants		3867	-	2662		6529	
Grand total (Women+ Children)	**No of programmes**	678	-	495	-	1173	
	No of participants	**22211**	-	**16314**	-	**38525**	

3.1.3 Capacity Development

One of the main activities of KVKs is capacity development of farmers and extension personnel to update their knowledge and skills on modern agricultural technologies. Keeping this in view, KVKs of Zone-XI have organized various capacity development programmes for different category of participants representing farmers, farmwomen, rural youth, extension personnel and other stakeholders during the year. State and participant category wise capacity development courses organized and the numbers of participants are presented in Table 68. Data indicated that a total of 5,524 capacity development courses were organized and trained 2,00,529 participants. Out of which 3,511 courses were organized with 1,31,354 participants by KVKs of Karnataka, 1,987 courses with 68,456 participants by KVKs of Kerala and 26 courses with 719 participants by KVK, Lakshadweep. According to type and participant category, 4,098 capacity development courses

Table 68: State and participant category wise capacity development courses organized by KVKs of Zone-XI

State	Participant category and capacity development courses (No.)											
	Farmers/Farm women		Rural youth		Extension personnel		Sponsored courses		Vocational courses		Total	
	C	P	C	P	C	P	C	P	C	P	C	P
Karnataka	2802	106040	233	7339	176	7344	177	6804	123	3827	3511	131354
Kerala	1278	49083	302	8378	136	4031	199	5237	72	1727	1987	68456
Lakshadweep	18	395	0	0	1	24	7	300	0	0	26	719
Total	**4098**	**155518**	**535**	**15717**	**313**	**11399**	**383**	**12341**	**195**	**5554**	**5524**	**200529**

C = Courses; P = Participants

were organized for farmers/ farm women (1,55,518 participants), 535 courses for rural youth (15,717 participants), 313 courses for extension personnel (11,399 participants), 383 sponsored capacity development courses (12,341 participants) and 195 vocational courses (5,554 participants).

3.1.3.1 Farmers and Farm Women

(a) State wise

Capacity development courses organized for farmers and farm women by KVKs of zone-XI are presented in Table 69. Data indicated that a total of 4,098 capacity development courses were conducted and trained 1,55,518 participants (1,04,995 male and 50,523 female) of which 1,31,232 (89,191 male and 42,041 female) were general and 24,286 (15,804 male and 8,482 female) were SC/ST. KVKs of Karnataka have organized 2,802 capacity development courses and trained 1,06,040 farmers and farm women (77,835 male and 28,205 female) of which 86,441 (64,255 male and 22,186 female) were general and 19,599 (13,580 male and 6,019 female) were SC/ST. KVKs of Kerala have organized 1,278 capacity development courses and trained 49,083 farmers and farm women (26,974 male and 22,109 female) of which 44,791 (24,936 male and 19,855 female) were general and 4,292 (2,038 male and 2,254 female) were SC/ST. KVK, Lakshadweep organized 18 capacity development courses and trained 395 farmers and farm women (186 male and 209 female) who were all belonging to SC/ST.

Table 69: State wise capacity development courses conducted for farmers and farmwomen by KVKs of Zone-XI

State	Courses (No.)	Participant farmers and farm women (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Karnataka	2802	64255	22186	86441	13580	6019	19599	77835	28205	106040
Kerala	1278	24936	19855	44791	2038	2254	4292	26974	22109	49083
Lakshadweep	18	0	0	0	186	209	395	186	209	395
Total	**4098**	**89191**	**42041**	**131232**	**15804**	**8482**	**24286**	**104995**	**50523**	**155518**

(b) Area wise

Capacity development courses conducted for farmers and farm women on different areas by KVKs of Zone-XI are presented in Table 70. Data reveals that crop production was the major area of capacity development with 741 courses and 25418 participants. Capacity development on home science/women empowerment (615 courses) and plant protection (555 courses) were the next major important area followed by soil health and fertility management (476 courses). More courses were also organized for livestock production and management (341 courses). Area wise capacity development courses conducted for farmers and farm women by KVKs of Karnataka, Kerala and Lakshadweep are presented in Tables 71, 72, 73 respectively.

Table 70: Area wise capacity development courses conducted for farmers and farmwomen by KVKs of Zone-XI

Thematic Area	Courses (No.)	Participant farmers and farm women (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production	741	16855	4186	21041	3326	1051	4377	20181	5237	25418
Horticulture										
a) Vegetable crops	271	5322	2799	8121	560	364	924	5882	3163	9045
b) Fruit crops	137	3438	730	4168	527	190	717	3965	920	4885
c) Ornamental plants	18	362	108	470	23	32	55	385	140	525
d) Plantation crops	75	1829	366	2195	168	106	274	1997	472	2469
e) Tuber crops	32	480	302	782	69	83	152	549	385	934
f) Spices	54	1779	325	2104	198	97	295	1977	422	2399
g) Medicinal and aromatic plants	9	304	31	335	4	0	4	308	31	339
Soil health and fertility management	476	13384	4056	17440	1825	922	2747	15209	4978	20187
Livestock production and management	341	8365	4223	12588	1361	758	2119	9726	4981	14707
Home science/ women empowerment	615	5320	13268	18588	1017	2490	3507	6337	15758	22095
Agriculture Engineering	106	2600	1103	3703	210	123	333	2810	1226	4036
Plant protection	555	13814	3492	17306	2327	728	3055	16141	4220	20361
Fisheries	96	1897	791	2688	241	243	484	2138	1034	3172
Production of inputs at site	221	4092	2850	6942	765	583	1348	4857	3433	8290
Capacity building and group dynamics	146	3163	1878	5041	604	517	1121	3767	2395	6162
Agro-forestry	205	6187	1533	7720	2579	195	2774	8766	1728	10494
Total	**4098**	**89191**	**42041**	**131232**	**15804**	**8482**	**24286**	**104995**	**50523**	**155518**

Table 71: Area wise capacity development courses conducted for farmers and farmwomen by KVKs of Karnataka

Area	Courses (No.)	Participant farmers and farm women (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production	568	13785	2532	16317	3077	818	3895	16862	3350	20212
Horticulture										
a) Vegetable crops	156	3198	880	4078	466	170	636	3664	1050	4714
b) Fruit crops	92	2639	296	2935	420	114	534	3059	410	3469
c) Ornamental plants	9	270	30	300	16	6	22	286	36	322
d) Plantation crops	53	1389	186	1575	149	65	214	1538	251	1789
e) Tuber crops	4	93	24	117	26	7	33	119	31	150
f) Spices	32	1113	137	1250	156	38	194	1269	175	1444
g) Medicinal and aromatic plants	8	289	29	318	4	0	4	293	29	322
Soil health and fertility management	403	11412	3106	14518	1631	846	2477	13043	3952	16995
Livestock production and management	231	4773	1338	6111	1151	462	1613	5924	1800	7724
Home science/ women empowerment	381	3002	8290	11292	708	1962	2670	3710	10252	13962
Agriculture engineering	39	1302	199	1501	143	57	200	1445	256	1701
Plant protection	393	9333	1691	11024	1909	522	2431	11242	2213	13455
Fisheries	59	1308	408	1716	202	110	312	1510	518	2028
Production of inputs at site	97	2372	858	3230	503	354	857	2875	1212	4087
Capacity building and group dynamics	81	1919	720	2639	447	306	753	2366	1026	3392
Agro-forestry	196	6058	1462	7520	2572	182	2754	8630	1644	10274
Total	**2802**	**64255**	**22186**	**86441**	**13580**	**6019**	**19599**	**77835**	**28205**	**106040**

Capacity development programme on operation and maintenance of transplanter (KVK, Kollam)

Method demonstration on areca husk compost preparation (KVK, Shivamogga)

Table 72: Area wise capacity development courses conducted for farmers and farmwomen by KVKs of Kerala

Area	Courses (No.)	Participant farmers and farm women (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production	170	3070	1654	4724	221	179	400	3291	1833	5124
Horticulture										
a) Vegetable crops	114	2124	1919	4043	81	182	263	2205	2101	4306
b) Fruit crops	45	799	434	1233	107	76	183	906	510	1416
c) Ornamental plants	8	92	78	170	7	11	18	99	89	188
d) Plantation crops	22	440	180	620	19	41	60	459	221	680
e) Tuber crops	26	387	278	665	43	31	74	430	309	739
f) Spices	22	666	188	854	42	59	101	708	247	955
g) Medicinal and aromatic plants	1	15	2	17	0	0	0	15	2	17
Soil health and fertility management	73	1972	950	2922	194	76	270	2166	1026	3192
Livestock production and management	107	3592	2885	6477	199	248	447	3791	3133	6924
Home science/ women empowerment	234	2318	4978	7296	309	528	837	2627	5506	8133
Agriculture engineering	67	1298	904	2202	67	66	133	1365	970	2335
Plant protection	156	4481	1801	6282	318	188	506	4799	1989	6788
Fisheries	37	589	383	972	39	133	172	628	516	1144
Production of inputs at site	122	1720	1992	3712	228	212	440	1948	2204	4152
Capacity building and group dynamics	65	1244	1158	2402	157	211	368	1401	1369	2770
Agro-forestry	9	129	71	200	7	13	20	136	84	220
Total	**1278**	**24936**	**19855**	**44791**	**2038**	**2254**	**4292**	**26974**	**22109**	**49083**

Table 73: Area wise capacity development courses conducted for farmers and farmwomen by KVK, Lakshadweep

Area	Courses (No.)	Participant farmers and farm women (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production	3	0	0	0	28	54	82	28	54	82
Horticulture										
a) Vegetable crops	1	0	0	0	13	12	25	13	12	25
c) Ornamental plants	1	0	0	0	0	15	15	0	15	15
e) Tuber crops	2	0	0	0	0	45	45	0	45	45
Livestock production and management	3	0	0	0	11	48	59	11	48	59
Plant protection	6	0	0	0	100	18	118	100	18	118
Production of inputs at site	2	0	0	0	34	17	51	34	17	51
Total	**18**	**0**	**0**	**0**	**186**	**209**	**395**	**186**	**209**	**395**

3.1.3.2 Rural youth

(a) State wise

Capacity development courses organized for rural youth by KVKs of Zone-XI are presented in Table 74. Data indicated that a total of 535 capacity development courses were conducted and trained 15,717 rural youth (9,478 male and 6,239 female) of which 13,044 (7,810 male and 5,234 female) were general and 2,673 (1,668 male and 1,005 female) were SC/ST. KVKs of Karnataka have organized 233 capacity development courses and trained 7,339 rural youth (5,585 male and 1,754 female) of which 5,823 (4,501 male and 1,322 female) were general and 1,516 (1,084 male and 432 female) were SC/ST. KVKs of Kerala have organized 302 capacity development courses and trained 8,378 rural youth (3,893 male and 4,485 female) of which 7,221 (3,309 male and 3,912 female) were general and 1157 (584 male and 573 female) were SC/ST. Nearly 39.70 per cent of the rural youth trained were female, which is a proof for the fact that KVKs have given emphasis to women participation to acquire knowledge and skills in agriculture and related areas. Youth belonging to SC/ST also participated in good number (17.01%) but indicated further scope for mainstreaming the youth of socially disadvantaged sections.

Table 74: State wise capacity development courses conducted for rural youth by KVKs of Zone-XI

Area	Courses (No.)	Participant rural youth (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Karnataka	233	4501	1322	5823	1084	432	1516	5585	1754	7339
Kerala	302	3309	3912	7221	584	573	1157	3893	4485	8378
Total	**535**	**7810**	**5234**	**13044**	**1668**	**1005**	**2673**	**9478**	**6239**	**15717**

(b) Area wise

Capacity development courses conducted for rural youth on different areas by KVKs of Zone-XI are presented in Table 75. Data reveals that a total of 535 capacity development courses were conducted for rural youth wherein trained 15,717 participants in different areas. Other areas *viz.* importance of organic farming, sericulture, agriculture and environment, micro irrigation, quality seed grower, mulberry cultivation & silkworm rearing, production of medicinal plants, paddy mechanization, nutrition security, soil and water testing, vegetable farming, kitchen gardening, Integrated Pest Management, bio control agent production, entrepreneurial development of youth, ICT and cultivation of pepper & coconut were the major areas with 91 courses and 2,422 participants. The relative popularity of these areas reflects the preference of rural youth in areas representing secondary agriculture. Value addition (61 courses, 2,404 participants), mushroom production (51 courses, 1,178 participants) and nursery management of horticulture crops (39 courses, 853 participants) were the other important areas for rural youth. Area wise capacity development courses conducted for rural youth by KVKs of Karnataka and Kerala are presented in Tables 76 and 77, respectively.

Table 75: Area wise capacity development courses conducted for rural youth by KVKs of Zone-XI

Area	Courses (No.)	Participant rural youth (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Nursery management of horticulture crops	39	444	274	718	71	64	135	515	338	853
Training and pruning of orchards	4	59	18	77	11	2	13	70	20	90
Protected cultivation of vegetable crops	19	252	76	328	63	21	84	315	97	412
Commercial fruit production	7	103	34	137	25	5	30	128	39	167
Integrated farming	28	569	283	852	73	27	100	642	310	952
Seed production	4	53	1	54	11	0	11	64	1	65
Production of organic inputs	27	457	166	623	124	63	187	581	229	810
Planting material production	7	82	79	161	23	37	60	105	116	221
Vermi-culture	23	381	135	516	110	39	149	491	174	665
Mushroom production	51	432	503	935	126	117	243	558	620	1178
Bee-keeping	31	715	310	1025	70	32	102	785	342	1127
Sericulture	16	361	75	436	48	7	55	409	82	491

(Contd.... P-83)

Repair and maintenance of farm machinery and implements	17	198	157	355	20	0	20	218	157	375
Value addition	61	822	1143	1965	256	183	439	1078	1326	2404
Small scale processing	16	234	345	579	50	25	75	284	370	654
Post Harvest Technology	10	165	138	303	31	12	43	196	150	346
Tailoring and stitching	2	26	12	38	3	12	15	29	24	53
Rural crafts	9	58	25	83	4	92	96	62	117	179
Dairying	26	488	173	661	137	41	178	625	214	839
Sheep and goat rearing	17	398	71	469	106	7	113	504	78	582
Quail farming	1	11	9	20	0	6	6	11	15	26
Piggery	1	12	15	27	4	3	7	16	18	34
Poultry production	17	155	132	287	41	53	94	196	185	381
Ornamental fisheries	2	71	41	112	0	0	0	71	41	112
Composite fish culture	3	25	5	30	47	3	50	72	8	80
Shrimp farming	1	4	3	7	1	0	1	5	3	8
Pearl culture	1	38	4	42	4	0	4	42	4	46
Cold water fisheries	2	7	17	24	0	2	2	7	19	26
Fish harvest and processing technology	2	68	51	119	0	0	0	68	51	119
Other	91	1122	939	2061	209	152	361	1331	1091	2422
Total	**535**	**7810**	**5234**	**13044**	**1668**	**1005**	**2673**	**9478**	**6239**	**15717**

Training on Honey bee rearing for Rural Youth
KVK Pathanamthitta

Training on value addition in finger millet under ARYA
(KVK, Shivamogga)

Table 76: Area wise capacity development courses conducted for rural youth by KVKs of Karnataka

Area	Courses (No.)	Participant rural youth (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Nursery management of horticulture crops	13	265	69	334	64	47	111	329	116	445
Training and pruning of orchards	3	47	6	53	9	2	11	56	8	64
Protected cultivation of vegetable crops	9	202	25	227	58	19	77	260	44	304
Commercial fruit production	2	34	6	40	7	2	9	41	8	49
Integrated farming	18	419	106	525	68	21	89	487	127	614
Seed production	4	53	1	54	11	0	11	64	1	65
Production of organic inputs	13	236	25	261	82	38	120	318	63	381
Planting material production	2	41	19	60	0	0	0	41	19	60
Vermi-culture	18	333	85	418	102	32	134	435	117	552
Mushroom production	12	168	97	265	54	18	72	222	115	337
Bee-keeping	11	188	39	227	26	9	35	214	48	262
Sericulture	9	334	23	357	43	3	46	377	26	403
Repair and maintenance of farm machinery and implements	2	51	6	57	18	0	18	69	6	75
Value addition	26	239	239	478	74	97	171	313	336	649
Small scale processing	4	32	65	97	8	11	19	40	76	116
Post Harvest Technology	5	101	48	149	27	5	32	128	53	181
Tailoring and stitching	2	26	12	38	3	12	15	29	24	53
Rural crafts	3	58	9	67	3	10	13	61	19	80
Dairying	24	474	149	623	125	37	162	599	186	785
Sheep and goat rearing	15	377	41	418	102	2	104	479	43	522
Piggery	1	12	15	27	4	3	7	16	18	34
Poultry production	2	43	5	48	5	0	5	48	5	53
Composite fish culture	3	25	5	30	47	3	50	72	8	80
Pearl culture	1	38	4	42	4	0	4	42	4	46
Others	31	705	223	928	140	61	201	845	284	1129
Total	**233**	**4501**	**1322**	**5823**	**1084**	**432**	**1516**	**5585**	**1754**	**7339**

Table 77: Area wise capacity development courses conducted for rural youth by KVKs of Kerala

Area	Courses (No.)	Participant rural youth (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Nursery management of horticulture crops	26	179	205	384	7	17	24	186	222	408
Training and pruning of orchards	1	12	12	24	2	0	2	14	12	26
Protected cultivation of vegetable crops	10	50	51	101	5	2	7	55	53	108
Commercial fruit production	5	69	28	97	18	3	21	87	31	118
Integrated farming	10	150	177	327	5	6	11	155	183	338
Production of organic inputs	14	221	141	362	42	25	67	263	166	429
Planting material production	5	41	60	101	23	37	60	64	97	161
Vermi-culture	5	48	50	98	8	7	15	56	57	113
Mushroom production	39	264	406	670	72	99	171	336	505	841
Bee-keeping	20	527	271	798	44	23	67	571	294	865
Sericulture	7	27	52	79	5	4	9	32	56	88
Repair and maintenance of farm machinery and implements	15	147	151	298	2	0	2	149	151	300
Value addition	35	583	904	1487	182	86	268	765	990	1755
Small scale processing	12	202	280	482	42	14	56	244	294	538
Post Harvest Technology	5	64	90	154	4	7	11	68	97	165
Rural crafts	6	0	16	16	1	82	83	1	98	99
Dairying	2	14	24	38	12	4	16	26	28	54
Sheep and goat rearing	2	21	30	51	4	5	9	25	35	60
Quail farming	1	11	9	20	0	6	6	11	15	26
Poultry production	15	112	127	239	36	53	89	148	180	328
Ornamental fisheries	2	71	41	112	0	0	0	71	41	112
Shrimp farming	1	4	3	7	1	0	1	5	3	8
Cold water fisheries	2	7	17	24	0	2	2	7	19	26
Fish harvest and processing technology	2	68	51	119	0	0	0	68	51	119
Others	60	417	716	1133	69	91	160	486	807	1293
Total	**302**	**3309**	**3912**	**7221**	**584**	**573**	**1157**	**3893**	**4485**	**8378**

3.1.3.3 Extension Personnel

(a) State wise

Capacity development programmes organized for the extension personnel by KVKs of Zone-XI are presented in Table 78. Data indicated that a total of 313 capacity development programmes were conducted and trained 11,399 extension personnel (7,724 male and 3,675 female) of which 9,467 (6,489 male and 2,978 female) were general and 1,932 (1,235 male and 697 female) were SC/ ST. KVKs of Karnataka have organized 176 capacity development programmes and trained 7,344 extension personnel (4,959 male and 2,385 female) of which 5,798 (4,001 male and 1,797 female) were general and 1,546 (958 male and 588 female) were SC/ST. KVKs of Kerala have organized 136 capacity development programmes and trained 4,031 extension personnel (2,765 male and 1,266 female) of which 3,657 (2,488 male and 1,169 female) were general and 374 (277 male and 97 female) were SC/ST. KVK Lakshadweep has organized one capacity development course and trained 24 extension personnel all were female who belongs to 12 each under general and SC/ST category each.

(b) Area wise

Capacity development courses conducted for extension personnel on different training areas by KVKs of Zone-XI are presented in Table 79. Data from the table shows that out of 313 courses conducted for 11,399 extension personnel, other areas *viz.,* capacity building for input dealers, advanced technologies in sericulture, nursery management, seed production, animal husbandry technologies for doubling of farmers' income, disease management in milch animals, post-harvest management in rabi crops, formation and management of FPOs, natural farming, water management, productivity enhancement in plantation crops, composting techniques, monthly technological advice for ATMA field staff, value addition, processing, integrated farming system, agri nutri campaign, value addition, food safety and organic cultivation with 79 courses was the major area with the participation of 2,622 extension personnel followed by Integrated Pest Management (47) and Integrated Nutrient Management (36) and so on. Details on area wise capacity development courses conducted for extension personnel by KVKs of Karnataka, Kerala and Lakshadweep are presented in Tables 80, 81 and 82, respectively.

3.1.3.4 Sponsored Capacity Development Courses

(a) State wise

KVKs of Zone-XI conducted sponsored capacity development courses which are presented state wise in Table 83. Data revealed that a total of 383 sponsored capacity development courses were organized and trained 12,341 participants (7,998 male and 4,343 female) of which 10,119 (6,697 male and 3,422 female) were general and 2,222 (1,301 male and 921 female) were SC/ST. KVKs of Karnataka have organized 177 sponsored capacity development courses and trained 6,804

Table 78: State wise capacity development courses conducted for extension personnel by KVKs of Zone-XI

State	Courses (No.)	Extension personnel (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Karnataka	176	4001	1797	5798	958	588	1546	4959	2385	7344
Kerala	136	2488	1169	3657	277	97	374	2765	1266	4031
Lakshadweep	1	0	12	12	0	12	12	0	24	24
Total	**313**	**6489**	**2978**	**9467**	**1235**	**697**	**1932**	**7724**	**3675**	**11399**

Table 79: Area wise capacity development courses conducted for extension personnel by KVKs of Zone-XI

Area	Courses (No.)	Participant extension personnel (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Productivity enhancement in field crops	28	573	158	731	228	48	276	801	206	1007
Integrated Pest Management	47	1113	258	1371	83	82	165	1196	340	1536
Integrated Nutrient Management	36	800	136	936	199	62	261	999	198	1197
Rejuvenation of old orchards	2	150	48	198	0	0	0	150	48	198
Protected cultivation technology	10	187	14	201	49	4	53	236	18	254
Production and use of organic inputs	14	329	111	440	106	44	150	435	155	590
Care and maintenance of farm machinery and implements	2	20	12	32	1	3	4	21	15	36
Women and child care	26	28	727	755	28	244	272	56	971	1027
Low cost and nutrient efficient diet designing	6	88	182	270	13	24	37	101	206	307
Group dynamics and farmers organization	9	212	74	286	29	7	36	241	81	322
Information networking among farmers	2	47	2	49	9	0	9	56	2	58
Capacity building for ICT application	20	525	126	651	30	6	36	555	132	687
Management in farm animals	10	340	77	417	66	16	82	406	93	499
Livestock feed and fodder production	16	558	94	652	169	38	207	727	132	859
Household food security	6	70	93	163	24	13	37	94	106	200
Other areas	79	1449	866	2315	201	106	307	1650	972	2622
Total	**313**	**6489**	**2978**	**9467**	**1235**	**697**	**1932**	**7724**	**3675**	**11399**

Training programme for extension functionaries on Vermicompost preparation (KVK, Ramanagara)

Training of ATMA functionaries on recent advances in agriculture (KVK, Davanagere)

Table 80: Area wise capacity development courses conducted for extension personnel by KVKs of Karnataka

Area	Courses (No.)	Participant extension personnel (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Productivity enhancement in field crops	19	369	85	454	178	48	226	547	133	680
Integrated Pest Management	31	632	212	844	83	82	165	715	294	1009
Integrated Nutrient Management	14	452	79	531	99	13	112	551	92	643
Protected cultivation technology	5	94	11	105	39	4	43	133	15	148
Production and use of organic inputs	9	235	91	326	95	43	138	330	134	464
Women and child care	23	28	634	662	28	244	272	56	878	934
Low cost and nutrient efficient diet designing	6	88	182	270	13	24	37	101	206	307
Group dynamics and farmers organization	8	182	73	255	21	7	28	203	80	283
Capacity building for ICT application	3	130	19	149	8	3	11	138	22	160
Management in farm animals	9	340	77	417	66	16	82	406	93	499
Livestock feed and fodder production	15	556	91	647	169	38	207	725	129	854
Household food security	4	68	64	132	24	13	37	92	77	169
Other areas	30	827	179	1006	135	53	188	962	232	1194
Total	176	4001	1797	5798	958	588	1546	4959	2385	7344

participants (4,955 male and 1,849 female) of which 5,390 (4,061 male and 1,329 female) were general and 1,414 (894 male and 520 female) were SC/ST. KVKs of Kerala have organized 199 sponsored capacity development courses and trained 5,237 participants (2,835 male and 2,402 female) of which 4,579 (199 male and 2,532 female) were general and 658 (303 male and 355 female) were SC/ST.

(b) Area wise

Sponsored capacity development courses conducted on different areas by KVKs of Zone-XI are presented in Table 84. Data indicated that a total of 383 sponsored capacity development courses were conducted besides the regular capacity development courses wherein trained 12,341 participants. More number of sponsored courses on other areas *viz.,* bio fuels, ICM in onion, scientific beekeeping, IFS, energy efficient pump sets and water conservation, farmer producer organization, friends of coconut tree, RAWE, INM, IMC, DAESI, PMFME, rooftop and tribal extension center under agricultural extension (57) were conducted on increasing production and productivity of crops with 2,085 participants followed by increasing production and productivity of crops with 36 courses and 1,425 participants.

Table 81: Area wise capacity development courses conducted for extension personnel by KVKs of Kerala

Area	Courses (No.)	Participant extension personnel (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Productivity enhancement in field crops	9	204	73	277	50	0	50	254	73	327
Integrated Pest Management	16	481	46	527	0	0	0	481	46	527
Integrated Nutrient Management	22	348	57	405	100	49	149	448	106	554
Rejuvenation of old orchards	2	150	48	198	0	0	0	150	48	198
Protected cultivation technology	5	93	3	96	10	0	10	103	3	106
Production and use of organic inputs	5	94	20	114	11	1	12	105	21	126
Care and maintenance of farm machinery and implements	2	20	12	32	1	3	4	21	15	36
Women and child care	3	0	93	93	0	0	0	0	93	93
Group dynamics and farmers organization	1	30	1	31	8	0	8	38	1	39
Information networking among farmers	2	47	2	49	9	0	9	56	2	58
Capacity building for ICT application	17	395	107	502	22	3	25	417	110	527
Livestock feed and fodder production	1	2	3	5	0	0	0	2	3	5
Household food security	2	2	29	31	0	0	0	2	29	31
Others	48	622	675	1297	66	41	107	688	716	1404
Total	**136**	**2488**	**1169**	**3657**	**277**	**97**	**374**	**2765**	**1266**	**4031**

Table 82: Area wise capacity development courses conducted for extension personnel by KVK, Lakshadweep

Area	Courses (No.)	Participant extension personnel (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Organic cultivation	1	0	12	12	0	12	12	0	24	24
Total	**1**	**0**	**12**	**12**	**0**	**12**	**12**	**0**	**24**	**24**

Table 83: State wise sponsored capacity development courses conducted by KVKs of Zone-XI

State	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Karnataka	177	4061	1329	5390	894	520	1414	4955	1849	6804
Kerala	199	2532	2047	4579	303	355	658	2835	2402	5237
Lakshadweep	7	104	46	150	104	46	150	208	92	300
Total	**383**	**6697**	**3422**	**10119**	**1301**	**921**	**2222**	**7998**	**4343**	**12341**

Table 84: Area wise sponsored capacity development courses conducted by KVKs of Zone-XI

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Production technologies of crops	36	839	247	1086	272	71	343	1111	318	1429
Commercial production of vegetables	16	107	134	241	40	63	103	147	197	344
Production and value addition										
Fruit crops	14	196	113	309	40	43	83	236	156	392
Ornamental plants	1	20	0	20	10	0	10	30	0	30
Spice crops	3	100	0	100	40	0	40	140	0	140
Soil health and fertility management	33	958	155	1113	60	41	101	1018	196	1214
Production of inputs at site	11	271	42	313	15	26	41	286	68	354
Methods of protective cultivation	6	176	52	228	37	21	58	213	73	286
IPDM	22	299	113	412	83	40	123	382	153	535
Post harvest technology and value addition										
Processing and value addition	22	185	292	477	22	46	68	207	338	545
Others	16	106	343	449	7	35	42	113	378	491
Farm machinery										
Farm machinery, tools and implements	26	336	80	416	121	30	151	457	110	567
Water conservation	15	229	79	308	13	16	29	242	95	337
Livestock and fisheries	7	72	68	140	5	43	48	77	111	188

(Contd.... P-91)

Livestock production and management										
Animal nutrition management	9	199	73	272	9	47	56	208	120	328
Animal disease management	9	181	73	254	2	0	2	183	73	256
Fisheries nutrition	2	20	49	69	0	11	11	20	60	80
Fisheries management	4	78	2	80	94	8	102	172	10	182
Others	11	347	65	412	44	15	59	391	80	471
Home Science										
Household nutritional security	4	10	55	65	0	7	7	10	62	72
Economic empowerment of women	9	8	145	153	10	64	74	18	209	227
Drudgery reduction of women	2	0	51	51	0	20	20	0	71	71
Others	7	95	127	222	24	31	55	119	158	277
Agricultural Extension										
Capacity building and group dynamics	14	369	105	474	35	34	69	404	139	543
Others	57	1061	639	1700	255	130	385	1316	769	2085
Total	**383**	**6697**	**3422**	**10119**	**1301**	**921**	**2222**	**7998**	**4343**	**12341**

Table 85: Area wise sponsored capacity development courses conducted by KVKs of Karnataka

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Production technologies of crops	29	749	112	861	254	53	307	1003	165	1168
Commercial production of vegetables	6	68	66	134	28	17	45	96	83	179
Production and value addition										
Fruit crops	5	106	14	120	4	13	17	110	27	137
Ornamental plants	0	0	0	0	0	0	0	0	0	0
Spice crops	3	100	0	100	40	0	40	140	0	140
Soil health and fertility management	27	811	67	878	45	34	79	856	101	957
Production of inputs at site	7	185	25	210	9	25	34	194	50	244
Methods of protective cultivation	2	35	9	44	16	4	20	51	13	64
IPDM	2	163	32	195	52	8	60	215	40	255

(Contd.... P-92)

Post harvest technology and value addition										
Processing and value addition	9	81	168	249	5	33	38	86	201	287
Others	14	70	322	392	2	25	27	72	347	419
Farm machinery										
Farm machinery, tools and implements	4	85	25	110	6	14	20	91	39	130
Water conservation	1	31	14	45	0	0	0	31	14	45
Livestock and fisheries										
Animal nutrition management	7	174	55	229	5	40	45	179	95	274
Animal disease management	2	64	0	64	2	0	2	66	0	66
Fisheries nutrition	1	0	19	19	0	11	11	0	30	30
Fisheries management	4	78	2	80	94	8	102	172	10	182
Others	9	231	24	255	36	2	38	267	26	293
Home Science										
Household nutritional security	1	0	13	13	0	7	7	0	20	20
Economic empowerment of women	2	0	11	11	10	29	39	10	40	50
Drudgery reduction of women	2	0	51	51	0	20	20	0	71	71
Others	3	12	20	32	7	19	26	19	39	58
Agricultural Extension										
Capacity building and group dynamics	5	219	14	233	0	0	0	219	14	233
Others	20	469	176	645	214	104	318	683	280	963
Total	**177**	**4061**	**1329**	**5390**	**894**	**520**	**1414**	**4955**	**1849**	**6804**

Table 86: Area wise sponsored capacity development courses conducted by KVKs of Kerala

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Production technologies of crops	7	90	135	225	18	18	36	108	153	261
Commercial production of vegetables	8	35	22	57	8	0	8	43	22	65
Production and value addition										

(Contd.... P-93)

Fruit crops	9	90	99	189	36	30	66	126	129	255
Ornamental plants	1	20	0	20	10	0	10	30	0	30
Soil health and fertility management	6	147	88	235	15	7	22	162	95	257
Production of inputs at site	4	86	17	103	6	1	7	92	18	110
Methods of protective cultivation	4	141	43	184	21	17	38	162	60	222
IPDM	20	136	81	217	31	32	63	167	113	280
Post harvest technology and value addition										
Processing and value addition	13	104	124	228	17	13	30	121	137	258
Others	2	36	21	57	5	10	15	41	31	72
Farm machinery										
Farm machinery, tools and implements	17	151	55	206	15	16	31	166	71	237
Water conservation	14	198	65	263	13	16	29	211	81	292
Livestock and fisheries										
Livestock production and management	1	23	13	36	0	4	4	23	17	40
Animal nutrition management	2	25	18	43	4	7	11	29	25	54
Animal disease management	7	117	73	190	0	0	0	117	73	190
Fisheries nutrition	1	20	30	50	0	0	0	20	30	50
Others	2	116	41	157	8	13	21	124	54	178
Home Science										
Household nutritional security	4	13	48	61	0	0	0	13	48	61
Economic empowerment of women	7	8	134	142	0	35	35	8	169	177
Others	4	83	107	190	17	12	29	100	119	219
Agricultural Extension										
Capacity building and group dynamics	9	150	91	241	35	34	69	185	125	310
Others	37	592	463	1055	41	26	67	633	489	1122
Total	**199**	**2532**	**2047**	**4579**	**303**	**355**	**658**	**2835**	**2402**	**5237**

Table 87: Area wise sponsored capacity development courses conducted by KVK, Lakshadweep

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Commercial production of vegetables	2	4	46	50	4	46	50	8	92	100
Farm machinery										
Farm machinery, tools and implements	5	100	0	100	100	0	100	200	0	200
Total	**7**	**104**	**46**	**150**	**104**	**46**	**150**	**208**	**92**	**300**

Soil health and fertility management with 33 courses and 1,214 participants was also an important area of capacity development. Area wise sponsored capacity development courses conducted by KVKs of Karnataka, Kerala and Lakshadweep are presented in Tables 85, 86 and 87, respectively.

3.1.3.5 Vocational Capacity Development Courses

(a) State wise

Vocational capacity development courses conducted by KVKs of Zone-XI are presented state wise in Table 88. Data shows that a total of 195 vocational capacity development courses were organized and trained 5,554 participants (3,448 male and 2,106 female) of which 4,711 (2,916 male and 1,795 female) were general and 843 (532 male and 311 female) were SC/ST**.** KVKs of Karnataka have organized 123 vocational capacity development courses for 3,827 participants (2,563 male and 1,264 female) of which 3,162 (2,122 male and 1,040 female) were general and 665 (441 male and 224 female) were SC/ST. KVKs of Kerala have organized 72 vocational capacity development courses and trained 1,727 participants (885 male and 842 female) of which 1,549 (794 male and 755 female) were general and 178 (91 male and 87 female) were SC/ST.

(b) Area wise

This is an important area of capacity development where the focus is to impart skills and enable the trainees to earn or supplement his/her livelihood. In this regard, vocational capacity development courses conducted on different areas by KVKs of Zone-XI are presented in Table 89. Data indicated that a total of 195 capacity development courses were conducted by involving 5,554 potential entrepreneurs. Among the different vocations, capacity building and group dynamics was the major area of training (29 courses and 949 participants) followed by others *viz.,* areca palm

Table 88: State wise vocational capacity development courses conducted by KVKs of Zone-XI

State	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Karnataka	123	2122	1040	3162	441	224	665	2563	1264	3827
Kerala	72	794	755	1549	91	87	178	885	842	1727
Total	**195**	**2916**	**1795**	**4711**	**532**	**311**	**843**	**3448**	**2106**	**5554**

Table 89: Area wise vocational capacity development courses conducted by KVKs of Zone –XI

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Commercial floriculture	2	26	32	58	0	0	0	26	32	58
Commercial fruit production and vegetable production	1	10	10	20	8	2	10	18	12	30
Integrated crop management	3	62	38	100	12	10	22	74	48	122
Organic farming	5	76	34	110	31	5	36	107	39	146
Others	8	213	127	340	11	17	28	224	144	368
Post harvest technology and value addition	7	215	170	385	24	16	40	239	186	425
Others	2	5	8	13	36	10	46	41	18	59
Livestock and fisheries										
Dairy farming	13	358	122	480	60	21	81	418	143	561
Composite fish culture, sheep and goat rearing	8	159	9	168	21	0	21	180	9	189
Piggery and poultry farming	6	98	22	120	1	0	1	99	22	121
Income generation activities										
Vermi-composting	5	67	86	153	11	44	55	78	130	208
Production of bio-agents and bio-pesticides.	3	32	10	42	7	5	12	39	15	54
Repair and maintenance of farm machinery	16	128	181	309	4	18	22	132	199	331
Rural crafts	1	18	4	22	3	0	3	21	4	25
Seed production	4	53	49	102	21	10	31	74	59	133
Sericulture	2	21	6	27	2	5	7	23	11	34
Mushroom cultivation	10	70	76	146	11	5	16	81	81	162
Nursery, grafting etc.	6	76	45	121	24	10	34	100	55	155
Tailoring, stitching, embroidery, dying etc.	7	177	4	181	1	0	1	178	4	182
Agril. para-workers, para-vet training	8	91	10	101	0	0	0	91	10	101
Others	10	246	130	376	17	8	25	263	138	401
Agricultural extension										
Capacity building and group dynamics	29	397	297	694	163	92	255	560	389	949
Others	29	103	272	375	2	22	24	105	294	399
Total	**195**	**2916**	**1795**	**4711**	**532**	**311**	**843**	**3448**	**2106**	**5554**

Table 90: Area wise vocational capacity development courses conducted by KVKs of Karnataka

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Commercial floriculture	0	0	0	0	0	0	0	0	0	0
Commercial fruit production	0	0	0	0	0	0	0	0	0	0
Commercial vegetable production Integrated crop management	2	53	26	79	10	1	11	63	27	90
Organic farming	2	43	7	50	17	0	17	60	7	67
Others	6	179	127	306	11	17	28	190	144	334
Post harvest technology and value addition										
Value addition	4	12	28	40	45	13	58	57	41	98
Others	1	0	0	0	32	0	32	32	0	32
Livestock and fisheries										
Dairy farming	13	358	122	480	60	21	81	418	143	561
Composite fish culture	3	103	18	121	28	3	31	131	21	152
Sheep and goat rearing	8	159	9	168	21	0	21	180	9	189
Piggery	1	40	0	40	0	0	0	40	0	40
Poultry farming	6	98	22	120	1	0	1	99	22	121
Income generation activities										
Vermi-composting	5	67	86	153	11	44	55	78	130	208
Production of bio-agents, bio-pesticides and bio-fertilizers etc.	2	22	4	26	3	2	5	25	6	31
Repair and maintenance of farm machinery and implements	1	0	31	31	0	1	1	0	32	32
Rural crafts	1	18	4	22	3	0	3	21	4	25
Seed production	4	53	49	102	21	10	31	74	59	133
Sericulture	2	21	6	27	2	5	7	23	11	34
Mushroom cultivation	4	63	46	109	11	5	16	74	51	125
Nursery, grafting etc.	3	50	22	72	8	0	8	58	22	80
Tailoring, stitching, embroidery, dying etc.	7	177	4	181	1	0	1	178	4	182
Agril. para-workers, para-vet training	8	91	10	101	0	0	0	91	10	101
Others	5	71	14	85	0	0	0	71	14	85
Agricultural extension										
Capacity building and group dynamics	27	376	272	648	156	85	241	532	357	889
Others	7	28	133	161	0	17	17	28	150	178
Total	**123**	**2122**	**1040**	**3162**	**441**	**224**	**665**	**2563**	**1264**	**3827**

climbing through machine, FOCT, RAWE, PDM and ornamental fish farming under agricultural extension with 29 courses and 399 participants. Details of area-wise vocational capacity development courses conducted by KVKs of Karnataka and Kerala are presented in Tables 90 and 91, respectively.

Table 91: Area wise vocational capacity development courses conducted by KVKs of Kerala

Area	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Crop production and management										
Commercial floriculture	2	26	32	58	0	0	0	26	32	58
Commercial vegetable production Integrated crop management	1	9	12	21	2	9	11	11	21	32
Organic farming	3	33	27	60	14	5	19	47	32	79
Post harvest technology and value addition										
Value addition	6	215	170	385	11	10	21	226	180	406
Others	1	5	8	13	4	10	14	9	18	27
Poultry farming	2	20	7	27	2	1	3	22	8	30
Income generation activities										
Production of bio-agents and bio-pesticides.	1	10	6	16	4	3	7	14	9	23
Repair and maintenance of farm machinery	15	128	150	278	4	17	21	132	167	299
Mushroom cultivation	6	7	30	37	0	0	0	7	30	37
Nursery, grafting etc.	3	26	23	49	16	10	26	42	33	75
Agricultural Extension										
Capacity building and group dynamics	2	21	25	46	7	7	14	28	32	60
Others	22	75	139	214	2	5	7	77	144	221
Total	**72**	**794**	**755**	**1549**	**91**	**87**	**178**	**885**	**842**	**1727**

Capacity development course on mushroom cultivation (KVK, Kodagu)

3.1.3.6 On and Off Campus Capacity Development Courses

(a) On campus

State wise on campus capacity development courses conducted by KVKs of Zone-XI under different categories of capacity development are furnished in Table 92. Data indicated that a total of 3,637 on campus capacity development courses were organized for 1,37,385 participants (89,044 male and 48,341 female) of which 1,17,091 (76,901 male and 40,190 female) were general and 20,294 (12,143 male and 8,151 female) were SC/ST. Out of which 2,431 capacity development courses were organized for 99,299 farmers and farm women, 401 capacity development courses for 11,589 rural youth, 227 capacity development courses for 8,602 extension personnel, 383 sponsored capacity development courses for 12,341 participants and 195 vocational capacity development programmes for 5,554 budding entrepreneurs. State wise and participant wise data could be seen in Table 92.

Table 92: State wise on campus capacity development courses conducted by KVKs of Zone-XI

Category and State	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
(i) Farmers and farm women										
Karnataka	1533	39496	13798	53294	6653	3845	10498	46149	17643	63792
Kerala	880	17077	14966	32043	1464	1605	3069	18541	16571	35112
Lakshadweep	18	0	0	0	186	209	395	186	209	395
Total	2431	56573	28764	85337	8303	5659	13962	64876	34423	99299
(ii) Rural youth										
Karnataka	165	3015	976	3991	693	286	979	3708	1262	4970
Kerala	236	2703	3000	5703	470	446	916	3173	3446	6619
Total	401	5718	3976	9694	1163	732	1895	6881	4708	11589
(iii) Extension personnel										
Karnataka	133	3175	1506	4681	702	465	1167	3877	1971	5848
Kerala	94	1822	727	2549	142	63	205	1964	790	2754
Total	227	4997	2233	7230	844	528	1372	5841	2761	8602
(iv) Sponsored courses										
Karnataka	177	4061	1329	5390	894	520	1414	4955	1849	6804
Kerala	199	2532	2047	4579	303	355	658	2835	2402	5237
Lakshadweep	7	104	46	150	104	46	150	208	92	300
Total	383	6697	3422	10119	1301	921	2222	7998	4343	12341
(v) Vocational courses										
Karnataka	123	2122	1040	3162	441	224	665	2563	1264	3827
Kerala	72	794	755	1549	91	87	178	885	842	1727
Total	195	2916	1795	4711	532	311	843	3448	2106	5554
Zone-XI										
Karnataka	2131	51869	18649	70518	9383	5340	14723	61252	23989	85241
Kerala	1481	24928	21495	46423	2470	2556	5026	27398	24051	51449
Lakshadweep	25	104	46	150	290	255	545	394	301	695
Total	**3637**	**76901**	**40190**	**117091**	**12143**	**8151**	**20294**	**89044**	**48341**	**137385**

(b) Off campus

State wise off campus capacity development courses conducted by KVKs of Zone-XI under different categories of capacity development are furnished in Table 93. Data indicated that a total of 1,887 off campus capacity development courses were organized and trained 70,589 participants (49,599 male and 18,545 female) of which 60,364 (42,979 male and 17,385 female) were general and 10,225 (6,603 male and 3,622 female) were SC/ST**.** Out of which 1,667 capacity development courses were organized for 61,861 farmers and farm women, 134 capacity development courses for 6,705 rural youth and 86 capacity development courses for 2,023 extension personnel. State wise and participant wise data could be seen in Table 93.

Table 93: State wise off campus capacity development courses conducted by KVKs of Zone-XI

Category and State	Courses (No.)	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
(i) Farmers and farm women										
Karnataka	1269	24759	8388	33147	6927	2174	9101	31686	10562	42248
Kerala	398	7859	4889	12748	574	649	1223	8433	5538	13971
Total	1667	32618	13277	45895	7501	2823	10324	40119	16100	61861
(ii) Rural youth										
Karnataka	68	1486	346	1832	391	146	537	1877	492	1772
Kerala	66	606	912	1518	114	127	241	720	1039	4933
Total	134	2092	1258	3350	505	273	778	2597	1531	6705
(iii) Extension personnel										
Karnataka	43	826	291	1117	256	123	379	1082	414	1597
Kerala	42	666	442	1108	135	34	169	801	476	416
Lakshadweep	1	0	12	12	0	12	12	0	24	10
Total	86	1492	745	2237	391	169	560	1883	914	2023
Zone-XI										
Karnataka	1380	27071	9025	36096	7574	2443	10017	34645	11468	43897
Kerala	506	9131	6243	15374	823	810	1633	9954	7053	26532
Lakshadweep	1	0	12	12	0	12	12	0	24	160
Total	**1887**	**36202**	**15280**	51482	**8397**	**3265**	11662	44599	18545	**70589**

3.1.4 Frontline Extension Programmes

Organization of extension activities is carried out by the KVKs to create awareness among farmers, extension personnel, other stakeholders and public about various technologies in agriculture and allied sectors. Details are described below:

(a) State wise

Extension programmes carried out by KVKs during the reporting year are presented in Table 94. Data indicate that a total of 1,14,832 extension programmes were carried out by KVKs through different methods which involved 12,45,414 farmers (11,10,434 general and 1,34,980 SC/ST) and 37,995 extension personnel. KVKs of Karnataka carried out 68,955 extension programmes with the participation of 9,93,267 farmers and 31,781 extension personnel. KVKs of Kerala conducted 45066 programmes with the participation of 2,50,757 farmers and 6,140 extension personnel. KVK Lakshadweep conducted 811 programmes with the participation of 1,390 farmers and 74 extension personnel.

(b) Activity wise

Extension programmes carried out by KVKs in Karnataka, Kerala, Lakshadweep are presented in Tables 95, 96, 97 and 98, respectively. Data from Table 95 indicate that the KVKs of Karnataka organised more extension programmes on farmers visits to KVKs (28,972) followed by advisory services (28,122), scientist visits to farmers fields (4,346). Whereas KVKs of Kerala organized more advisory services (20,636) followed by farmers visit to KVKs (20,365) and Scientists visit to farmers fields (1,552) presented in Table 96. Data in Table 97 shows that the KVK, Lakshadweep carried out more advisory services (750) followed by diagnostic visits (27) and scientists visit to farmers fields (14).

Data from the table 98 shows that the KVKs of Zone XI carried out more advisory services (49,508) followed by farmers visit to KVKs (49,337), scientists visit to farmers fields (5,912), lectures delivered as resource persons (2,733), diagnostic visits (1,709), method demonstrations (1,083), group meetings (962), celebration of important days (531), field days (484), film shows (445), exposure visits (339), special day celebrations (332), workshops (169), farmers seminars (139), self-help group meetings (139), exhibitions (107), soil health camps (86), animal health camps (74), kisan melas (55), kisan gosthies (49), ex-trainees sammelans (39), mahila mandals conveners meetings (27), plant health camps (14), farm science club meetings (13) and others (546).

Table 94: State wise extension programmes carried out by KVKs

State	Programmes (No.)	Farmers (No.)							Extension personnel (No.)		
		General			SC/ST			Grand total			
		Male	Female	Total	Male	Female	Total		Male	Female	Total
Karnataka	68955	774502	114405	888907	75914	28446	104360	993267	23290	8491	31781
Kerala	45066	148150	73377	221527	18479	10751	29230	250757	3156	2984	6140
Lakshadweep	811	0	0	0	695	695	1390	1390	47	27	74
Total	**114832**	**922652**	**187782**	**1110434**	**95088**	**39892**	**134980**	**1245414**	**26493**	**11502**	**37995**

Table 95: Extension programmes carried out by KVKs of Karnataka

State	Programmes (No.)	Farmers (No.)							Extension personnel (No.)		
		General			SC/ST			Grand total			
		Male	Female	Total	Male	Female	Total		Male	Female	Total
Farmers visit to KVKs	28972	20133	4880	25013	3538	1921	5459	30472	15	5	20
Advisory services	28122	16843	5368	22211	3191	1286	4477	26688	2074	750	2824
Scientist visit to farmers fields	4346	18041	3512	21553	2213	776	2989	24542	653	156	809
Lectures delivered as resource persons	2497	67693	15097	82790	9717	3578	13295	96085	4938	1398	6336
Diagnostic visits	1182	4950	617	5567	644	173	817	6384	623	199	822
Method demonstrations	781	11736	2781	14517	2376	860	3236	17753	890	328	1218
Group meetings	648	9634	2956	12590	1940	784	2724	15314	834	365	1199
Celebration of important days	387	17033	7316	24349	3515	2193	5708	30057	826	481	1307
Film shows	375	9526	2889	12415	2493	1046	3539	15954	343	217	560
Field days	344	9747	1792	11539	2099	456	2555	14094	440	181	621
Special day celebrations	271	9850	5101	14951	1978	1363	3341	18292	550	289	839
Exposure visits	231	1859	472	2331	335	192	527	2858	157	92	249
Workshops	126	4326	1288	5614	872	583	1455	7069	375	226	601
Exhibitions	87	85563	16885	102448	13454	3931	17385	119833	3187	1212	4399
Animal health camps	69	3097	503	3600	731	284	1015	4615	116	42	158
Soil health camps	69	1073	227	1300	239	160	399	1699	120	29	149
Self help group meetings	62	195	995	1190	72	174	246	1436	16	85	101
Farmers seminars	52	2750	1076	3826	556	278	834	4660	463	130	593
Kisan melas	51	469672	38088	507760	23576	7401	30977	538737	6201	2132	8333
Kisan gosthies	38	3754	678	4432	558	279	837	5269	102	29	131
Mahila mandals conveners meetings	27	98	425	523	1	126	127	650	8	27	35
Ex-trainees samelan	22	348	52	400	47	16	63	463	13	2	15
Farm science club meetings	10	229	6	235	29	11	40	275	16	2	18
Plant health camps	9	783	75	858	35	19	54	912	46	5	51
Others	177	5569	1326	6895	1705	556	2261	9156	284	109	393
Total	**68955**	**774502**	**114405**	**888907**	**75914**	**28446**	**104360**	**993267**	**23290**	**8491**	**31781**

Table 96: Extension programmes carried out by KVKs of Kerala

State	Programmes (No.)	Farmers (No.)							Extension personnel (No.)		
		General			SC/ST			Grand total			
		Male	Female	Total	Male	Female	Total		Male	Female	Total
Advisory services	20636	9440	6984	16424	1868	1245	3113	19537	556	543	1099
Farmers visit to KVKs	20365	10717	6651	17368	2809	1632	4441	21809	4	3	7
Scientist visit to farmers fields	1552	2930	1541	4471	422	387	809	5280	0	0	0
Diagnostic visits	500	804	548	1352	218	94	312	1664	171	149	320
Others	357	505	217	722	0	0	0	722	255	156	411
Group meetings	311	2904	1761	4665	556	831	1387	6052	209	169	378
Method demonstrations	302	1867	1416	3283	276	289	565	3848	153	96	249
Lectures delivered as resource persons	236	5749	3728	9477	720	598	1318	10795	391	524	915
Celebration of important days	141	3383	2841	6224	235	199	434	6658	312	356	668
Field days	140	1483	1141	2624	136	141	277	2901	134	152	286
Exposure visits	108	484	549	1033	230	204	434	1467	119	97	216
Farmers seminars	87	1682	1321	3003	399	319	718	3721	188	134	322
Self-help group meetings	77	2443	963	3406	186	313	499	3905	38	54	92
Film shows	70	1023	467	1490	320	151	471	1961	40	36	76
Special day celebrations	61	1950	1611	3561	141	148	289	3850	134	138	272
Workshops	42	2154	1297	3451	87	90	177	3628	88	64	152
Exhibitions	19	96775	39090	135865	9513	3827	13340	149205	195	149	344
Ex-trainees Sammelans	17	240	188	428	34	36	70	498	16	17	33
Soil health camps	17	402	254	656	86	41	127	783	12	9	21
Kisan gosthies	11	257	223	480	52	35	87	567	54	44	98
Animal health camps	5	273	117	390	74	37	111	501	24	18	42
Plant health camps	5	67	27	94	13	16	29	123	4	3	7
Kisan Melas	4	577	424	1001	102	117	219	1220	59	73	132
Farm science club meetings	3	41	18	59	2	1	3	62	0	0	0
Total	**45066**	**148150**	**73377**	**221527**	**18479**	**10751**	**29230**	**250757**	**3156**	**2984**	**6140**

Table 97: Extension programmes carried out by KVK, Lakshadweep

State	Programmes (No.)	Farmers (No.)							Extension personnel (No.)		
		General			SC/ST			Grand total			
		Male	Female	Total	Male	Female	Total		Male	Female	Total
Advisory services	750	0	0	0	480	350	830	830	0	0	0
Diagnostic visits	27	0	0	0	20	7	27	27	0	0	0
Scientists visit to farmers fields	14	0	0	0	10	4	14	14	0	0	0
Others	12	0	0	0	109	265	374	374	13	17	30
Group meetings	3	0	0	0	45	0	45	45	4	0	4
Celebration of important days	3	0	0	0	26	44	70	70	3	2	5
Exhibitions	1	0	0	0	0	25	25	25	11	0	11
Workshops	1	0	0	0	5	0	5	5	16	8	24
Total	**811**	**0**	**0**	**0**	**695**	**695**	**1390**	**1390**	**47**	**27**	**74**

Table 98: Extension programmes carried out by KVKs in Zone XI

State	Programmes (No.)	Farmers (No.)							Extension personnel (No.)		
		General			SC/ST			Grand total			
		Male	Female	Total	Male	Female	Total		Male	Female	Total
Advisory services	49508	26283	12352	38635	5539	2881	8420	47055	2630	1293	3923
Farmers visit to KVKs	49337	30850	11531	42381	6347	3553	9900	52281	19	8	27
Scientists visit to farmers fields	5912	20971	5053	26024	2645	1167	3812	29836	653	156	809
Lectures delivered as resource persons	2733	73442	18825	92267	10437	4176	14613	106880	5329	1922	7251
Diagnostic visits	1709	5754	1165	6919	882	274	1156	8075	794	348	1142
Method demonstrations	1083	13603	4197	17800	2652	1149	3801	21601	1043	424	1467
Group meetings	962	12538	4717	17255	2541	1615	4156	21411	1047	534	1581
Celebration of important days	531	20416	10157	30573	3776	2436	6212	36785	1141	839	1980

(Contd.... P-104)

Field days	484	11230	2933	14163	2235	597	2832	16995	574	333	907
Film shows	445	10549	3356	13905	2813	1197	4010	17915	383	253	636
Exposure visits	339	2343	1021	3364	565	396	961	4325	276	189	465
Special day celebrations	332	11800	6712	18512	2119	1511	3630	22142	684	427	1111
Workshops	169	6480	2585	9065	964	673	1637	10702	479	298	777
Farmers seminars	139	4432	2397	6829	955	597	1552	8381	651	264	915
Self-help group meetings	139	2638	1958	4596	258	487	745	5341	54	139	193
Exhibitions	107	182338	55975	238313	22967	7783	30750	269063	3393	1361	4754
Soil health camps	86	1475	481	1956	325	201	526	2482	132	38	170
Animal health camps	74	3370	620	3990	805	321	1126	5116	140	60	200
Kisan melas	55	470249	38512	508761	23678	7518	31196	539957	6260	2205	8465
Kisan gosthies	49	4011	901	4912	610	314	924	5836	156	73	229
Ex-trainees Sammelans	39	588	240	828	81	52	133	961	29	19	48
Mahila mandals conveners meetings	27	98	425	523	1	126	127	650	8	27	35
Plant health camps	14	850	102	952	48	35	83	1035	50	8	58
Farm science club meetings	13	270	24	294	31	12	43	337	16	2	18
Others	546	6074	1543	7617	1814	821	2635	10252	552	282	834
Total	**114832**	**922652**	**187782**	**1110434**	**95088**	**39892**	**134980**	**1245414**	**26493**	**11502**	**37995**

(c) Mass contact

Extension programmes carried out for mass contact by KVKs of Zone XI are presented in Table 99. The state wise analysis of data indicates that newspaper coverage was major programmes in both the states. Zone level pooled data shows that KVKs carried out 4,172 extension programmes of mass contact of which large number of programmes were covered through 2,261 news items published in local and national dailies. Further, KVK scientists published 590 extension literature and 432 popular articles as well as prepared 162 DVD/CD/Video clippings during the year. KVKs were also participated in radio talks (472) and TV talks (255). It is worth to mention here that KVKs of Karnataka have participated in agricultural exhibitions and kisan melas organized as mega events annually by their respective host organizations where in lakhs of farmers, extension personnel and other stakeholders took part.

Table 99: Extension programmes carried out for mass contact by KVKs in Zone-XI

Programme /Media	Extension programmes for mass contact (No.)			
	Karnataka	Kerala	Lakshadweep	Total
Newspaper coverage	1464	797	0	2261
Radio talks	405	58	9	472
Extension literature	468	116	6	590
Popular articles	319	113	0	432
TV talks	220	35	0	255
DVD/CD/Video clippings	110	52	0	162
Total	**2986**	**1171**	**15**	**4172**

Exhibition of cocoon crafts (KVK, Chikkaballapura)

International women's day (KVK, Pathanamthitta)

Mahila kisan divas (KVK, Udupi)

Ragi field day (KVK, Chamarajanagara)

Webcasting of PM's programme (KVK, Alappuzha)

World soil day (KVK, Chikkamagaluru)

3.1.5 Production of Technological Products

Timely availability of quality technological products such as seeds, planting material, livestock breeds and bio-products are essential to achieve the potential yield in agriculture and allied sectors. Keeping this in view, KVKs are actively involved in production of technological products and the details are given here under.

(a) Seeds

State and crop category wise seeds produced by KVKs are presented in Tables 100, 101, and 102. A total of 2,824.21 q of seeds of different crops were produced by KVKs in the Zone (Table 100) and supplied to 1,02,213 farmers. Out of which, 2,694.65 q seeds produced by KVKs of Karnataka and 129.56 q seeds produced by KVKs of Kerala.

Table 100: State wise production of seeds by KVKs in Zone XI

State	Production of seeds		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Karnataka	2694.65	12810441	48865
Kerala	129.56	4534403	53348
Total	**2824.21**	**17344844**	**102213**

KVKs of Karnataka produced more seeds of cereals (1,511.08 q) followed by pulses (561.77 q), oilseeds (353.67 q), millets (170.85 q), fodder (56.58 q), vegetables (23.33 q) and green manure crops (17.37 q) and supplied to 48,865 farmers (Table 101).

Table 101: Crop category wise production of seeds by KVKs of Karnataka

Crop category	Production of seeds		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Cereals	1511.08	3929335	12202
Pulses	561.77	3726425	6264
Oilseeds	353.67	2747550	6596
Millets	170.85	713916	16818
Fodder	56.58	891775	3002
Vegetables	23.33	662480	3848
Green manures	17.37	138960	135
Total	**2694.65**	**12810441**	**48865**

Kerala KVKs have produced more spices seeds (43.25 q), followed by cereals (42.01 q), pulses (12.10 q), vegetables (13.10 q), oilseeds (10.00 q) and tubers (9.10 q) and supplied to 53,348 farmers (Table 102).

Table 102: Crop category wise production of seeds by KVKs of Karnataka

Crop category	Production of seeds		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Spices	43.25	432500	355
Cereals	42.01	189045	137
Vegetables	13.10	3635408	52482
Pulses	12.10	84700	294
Oilseeds	10.00	170000	24
Tubers	9.10	22750	56
Total	**129.56**	**4534403**	**53348**

Crop category wise production of seeds by KVKs in the Zone presented in Table 103 indicated that higher quantity of cereals seeds were produced (1,553.09 q) followed by pulses (573.87 q), oilseeds (363.67 q), millets (170.85 q), fodder (56.58 q), vegetables (36.43 q), spices (43.25 q), green manures (17.37 q) and tubers (9.10 q) and supplied to 1,02,213 farmers.

Table 103: Crop category wise production of seeds by KVKs in Zone-XI

Crop category	Production of seeds		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Cereals	1553.09	4118380	12339
Pulses	573.87	3811125	6558
Oilseeds	363.67	2917550	6620
Millets	170.85	713916	16818
Fodder	56.58	891775	3002
Spices	43.25	432500	355
Vegetables	36.43	4297888	56330
Green manures	17.37	138960	135
Tubers	9.10	22750	56
Total	**2824.21**	**17344844**	**102213**

(b) Planting materials

State and crop category wise planting materials produced by KVKs are presented in Tables 104,105,106 and 107. A total of 26,02,452 planting materials of different crops were produced by KVKs of Zone-XI and supplied to 86,935 farmers (Table 104). Out of which, 14,95,403 numbers of planting materials were produced by KVKs of Karnataka and 11,07,049 numbers of planting materials were produced by KVKs of Kerala.

Table 104: State wise production of planting materials by KVKs in Zone XI

State	Production of planting materials		
	Quantity (No.)	Worth (₹.)	Farmers (No.)
Karnataka	1495403	8420150	27178
Kerala	1107049	14162421	59757
Total	**2602452**	**22582571**	**86935**

KVKs of Karnataka produced highest number of planting materials of fodder (9,59,200) followed by commercial (1,51,960), plantation (1,25,978), vegetables (96,206), fruits (73,362), spices (57,790), flowers (22,391), medicinal and aromatic (4,633), forest (2,117) and ornamental (1,766) and provided to 27,178 farmers (Table 105).

Table 105: Crop category wise production of planting materials by KVKs of Karnataka

Crop category	Production of planting materials		
	Quantity (No.)	Worth (₹.)	Farmers (No.)
Fodder	959200	1379927	5916
Commercial	151960	327840	156
Plantation	125978	2376425	2874
Vegetables	96206	587348	5948
Fruits	73362	2766329	6625
Spices	57790	789039	3252
Flowers	22391	63755	607
Medicinal and aromatic	4633	47792	1265
Forest	2117	52925	260
Ornamental plants	1766	28770	275
Total	**1495403**	**8420150**	**27178**

KVKs of Kerala produced more number of planting materials of vegetables (5,99,474) followed by fodder (2,20,777), spices (1,543,74), plantation (54,095), fruits (47,587), medicinal and aromatic (11,578), tubers (7,767), ornamental (5,904), forest (3,282) and flowers (2,211) and supplied to 59,757 farmers (Table 106).

Table 106: Crop category wise production of planting materials by KVKs of Kerala

Crop category	Production of planting materials		
	Quantity (No.)	Worth (₹.)	Farmers (No.)
Vegetables	599474	2997370	23440
Fodder	220777	359349	2345
Spices	154374	3869839	14014
Plantation	54095	4089440	7696
Fruits	47587	2297232	5329
Medicinal and aromatic	11578	48239	2505
Tubers	7767	194175	1843
Orna-mental	5904	191557	2072
Forest	3282	71370	244
Flowers	2211	43850	269
Total	**1107049**	**14162421**	**59757**

Data on crop category wise production of planting materials produced by KVKs in Zone-XI are presented in Table 107 revealed that more quantity of planting materials were produced on fodder (11,79,977) followed by vegetables (6,95,680), spices (2,12,164), plantation (1,80,073), commercial (1,51,960), fruits (1,20,949), flowers (24,602), medicinal and aromatic (16,211), tubers (7,767), ornamental (7,670) and forest (5,399) and supplied to 86,935 farmers.

Table 107: Crop category wise production of planting materials by KVKs in Zone XI

Crop category	Production of planting materials		
	Quantity (No.)	Worth (₹.)	Farmers (No.)
Fodder	1179977	1739276	8261
Vegetables	695680	3584718	29388
Spices	212164	4658878	17266
Plantation	180073	6465865	10570
Commercial	151960	327840	156
Fruits	120949	5063561	11954
Flowers	24602	107605	876
Medicinal and aromatic	16211	96031	3770
Tubers	7767	194175	1843
Orna-mental	7670	220327	2347
Forest	5399	124295	504
Total	**2602452**	**22582571**	**86935**

(c) Hybrids

State and crop category wise planting materials of crop hybrids produced by KVKs are presented in Table 108. A total of 4,22,284 numbers of hybrid planting materials of different crops were produced by KVKs of Zone XI and supplied to 9,847 farmers. KVKs of Karnataka produced 2,43,537 number of hybrid planting materials of which vegetables (2,28,822) and fruits (14,715) and provided to 2811 farmers. KVKs of Kerala produced 1,78,747 number of hybrid planting materials of which vegetables (1,77,250) and fruits (1,497) and supplied to 7,036 farmers. Thus, KVKs in Zone XI produced 4,06,072 number of hybrid planting materials on vegetables and 16,212 number of hybrid planting materials on fruits.

Table 108: State and crop category wise production of hybrid planting materials by KVKs in Zone XI

State	Crop category	Production of hybrid planting materials		
		Quantity (No.)	Worth (₹.)	Farmers (No.)
Karnataka	Vegetables	228822	572055	2103
	Fruits	14715	209940	708
	Total	243537	781995	2811
Kerala	Vegetables	177250	620375	6296
	Fruits	1497	44910	740
	Total	178747	665285	7036
Zone XI	**Grand total**	**422284**	**1447280**	**9847**

(d) Bio-products

State and category wise bio-products produced by KVKs are presented in Tables 109, 110, 111, 112 and 113. Data in Table 109 indicated that a total of 4,415.56 q of bio-products were produced by KVKs of Zone XI and supplied to 1,20,776 farmers. Out of which, 2,119.40 q of bio-products produced by KVKs of Karnataka and 2,296.16 q of bio-products produced by KVKs of Kerala.

Table 109: State wise production of bio-products by KVKs in Zone XI

State	Production of bio-products		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Karnataka	2119.40	14884680	35861
Kerala	2296.16	16426009	84915
Total	**4415.56**	**31310689**	**120776**

KVKs of Karnataka produced more quantity of bio-products related to bio-fertilisers (1,401.29 q) followed by micro nutrient mixtures (437.04 q), bio-fungicides (96.79 q), bio-pesticides (94.21 q), organic manures (86.24 q), bio-agents (3.71 q) and mushroom spawn (0.13 q) and provided to 35,861 farmers (Table 110).

Table 110: Category wise production of bio-products by KVKs of Karnataka

Bio-product category	Production of bio-products		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Bio-fertilisers	1401.29	2802583	15379
Micro nutrient mixtures	437.04	8079100	8078
Bio-fungicides	96.79	967890	3751
Bio-pesticides	94.21	2254350	3838
Organic manures	86.24	555813	4207
Bio-agents	3.71	179694	560
Mushroom spawn	0.13	45250	48
Total	**2119.40**	**14884680**	**35861**

KVKs of Kerala produced more quantity of bio-products related to micro nutrient mixtures (687.80 q) followed by bio - pesticides (680.50 q), organic manures (481.65 q), bio-fertilizers (210.80 q), bio-fungicides (188.37 q), bio-agents (45.21 q) and mushroom spawn (1.82 q) and supplied to 84915 farmers (Table 111).

Data on category wise bio-products produced by KVKs in the Zone presented in Table 112 revealed that more quantity of bio-fertilisers (1,612.10 q) were produced followed by micro nutrient mixtures (1,124.84 q), bio-pesticides (774.71 q), organic manures (567.89 q), bio-fungicides (285.16 q), bio-agents (48.92 q) and mushroom spawn (1.95 q) and supplied to 1,20,776 farmers.

Pumpkin beetle management (KVK Kannur)

Table 111: Category wise production of bio-products by KVKs of Kerala

Bio-product category	Production of bio-products		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Micro nutrient mixtures	687.80	3782922	8034
Bio-pesticides	680.50	3742750	27348
Organic manures	481.65	1444962	7766
Bio-fertilisers	210.80	2455648	16188
Bio-fungicides	188.37	3767365	22915
Bio-agents	45.21	324312	939
Mushroom spawn	1.82	908050	1725
Total	**2296.16**	**16426009**	**84915**

Table 112: Category wise production of bio-products by KVKs in Zone XI

Bio-product category	Production of bio-products		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Bio-fertilisers	1612.10	5258231	31567
Micro nutrient mixtures	1124.84	11862022	16112
Bio-pesticides	774.71	5997100	31186
Organic manures	567.89	2000775	11973
Bio-fungicides	285.16	4735255	26666
Bio-agents	48.92	504006	1499
Mushroom spawn	1.95	953300	1773
Total	**4415.56**	**31310689**	**120776**

KVKs in the Zone (Table 113) produced 2,19,181 number of other bio-products of which KVKs of Karnataka produced 20,227 (20,083 Pheromone traps and 144 Tricho cards) and KVKs of Kerala produced 1,98,954 (9,924 Pheromone traps and 1,89,030 EPN) and supplied to 6,793 farmers. As a whole, KVKs in the Zone produced 30,007 Pheromone traps and supplied to 7,393 farmers.

Table 113: Production of other bio-products by KVKs in Zone XI

State	Bio-product category	Production of other bio-products		
		Quantity (q)	Worth (₹.)	Farmers (No.)
Karnataka	Pheromone traps	20083	452815	2696
	Tricho cards	144	3600	72
	Total	20227	456415	2768
Kerala	Pheromone traps	9924	1091640	4697
	EPN	189030	283545	2096
	Total	198954	1375185	6793
Zone XI	**Grand total**	**219181**	**1831600**	**9561**

(c) Livestock and fisheries

State and category wise livestock and fisheries technological products produced by KVKs are presented in Tables 114, 115, 116 and 117. A total of 3,13,568 numbers of livestock and fish fingerlings were produced by KVKs of Zone XI and supplied to 20,050 farmers. Out of which, 1,12,089 livestock and fish fingerlings produced by KVKs of Karnataka and 2,01,479 livestock and fish fingerlings produced by KVKs of Kerala (Table 114).

Table 114: State wise production of livestock and fish fingerlings by KVKs in Zone XI

State	Production of livestock and fish fingerlings		
	Quantity (No.)	Worth (₹.)	Farmers (No.)
Karnataka	112089	1766865	5145
Kerala	201479	2771804	14905
Total	**313568**	**4538669**	**20050**

KVKs of Karnataka produced more number of fish fingerlings (88,100) followed by poultry chicks (18,420), poultry eggs (5,108), piglets (286), sheep and goat kids (119) and dairy (44), rabbitary (12) and provided to 5,145 farmers (Table 115).

Table 115: Category wise production of livestock and fish fingerlings by KVKs of Karnataka

Bio-product category	Production of livestock and fish fingerlings		
	Quantity (No)	Worth (₹.)	Farmers (No.)
Fish fingerlings	88100	440500	415
Poultry chicks	18420	552600	3893
Poultry eggs	5108	25540	650
Piglets	286	171600	96
Sheep and goat kids	119	59500	75
Dairy calves	44	512400	14
Rabbitary	12	4725	2
Total	**112089**	**1766865**	**5145**

KVKs of Kerala produced more number of fish fingerlings (1,55,000) followed by poultry chicks (45,395), poultry eggs (963) and sheep & goat kids (118), dairy calves (3) and supplied to 14,905 farmers (Table 116).

Table 116: Category wise production of livestock and fish fingerlings by KVKs of Kerala

Bio-product category	Production of livestock and fish fingerlings		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Fish fingerlings	155000	310000	4472
Poultry chicks	45395	2269750	10283
Poultry eggs	963	7704	71
Sheep and goat kids	118	94350	76
Dairy calves	3	90000	3
Total	**201479**	**2771804**	**14905**

Data on category wise production of livestock and fish fingerlings by KVKs in the Zone presented in Table 117 revealed that more numbers of fish fingerlings (2,43,100) were produced followed by poultry chicks (63,815), poultry eggs (6,071), piglets (286), sheep and goat kids (237), dairy calves (47) and rabbitary (12) and provided to 20,050 farmers.

Table 117: Category wise production of livestock and fish fingerlings by KVKs in Zone XI

Bio-product category	Production of livestock and fish fingerlings		
	Quantity (q)	Worth (₹.)	Farmers (No.)
Fish fingerlings	243100	750500	4887
Poultry chicks	63815	2822350	14176
Poultry eggs	6071	33244	721
Piglets	286	171600	96
Sheep and goat kids	237	153850	151
Dairy calves	47	602400	17
Rabbitary	12	4725	2
Total	**313568**	**4538669**	**20050**

Pepper nursery (KVK, Idukki)

Arecanut nursery (KVK, Davanagere)

Nursery unit (KVK, Haveri)

Nursery unit (KVK, Kalaburagi-I)

3.1.6 Kisan Mobile Advisory Service (KIMAS)

The KIMAS is one of the Information and Communication Technology (ICT) tools for dissemination of requisite and need based information at the right time to farmers. KVKs are sending text information/voice calls to registered farmers advising them on the issues of agricultural importance on real time basis. The details are presented in Table 118. Data shows that 35 KVKs have advised farmers regularly on the areas of crops, livestock, other enterprises, weather, marketing and awareness of latest agricultural technologies through text messages depending on the expertise available with them. Altogether, 19,903 text messages were sent to 10.89 lakh farmers. Among these most messaging was related to crops (9,052) followed by weather (4,436), livestock (3,086), other enterprises (1,669), awareness (1,218) and marketing (442).

3.1.7 Soil, Water and Plant Analysis and World Soil Health Day Celebrations

KVKs established soil, water and plant testing laboratories (SWPTL) for the benefit of farming community. Further KVKs are also utilizing this facility for carrying out the soil test based nutrient recommendations for on farm trials and demonstrations besides, rendering advisory services to the farmers. Details of samples analyzed during the reporting year are presented in Table 119. Data indicated that a total of 31,342 samples of soil, water, plant, manure and others received from 27,759 farmers belonging to 14,838 villages were analyzed. State wise data presented in Table 120 shows that the KVKs of Karnataka analyzed 28,662 samples whereas 2,680 samples were analyzed by KVKs of Kerala.

Table 119: Samples analyzed by KVKs

Type of sample	Samples (No.)	Farmers (No.)	Villages (No.)
Soil	21996	19612	9332
Water	9067	7999	5431
Plant	120	30	7
Manure and others	159	118	68
Total	**31342**	**27759**	**14838**

Table 120: State wise soil, water, plant analysis carried out by KVKs

State	Samples (No.)	Farmers (No.)	Villages (No.)
Karnataka	28662	24759	14630
Kerala	2680	3000	208
Total	**31342**	**27759**	**14838**

In addition to 41 SWPTL, 13 KVKs have mobile soil testing kits to meet the growing need of soil testing by farmers and tested 2,549 soil samples belonging to 2,161 farmers spread across 475 villages (Table 121). KVKs provided soil health cards along with necessary advices about usage of results of soil testing for efficient use of resources. State wise data on distribution of soil health cards is furnished in Table 122. A total of 1,26,385 soil health cards were distributed among farmers by

Table 118: State and category wise KIMAS sent by KVKs of Zone-XI

State	KVKs (No.)	Farmers (No.)	KIMAS (No.)						
			Crop	Livestock	Weather	Marketing	Awareness	Other enterprises	Total
Karnataka	24	849520	1728	297	408	144	438	433	3448
Kerala	10	**239530**	**7324**	**2398**	**3932**	**298**	**761**	**1236**	15949
Lakshadweep	1	70	0	391	96	0	19	0	506
Total	**35**	**1089120**	**9052**	**3086**	**4436**	**442**	**1218**	**1669**	19903

KVKs of Zone XI. Out of which, 1,23,836 soil health cards are through SWPTL and 2,549 are through mobile soil testing kits.

Table 121: State wise soil testing by KVKs using mobile soil testing kits

State	Samples (No.)	Farmers (No.)	Villages (No.)
Karnataka	1701	1,464	412
Kerala	848	697	63
Total	**2549**	**2161**	**475**

Table 122: State wise distribution of soil health cards by KVKs

State	Distribution of soil health cards		
	SWTL	Mobile soil testing kit	Total
Karnataka	121880	1701	123581
Kerala	1956	848	2804
Total	**123836**	**2549**	**126385**

3.1.7.1 Celebration of World Soil Day

To create awareness on the importance of maintaining the health of soil every year 5th December is celebrated as World Soil Day. It was celebrated during the reporting year with a theme "Halt soil salinization, boost soil productivity" at 46 KVKs of the Zone with the participation of 5,592 farmers, 331 scientists and 1,209 students. On the occasion, 56 VIPs and public representatives have participated.

Hon'ble Member of Parliament- Shri. Nalin Kumar Kateel during world soil day (KVK, Dakshina Kannada)

Distribution of Soil Health Card on the occasion of World Soil Day (KVK, Ramanagara)

World Soil day (KVK, Kalaburagi-Ii)

Celebration of world soil day (KVK, Idukki)

3.1.8 Rainwater Harvesting Units

Rainwater harvesting units with micro irrigation system established during the previous years were utilized by the KVKs for extending services to farming community. During the period, KVKs conducted 25 training courses and 38 demonstrations as well as produced 1,50,819 planting material utilizing the facility. Further, 9,775 farmers and 438 officials visited these units and got acquainted with the rainwater harvesting techniques.

3.1.9 Convergence and Linkages

KVKs continued their linkage with various organizations and agencies while discharging their responsibilities as agricultural science centres at the district level. KVKs worked closely with the development departments for sharing technology and information through bi-monthly workshops, seminars, technology weeks, frontline demonstrations, field days, farmers-scientists interfaces and kisan gosthties/ melas. Capacity development of extension personnel was ensured through training, farm schools and farmers field schools. Extension activities involved all stakeholders including media, local institutions, district administration and people representatives. Diagnostic field visits and joint field visits with development departments were made to problematic fields and helped to identify emerging problems. Technical backstopping required for successful implementation of various schemes and programmes in the district was the major responsibility of the KVKs in the collaborative activities.

(a) Convergence through Agricultural Technology Management Agency (ATMA)

Convergence with ATMA enabled KVKs to promote various technologies in their respective districts and details are given in Table 123. Data indicated that KVKs participated in 851 programmes organized by ATMA and at the same time KVKs organized 482 programmes in collaboration with ATMA.

Table 123: Details of linkages with ATMA by KVKs of Zone-XI

Programmes	Convergence with ATMA by KVKs					
	Karnataka		Kerala		Total	
	Programmes attended by KVKs (No.)	Programmes organized by KVKs (No.)	Programmes attended by KVKs (No.)	Programmes organized by KVKs (No.)	Programmes attended by KVKs (No.)	Programmes organized by KVKs (No.)
Meetings	99	23	83	14	211	37
Research projects	128	23	0	0	19	11
Training programmes	19	11	97	83	319	153
Demonstrations	222	70	7	13	158	215
Kisan melas	151	202	0	0	5	3
Technology weeks	5	3	10	11	21	15
Exposure visits	11	4	29	17	48	21
Exhibitions	19	4	1	2	27	7
Soil health camps	26	5	0	2	28	11
Animal health campaigns	28	9	1	1	3	2
Video films	2	1	0	0	3	3
Extension literature	3	3	0	0	5	0
Integrated farm development	5	0	0	0	4	4
Total	**718**	**358**	**228**	**143**	**851**	**482**

(b) External funded projects/schemes

External funds received by KVKs to organize various programmes and activities through convergence and linkage is presented in Table 124. A total of ₹. 678.44 lakh was received by KVKs of Zone-XI of which ₹. 408.98 lakh by KVKs of Karnataka and ₹. 216.98 lakh by KVKs of Kerala. In terms of total amount received, support from the state governments and development departments was high in both Karnataka and Kerala,. Agencies like Rashtriya Krishi Vikas Yojana (RKVY), National Horticultural Mission (NHM) and National Bank for Agriculture and Rural Development (NABARD) funded/supported KVK activities. Various Boards and Directorates also supported KVK activities through convergence and linkages for optimum utilization of available resources.

Table 124: External fund received by KVKs of Zone-XI through convergence and linkages

Name of external funding agency	KVKs (No.)	Amount received (₹.)
Karnataka		
Agricultural Technology Management Agency (ATMA)	1	215000
Coconut Development Board	3	2,60,500
DASD, Calicut	1	65000
DBT, GOI	1	310000
Department of Agriculture, Mysuru	1	510412
ICAR Institutes	1	500000
Karnataka Renewable Energy Development Ltd, Bengaluru	6	600000
KSDA, Karnataka	1	300000
KSLDBI	1	100000
M/S Willow wood Chemical Pvt. Ltd, New-Delhi	2	438600
MANAGE, Hyderabad	5	2762000
Mission on Integrated Horticulture Development	1	40000
National Bank for Agriculture and Rural Development (NABARD)	1	329275
National Bee Board, New Delhi	1	9949000
National Cooperative Development Board	1	400000
National Horticulture Mission	**4**	4422000
Prism Crop Science Pvt. Ltd., Hyderabad	1	200600
RKVY	4	16375000
State Agricultural Universities	5	2146000
String Bio Private Limited, Centre for Cellular and Molecular Platforms	1	265424
Tagros Chemicals India PVT Ltd, Chennai	1	614900
Taralabalu District Bio-energy Research Information & Demonstration Centre	1	95000
Total		**40898711**

(Contd..... P-116)

Kerala		
Agriculture Development and Farmers Welfare Department	1	189000
Coconut Development Board	2	179500
DoA, GoK	2	642000
DOECC	1	580000
Grama Panchayath	1	245000
Horticorp	1	20000
ICAR Institutes	3	1305000
Jan Shikshan Sanasthan	1	19550
Kudumbashree District Mission, Kozhikode	1	24000
MANAGE, Hyderabad	2	1557623
MIDH	1	90000
National Bank for Agriculture and Rural Development (NABARD)	3	2473500
National Horticulture Mission	4	5081000
NFDB	1	25500
NIPHM	1	135000
RKVY	1	835000
State Planning Board	5	8118500
Tea Board	1	76100
VFPCK	1	102000
Total		**21698273**
Lakshadweep		
Coconut Development Board	1	357500
UT Administration of Lakshadweep	1	4890000
Total		**5247500**
Grand total		**67844484**

Training of ATMA functioneries on Recent advances in agriculture and horticulture (KVK, Davanagere)

ATMA Krishi Padhashala (KVK, Ernakulam)

3.1.10 Success Stories and Cases of Large Scale Adoption

(a) Blackgram intercropping in pigeon pea (KVK, Belagavi-I)

Pigeon pea is being cultivated in Tevaratti village of Athani taluk in an area of 60 ha every year as a sole crop. Farmers are not getting satisfactory income from pigeon pea due to high cost of cultivation especially removing of weeds between the rows. In order to address this issue, KVK, Belagavi-I demonstrated blackgram intercropping in pigeon pea. Shri. Babu Nilajagi S/o Vittal who is highly successful farmer-participant in this demonstration. He was trained on importance and advantages of pigeon pea + blackgram intercropping as well as identification of pest and weed management techniques in pigeon pea. He cultivated pigeon pea + blackgram (1:4) along with IPM technologies under the technical guidance of KVK Scientists. Shri Babu Nilajagi from his one acre of intercropping pigeon pea + blackgram, harvested two crops, one is blackgram after 80 days of sowing and another one is at 155 days after sowing whereas previous years, he used to harvest only one crop at 160 days with pigeon pea as sole crop. He harvested 2.03 quintal yield from first crop blackgram and second crop that is main crop pigeon pea 6.27 quintal from 0.4 ha. He got net income of ₹. 34,371 as compared to ₹.27,363 from sole crop of pigeon pea. Thus, he got additional revenue of ₹.7,008 from 0.40 ha. Advantages of technology are (a) harvested two crops instead of one crop, (b) reduced weed problem, and (c) got additional income. If the entire pigeon pea area (50 ha) of village is explored to this cropping system, the village can harvest additional revenue of ₹.7,00,800. After observing the success of technology, more than 60 farmers of the same village as well as neighbouring villages visited his field. Besides additional income, eight man-days of employment provided for harvesting of blackgram.

A view of pigeon pea + blackgram intercropping

Scientist-farmers interaction on site

(b) Stepping from business to mango cultivation (KVK, Bidar)

"*Bidar Ki Aam and Kohirki Jam*" is a well-known saying, which envisages the message of the popularity of the quality of mangos grown since old age. Shri Yuvraj Shankar Rao Unne is 38 years of age belonging to Hudagi village of Humanabad taluk, a commerce graduate who was involved in business in Bidar city. Yuraj's zeal for farming is entirely home-based as his father who had been passionately doing farming since long. This young man, however, took that inheritance a step forward by doing all agricultural processes on his farm scientifically. He underwent training at KVK Bidar on Integrated Crop Management in Mango. He has agriculture land of eight acres including four acres of mango orchard which was established in the year 2010 by his father. Mango orchard having 400 fruiting trees with varieties like Beneshan, Dasheri and Kesar started yielding since 2014, his father used to sell the produce to the contractor in a wholesale.

The practices of mango orchard management by the Yuvaraj under the technical guidance of KVK scientists includes, light pruning after harvesting of fruits in the month of June-July followed by the basin preparation. He gives plenty of enriched Farm Yard Manure with PSB, Trichodema and VAM along with pongamia and neem cake after the first showers of monsoon. He gives chemical fertilizers recommended based on the age of the tree that includes urea @ 1.0 kg, 10:26:26 @ 2.5 Kg and SSP @ 3.0 Kg for fulfilling the need of N, P and K. He sprays mango special in the month of September, October, November, December and once after fruit set when the fruits attain lime size. The mango special solution prepared by adding 75 g mango special to 15 l of water and juice of 2 acid lime and a sachet of shampoo in order to take care of micronutrient requirement. He takes up spray of pongamia and neem soap as plant protection measures. Before onset of flowering the trees are sprayed with a hexaconozole @ 1 ml and imidachloprid @ 0.3 ml, to manage the flower drop. Planofix is also being sprayed @ 0.3 ml per lit of water. He manages the fruit fly by installing the pheromone fruit fly traps. Other practices are need based. With these practices he could able to realize the yield of 1.20 quintal of fruit from a 11-year-old tree. Quality is also much improved with respect to size and appearance. At present he is earning a net profit of ₹.2.57 lakh with 5.43 BCR from four acres of mango orchard.

Technology interventions by KVK made a youth involved in business to stay comfortable in farming. Now the young farmer Shri Yuvaraj got full confidence of mango farming. Talking about how things actually changed, he said that 'having grown up seeing my father doing farming, I automatically got inclined towards farming. Further he says systematic and scientific management is very much needed for mango orchard for producing quality fruits that support and advices he received from KVK, Bidar. He is an inspiring icon to the neighbouring farmers of his village and other young mango growers.

A view of mango orchard maintained by Shri Yuvaraj

(c) Software engineer couple turned into Dairy Entrepreneurs (KVK, Haveri)

Shri. Harshawardan and Smt. Sahana were software engineers worked in different countries. They left the job and shifted to their native Gangapura, Ranebennuru (tq.) where they have got two acres of land, to start dairy farm in 2018. Initially they brought eight Gir cows from Gujarat. The big challenge was marketing of desi milk with suitable price. During the initial period the entire milk was converted into ghee to preserve it for a longer period. Later Mr and Mrs Harshawardan visited KVK Haveri, interacted with scientists regarding Gir cow maintenance, clean milk production, fodder and feed management and vermicomposting. Scientist of KVK suggested them to create their own brand for the purpose of marketing. The new technologies on milking, bottling, labelling and marketing were taught to the couple. Later they created their own marketing channel where milk was sold under the brand name of "Jeevakosha" and ghee as "Aadhya". To provide further opportunity KVK Haveri selected Mrs.Sahana for 5 days training programme on

"Entrepreneurship development in dairying" organized by AIC-SRS-ICAR-NDRI foundation in collaboration with ICAR-ATARI, Zone-XI, Bengaluru. During the state level training she learnt the advanced dairy technologies in value addition and marketing.

Now the Jeevakosha dairy farm has expanded with 22 Gir cows, 3 Bulls, 5 heifers and 10 calves. Total milk production is around 60 liters/day. They sell milk @ ₹.80/l and ghee at the rate of ₹.2,500/kg at nearby city and Davanagere thereby earning ₹. 86,000 net income per month. Utilizing this amount, they are planning for small scale Deccani sheep farm and backyard poultry. Throughout the year, two male and one female labours employed in their dairy farm. Jeevakosha Gir dairy farm has become a point of attraction for new aspirant dairy farmers. Lot of people visiting the farm, three farmers started dairy farming by inspired by them. For example farmer Shri. Suresh Olasangada from Savanuru tq, Haveri district inspired by them, started small scale Gir dairy farm. He started selling ghee to different parts of Karnataka with the help of Jeevakosha farm.

A view of dairy farm of Shri. Harshawardan and Smt. Sahana

(d) Integrated Farming System (KVK, Shivamogga)

Shri. Umesh Reddy is a progressive, innovative and awardee farmer from Harogoppa village in Shikaripura taluk of Shivamogga district, Karnataka. He is having 2.60 hectares of land and cultivating different crops *viz.,* arecanut, paddy, maize, ragi, banana, ginger, rearing cattle, sheep, poultry birds, fish and producing vermicompost. He attended the training on Integrated Farming System organized by KVK, Shivamogga during 2013. After the KVK intervention, he started growing of intercrops in arecanut garden *viz.,* banana, ginger, pepper, nutmeg, coffee and vegetable crops like drumstick, french bean and chilli. He planted different forest species like teak and silver oak as border crops. He started subsidiary enterprises in his IFS like bee keeping, fishery, backyard poultry, sheep rearing, dairy unit as income generating activities. He harvested the good yield in arecanut, ginger, drumstick, french bean, banana, vegetable crops and getting additional income from subsidiary enterprises.

Broiler poultry

Maize

From his IFS, he is earning a net profit of ₹.9.76 lakh per annum, of which ₹.20,000 from maize, ₹.24,000 from paddy, ₹.15,000 from finger millet, ₹.3,60,000 from arecanut, ₹.65,000 from banana, ₹.1,10,000 from ginger, ₹.20,000 from drumstick, ₹.34,000 from frenchbean, ₹.26,000 from dairy, ₹.12,000 from honey bee, ₹.1,35,000 from poultry, ₹.1,15,000 from sheep, ₹.16,000 from fishery and ₹.24,000 from vermicompost. He disseminated technologies and ICM practices to his fellow farmers, within and outside the district. Totally 410 farmers were getting benefit and adopted this IFS model.

(e) Dairy farming by women SHG (KVK, Uttara Kannada)

Women SHG consists of 13 members namely Sudarshini P. N., Kaveri S. S., Veda V. S., Anita S. G., Godavari N. T., Shoba G. S., Kamalakshi S., Parvati G. S., Sulochana S. N., Ajita K. K., Lata C. G. and Rajeshwari T. N. started dairy unit under the leadership of Smt. Leela Devendra Shetty hails from village Javalgundi who is a successful dairy entrepreneur and technical guidance of KVK Uttara Kannada and named as Javalgundi Sangha in 2016. They availed a loan of ₹. 5.00 lakh from NABARD. In the year 2017, Department of Agriculture provided Hydroponic machine through ATMA scheme. The capacity of milk yield was increased and economically helpful. The group supply 90 per cent of milk to dairy unit and 10 per cent of milk for their daily household per day through Javalgundi dairy unit. SHG earning ₹.1,50,000 per month. They have started repaying the loan dues in the bank. The milk society in this area which was on the verge of closure got a second lease of life with increase in milk collection to 200 l per day. Milk availability in the village increased and the economy has turned around. Apart from this they sell cow dung and earn income. They are investing ₹. 1,00,000 and getting a net profit of ₹. 50,000 per month. During 2018, SHG group received a cash grant of ₹. 5,000 on their success from state government. Group members are very happy now, a lot of changes have happened in their lives. They have gained self-confidence and are planning to extend their dairy unit.

A view of women SHG dairy unit - Javalgundi

(f) Dragon fruit in dryland of Vijayapura district (KVK, Vijayapura-I)

Shri Pavankumar Basappa Rangatti, 21 years of age, is a graduate hailing from Ratnapur village, Tikota taluk, Vijayapur district being the only son, he did not want to leave his parents alone. After his graduation he was in dilemma regarding profession to be taken up. Browsing through the newspapers, he read about the training to be conducted by Krishi Vigyan Kendra, Vijayapura-I for individuals aged below 35 years on organic farming and he attended. Then he adopted dragon fruit cultivation in his dry land area under the technical guidance of KVK, Vijayapura-I. Earlier his father was growing grape which was a costly affair. Looking into the expenses on grapes his father too supported him in his new venture. He brought 4,000 saplings of both white and red varieties of dragon fruit from Maharashtra and took the risk of planting them in his two acres of land.

He harvested the fruits after one and half years. He sells the fruits at the rate of ₹.150-180 per Kg and

sapling at the rate of ₹. 20 per sapling. In eighteen months he earned ₹. 1.25 lakh by spending ₹.3.00 lakh. Gradually, his profit increased to ₹.3.80 lakh in second year, ₹.6.00 lakh in third and ₹.8.00 lakh in fourth year by selling the fruits. From the sale of saplings, he has earned ₹.3.00 lakh. Thus, as on today he has earned a net profit of ₹.11.00 lakh and is very much confident of earning higher profits in future too. Looking in to the profit and realizing the importance of dragon fruit, farmers of different taluks and districts from surrounding areas like Muddebihal, Torvi, Atalatti, Nidgundi, Dhavalgi, Hoskote, Kadur have purchased seedlings from him and started dragon fruit farming.

A view of dragon fruit orchard

Sapling unit of dragon fruit in the field
of Shri Pavankumar Basappa Rangatti

(g) Earn while you learn: a success story of a student farmer (KVK Kollam)

Mr. Ashik Deth, is graduate student from Chavarcode village of Kollam district. He has undergone capacity development programmes conducted by KVK Kollam on scientific vegetable cultivation, scientific production techniques of organic manures and animal husbandry. He imparted novel techniques in generating additional income from egg laying chicks, rainy/winter season management in egg laying poultry, integrated broiler duck rearing in Kollam district. Despite his regular classes he took special interest to attend training programme of agriculture department and Krishi Vigyan Kendra Kollam to learn more about scientific farming practices. Considering his interest in farming the agricultural officer of Kalluvathukkal panchayat selected his farm under the scheme of Jaivagriham program and allotted various inputs to start nutri garden, azolla farming and family drip irrigation kit. The continuous linkage with KVK Kollam with proper technical guidance and support, he established a homestead based Integrated Farming System including agriculture and animal husbandry component in his courtyard, which attract several farmers of Kollam district. The technological demonstrations are yard long bean variety Deepika, onion variety Agri Found Dark Red and broiler ducks. Azolla as an economic feed supplement in ducks for increasing egg production. Cultivation of different vegetables as well as sale of eggs of hen, ducks and meat of Vigova broiler duck helps him to earn an amount of ₹. 20,000 per month and this additional income helps him to support his education and at times his family. He engages one labour to carry out his regular farming activities.

Mr. Ashik Deth is an active member of National Service Scheme at Sree Narayana College, Varkala. He is also active in vegetable farming under rain shelter facilities in the campus. Ashik Deth has become a motivation to several students and youth of the area to take up vegetable and poultry farming activities at their home. He is an inspiration to youth and Self-Help Groups and conducts motivational classes and share his experiences in the nearby areas. Mr. Ashik Deth is now a trainer for mushroom and vegetable cultivation for the entrepreneurship development club of his college. He is the coordinator of animal husbandry training, organised as a part of capacity building programme for the livestock farmers at field training in Krishi Bhavan , Kalluvathukkal. The demonstration of yard long bean variety Deepika enabled him to grab the best student farmer of the region.

Mr. Ashik Deth with harvested Yard long bean variety KAU Deepika

Mr. Ashik Deth with broiler duck variety Vigova super M

(h) Pearl spot (*Etroplus suratensis*) (KVK, Kottayam)

Shri Vineesh, 40 years of age, farmer belonging to Nerekadavu village, Vaikom taluk of Kottayam district is an enterprising fish farmer. He started aquaculture of Pearl spot in 2005. With the financial support from State Fisheries Department, the ponds were modified as three 50 cent ponds, three 20 cent ponds and an 18 cent cement tank for hatchery and seed production of Pearl spot. The technical support given by FFDA (Fish Farmers Development Agency, Kerala) in collaboration with KVK Kottayam helped in scientific seed production and marketing of Etroplus seeds. The pond layout was modified to Brood stock ponds, Breeding tanks, Nursery rearing ponds with hapas. The technology on scientific pond preparation using lime, application of fish toxicants for eradication of unwanted fishes, bund strengthening, pond fencing and bird net fencing to ensure biosecurity was given. The water exchange periodicity using sluice was ensured. The ponds are equipped with sprinkler irrigation systems for aeration and temperature control. Artificial aeration with blowers is provided at necessary times with five blowers. packing shed with oxygen cylinder and packing materials. A packing shed with oxygen cylinders and packing materials is installed to market the seeds. The feed store and packing sheds are maintained separately. Family farming system is followed and all the family members are involved in farming.

Brood fishes of 50 -100 g size were introduced in the breeding ponds/ tanks at a stocking density of 1 per m^2. The breeding substratums are provided in the breeding tanks. Even though the Pearl spot is an annual breeder the peak breeding seasons are January to March and June to July. The dipnet systems for trapping the fingerlings are arranged in the ponds. The collected fingerlings are reared in nursery rearing ponds with hapas initially and then released into the nursery ponds. The nursery diets are fed according to the size gradation in hapas. The dip net arrangement is made in each pond for collection of mature fish as well as fingerlings with different sized mesh nets. The rate of mortality and seed recovery is best with this type of intervention rather than cast netting to collect the seeds. Again the seeds are retained in dip nets for 24 hours prior to harvesting in order to avoid the mortality losses. The mature fishes are segregated and stocked in brood stock or grow out ponds at a rate of 1-2 fish/ m^2. Brooders are replaced every 2 years to resist inbreeding depressions.

Biosecured farm

Annually he is producing one lakh pearl spot seeds and selling to the farmers inside and outside the state. The pearl spot being an indigenous fish with high market value is in great demand all over Kerala. This farmer with his entire family support is a regular seed supplier to many reputed government institutions, government schemes for farming apart from farmer friends throughout the state. The seeds are of high health as they are fed with proper feed size and in correct rations. Apart from seed supply, the Puthenthara Fish Farm located at Nerekadavu, Vaikom is also selling brooders. Around 4,000 brooders are sold annually from this farm. For the entire modification of the farm, so far he has invested around Rupees 45 lakh and his average monthly income is around ₹.1.00 lakh. The seeds of size range 3-4 cm are sold at a rate of ₹.12/seed. This venture has ensured job security to five persons in the farm. Puthenthara fish farm is selected as the demonstration farm of Pearl spot seed production. He has popularized the technology among 200 farmers who often come visiting his farm. Being a progressive farmer, the Pearl spot seeds from this farm have been dispatched to Kollam, Malappuram, Kozhikode districts in Kerala and to the state of Karnataka. Sri. Vineesh's Puthenthara farm is open to all those ready to venture into Pearl spot farming. He also serves as resource person for seed production training programmes in Fisheries University and state funded programmes. For his tremendous efforts, he was coveted with Best Pearl Spot farmer Award for the state in 2015 and Best Brackish water Progressive Farmer Award for Kottayam district in 2019. Now, Sri. Vineesh is one of the state recognized progressive farmer and regular seed supplier of Pearl spot.

Seed stocking

Pearl spot seeds for sale

Pearl spot seed supply for government schemes

(i) Horticultural nursery based innovative activities (KVK, Kozhikode)

Shri. Jojo and Smt. Bindu hailing from Kozhikode is a good example of the above quote. Shri Jojo Jacob, aged 50 years is a resident of the Changaroth Panchayat, which covers the north-east hilly tracts of the Kozhikode district in Kerala. In 1998, he happened to attend a training programme on nursery techniques of horticultural plants at ICAR-KVK, Kozhikode which was the turning point in his life. The training motivated him to start a plant nursery at his farm. The nursery initially started with a few plants in 36 cents of own land around his house soon became a roaring success with the involvement of Smt. Bindu whom he married in 2003. Shri and Smt. Jojo - Bindu couple worked over 16-18 hours a day which made their nursery into fame.

The focal point of the nursery is much prized bush pepper plants. Probably their nursery must be the largest bush pepper nursery in the world selling over 18000 plants annually. Incidentally one such bush pepper plant was taken from their nursery for a national seminar in agriculture at New Delhi in 2019 and the seminar was inaugurated by the Honourable Prime Minister of India by unveiling this bush pepper plant. The nursery of Shri Jojo also has unique and diverse collection of plants. In addition to bush pepper, they produce and sell planting materials of plantation crops and spices, native and exotic fruit plants and ornamental plants. They have bush pepper plants from six months of age to 15 years. Other collections include bougainvillea (35 types, grafted plants with multiple coloured flowers in a single plant), fruit plants like mango (All season, Alphonso, Mallika, Kotturkonam etc.), sapota (Thailand type), jack (Vietnam Super Early, *Chembaruthivarikka*, seedless, small seeded etc.), Rambutan (N-18), mangosteen, longan, abiu, Thailand chamba, guava (Allahabad Safeda, *Kilo pera*), miracle fruit, milk fruit, coconut seedlings (WCT, COD), arecanut seedlings (Mohitnagar, South Kanara local, Sagar etc.), Malabar tamarind, ginger (IISR Varada), turmeric (IISR Pragati), nutmeg grafts (elite line), ornamental plants (5 types) etc. All these plants are produced or collected from reliable sources only so that quality is never compromised at their nursery. Enthused by the success of their nursery venture, they later diversified their activities into ornamental fisheries, vermiculture, apiculture, grow bag ginger and turmeric cultivation etc.

With the joining of Bindu in the family, their nursery business flourished. Initially she was a house wife, but with post graduate qualification, later joined as a teacher in a nearby school. She mainly works after school hours. Both work in tandem mostly single-handedly without outsourcing anyone for various nursery and farm operations including coconut palm climbing for harvesting. Numerous farmers/ students visit their farm every day from different places and both teaches them different techniques of farming with lot of enthusiasm. To promote farming in a greater perspective, Smt. Bindu started a YouTube channel during the year 2019 named as "Techflora" with over 90,000 subscribers. Regular videos on farming for the benefit of farmers as well as young entrepreneurs are uploaded in the channel. She also conducts hands on training to school and college students in both on and off campus modes. She is a much sought after student counsellor with inspiring, motivational and entrepreneurship development classes as well.

Their total annual income from a mere 36 cents of land from all their activities is nearly ₹.25 lakh. Presently the family owns a jeep, car and two-wheeler for farm activities apart from a decent house which all were earned from farm income only. Their success stimulated other farmers to rise from the slumber, realizing the untapped potential in their fields through better utilization of resources for a better livelihood. Shri Jojo has won several panchayat and district level awards for his achievements. He was selected for the "Young Farmer" award of Kerala Government in 2006 and

Farmers visit to nursery unit of Shri Jojo and Smt. Bindu

More than 12 year old bush pepper maintained in poly tubs

"Innovative Farmer" award of Indian Agricultural Research Institute, New Delhi in 2007 which were nominated by KVK, Calicut. Diversified activities of Bindu - Jojo couple and their success is the result of hard work, dedication and social commitment and now they are a role model for fellow farmers to emulate.

(j) Azolla as best protein supplement to poultry farming (KVK, Dharwad)

Shri. NarasangowdaVeerapur belonging to Dharwad, 47 years of age with BE education, established poultry unit under the technical guidance of KVK, Dharwad. He adopted scientific rearing of local and improved poultrybreeds (Swarnadhara, Giriraja). He attended scientific poultry farming training organized by KVK. He regularly takes consultancy from KVK Scientists for his poultry farm improvement. As a part of it, he adopted low cost feeding technologies and supplementation of Azolla. In fact, Azolla is protein rich source (24%). Before exposure to KVK, do not have knowledge on scientific management practices, improved poultry breeds and low cost technologies. As a result, he spent high cost on feedingpoultry. Having training and seeking consultancy from KVK, he switched to improved poultry breeds (Swarnadhara, Giriraja) and preparation and feeding of balanced ration poultry feed. Feed cost for rearing improved poultry breeds for meat purpose was ₹. 263 per bird after supplementation of Azolla (10-50 g per bird) as protein source thereby reduced the feed cost by 36.12 % per bird. Thereby he is savingRs. 95 per bird as additional income.KVK, Dharwad has motivated and trained more than 60 farmers in this direction of which 25 farmers already started using azolla feeding to poultry. KVK has produced and sold more than 210 kg of Azollato 180 farmersShri. NarasangowdaVeerapur also supplied 5kg of azolla to other farmers for poultry farming for its horizontal spread.

Poultry unit

Azolla unit

Azolla production

Azola as poultry feed

3.1.11 Doubling Farmer's Income

Doubling farmers' income (DFI) is a target set by the government of India in February 2016 to be achieved by 2022. In this regard, KVKs under Zone XI have started various interventions in the selected villages to achieve the target. A total of 5,171 successful cases of farmers whose income was doubled due to KVK interventions were compiled and submitted to ICAR for the national level documentation. Each KVK has contributed about 110 success stories. This included 3,631 cases from Karnataka and 1,540 cases from Kerala.

3.1.12 Recognition and Awards

3.1.12.1 KVK Kalaburagi-I Bagged ICAR National Award

KVK Kalaburgi bagged the National Best KVK Pandit Deendayal Upadhyay Rashtriya Krishi Vigyan Protshahan Puraskar 2020 (2nd Prize of ₹. 8.00 lakh). Hon'ble Union Minister for Agriculture and Farmers Welfare Shri Narendra Singh Tomar presented the awards virtually in the presence of Hon'ble Ministers of State for Agriculture and Farmers Welfare Shri Kailash Choudhary and Sushri Shoba Karandlaje; Hon'ble Union Minister for Railways; Communications and IT Shri Ashwini Vaishnaw; Hon'ble Union Minister for Fisheries, Animal Husbandry and Dairying Shri Parshottam Rupala; Dr. Trilochan Mohapatra, Secretary DARE; and DG, ICAR; and Dr. A. K. Singh, DDG, ICAR.

3.1.12.2 Farmer of KVK Kalaburagi-1 Bagged ICAR National Award

Shri. Sharanabasappa Patil s/o Shri. Peerappa Patil, R/o: Hal Sultanpur, Kalaburagi (Tq. & Dist.) has been awarded with ICAR-Jagjivan Ram Innovative Farmer Award (₹.1.00 lakh). He is ICAR-KVK, Kalaburagi-1 contact farmer since 15 years. Shri. Sharanabasappa Patil has invented low cost technologies that are highly affordable and beneficial to farming community.

3.1.12.3 Farmer Guided by KVK, Uttara Kannada gets IARI - Innovative Farmer Award -2021

Shri Hanumantappa Bheemappa Madlur, Kapageri Village, Sirsi Taluq guided by KVK, Uttara Kannada bestowed with IARI- Innovative Farmer Award -2021. He cultivated more than 65 types of crops on his own land of 3.50 acres and he is locally known as Multi Crop Specialist Hanumantappa.

KVK Kalaburgi bagged the National Best KVK Pandit Deendayal Upadhyay Rashtriya Krishi Vigyan Protshahan Puraskar 2020

Shri Hanumantappa Bheemappa Madlur reciving IARI - Innovative Farmer Award 2021

3.2 Special Programmes

3.2.1 Cluster Frontline Demonstrations (CFLD) on Pulses under NFSM

ICAR-ATARI, Bengaluru has implemented the project on Cluster Frontline Demonstrations (CFLDs) on Pulses under NFSM with financial support from Department of Agriculture, Cooperation & Farmers Welfare (DAC & FW) through ICAR, New Delhi with an aim to enhance the production of pulses in the country and details are presented in Table 125. A total of 2,365 CFLDs on different pulse crops were conducted by KVKs in 946 ha.

During kharif, 1000 demonstrations were conducted by KVKs of Karnataka in 400 ha which include 272 ha on pigeonpea covering 680 farmers, 30 ha on blackgram covering 75 farmers and 98 ha on greengram covering 245 farmers.

During rabi, 550 demonstrations were conducted in 220 ha of which KVKs of Karnataka conducted 525 demonstrations in 210 ha that covers 196 ha on chickpea by involving 490 farmers, 10 ha on blackgram by involving 25 farmers, 4 ha on greengram by involving 10 farmers and KVKs of Kerala conducted 25 demonstrations on greengram in 10 ha

During summer, 815 demonstrations were conducted in 326 ha of which KVKs of Karnataka conducted 415 demonstrations in 166 ha that covers 82 ha on blackgram by involving 205 farmers, 74 ha on greengram by involving 185 farmers, 10 ha on cowpea by involving 25 farmers and KVKs of Kerala conducted 400 demonstrations in 160 ha that covers 60 ha on blackgram by involving 150 farmers, 70 ha on greengram by involving 175 farmers and 30 ha on cowpea by involving 75 farmers.

Table 125: CFLDs on pulses under NFSM conducted by KVKs of Zone XI

Season	State	Crop	CFLDs on oilseeds	
			Area (ha)	Demonstrations (No.)
(a) Kharif	Karnataka	Pigeon pea	272	680
	Karnataka	Blackgram	30	75
	Karnataka	Greengram	98	245
Total			400	1000
(b) Rabi	Karnataka	Chickpea	196	490
	Karnataka	Blackgram	10	25
	Karnataka	Greengram	4	10
	Kerala	Greengram	10	25
Total			220	550
(c) Summer	Karnataka	Blackgram	82	205
	Karnataka	Greengram	74	185
	Karnataka	Cowpea	10	25
	Kerala	Blackgram	60	150
	Kerala	Greengram	70	175
	Kerala	Cowpea	30	75
Total			326	815
Grand total (a + b + c)			**946**	**2365**

Greengram (KVK, Kannur)

Chickpea (KVK, Chamarajanagara)

Blackgram (KVK, Kollam)

Pigeon pea (KVK, Haveri)

3.2.2 Cluster Frontline Demonstrations (CFLDs) on Oilseeds under NFSM (NMOOP)

During the reporting year, ICAR-ATARI, Bengaluru has implemented the project on Cluster Frontline Demonstrations (CFLDs) on Oilseeds under NFSM (NMOOP) with financial support from Department of Agriculture, Co-operation & Farmers Welfare (DAC & FW) through ICAR, New Delhi with an aim to enhance the production of oilseeds in the country and details are presented in Table 126. A total of 1962 CFLDs on different oilseed crops were conducted by KVKs in 785 ha.

During kharif, 365 demonstrations were conducted by KVKs of Karnataka in 146 ha which includes 26 ha on groundnut by involving 65 farmers, 40 ha on soybean by involving 100 farmers, 20 ha on sunflower by involving 50 farmers, 10 ha on niger by involving 25 farmers, and 50 ha on castor by involving 125 farmers.

During rabi, 477 demonstrations were conducted by KVKs of Karnataka in 191 ha which includes 45 ha on groundnut by involving 112 farmers, 30 ha on linseed by involving 75 farmers, 6 ha on mustard by involving 15 farmers, 50 ha on sunflower by involving 125 farmers, 40 ha on safflower by involving 100 farmers and 10 ha on sesame by involving 25 farmers whereas KVKs of Kerala conducted demonstrations on sesame in 10 ha by involving 25 farmers.

During summer, 1120 demonstrations were conducted in 448 ha of which KVKs of Karnataka conducted 883 demonstrations in 353 ha that covers 268 ha on groundnut by involving 670 farmers, 40 ha on soybean by involving 100 farmers, 20 ha on mustard by involving 50 farmers, 20 ha on sunflower by involving 50 farmers, 5 ha on sesame by involving 13 farmers, and KVKs of Kerala conducted 237 demonstrations in 95 ha that covers 30 ha on groundnut by involving 75 farmers and 65 ha on sesame by involving 162 farmers.

Table 126: CFLDs on oilseeds under NFSM (NMOOP) conducted by KVKs of Zone XI

Season	State	Crop	CFLDs on oilseeds	
			Area (ha)	Demonstrations (No.)
(a) Kharif	Karnataka	Groundnut	26	65
	Karnataka	Soybean	40	100
	Karnataka	Sunflower	20	50
	Karnataka	Niger	10	25
	Karnataka	Castor	50	125
Total			**146**	**365**
(b) Rabi	Karnataka	Groundnut	45	112
	Karnataka	Linseed	30	75
	Karnataka	Mustard	6	15
	Karnataka	Sunflower	50	125
	Karnataka	Safflower	40	100
	Karnataka	Sesame	10	25
	Kerala	Sesame	10	25
Total			**191**	**477**
(c) Summer	Karnataka	Groundnut	268	670
	Karnataka	Soybean	40	100
	Karnataka	Mustard	20	50
	Karnataka	Sunflower	20	50
	Karnataka	Sesame	5	13
	Kerala	Groundnut	30	75
	Kerala	Sesame	65	162
Total			**448**	**1120**
Grand total (a + b + c)			**785**	**1962**

Castor (KVK, Chikkaballapura)

Groundnut (KVK, Yadgir)

Linseed (KVK, Vijayapura-II)

Sesame (KVK, Alappuzha)

Sunflower (KVK, Bagalkote)

Sesame (KVK, Kannur)

3.2.3 Seed Hubs

Timely availability of adequate quantity of quality seed is one of the most critical factors to enhance productivity of pulses. In this direction the Department of Agriculture, Cooperation & Farmers Welfare (DAC & FW), Government of India, New Delhi has sanctioned a project on 'Creation of Seed Hubs for Increasing Indigenous Production of Pulses in India' under National Food Security Mission (NFSM) with ICAR-Indian Institute of Pulses Research (ICAR-IIPR), Kanpur as Nodal Agency for its implementation at 150 Seed Hub centres across the country through State Agricultural Universities/Krishi Vigyan Kendras/ ICAR Institutes.

As a part of it, eight KVKs *viz.*, Bagalkot, Bidar, Belagavi-II, Dharwad, Kalaburagi-II, Mysuru, Vijayapura-I and Mandya established Seed Hubs under ICAR-ATARI, Bengaluru and started functioning from 2016-17. Crop wise seed production on different pulse crops carried out by Seed Hubs during 2021 is presented in Table 127. Data indicates that 1,851.71 q pulse seed were produced by Seed Hub KVKs which includes 816.69 q seed of chickpea, 621.98 q seed of pigeon pea, 218.94 q seed of blackgram, 154.32 q seed of greengram, 23.05 q seed of cowpea, 4.30 q seed of horsegram and 12.43 q seed of avare.

Table 127: Seed production of pulses through seed hubs under NFSM by KVKs of Zone-XI

Crop	Varieties	Seed produced (q)
Pigeon pea	NBeG-47, BGD-111-1, JAKI-9218	621.98
Chickpea	TS-3R, GRG-811, BRG-1, BRG-3	816.69
Blackgram	LBG-791, DBGV-5	218.94
Greengram	BGS-9, KKM-3, DGGV-2	154.32
Cowpea	KBC-9, KBC-152	23.05
Horsegram	PHG-9	4.30
Avare	HA-3 and HA-4	12.43
Total		**1851.71**

3.2.4 National Innovations in Climate Resilient Agriculture

National Innovations in Climate Resilient Agriculture (NICRA) is a network project being implemented in the country to develop improved climate resilient technologies and demonstrate the existing technologies on farmers' fields under Technology Demonstration Component (TDC) for enhancing climate resilience. In ICAR-ATARI, Zone XI, Bengaluru, climate resilient technological interventions are being implemented in farmer participatory mode in five most climatically vulnerable districts namely Alappuzha in Kerala and Belagavi, Gadag, Kalaburagi, Tumakuru, Davanagere and Chikkaballapura in Karnataka through Krishi Vigyan Kendras. In phase-II, the project is being extended to three more districts in Karnataka namely, Chamarajanagara, Chitradurga and Haveri, five more districts in Kerala namely, Kannur, Wayanad, Palakkad, Kozhikode and Kottayam and Lakshadweep Islands during 2021-22. Rainfall situation and technological interventions undertaken in this project in the phase-I are briefed here under.

(a) Rainfall distribution

Data indicated that annual rainfall recorded was highest in Alappuzha district of Kerala with 3,610.20 mm (109 rainy days) as against normal rainfall of 2,928.30 mm. Eight intensive rain spells of more than 60 mm occurred during the months from June to December. Annual rainfall in Chikkaballapura district recorded 1,322.40 mm with 57 rainy days as against normal rainfall of 703.21mm, with two intensive rain spells of more than 60mm occurred in the month of October. In Gadag, one dry spell of more than 10 days in June and October, three dry spells of more than 15 days in August, November and December with annual rainfall of 612.80 mm (33 rainy days) were recorded as against normal rainfall of 641.60 mm. In total, it was 4.67 per cent deficit from the normal rainfall. Kalaburgi district received annual rainfall of 1,179.10 mm as against normal rainfall of 782.90 mm with distribution of 13.40, 300.60, 200.00, 251.30, 194.60, 90.20 and 0.0 mm respectively from June to December months with 53 rainy days. In Tumakuru district of Karnataka, annual rainfall recorded was 1,097 mm with two dry spells of more than 10 days in the month of June and August and two dry spell of more than 20 days of September and December and also three intensive rain spells of more than 60 mm occurred in the months of October and November.

b) Interventions by KVKs under NICRA

NICRA is being implemented based on four farming system typologies such as rainfed without animals, rainfed with animals and irrigated without animals, besides institutional interventions including capacity development and extension activities. Data from Table 128 shows that, a total of 1,400 demonstrations were implemented in four different farming system typologies covering 408.20 ha area to build climate resilience in cluster of villages

Table 128: Interventions in each farming typologies carried out by KVKs under NICRA

KVK	Rainfed without animals		Rainfed with animals		Irrigated without animals		Irrigated with animals		Total	
	Demo (No.)	Area (ha)	Demo (No.)	Area (ha)	Demo (No.)	Area (ha)	Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
Alappuzha	169	15.40	53	-					222	15.40
Chikkaballapur	3	-	82	37.00	136	61.00	163	4.20	384	102.20
Gadag	52	20.80	65	23.00	6	2.40	14	2.60	137	48.80
Kalaburgi-I	160	58.00	65	5.00	20	10.00	27	11.00	272	84.00
Tumakuru-II	33	24.80	149	64.50	11	4.00	192	64.50	385	157.80
Total	**417**	**119.00**	**414**	**129.50**	**173**	**77.40**	**396**	**82.30**	**1400**	**408.20**

covering five climate vulnerability districts. KVK-wise and farming system typologies-wise results are presented in the foregoing discussions.

c) Technological interventions by KVKs under NICRA

KVK Alapuzzha: A total of 222 demonstrations in two farming system typologies *viz.*, rainfed without animal and rainfed with animal under various interventions such as utilizing crop residues for mushroom cultivation, climate resilient practices for paddy cultivation in Kuttanad region, Short duration cassava variety, modified season cultivation of HY ginger for vegetable purpose, modified rain shelter for year-round vegetable production, recycling of organic residues for energy generation and crop production using portable biogas plants, aquatic weeds composting using EM culture, soil health card for better nutrient management, fabrication of goat shed with raised platform, climate resilient cages for poultry rearing, stress management in cross bred cows using cow mat and traditional fish variety opheocephalus (Varaal) fish in homestead pond for income generation technologies were implemented covering an area of 15.4 ha in the village. Cultivation of mushroom using paddy straw as a substrate was found to be a better way of utilization of available paddy straw and the farmers could obtain reasonable income in addition to the nutritional security and self-employment.

KVK Chikkaballapura: A total of 384 demonstrations were conducted covering an area of 102.20 ha under different farming system typologies. In ''rainfed-without-animal-farming'' system, climate resilient technologies like construction of check-dam and construction of nala bund were implemented. Climate resilient varieties like BRG-5 in pigeonpea and KMR-630 in finger millet, pulse magic spray at flowering stage in pigeonpea, nipping in pigeonpea @ 50-55 DAS by use of nipping machine, intercropping of groundnut (K-6) plus pigeonpea and promotion of agri-horti system technologies were demonstrated under 'rainfed-with-animal-farming system.'

Mushroom cultivation by using crop residues
(KVK, Alapuzzha)

Ground nut intercropping with field bean
(KVK, Chikkaballapura)

Composting of aquatic weeds using EM solution
(KVK, Alapuzzha)

Finger millet variety KMR 630
(KVK, Chikkaballapura)

In 'irrigation-without-animal-farming system', spraying of vegetable special, mango special, introduction of fig, guava, tamarind, cashew and mango in agri-horti system, application of liquid Trichoderma for vegetable crops, installation of eugenol traps in horticultural crops and spraying of biological chemicals (spinosad) technologies intervention were demonstrated in 89 famers' field. Climate resilient technologies such as year-round fodder production, silage preparation cultivation of multi-cut sorghum (CoFS -31), azolla feed supplement for milch animal, culture of high value fish species in farm pond and upgradation of backyard poultry technologies were demonstrated under-rainfed-with-animal-farming system. Heavy rainfall was received during the months of September and October, 2022 and villages experienced with uneven distribution of rainfall. To minimize the crop loss and blast incidence in finger millet, variety KMR-630 was demonstrated in NICRA villages. The variety KMR-630 performed well and escaped from the heavy rainfall with average grain yield of 23.9 q/ha. The resilience was achieved 50-60 per cent due to adoption of KMR-630 in NICRA villages and minimized the yield loss. Dryland horticulture production system helps to mitigate the challenges, through provision of economic products and by providing stabilized income under low rainfall situation and other ecosystems services such as biodiversity, prevention of soil erosion and improving soil fertility.

KVK Gadag: Conducted the climate resilient interventions such as intercropping of maize + pigeonpea, intercropping of greengram + pigeonpea, high yielding and foliar disease tolerant onion variety (Bheema Super), high yielding, charcoal stem root rot & lodging resistant rabi sorghum variety (SPV-2217), wilt resistant and high yielding bengalgram variety (JAKI-9218), promotion of horticulture and forestry plantation and year round fodder production strategies in protective irrigated condition for enhancing milk yield covering an area of 50.40 ha under four different farming system typologies. A total of five dry spell occurred during the cropping season, sloe like maize, greengram crop recorded lower yield compared to intercrop with pigeonpea due to double the benefits as it resulted in higher yields in greengram and maize besides additional yield of pigeonpea, resulting in increased farmers' income and minimize the yield loss risk in the sole crop. The Bheema Super variety of Bheem super was performed very well in this dry spell and resulted in good yield as compared to local.

Greengram+ Pigeon pea intercropping
(KVK, Gadag)

Year-round fodder production
(KVK, Gadag)

KVK Kalaburgi-I: Under different farming system typologies various interventions like pigeonpea seed hardening, dibbling on ridge and furrow, nipping, pulse magic spray in pigeonpea, intercropping system with pigeonpea plus blackgram, new variety of sorghum (SPV 2217) and seed hardening, introduction of wilt resistant variety in Bengal gram (BGD-103), seed hardening, chickpea magic spray, desilting of Naala, Deoni cow breed, multi cut fodder (COFS-31), silage in polyethylene bags, azolla cultivation, urea molasses mineral blocks (UMMB), in-situ green manuaring in summer, introduction of summer vegetables and use of vegetable special,

introduction of bhima shakti variety of onion and use of vegetable special and establishment of fodder cafeteria were implemented. A total of 254 demonstrations covering 82 ha area were implemented by KVK Kalaburgi. During October 2021, 194.6 mm rainfall was received and hence, water stagnation was observed due to heavy downpour in flat land pigeonpea cultivation and hence growth was reduced. In contrast, furrow acted as drainage channel to drain out excess water out of field in ridge and furrow method of cultivation and thereby stagnation of water was avoided to facilitate luxurious growth. This differential growth has led to yield variation as flat land cultivated pigeonpea recorded 4.90 q/ha whereas, ridges and furrow cultivated pigeonpea recorded 12.50 q/ha. The improved sorghum variety (SPV 2217) is drought tolerant, maintains greenness at physiological maturity and moderately tolerant to charcoal rot disease. Cultivation of SPV 2217 has resulted in higher yield (22.75 q/ha) as compared to local variety (18.50 q/ha).

Ridge and furrow cultivation of pigeonpea
(KVK, Kalaburgi-I)

Foliar application of chickpea magic
(KVK , Kalaburgi-I)

KVK Tumakuru-II: A total of 34 demonstrations in ‘‘rainfed-without-animal’’, 153 demonstrations in ‘rainfed-with-animal’, 11 demonstrations in ‘‘irrigation-without-animal’’ and 192 demonstrations in ‘irrigation-with-animal’ demonstrations were conducted by KVK Tumakuru-II covering an area of 155.8 ha. Climate resilient interventions like drought/ high temperature tolerant varieties, short duration varieties, high yielding varieties, location specific intercropping systems with high sustainable yield index, promotion of agroforestry, water storage structure like farm pond and trench cum bunds, aerobic paddy Paustic-9, fodder production by multi cut sorghum CoFS-29&31 and sorghum African tall technologies were demonstrated in farmer’s fields. During the cropping season four dry spells occurred. Due to delayed onset of monsoon, finger millet variety ML-365 was demonstrated. Performance of the variety ML-365 was superior over local variety and recorded (20.85 % to 23.84 %) higher yield compared to the local variety used by the farmers. October and November months received 50 to 80 per cent more than normal rainfall. Water stagnation was observed in finger millet and pigeonpea intercrop system and hence pigeonpea yield was reduced but, this intercropping system reduced the yield loss risk.

d) Dissemination of climate resilient varieties

The climate resilient varieties emerged under NICRA demonstrations such as pigeonpea BRG-5, TS-3R, BRG-2 and DGGV-2, finger millet ML-365 and KMR-630, groundnut K6, tomato Sahoo and abinava-1148, rabi sorghum SPV-221, bengalgram JAKI-9218 and BGD 103 suiting these drought prone districts have been incorporated in Kharif-2021 and Rabi-2021 in the district plans of NICRA districts. A total of 1,16,620 ha has been brought under climate resilient varieties through state department of agriculture in Chikkaballapura, Gadag, Kalaburagi and Tumakuru districts of Karnataka and details are presented in Table 129.

Table 129: Dissemination of climate resilient varieties through State Department plan during kharif and rabi 2021 in NICRA districts

Crop	KVK	Climate resilient varieties	Approximate area (ha)
***Kharif* -2021**			
Pigeon pea	Chikkaballapura	BRG-5	3500
	Gadag	TS-3R	4500
	Tumakuru-II	BRG-2	3290
Greengram	Gadag	DGGV-2	25000
Groundnut	Chikkaballapura	K-6	300
Finger millet	Chikkaballapura	KMR-630, ML 365	3800
	Tumakuru-II	ML365	4130
Tomato	Chikkaballapura	Sahoo, abinava, 1148	50
Total			**44520**
***Rabi*-2021**			
Rabi sorghum	Gadag	SPV-2217	10000
	Kalaburgi-II	SPV 2217	2000
Bengal gram	Gadag	JAKI-9218	60000
	Kalaburgi-II	BGD 103	100
	Total		**72100**
Grand total			**116620**

e) Contingency measures taken up in NICRA village during dry spells

KVKs have successfully implemented contingency measures to alleviate the effect of dry spells on crops at various growth stages in NICRA villages of drought prone districts in Karnataka. Contingency measures adopted to overcome the impact of dry spells in crops such as pigeon pea, maize, finger millet, groundnut, and black gram crops in the districts of Chikkaballapur, Gadag, Kalaburagi-I and Tumakuru-II have minimised the impacts and realised better yields over the farmer's practices. District wise details of contingency measures and its impacts are presented in Table 130.

Farmers exposure visit (KVK, Gadag)

Method demonstration on azolla cultivation (KVK, Kalaburagi- I)

Table 130: Details of contingency measures implemented to combat the dry spells and impact on crop production under NICRA during the year

KVK	Dry spell (no. of days)	Duration	Crop name	Crop stage affected	Interventions	Farmers (No.)	Impact on crop yield (q/ha)		
							Farmers' practice	Demo	Increase over farmers' practice
Chikkaballapura	15	Sep 5th to Sep 19th	Pigeon pea	Vegetative	Nipping and pulse magic spray	20	10.32	8.92	15.60
	15	Sep 5th to Sep 19th	Finger millet	Vegetative	Line sowing , short duration crops variety KMR 630	20	23.95	21.5	11.30
	15	Sep 5th to Sep 19th	Ground nut	Vegetative	Intercropping system 10:2 ratio with pigeonpea and nipping and pulse magic	20	14.37	13.4	7.23
Gadag	22	Oct 26th to Nov 16th	Pigeon pea	Flowering, pod setting and pod develop-ment	Foliar spray of KNO_3 and water soluble 19:19:19 NPK	60	4.64	5.36	15.51
Kalaburgi-I	18	Jul 26th to Aug 8th	Black gram	Vegetative	Inter cultivation	25	10.30	10.80	4.00
	08	Oct 22th to Nov 30th	Pigeon pea	Flowering	Pulse magic spray	25	14.60	12.50	17.00
Tumakuru-II	12	Jun 5th to Jun 16th	Finger millet	Establish-ment	Finger millet KMR-630	50	20.6	17	3.60
	17	Jun 17th to Jul 4th	Pigeon pea	Establish-ment Vegetative	Pigeon pea BRG-2&3&4	81	2.3	1.9	0.40
	12	Jul 27th to Aug 7th	Maize	Establish-ment	Maize MAH 14-5	40	27.3	21.1	6.20

f) Institutional interventions

As a part of development of institutional mechanisms to take care of overall implementation of NICRA at village level, activities relating to seed bank, fodder bank, custom hiring centre, climate literacy through a village weather station were implemented which benefited 799 farmers and details are presented in Table 131.

Table 131 : Institutional interventions implemented under NICRA village

KVK	Type of institutional interventions	Interventions (No.)	Farmers (No.)	Area/unit (ha)
Alappuzha	Climate literacy through a village level weather station	1	200	-
Chikkaballapura	Seed bank- ragi , pigeonpea	1	24	3.00
Gadag	Seed bank – foxtail millet (DHFt-109-03), pigeonpea (TS-3R), rabi sorghum (SPV-2217)	3	60	24.00
	Custom hiring centre	8	113	118.40
	Climate literacy through a village level weather station	1	260	-
Kalaburgi -I	Seed bank –(COFS -31)	1	10	2.50
Tumakuru-II	Climate literacy through a village level weather station	1	132	-

Table 132: Extension activities organized by KVK under NICRA

KVK	Extension Activities	(No.)	Farmers participated (No.)		
			Male	Female	Total
Alappuzha	Awareness	6	65	17	82
	Method demonstration	10	79	60	139
	Total	**16**	**144**	**77**	**221**
Chikkaballapura	Exposure visit	1	51	0	51
	Field day	4	20	25	45
	Awareness	1	46	10	56
	Method demonstrations	7	56	26	82
	Total	**13**	**173**	**61**	**234**

(Contd..... P-138)

Gadag	Exposure visit	3	90	-	90
	Field day	4	235	39	274
	Awareness	7	97	-	97
	Method demonstration	5	66	6	72
	Kissan mela	1	100	85	185
	Diagnostic visit	6	29	-	29
	Group discussion	7	25	-	25
	Total	**33**	**642**	**130**	**772**
Kalaburgi-I	Field day	2	265	45	310
	Method demonstrations	3	60	15	75
	Total	**5**	**325**	**60**	**385**
Tumakuru-II	Exposure visit	1	48	0	48
	Field Day	1	44	5	49
	Awareness	1	159	27	186
	Total	**3**	**251**	**32**	**283**
	Grand total	**70**	**1535**	**360**	**1895**

g) Extension Activities

A total of 70 extension activities have been carried out to create awareness among the community about the climate related impacts on the agriculture and related sector through various activities with the participation of 1,895farmers including 360 women (Table 132). A total of 189 farmers were taken on exposure visits to various places/intuitions by the NICRA KVKs in order to expose the farmers to the on field climate smart technologies with the contention of seeing in believing

h) Capacity Development to Farmers

KVKs have conducted 42 capacity development courses related to climate resilient agriculture under NICRA covering topics such as crop production, natural resource management, livestock, ICM, INM, IPDM, value addition and dry land technologies wherein trained 1,069 farmers including 244 women and details are provided in Table 133.

Table 133: Capacity development courses organized by KVK under NICRA

KVK	Courses (No.)	Farmers (No.)		
		Male	Female	Total
Alappuzha	13	102	98	200
Chikka-ballapura	8	125	40	165
Gadag	12	304	14	318
Kalaburgi-I	3	99	12	111
Tumakuru-II	6	195	80	275
Total	**42**	**825**	**244**	**1069**

3.2.5 Skill Development

Seventeen KVKs of Zone XI organized 17 programmes under skill development involving 392 participants of which 340 were male participants and remaining were female (about 13.00 %). In Karnataka, 322 participants were benefited as compared to 70 participants in Kerala (Table 134).

In Karnataka, 14 skill development programmes were conducted by 12 KVKs with 322 participants including 289 male and 33 female. In general category, there were 263 participants compared to 59 participants in SC/ST category (Table 135). These programmes were conducted on 11 job roles, dairy farmer/ entrepreneur being the major job role with four programmes and 100 participants, which included 11 females.

Table 134: State wise skill development programmes carried out by KVKs of Zone XI

State	Programmes (No.)	General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Karnataka	14	242	21	263	47	12	59	289	33	322
Kerala	3	29	17	46	22	2	24	51	19	70
Total	**17**	**271**	**38**	**309**	**69**	**14**	**83**	**340**	**52**	**392**

Table 135: Skill development programmes carried out by KVKs of Karnataka

KVK	Job Role	Participants (No.)								
		General			SC/ST			Grand total		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
Bagalkot	Organic grower	20	0	20	2	0	2	22	0	22
Belagavi-II	Dairy Farmer/ entrepreneur	25	0	25	0	0	0	25	0	25
Bidar	Micro irrigation	12	2	14	6	0	6	18	2	20
	Quality seed grower	13		13	7	0	7	20	0	20
Chamarajanagara	Sericulturist	20	0	20	0	5	5	20	5	25
	Nursery worker	15	2	17	1	2	3	16	4	20
Chikkaballapura	Bee keeper	16	0	16	4	0	4	20	0	20
Davanagere	Dairy farmer/ entrepreneur	16	5	21	3	1	4	19	6	25
Gadag	Dairy entrepreneur	16	5	21	4	0	4	20	5	25
Hassan	Mushroom cultivation	12	5	17	6	2	8	18	7	25

(Contd.... P-140)

Kalaburgi-I	Dairy farmer / entrepreneur	20	0	20	5	0	5	25	0	25
Koppal	Small poultry farmer	17	2	19	4	2	6	21	4	25
Mysuru	Friends of Coconut Tree	20	0	20	0	0	0	20	0	20
Vijayapura II	Vermicompost producer	20	0	20	5	0	5	25	0	25
Total		**242**	**21**	**263**	**47**	**12**	**59**	**289**	**33**	**322**

In Kerala, two KVKs conducted three skill development programmes (Table 136). Total number of participants were 70 including 51 male and 19 female. In general category, 46 participants attended capacity development programmes compared to 24 participants in SC/ST category.

Table 136: Skill development programmes carried out by KVKs of Kerala

KVK	Name of job role	Total	Participants (No.)								
			General			SC/ST			Grand total		
			Male	Female	Total	Male	Female	Total	Male	Female	Total
Idukki	Beekeeper Batch 1	25	23	2	25	0	0	0	23	2	25
	Beekeeper Batch II	20	0	0	0	20	0	20	20	0	20
Thiruvanantha puram	Mushroom grower	25	6	15	21	2	2	4	8	17	25
Total		**70**	**29**	**17**	**46**	**22**	**2**	**24**	**51**	**19**	**70**

ASCI training on Dairy Farmer Enterprenuer (KVK, Belagavi-II)

Skill training on scientific dairy farming (KVK, Dharwad)

3.2.6 Attracting and Retaining Youth in Agriculture

The ICAR project "Attracting and Retaining Youth in Agriculture (ARYA)" is aimed at entrepreneurial development of youth in rural areas to take up different agriculture, allied and service sector enterprises for sustainable income and gainful employment. ARYA KVKs identified potential youth and trained them on entrepreneurship development skills by providing a basket of options to start agricultural ventures for self-employment.

Bengaluru Rural, Uttara Kannada, Shivamogga, Kannur, Pathanamthitta and Malappuram KVKs have implemented the ARYA program in Zone-XI. Under this programme, 121 programs were organized to train rural youth on income generating activities during the year 2021 (Table 137). A total of 1,400 rural youth were trained on various agricultural and allied enterprises *viz.* bee keeping, processing and value addition, mushroom production, poultry, goat rearing and nursery. As a result, 290 units were established (Table 138) and managed by the trained youth.

Table 137: Center-wise number of capacity development programmes organized for rural youth

ARYA KVK centers	Training (No.)	Rural youth (No.)
Bengaluru-Rural	6	120
Kannur	39	349
Pathanamthitta	40	206
Shivamogga	17	372
Uttara Kannada	7	189
Malappuram	12	164
Total	**121**	**1400**

Table 138: Enterprise -wise rural youth trained and number of enterprise units established

Name of enterprises	Rural youth (No.)	Units established (No.)
Coconut palm climbing	118	22
Bee keeping	287	91
Processing and value addition	322	37
Nursery	318	45
Poultry and goat rearing	135	21
Mushroom production	180	71
Vermicompost	40	3
Total	**1400**	**290**

ARYA capacity development programme on incubation for poultry entreprenures (KVK, Pathanamthitta)

ARYA capacity development programme on grafting for nursery entreprenures (KVK, Pathanamthitta)

ARYA capacity development programme on coconut climbing (KVK, Shivamogga)

ARYA capacity development programme on vermicompost for young entreprenures (KVK,Bengaluru Rural)

Bee keeping entrepreneur under ARYA (KVK, Shivamogga)

Goatery Unit under ARYA (KVK, Uttara Kannada)

Beekeeping unit under ARYA (KVK, Kannur)

Nursery training under ARYA (KVK, Kannur)

3.2.7 Swachhta Pakhwada

ICAR-ATARI, Bengaluru has been implementing Swacch Bharat Mission for promoting cleanliness. Swachhta Pakhwada was observed by the Institute and its KVKs during 16-31 December, 2021 and organized activities as per the guidelines provided by the ICAR, New Delhi. Date and activity wise programmes organized by KVKs of Zone-XI during Swachhta Pakhwada are given in Table 139.

KVKs have organized various programmes with the participation of 16,505 participants of different categories involving farmers, farm women, rural youth, school children, extension personnel, other stakeholders and general public. Out of which, KVKs of Karnataka conducted swachhta activities by involving 11,943 participants, KVKs of Kerala conducted swachhta activities by involving 4,164 participants and KVK Lakshadweep conducted swachhta activities by involving 398 participants.

Oath taking ceremony of Swachhta Pakhwada at ICAR-ATARI, Bengaluru

Swachta activity at ICAR-ATARI Bengaluru premises

Table 139: Date and activity wise programmes organized by KVKs of Zone-XI during Swachhta Pakhwada

Date	Activities	Participants (No.)			
		Karnataka	Kerala	Lakshadweep	Total
16.12.2021	Display of banner at prominent places, taking swachhta pledge, stock taking and briefing of the activities to be organized during the pakhwada, plantation of trees.	766	509	112	**1387**
17.12.2021	Basic maintenance stock taking on digitization of office records/ e-office implementation. Cleanliness drive including cleaning of offices, corridors and premises.	373	174	28	**575**
18.12.2021	Sanitation and SWM Cleanliness and sanitation drive in the villages adopted under the Mera Gaon Mera Gaurav programme by ICAR Institutes/ KVKs involving village community.	647	209	_	**856**

19.12.2021	Sanitation and SWM Cleanliness and sanitation drive within campuses and surroundings including residential colonies, common market places.	512	125	_	**637**
20.12.2021	Stock taking of waste management and other activities including utilization of organic wastes/generation of wealth from waste, polythene free status, composting of kitchen and home waste materials, promoting clean and green technologies and organic farming practices in kitchen gardens of residential colonies /one nearby village and proving on the spot technology solution.	807	292	_	**1099**
21.12.2021	Campaign on cleaning of sewerage and waterlines, awareness on recycling of waste water, water harvesting for agriculture/ horticulture application/kitchen gardens in residential colonies/1-2 nearby villages	620	389	53	**1062**
22.12.2021	Organizing workshops, debate, exhibitions, technology demonstrations on agricultural technologies for conversion of waste to wealth, safe disposal of all kinds of wastes.	714	300		**1014**
23.12.2021	Celebration of special day- kisan diwas (farmer's day) on 23 December involving farmers.	2719	281	23	**3023**
24.12.2021	Swachhta awareness at local level (organizing sanitation campaigns involving and with the help of the farmers, farm women and village youth in new villages not adopted any by institutes/establishments.	742	347	23	**1112**
25.12.2021	Cleaning of public places, community market places and/or nearby tourist/selected spots.	721	180	8	**909**

26.12.2021	Fostering healthy competition: Organizing competition and rewarding best offices/ residential areas/campuses on cleanliness. quiz, assay and drawing competitions for school children, village youth.	373	389	25	**787**
27.12.2021	Awareness on waste management and other activities including utilization of organic wastes/ generation of wealth from waste, polythene free status, composting of kitchen and home waste materials, promoting clean and green technologies and organic farming practices in new area.	496	246	24	**766**
28.12.2021	Campaign on cleaning of sewerage and water lines, awareness on recycling of wastewater, water harvesting for agriculture/ horticulture application/ kitchen gardens in residential colonies outside campuses/nearby villages with the involvement of 1ocal/ village communities.	646	237	34	**917**
29.12.2021	Visits of community waste disposal sites/ compost pits, cleaning and creating awareness on treatment & safe disposal of bio-degradable/non-bio-degradable wastes by involving civil/ farming community.	604	216	_	**820**
30.12.2021	Involvement of VIP/ VVIP in the swachhta activities, Involvement of print and electronic media may be ensured so that adequate publicity is given to the swachhta pakhwada.	626	155	7	**788**
31.12.2021	Organization of press conference for highlighting the activities of Swachh Bharat Pakhwada by involving all stakeholders including farmers/VIPs/ press and electronic media.	577	115	61	**753**
Total		**11943**	**4164**	**398**	**16505**

KVK, Davanagere

KVK, Haveri

KVK, Shivamogga

KVK, Idukki

KVK, Ernakulam

KVK, Pathanamthitta

KVK, Ernakulam

KVK, Kalaburgi

3.2.8 Mera Gaon-Mera Gaurav (My Village-My Pride)

ICAR-ATARI, Bengaluru is coordinating the activities under Mera Gaon - Mera Gaurav (MG-MG) in Zone XI. Ten ICAR institutes in the Zone *viz.*, ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru; ICAR-National Institute of Animal Nutrition and Physiology (NIANP), Bengaluru; ICAR- National Bureau of Agricultural Insect Resources (NBAIR), Bengaluru; ICAR- National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI), Bengaluru; ICAR-Directorate of Cashew Research (DCR), Puttur in Karnataka, ICAR-Central Plantation Crops Research Institute (CPCRI), Kasaragod; ICAR-Central Tuber Crops Research Institute (CTCRI), Trivandrum; ICAR-Indian Institute of Spices Research (IISR), Kozhikode; ICAR-Central Marine Fisheries Research Institute (CMFRI), Cochin; and ICAR-Central Institute of Fisheries Technology (CIFT), Cochin in Kerala implemented MG-MG programme through formation of 126 multidisciplinary teams of scientists. Scientist teams extended farm advisories in agriculture and allied sectors and disseminated latest agricultural technologies through organization of different extension activities by involving farmers and other stakeholders in 565 adopted villages. Activities included mobile advisories, extension literature, team visits to villages, interface meetings, awareness programmes, method demonstrations, training programmes, facilitating linkages with line departments and other development agencies, seeds of latest varieties, latest livestock breeds, latest production technologies and crop diversification.

Supply of CMD resistant cassava variety Sree Reksha to farmers at Pothencode and Karichara by Scientist team, ICAR- Central Tuber Crops Research Institute, Thiruvananthapuram

Interaction with President and Panchayat Development officer (PDO) and farmers of Grama Panchayat, Kedambadi by Scientist team, ICAR- Directorate of Cashew Research, Puttur

Demonstration of grain sprout production and supply of fodder slips to the farmers under MGMG by Scientists team, ICAR- National Institute of Animal Nutrition and Physiology, Bengaluru

3.2.9 District Agricultural Meteorological Unit

Gramin Krishi Mausam Sewa (GKMS) is the Government of India's flagship initiative for weather-related services to farmers, aiding in decision-making on day-to-day agricultural operations. The GKMS has been expanded to Krishi Vigyan Kendras to meet block level weather needs of farmers at the micro level through establishment of District Agricultural Meteorological Unit (DAMU). The implementation of various components is a collaborative effort of IMD and ICAR, with multi-organizational collaboration.

DAMU Phase-I has been operational at 16 KVKs in Zone-XI, ATARI, Bengaluru, with 12 in Karnataka, three in Kerala, and one in Lakshadweep during 2019. DAMUs are interdisciplinary units with responsibility of preparing and disseminating agro-met alerts for districts and sub-districts.

A total of 9,392 agro advisories were disseminated to 3,47,224 farmers using various communication methods by 16 DAMU KVKs. They have prepared 72 Agro advisories and disseminated to 2,19,112 farmers via Kisan Portal. DAMU KVKs have conducted 263 farmer awareness programmes benefiting 13,029 farmers and generated 51 videos on district-specific weather-related topics, which were sent to 70,261 farmers via registered Whats App groups. The progress achieved by each KVK is given in Table 140. According to feedback from registered farmers, the bulletins and telephonic mode of contact were helpful in completing agricultural tasks such as field preparation, crop sowing, irrigation on non-rainy days, fertiliser application and spraying during calm and clear weather conditions. Information about occurrence of dry spell, crop harvesting time and incidence of pests/diseases and their control measures were most useful to farmers.

Developed Crop Weather Calendar (CWC) for Maize (KVK, Ballari)

Famers awareness programme on DAMU (KVK, Kollam)

Table 140: Progress of DAMUs

KVK	Agro advisories					Farmers awareness programmes		Videos developed and disseminated	
	Agro advisories generated (No.)	Farmers registered for agro advisories (No.)	Farmers benefitted (No.)	SMS sent through Kisan Portal (No.)	Farmers sent (No.)	Programmes (No.)	Farmers benefitted (No.)	Videos developed (No.)	Farmers benefitted (No.)
Karnataka									
Bagalkot	105	624	2500	0	0	6	232	9	307
Ballari	104	33044	33044	3	10000	11	628	2	5000
Chamaraja nagara	108	47828	47828	2	40739	28	917	1	7569
Chikka magaluru	88	20830	75250	0	0	18	720	0	0
Haveri	105	3850	3625	22	35250	38	1371	13	3500
Kodagu	832	5985	10340	14	4943	31	3791	3	1245
Kolar	105	6900	6900	2	24739	15	820	2	6000
Koppal	101	14500	14500	4	9050	36	1138	8	4490
Mandya	105	59077	59077	2	47240	11	317	3	1100
Rama nagara	510	32300	29200	3	45541	15	548	3	5800
Tumakuru	328	80,000	80,000	0	0	13	592	3	34,000
Yadgir	105	3380	3380	8	19258	20	723	2	1000
Total	**2596**	**308318**	**365644**	**60**	**236760**	**242**	**11797**	**49**	**70011**
Kerala									
Kollam	1260	8265	1365	0	0	13	1025	2	250
Mala ppuram	3450	30000	20000	0	0	1	30	0	0
Palakkad	1456	600	12000	12	1610	3	100	0	0
Total	6166	38865	33365	12	1610	17	1155	2	250
Lakshadweep									
Laksha-dweep	630	41	41	0	0	4	77	0	0
Grand total	**9392**	**347224**	**399050**	**72**	**219112**	**263**	**13029**	**51**	**70261**

Automatic weather station (AWS) (KVK, Bagalkot)

3.2.10 Farmer FIRST Project

Farmer FIRST Project (FFP) was sanctioned by Division of Agricultural Extension, ICAR, New Delhi and it was implemented through ICAR-ATARI, Bengaluru at three institutes *viz.* ICAR-Central Plantation Crops Research Institute (CPCRI), Kasaragod (implemented at CPCRI Regional Station, Kayamkulam), ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru and ICAR- National Institute of Animal Nutrition and Physiology (NIANP), Bengaluru. Brief profile of adopted villages under FFP by these institutes is given in Table 141.

The FFP institutes demonstrated technologies under different modules *viz.*, crop, horticulture, livestock, NRM and IFS. Details on interventions implemented in each module by the institutes at field level are presented in Table 142. Data shows that 864 demonstrations with 2,626 farm families were conducted by FFP institutes under NRM module (9 demos with 220 families), crop module (566 demos with 1150 families), horticulture module (99 demos with 344 families), livestock module (188 demos with 768 families having 1184 animals) and IFS module (2 demos with 144 families). Further, 191 extension programmes were organized by FFP institutes with the participation of 1221 farmers. Module wise progress of technological interventions is discussed below.

Table 141: Brief profile of adopted villages under FFP

Institute	Adopted villages	Families covered (No.)	Major crops	Major enterprises
ICAR-CPCRI Regional Station, Kayamkulam (ICAR-CPCRI, Kasaragod)	Pathiyoor and Keerikkad	4220	Coconut, sesamum, vegetables, turmeric, ginger, amorphophallus, colocasia, dioscorea, tapioca, fodder grass, fodder maize, maize, finger millet, horse gram, paddy	Coconut products and value addition units, turmeric powder unit, curry powder, kera probio production, vermicompost production
ICAR-IIHR, Bengaluru	Vasappanadoddi, Yeramgere, Balepura, Kebbedoddi, Hosadurga and Thattiguppe	525	Finger millet, pigeonpea, field bean, tomato, chilli, french bean, tuberose	Dairy, small ruminants, fishery
NIANP, Bangalore	Lekshmidevipura, Timmajanahalli and S. Nagenahalli	500	Ragi, maize, pigeonpea and vegetables	Agriculture and dairying
Total		5245		

Table 142: Institute wise interventions implemented under FFP

Institute	NRM module		Crop module		Horticulture module		Livestock module			IFS module		Extension activities	
	Demos (No.)	Families (No.)	Demos (No.)	Families (No.)	Demos (No.)	Families (No.)	Demos (No.)	Families (No.)	Animals (No.)	Demos (No.)	Families (No.)	Programmes (No.)	Farmers (No.)
ICAR-CPCRI Regional Station, Kayamkulam (ICAR-CPCRI, Kasaragod)	4	217	12	629	6	272	6	153	303	1	138	179	738
ICAR-IIHR, Bengaluru	5	3	550	400	88	56	153	115	40	-	-	11	429
ICAR-NIANP, Bengaluru	-	-	4	121	5	16	29	500	841	1	6	1	54
Total	9	220	566	1150	99	344	188	768	1184	2	144	191	1221

(a) NRM module

Technology wise interventions implemented under NRM module by FFP institutes are presented in Table 143. Data indicated that a total of 208 farmers were involved in demonstrations of improved technologies in 80.34 ha spread over the project villages., ICAR-CPCRI RS conducted demonstrations on soil based nutrient management, pond reclamation including refinement for water conservation and bio-resource management,

Table 143: Technology wise interventions implemented under NRM module by FFP institutes

Institute	Intervention / technology	Farmers (No.)	Area (ha)	Results
CPCRI RS, Kayamkulam (ICAR-CRCRI, Kasaragod) CPCRI Kasaragod	Soil test based nutrient management and soil health card distribution	105	61.04	Reduction of 27.90 per cent cost of fertilizers in crops other than coconut
	Pond reclamation and refinement for water conservation	72	4.30	Produced 131670 fish fingerlings (Anabas and nile tilapia)
	Bio resource management-Organic recycling and waste management	28	12.00	Obtained average income of ₹.0.70 lakh/year
ICAR-IIHR, Bengaluru	Soil and water conservation practices and activities on borewell recharge	3	3.00	Impact of borewell recharge is yet to be studied
Total		**208**	**80.34**	

organic recycling and waste management by involving 105, 72 and 28 farmers covering 61.04, 4.30, 12.00 ha respectively. ICAR-IIHR conducted demonstrations on soil and water conservation practices with bore well recharge by involving three farmers covering 3.00 ha area.

Bore well recharge, ICAR-IIHR, Bengaluru

Harvesting fishes - NRM interventions in revival of 88 homestead ponds with fish cultivation, ICAR-CPCRI RS, Kayamkulam

(b) Crop module

It consists of introducing improved high yielding varieties, cultivation practices, plant protection measures, high density planting, nutrient management etc. to achieve sustainable production. Technology wise interventions implemented under crop module by FFP institutes are presented in Table 144. Data revealed that a total of 1,748 farmers were involved in demonstrations of improved technologies on 527.35 ha spread over in different cluster villages. Demonstration on integrated management of root (wilt) disease affected by coconut palms gave yield of 7,538 nuts/ha with net return of ₹. 95,016 as compared to 4,288 nuts/ha with net return of ₹. 27,014 under check. Similarly, all other technology demonstrations conducted by FFP gave high yield as well as high net return to the farmers as compared to their respective checks. Further, demonstration conducted by ICAR-CPCRI RS on micro nutrient mix (Kalpa Vardhini) in coconut was new to the farmers and there by net return (₹.95,696/ha) obtained is considered as additional income to the farmers.

Varietal demonstration on Sesamum (Kayamkulam- 1, TMV 6,7& 4) and INM gave yield of 3.85 q/ha with net return of ₹. 75,434 as compared to 1.74 q/ha with net return of ₹. 32,000 under check. Demonstration on micro nutrient mix (KalpaVardhini) in coconut gave yield of 7718 nuts/ha with net return of ₹. 95,696 as compared to 5421 nuts/ha with net return of ₹. 87,881 under check.

Redgram BRG-5 (ICAR-IIHR, Bengaluru)

Sesamum in rice fallow (ICAR-CPCRI RS, Kayamkulam)

Table 144: Technology wise interventions implemented under crop module by FFP instututes

Institute	Intervention/technology	Farmers (No.)	Area (ha)	Yield			Net returns (₹./ha)	
				Demo (q/ha)	Local (q/ha)	Increase (%)	Demo	Check
ICAR-CPCRI RS, Kayamkulam (ICAR-CRCRI, Kasaragod)	Integrated root (wilt) disease management in coconut	105	55 (6450 palms)	7538 nuts/ha	4288 nuts/ha	76	95016	27014
	Micro nutrient mix (Kalpa Vardhini) in coconut	70	37.5 (4425 palms)	7718 nuts/ha	5421 nuts/ha	42	95696	87881
	Sesamum (Kayamkulam- 1, TMV 6,7& 4) and INM	240	25.75	3.85	1.74	64	75434	32000
	Cowpea (Kanaka moni)	43	8.60	28.00	12.00	133	352800	113400
	Cowpea (Hridya)	43	6.30	4.80	2.10	129	24192	7560
	Greengram (CO-2)	43	6.10	3.80	1.60	138	19154	5760
	Blackgram (CO -6)	43	5.80	3.20	1.40	129	16128	5040
	Soil and moisture conservation + INM in coconut palms	15	8.30	7906 nuts/ha	4546 nuts/ha	74	99616	62053
ICAR-IIHR, Bengaluru	Ragi (ML- 365)	400	80.00	57.50	27.00	113	138000	64800
	Pigeon pea: BRG- 5 (Intercrop)	332	65.50	7.00	3.25	115	46042	22000
	Field bean: HA- 4 (Intercrop)	226	45.20	8.50	4.00	113	34595	12183
	Horse gram (Intercrop)	18	2.50	8.50	4.00	113	27000	11000
	Navane (Intercrop)	16	5.80	9.50	4.40	116	62719	27200
ICAR-NIANP, Bengaluru	Ragi (ML- 365)	71	85.00	1.25	0.90	39	16530	12000
	Pigeon pea (BRG- 5)	83	90.00	84.00	72.00	17	109983	-
	Total	**1748**	**527.35**					

(c) Horticulture module

Technology wise interventions implemented under horticulture module by FFP institutes are presented in Table 145. A total of 190 farmers were involved in demonstrations of improved technologies in 40.13 ha spread over in different cluster of villages. Demonstration on Gajendra variety of Amorphophallus as intercrop by ICAR-CPCRI RS gave yield of 285.00 q/ha with net return of ₹. 6,68,325 as compared to 170.00 q/ha with net return of ₹. 4,10,375 under check, demonstration on tomato (Arka Rakshak) with precision farming package by ICAR-IIHR gave yield of 77.55 q/ha with net return of ₹. 8,13,250 as compared to 45 q/ha with net return of ₹. 4,05,000 under check and demonstration on ridge gourd (Arka Prasanna) by ICAR-NIANP gave yield of 65.40 q/ha with net return of ₹. 13,88,300 as compared to 61.00 q/ha under check net return of ₹. 1,07,000.

(d) Livestock module

Technology wise interventions implemented under livestock module by FFP institutes are presented in Table 146. Data indicated that a total

Table 145: Technology wise interventions implemented under horticulture module by FFP institutes

Institute	Intervention / technology	Farmers (No.)	Area (ha)	Yield (q/ha)			Net returns (₹./ha)	
				Demo (q/ha)	Local (q/ha)	Increase (%)	Demo	Check
ICAR-CPCRI RS, Kayamkulam (ICAR-CRCRI, Kasaragod)	Amorphophallus (Gajendra)	42	7.84	285.00	170.00	69	668325	410375
	Turmeric (Pragathi and Prathibha)	44	18.2	265.00	120.00	121	909600	280000
	Ginger cultivation-(IISR Varada)	11	0.27	133.20	86.90	53	243756	159027
ICAR-IIHR, Bengaluru	Tomato (Arka Rakshak) with precision farming package	4	0.80	77.55	45.00	72	813250	405000
	Chilli (Arka Haritha) with precision farming package	9	1.52	36.32	21.00	73	450473	192238
	Tuberose (Arka Prajwal)	5	0.70	26.20	-	-	2196750	-
	Mango	29	1.16	-	-	-	-	-
	Brinjal with Precision farming package	2	0.60	60.62	32.50	87	513250	262000
	Drumstick (Intercrop)	19	0.92	22.5	-	-	687750	-
	Palak	3	0.12	40.82	-	-	196833	-
	Coriander	4	0.40	12.40	-	-	40550	-
ICAR-NIANP, Bengaluru	Beans (Arka Arjun)	8	1.70	33.00	26.00	25	1297000	230000
	Ridge gourd (Arka Prasanna)	4	3.50	65.40	61.00	8	1388300	107000
	Okra (Arka Anamika)	6	2.40	13.00	11.00	27	414400	90000
	Total	**190**	**40.13**					

Tuberose Arka Prajwal, (ICAR-IIHR, Bengaluru)

Turmeric pragati and prathibha (ICAR-CPCRI RS, Kayamkulam)

of 1,066 farmers were involved in demonstrations of improved technologies in different cluster of villages and all have obtained benefit in terms of increased yield and income.

(e) Enterprise module

Technology wise interventions implemented under enterprise module by FFP institutes are presented in Table 147. A total of 69 farmers were involved in demonstrations of improved technologies in 168.25 ha. Demonstration on virgin coconut oil, vermicompost production and kalpakam keraprobio production enterprises by ICAR-CPCRI RS gave annual income of ₹. 7,56,000, ₹. 52,000 and ₹.69,000, respectively. Demonstration on tuberose bulb production enterprise by ICAR-IIHR gave annual income of ₹. 3,00,000. Milking machine as doorstep service demonstrated by ICAR- NIANP gave annual income of ₹. 96,000 to each farmer.

Table 146: Technology wise interventions implemented under livestock and poultry module by FFP institutes

Institute	Intervention / technology	Farmers (No.)	Unit/No./ Area	Output		Increase of output (%)
				Demo	Local	
CPCRI RS, Kayamkulam (ICAR-CRCRI, Kasaragod)	Cow mat for GAP in livestock units	35	92 animals	264960 liters of milk/year (₹.16 liters/cow/day) Average 180 milking days	190400 liters of milk/year (₹.14 liters/cow) Average 170 milking days	39
	Fodder cultivation (Susthira, Super Napier,CO-5)	42	5.80 ha	62.00 q/ha	10.00 q /ha	520
	Egg incubators-Poultry for mini units (4286 birds)	5	5 units	₹.1.028 lakh/ unit/ year	₹.0.32 lakhs/unit/ year	221
	Duck incubator	1	1 unit	₹.1.5 lakhs/unit/year	₹.0.45 lakhs/unit/ year	233
	64 poultry units- 3000 birds-Gramapriya, Gramasree, BV 380	70	3300 birds	₹.11236 /day (1783eggs /day)	₹.4368 /day (728 eggs/day)	157
ICAR-NIANP, Bengaluru	Animal health and fertility management	121	136 animals	One insemination to conceive	Three insemination to conceive	200
	Mastitis management	121	240 animals	₹. 250 veterinary expenses per month per animal	₹. 1500 veterinary expenses per month per animal	83 reduction in veterinary expenses
	Mineral nutrition	94	100 animals	10.25 l milk yield per animal	10 l milk yield per animal	2.5
	Lameness management	27	54 animals	₹. 250.00 veterinary expenses per month per animal	₹. 600.00 veterinary expenses per month per animal	58.30 reduction in veterinary expenses
	HACCP based quality milk production	500	712 animals	340.00 l milk yield per animal	300.00 l milk yield per animal	13.00
	Fodder production and conservation	50	79 animals with 67 acres	322.50 l milk yield per animal	300.00 l milk yield per animal	7.50
	Total	**1066**				

Director, ATARI, Bengaluru handing over community incubator to Mr. Radhakrishnan, duck farmer, (ICAR-CPCRI RS, Kayamkulam)

Animal health camp, (ICAR-NIANP, Bengaluru)

Table 147: Technology wise interventions implemented under enterprise module by FFP institutes

Institute	Enterprise	Intervention / technology	Area (ha)	Farmers (No.)	Annual income of farmer (₹.)	
					Before intervention	After intervention
CPCRI RS, Kayamkulam (ICAR-CRCRI, Kasaragod) CPCRI Kasaragod	Virgin Coconut Oil (VCO) unit + coconut based food products + copra dryer (shell fired copra dryer)	Shell fired copra dryer of 500 nuts / batch chakku rotary press- From 100 nuts - 16- 18 kg of copra (65–70% oil) Sesame oil can also be extracted in this	58.00	3	240000	756000
	Vermicompost production unit	Three vermi compost units	38.75	3	Nil	52000
	Kalpakam Keraprobio production unit	Nutrient mixture for coconut seedlings and bearing palms	68.00	1	Nil	69000
ICAR-IIHR, Bengaluru	Tuberose bulbs	Production and sale of tuberose bulbs	3.50	8	94500	300000
ICAR-NIANP, Bengaluru	Milking machine as doorstep service	Youths identified and provided with milking machine for door step milking services	0.00	54	-	96000
Total			**168.25**	**69**		

(f) Integrated Farming Systems (IFS) module

Technology wise interventions under IFS module by FFP institutes are presented in Table 148. A total of 144 farmers were involved in demonstrations of improved technologies on 43.20 ha spread over in different cluster of villages. Demonstration on IFS interventions and farm planning by ICAR-CPCRI RS gave annual income of ₹. 3,68,361/farmer. Demonstration on mixed cropping + livestock by ICAR-NIANP gave annual income of ₹.1,39,000 per farmer.

(g) Capacity building programmes

Thematic area and institute wise capacity building programmes organized under FFP are presented in Table 149. Farmers empowerment was done through organization of 39 capacity building programmes under different thematic areas related to agriculture and allied sector wherein trained 661 farmers. More programmes were conducted on thematic area- capacity building and group dynamics (6) followed by entrepreneurship development (6), livestock production and

Table 148: Technology wise interventions under Integrated Farming Systems (IFS) module

Institute	Intervention / technology	Area (ha)	Farmers (No.)	Annual income of farmer (₹.)	
				Before intervention	After intervention
CPCRI RS, Kayamkulam (ICAR-CRCRI, Kasaragod) CPCRI Kasaragod	IFS interventions and farm planning	33.20	138	135600	368361
ICAR-NIANP, Bengaluru	Mixed Cropping + Livestock	10.00	6	80000	139000
	Total	**43.2**	**144**		

Table 149: Thematic area and institute wise capacity building programmes organized under FFP

Thematic area	Capacity building programmes							
	ICAR-CPCRI RS, Kayamkulam		ICAR-IIHR, Bengaluru		ICAR-NIANP, Bengaluru		Total	
	Programmes (No.)	Farmers (No.)	Programmes (No.)	Farmers (No.)	Programmes (No.)	Farmers (No.)	Programmes (No.)	Farmers (No.)
Capacity building and group dynamics	1	15	3	44	2	31	6	90
Crop production	2	33	1	26	1	13	4	72
Entrepreneurship development	3	43	02	02	1	11	6	56
Farm implements	1	17	0	0	0	0	1	17
Livestock production and management	3	40	0	0	3	31	6	71
Natural resource management	1	20	1	32	0	0	2	52

(Contd.... P-158)

Nutrition security	2	34	0	0	0	0	2	34
Plant protection	1	49	1	30	0	0	2	79
Processing and value addition	1	23	02	32	0	0	3	55
Production of inputs at site	1	20	0	0	0	0	1	20
Soil health and fertility management	1	22	02	46	1	0	4	68
Women empowerment	1	27	1	20	0	0	2	47
Total	**18**	**343**	**13**	**232**	**8**	**86**	**39**	**661**

management (6), crop production (4), soil health and fertility management (4), processing and value addition (3), plant protection (2), natural resource management (2), women empowerment (2), nutrition security (2), farm implements (1) and production of inputs at site (1).

(h) Extension programmes

To create awareness among farmers in agriculture and allied sectors, different extension programmes were organized by the institutes which are presented in Table 150. A total of 307 extension programmes were organized by FFP institutes with the participation of 2371 farmers. Out of which, more progammes on diagnostic visits (117) followed by advisory services (112) and method demonstrations (34).

Table 150: Extension programmes organized by FFP institutes

Extension programmes								
Extension activity	**ICAR-CPCRI RS, Kayamkulam**		**ICAR-IIHR, Bengaluru**		**ICAR-NIANP, Bengaluru**		**Total**	
	Programmes (No.)	**Farmers (No.)**	**Programmes (No.)**	**Farmers (No.)**	**Programmes (No.)**	**Farmers (No.)**	**Programmes (No.)**	**Farmers (No.)**
Advisory services	45	142	18	175	49	551	112	868
Celebration of important days	5	39	0	0	4	166	9	205
Diagnostic visits	74	105	38	80	5	131	117	316
Exposure visits	0	0	02	19	0	0	2	19
Farmers' seminar/ workshops	3	50	0	0	0	0	3	50
Group discussions	8	0	08	105	0	0	16	105
Kisan ghosthies	0	0	0	0	1	56	1	56
Method demonstrations	23	59	11	429	0	0	34	488
Plant/animal health camps	0	0	01	56	9	208	10	264
Total	**161**	**395**	**78**	**864**	**68**	**1112**	**307**	**2371**

3.2.11 Krishi Kalyan Abhiyan (Aspirational districts)

The Ministry of Agriculture & Farmers Welfare launched Krishi Kalyan Abhiyan (KKA) on June 01, 2018 in aspirational districts across the country to provide assistance and advice for farmers on improving their farming techniques and raise their income. KKA Phase-II was launched on October 02, 2018 to give a boost to agriculture and allied activities in aspirational districts. As part of the Scheme, three KVKs of Zone XI *viz.*, Raichur and Yadgir in Karnataka and Wayanad in Kerala implemented the KKA in selected villages of their respective districts in collaboration with Department of Agriculture, Government of Karnataka. During the period under report, these three KVKs have conducted 327 technology demonstrations, trained 2,539 farmers on production technologies of different crops *viz.*, pepper, banana, passion fruit, coconut, paddy and floriculture, bee keeping, mushroom cultivation, kitchen gardening, goat rearing, cattle rearing, vermi composting and value addition. The KVKs have organised different extension activities with the participation of 3,402 participants, sent mobile farm advisories to 30,801 farmers, analysed 442 soil samples of farmers, produced and provided 40,924 planting material of different crops and covered 650 farm families in DFI villages.

3.2.12 Agriculture Technology Information Centre

Agriculture Technology Information Centers (ATICs) are serving as a single window delivery system by providing technology information, advisory services and technological inputs to farmers. During the reporting period, 1,65,034 farmers visited ATICs for obtaining solutions related to their agricultural problems. ATICs provided information related to various aspects of farming to 60,553 farmers, both through print and electronic media. Technology products were provided to 92,850 farmers. They received 612 q seeds of various crops, 23,42,719 planting materials, 9,656 poultry birds and 1,11,606 q bio-products through ATICs. The prominent technological related services provided to farmers by the ATICs were agri-veterinary services (6,948), soil and water testing (2,319), Kisan Call Center (350) and Kisan Mobile Advisory Services (1,88,894).

3.3 Technological Backstopping by Directorate of Extension

KVKs serve as a bridge between the source of technology and their stakeholders. In this process, the Directorate of Extension (DoE) under various state agricultural universities play an important role by providing technological backstopping to the KVKs under their jurisdiction. The DEs play a major role in coordinating and monitoring of KVK activities. During the year, Directorates of Extension have organized 85 meetings and supported KVKs in organizing world soil day and world water day.

Directors of Extension of SAUs in Zone-XI participated in 2,861 activities of which 38 Scientific Advisory Committee meetings, 115 field days, 106 workshops/seminars, 19 technology weeks and 545 training programs. In addition, they have attended 2,038 other programs including interface meetings, group discussion with KVK officials, annual review meeting, farmers meet, animal health camp and krishi mela. Directorates of Extension officials visited 99 on farm trials and 234 plots of frontline demonstrations to review and monitor the technology dissemination process at KVKs in the respective operational areas. The Directorates of Extension also undertook the technological backstopping by delivering 184 lectures, 42 TV talks, 483 radio talks and 891 news items in newspapers.

Chapter - 4

Research Projects

The ICAR-ATARI is undertaking research work besides the mandated activities related to KVKs coordination and monitoring.

This chapter consists of the following heads:

4.1 Institute Research Projects

4.2 Network Research Projects

4. Research Projects

4.1 Institute Research Projects

4.1.1 Project Code: AGEXATARIXII201800100002

Title : Effectiveness of dairy production interventions under Farmer FIRST Project

Duration : July 2018 - June 2021

PI : Dr. D. V. Kolekar, Scientist, ICAR-ATARI, Bengaluru.

Co-PI : Dr. K. Thimmappa, Principal Scientist, ICAR-ATARI, Bengaluru.

Progress report

Based on available review of literature and information from various reports and websites, problem has been identified and overview of research work has been prepared for research project entitled - Effectiveness of dairy production interventions under Farmer FIRST Project. Interview schedule has been prepared by keeping in view of objectives, variables of the study and other important aspects such as statistical analysis. The data has been collected from 240 dairy farmers (120 from FFP adopted and 120 from FFP non adopted). The collected data has been entered in excel sheet with specific codes, master table is prepared. Data analysis is completed and final report in form of RPP-III submitted. Major research findings are given below:

- Stall feeding with hay, green fodder and concentrates was the most common practice followed by open grazing during day time in case of both categories. Sizable FFP households were feeding mineral mixture and silage, but in case of FFP non-adopted very few adopted the practice of silage feeding. All the dairy animals in the study villages was provided with artificial insemination. Majority adopted closed housing, with either thatch or asbestos roofing. Stone or brick-walls had open sides or windows, mostly without plastering. Concrete floor and feed manger were less common. But majority cattle-sheds had good drainage with shed cleaning done twice daily. In majority cases, animals were confined only during day-night and provided special protection to newborn calf. Adoption of health care practices such as vaccination, ecto-parasites control, deworming was better in case of FFP adopted farmers as compared to non-adopted. Most newborn were allowed to suckle colostrum within 30 minutes, but disinfection of naval cord was not practiced by majority farmers. Treatment of sick animal was done mostly by veterinarians. Under general practices, majority farmers were regularly cleaning animal, animal shed and disbudding followed, but few were following trimming of hoof. Majority farmers adopted clean milk production with full hand milking.
- Majority dairy farmers of both the categories were having good knowledge and adoption level about most of the breeding, feeding, housing, health care, general management and clean milk production practices. However, knowledge and adoption level for practices such as 'Right time of AI after heat', 'Use of quality animals for breeding', 'Feeding of concentrates and green fodder', 'Feeding of mineral mixture silage', 'Balanced ration feeding', 'Feeding of special ration during parturition and pregnancy', 'Vaccination of FMD and HS', 'Deworming of adults and calves', 'Proper treatment of repeat breeders', 'Ecto-parasites control measures', 'Practice of heifer management', 'Treating lameness properly', and 'Various clean milk production practices' was much better in case of FFP adopted farmers as compared to non-adopted farmers.
- FFP adopted households had more number of milking dairy animals (1.82) as compared to FFP non-adopted (1.78). Average quantity of dry fodder and concentrates fed per animal in case of FFP non-adopted cluster was 6.66 & 4.06 kg respectively. This was more as

compared to FFP adopted cluster (6.13 & 3.74 kg respectively). But, average quantity of green fodder fed per animal in case of FFP non-adopted cluster was less (17.23 kg) as compared to FFP non-adopted cluster (20.39.44 kg). Thus, total feed cost and expenditure per animal was more in case of FFP non-adopted cluster (₹.117.42 & 151.42 respectively) than FFP adopted cluster (₹.114.92 & 148.92 respectively). In all the cases, FFP adopted cluster dairy animals were producing more milk (11.47 L/anim./day) as compared to FFP non-adopted cluster (10.22 L/day). Dairy animals required less expenditure on health per day/anim. (₹. 4) but the net return/day per animal (₹.172.29) was more in case of FFP adopted cluster as compared to FFP non-adopted cluster (₹.134.69).

- As majority of the dairy animal owners used own farm grown dry and green fodder to fed their dairy animals or from grazing. Also, dung produced (23.66 & 23.88 Kg/day/anim. in case of FFP adopted & non-adopted cluster) used for manure of his own farm including drought power & some milk for nourishment to family (0.94 & 1.07 L/day in case of FFP adopted & non-adopted cluster). So, it will be interesting to see the economics without considering cost of fodder. Without considering cost of fodder, total feed cost (₹./animal/day) was more in case of FFP non-adopted cluster (64.93) as compared to FFP adopted cluster (59.80). Thus, total expenditure (₹./animal/day) was more in case of FFP non-adopted cluster (98.93) as compared to FFP adopted cluster (93.80). Net return/day per animal (₹.227.41) was more in case of FFP adopted cluster as compared to FFP non-adopted cluster (₹. 187.17).

- Net return/day per animal (₹.172.29) and per farm (₹.287.62) was more in FFP adopted cluster as compared to FFP non-adopted cluster (₹. 134.69 & 206.73 respectively). As majority of the dairy animal owners used own farm grown dry and green fodder to fed their cattle or from grazing. Also, dung produced used for manure of his own farm including drought power & some milk for nourishment to family. Without considering cost of fodder, net return/day per animal (₹.227.41) and per farm (₹.387.93) was more in FFP adopted cluster as compared to FFP non-adopted cluster (₹.187.17 & 300.88 respectively). Protein, fat and calcium nourishment per animal to the family gm/day was less in case of FFP adopted cluster (31.02, 38.54 & 1.128, respectively) as compared FFP non-adopted cluster (35.31, 43.87 & 1.284, respectively). Nutrients to farm i.e. NPK kg/year/animal was less in case of FFP adopted cluster (69.09, 34.54 & 138.17, respectively) as compared to FFP non-adopted cluster (69.73, 34.86 & 139.46, respectively). Employment generation (Man days/year) per animal was more in case of FFP adopted cluster (85.78) as compared to non-adopted cluster (83.95).

- Poor economic condition, high cost of treatment, no access to credit facility, high cost for feeding and costly wages for workers were perceived as the major constraint by 100 per cent farmers of the both the categories. Constraints such as disease incidence, longer inter-calving period, non-availability of grazing land, longer maturity age, poor milk production, poor mass media or extension agency contact, unavailability of improved technologies, lack of knowledge on improved practices, unavailability of extension advisory services, unavailability of veterinary services in time and poor supply of quality semen were the other important constraints were perceived by farmers of both the categories. Constraints such as lack of organized market, lack of market demand and competition from commercial dairy were perceived as less important by almost all the farmers of the both the categories.

- The significant differences in milk production parameters and components of livelihood security in case of FFP adopted and non-adopted farmers were due to efficient and scientific nutritional and health management practices in case of FFP adopted cluster.

The potential to enhance the productivity of the dairy animals through professional farm management and superior nutrition is immense. Dairy animal's productivity can be improved with organized breeding programs, better management practices to hasten the efficiency of milk production and livelihood security of resource poor farmers.

4.1.2 Project: AGEXATARIXISIL201900100004

Title : Study on Agri based Entrepreneurship Development among Youth

PI : Dr. Thimmappa K

Co-PIs : Dr. B.T.Rayudu and Dr. D.V.Kolekar

Progress report

- Collected literatures was reviewed on aspirations of youth, perception of youth towards farming, perception of youth towards agro-enterprises, performance of agro-enterprises and constraints faced by the youth.
- Interview schedule has been prepared by keeping in view objectives and variables of the study.
- Data were collected from 192 trainee respondents and entered in the spread sheet. The analysis of the data has been done keeping in view of the objectives of the study.
- Result indicated that majority (36.68 %) of the youth strongly agreed that, poor income & living standard are the main causes of rural youth luring them to opt non-farm sector activities. Majority (70 %) of the youth showed a medium to high level of economic motivation to adopt additional activity as agri-enterprise to enhance their family income. About 41% of the youth showed a high level of entrepreneurial characteristics and 70% want to be the owner of an enterprise. The detailed results will be presented during the IRC meeting.

4.1.3 Project: AGEXATARIXISIL201800200003

Title : Analysis of skill development training conducted by KVKs for the aspirations of participants and constraints faced by trainees and trainers.

Duration : April, 2019 - March, 2021

PI : Dr. MJ Chandre Gowda, Principal Scientist, ATARI

Co-PI : Dr. M.B.Hanji, Chief Technical Officer

Progress report

- State-wise analysis of occupational and social aspirations: Most prominent aspirations of the skill trainees was to 'start a new occupation', in both Karnataka and Kerala. Overall, 'expanding present profession' was the second most important occupational aspiration, and it was true for Karnataka whereas getting a 'job in government/recognized institution' was the second ranked occupational aspiration in Kerala. Among the social aspirations, 'providing better food, clothes and health facilities to family' was the most important social aspiration, followed by the aspiration to become 'model to others in the profession' after undergoing skill training.
- Job role - wise analysis of occupational and social aspirations: Among the five occupational aspirations studied, most important aspiration was to become self employed by 'starting a new enterprise' for 'micro irrigation technicians' 'coconut grower' and 'assistant gardener' trainees. 'expanding the scale of present enterprise' and 'finding a job in local areas' were the major aspirations for the 'mango growers'. 'Finding a job in the government or reputed companies' was the major aspiration for 'nursery workers'. 'Tractor operator' and 'vermicompost producer' trainees aspired for 'higher salary in the present job' after acquiring skills in these job roles. Among the six social aspirations studied, cent per cent

trainees aspired to achieve 'better status in the village' (tractor operator), 'better status in the workplace' (sericulturists), 'better lifestyle to family members' (small poultry farmer) and 'acquiring new assets' (tractor operator).

- Change in occupational and social aspirations due to training: After participation in the training, more participants expressed aspiration to 'get job in government or recognized institute', followed by the aspiration to earn 'more salary in the present job'. The social aspirations were generally high with minimum of 671 participants and maximum of 759 respondents expressing social aspirations, during either pre or post training. The aspiration to 'become a model to others in the profession' was high both at the start and increased further at the end of training. Providing an 'improved lifestyle in the form of better food, clothes and health facilities' to their family members, was also found to be the most expressed aspiration both at the start as well as at the end.

- Profile: Profile characteristics of skill aspirants in Karnataka and Kerala revealed many similarities. The average age of the aspirants was 34.16 years in Karnataka and 36.12 years in Kerala. Average education was about 12 years of schooling, in both the states. Majority of the aspirants in both the States are married and they continued to stay in joint families, and the average family size was 5 in both the states. However, the two states differed significantly on the gender composition of the participants, average income and land holding status. Female participants were less in Karnataka as male participants constituted nearly 90%, whereas in Kerala, female participants constituted about 45%. Annual income was little higher in Karnataka with ₹.71959 as compared to ₹.65267 in Kerala. The average landholding of the participants is far less in Kerala (0.74 ha) compared to Karnataka (4.77 ha).

- Influence of independent variables on aspirations: Age of the participants and occupation of the spouse had negative and significant influence on both occupational and social aspirations. The results indicated that youth have higher aspiration and the aspirations decline as age advances. Similarly, occupation of spouse reflected on the lower aspirational level of the participant. Married men and women exhibited higher occupational as well as social aspirations than unmarried participants. Women participants had negative correlation with social aspirations.

Constraints faced by Participants and Trainers

- The participants of the skill development programmes expressed that longer duration of the programme is the biggest constraint. Their inability to stay /reside in the institutions for the entire duration was mainly due to farm and home commitments. Daily commuting was also bigger constraint due to distance, poor public transport facilities and cost factors.

- The trainers faced several hurdles while organizing the long-duration skill development programmes. The most important was the difficulty in uploading participants' details in the website of the ASCI. There were intermittent changes in the website leading to severe delay in uploading trainees' details. The trainers expressed difficulty in retaining the trainees for 25 days duration, as the trainees had to balance their farm and home committed activities as well as attending the programme. Mobilizing stipulated number of trainees was also a difficulty for the very same reason. Providing accommodation was a constraint for KVKs which had limited boarding facilities and those who did not have the required residential facilities. The present cost norms did not support the required number of exposure visits and field trips. Participants demanded more exposure to real-situations.

- Suggestions to overcome constraints and to improve skill development: In order to overcome the above constraints, the trainers have suggested to reduce the training duration to about 15 days, which is manageable

for both trainees as well as trainers. Since majority of the participants represented farming community and the practicing farmers performing most of the operations under many job roles, the training curriculum needs to be suitably redesigned to reduce the training duration. ASCI has to simplify its uploading processes, which appears to be very complex at present, and heavily time and energy consuming. Considering the limited network facilities available in many rural-based KVKs, this process has to be drastically refined to encourage the KVKs to take up skill training through ASCI.

4.1.4 Project: AGEXATARI-XISIL202100100006

Title : Analysis of Integrated Farming Systems in different Agro-climatic situations in the state of Karnataka for need based Technology Application and Capacity Development.

Duration : January, 2021 - March, 2024

PI : Dr.DV Srinivasa Reddy, Principal Scientist (Agronomy), ATARI, Bengaluru

Co-PIs : Dr.V.Venkatasubramanian, Director, ATARI, Bengaluru

Dr.M.J. Chandregowda, Principal Scientist (Agri. Extn), ATARI, Bengaluru

Dr.B.T. Rayudu, Principal Scientist (Agri. Extn), ATARI, Bengaluru

Field support team : Heads and select SMSs of KVKs of Karnataka

Progress report

- As per the targets of 2021-22, the questionnaire for the study of agricultural characteristics of agro climatic zone as part-I and farming systems in the agro climatic zone as part-II have been developed and subjected to peer review. After receiving the comments of the peer reviewer, the questionnaires have been subjected to pre-test in select agro climatic zones. The feedback and comments are yet to be received.
- Conducting the agro climatic zone-wise capacity development and orientation workshop for the stakeholders to finalise the agro climatic zone-wise farming systems is delayed due to prevailing COVID pandemic.
- The stakeholders' workshop will be conducted in physical form involving scientists, extension personnel of development departments, practicing IFS farmers and KVK staff as soon as the pandemic situation improves and the data collection will be initiated.

4.1.5 Project: AGEXATARI-XISIL202100200007

Title : Assessment of Technological and Capacity Needs perceived by Dairy Farmers and Extension Functionaries in Karnataka state

Duration : January, 2021 - December, 2022

PI : Dr. D.V. Kolekar, Scientist, ICAR-ATARI, Bengaluru

Co-PIs : Dr. B. T. Rayudu, Principal Scientist, ICAR-ATARI, Bengaluru

Dr. V.Venkatasubramanian, Director, ATARI, Bengaluru

Animal Science SMSs of selected KVKs of Karnataka

Progress report

- Based on review of available literature and information from various reports, websites etc. the problem has been identified and Overview of Research Work has been prepared for the research project and RPP-I has been submitted.
- The interview schedule has been prepared by keeping in view various objectives, variables

of the study and other important aspects such as statistical analysis. It is prepared in the google forms and data being collected with the help of mobile.

- Completed data collection from 510 farmers and 102 field veterinarians. Sample size has been increased from 8 KVKs jurisdiction to 17 KVKs jurisdiction area.

4.1.6 Project: AGEXATARI-XICIL202100300008

Title : Impact Assessment of Arka Technological Products Implemented by Krishi Vigyan Kendras of Karnataka and Kerala

Duration : January, 2021 - December, 2024

PI : Thimmappa K

Co-PIs : N. Loganandhan, and V. Venkatasubramanian

Progress report

- The literature reviews on different objectives were completed and interview schedule has been prepared by considering the study objectives and variables for conducting field survey.
- The information has been collected on Arka technologies implemented by KVKs through prescribed interview schedule and data analysis is under progress.

4.1.7 Project: AGEXATARI-XISIL202100400009

Title : Identification and development of farm leaders through KVKs for up-scaling agricultural technologies in Karnataka, Kerala and Lakshadweep.

Duration : September, 2020 - August, 2023

PI : Dr. BT Rayudu, Principal Scientist (Agril Extn), ICAR ATARI, Bengaluru

Co-PIs : Dr.M.J.Chandre Gowda, Pr. Scientist (Ag. Ext.)

Dr.D.V.Srinivasa Reddy, Pr.Scientist (Agronomy)

Dr.Thimmappa K, Sr. Scientist (Agri. Economics)

Dr.D.V.Kolekar, Scientist (Ag. Ext.); Dr.M.B.Hanji, CTO

Dr. V.Venkatasubramanian, Director (ICAR-ATARI, Bengaluru).

Progress report

- Project was carried out during the period under report focusing on first objective - to identify farm leaders and their capacity development needs in each district of Karnataka, Kerala and Lakshadweep.
- A total of 6233 farm leaders were identified of which 4282 farm leaders from Karnataka (27 KVKs), 1924 farm leaders from Kerala (12 KVKs) and 27 farm leaders from Lakshadweep (KVK Lakshadweep).
- Structured questionnaire has been prepared on identification of capacity development needs among identified farm leaders. Opinion of the sample farm leaders was collected on the degree of training needed in each specific area under major subject areas *viz.*, crop production, soil health and fertility management, plant protection, horticulture, livestock production and management, fisheries, agro forestry, agriculture engineering, home science/women empowerment, production of inputs at site and capacity building and group dynamics related to agricultural development. Sample farm leaders were requested to indicate their judgment by putting a tick mark in each specific area on a 3-point continuum namely, 'highly important', 'moderately important' and 'less important.'
- Ten identified farm leaders were selected randomly in each KVK district from Karnataka

and Kerala and five identified farm leaders from KVK Lakshadweep as sample for the study thus the sample size became 475 identified farm leaders. Out of which data were collected from 425 farm leaders which was tabulated and analyzed.

- Results indicate that majority of the farm leaders expressed that capacity development in fisheries area is moderately to highly important (383) followed by agriculture engineering (379), soil health and fertility management (376), agro forestry (375), crop production (373), plant protection (369), horticulture (367), production of inputs at site (365), home science/women empowerment (364), capacity building and group dynamics (362) and livestock production and management (352).
- Project is continuing with other objectives *viz.*, to formulate programmes for designated farm leaders based on the identified needs, and to integrate the designated farm leaders into the technology application and capacity development programmes of the development institutions including KVKs.

4.2 Network Research Projects of Agricultural Extension Division of ICAR

4.2.1 Network Research Project

Impact of ARYA on promotion of agri-preneurship and alternative livelihoods

Duration : January, 2021 - October, 2022

Lead Centre : ICAR-ATARI, Bengaluru

PI : Dr. M. J. Chandre Gowda, Principal Scientist, ICAR-ATARI, Bengaluru

Co-PIs : Dr P. Adhiguru, Principal Scientist, Agricultural Extension Division, ICAR, New Delhi

Dr.Lakhan Singh, Director, ICAR-ATARI, Pune

Dr.P.P.Pal, Principal Scientist, ICAR-ATARI, Kolkata

Dr.Rajesh Rana, Principal Scientist, ICAR-ATARI, Ludhiana

Dr.M.S.Meena, Principal Scientist, ICAR-ATARI, Jodhpur

Dr.R.Bordoloi, Principal Scientist, ICAR-ATARI, Umiam/ Guwahati

Dr.S.K.Dubey, Principal Scientist, ICAR-ATARI, Kanpur

Dr.A.Bhaskaran, Principal Scientist, ICAR-ATARI, Hyderabad

Dr.K.Thimmappa, Principal Scientist, ICAR-ATARI, Bengaluru

Dr.A.A.Raut, Principal Scientist, ICAR-ATARI, Jabalpur

Dr.Amrendra Kumar, Principal Scientist, ICAR-ATARI, Patna

Progress report

(a) Category 1 - Functional units: Data was collected from a total of 841 units promoter under ARYA, which included 157 group and 684 individual units during August 2021 to December 2021. Preliminary results are given below:

- On an average, each unit functioned for 179 days during 2017-18, 206 days during 2018-19, 226 days during 2019-20 and 253 days during 2021.The groups worked on an average 25 days more than individual units during 2017-18 to 2019-20. However, the gap was reduced to 10 days during 2020-21 (261 days and 251 days). Operational duration was highest for goat enterprise (average 351 days) and least for mushroom (199 days).
- The average gross turnover increased from ₹.197163 (2017-18) to ₹.328499 (2020-21), which indicated the slow and steady progress in the enterprises. Gross returns during 2020-21 was least with vermicompost enterprises (₹.39082) and highest for nursery units (₹.679459) and processing units (₹.775084).

- The BC ratio increased from 1.89 (2017-18) to 3.28 during 2020-21. BC ratio was least for processing and value addition (1.61) whereas it was highest for goat rearing (5.47) and piggery (4.68).
- Employment generation (person days) increased from 272 during 2017-18 to 352 during 2020-21. Group units generated 268 to 423 person days employment during 2017-18 to 2020-21 as compared to 276 to 336 person days for individual units. Employment generation was highest with fisheries (868 person days) and goat rearing (525 person days) during 2020-21 compared to other enterprises.
- The progress achieved was presented before RAC on 21.02.2022. The progress was appreciated and encouraged the team to carry on the good work.

4.2.2 Other Network projects

There are six other Network Research Projects wherein ICAR-ATARI, Bengaluru is Cooperating Centre with Co-PIs which are given below:

i. Impact assessment of popular pulses varieties and technologies disseminated by KVKs through Cluster Frontline Demonstration of Pulses (CFLD-P) in India (Co-PI: Dr.B.T.Rayudu, Principal Scientist (Agricultural Extension)).

ii. Impact of Climate Resilient Technologies in Different Agro - climatic zones in India: A Study in National Innovations in Climate Resilient Agriculture (NICRA) Project Areas (Co-PI: Dr.D.V.S.Reddy, Principal Scientist).

iii. Assessing Impact of Nutri-SMART Village on Dietary Pattern, Consumption Level and Food Availability in India (Co-PI: Dr.D.V.Kolekar, Scientist (Agricultural Extension)).

iv. Impact assessment of KVKs interventions on Doubling Farmers' Income (DFI) (Co-PI: Dr. M. J. Chandre Gowda, Principal Scientist).

v. Analysis of agricultural programmes conducted in Aspirational Districts in India (Co-PI: Dr.B.T.Rayudu, Principal Scientist).

Chapter - 5

Publications

Publications of Scientists of ICAR-ATARI as well as KVKs of Zone XI are presented broadly under the categories such as research papers, papers presented in conferences, training mannuals/technical bulletins, popular articles, books, book chapters and reports during the period under report.

5. Publications

5.1 Research Papers by ICAR-ATARI

Chandre Gowda M.J. 2021. Role of ICT and e-Resources in Agricultural Education under the new Education Policy 2020. *Journal of Farm Sciences*, 34(5):478-480.

Chandre Gowda M.J. and Mallikarjun B. Hanji. 2021. Occupational aspirations and profile of the participants of skill training in Karnataka. *The Mysore Journal of Agricultural Sciences*, 55(1): 24-29.

Chandre Gowda M.J. and Mallikarjun B. Hanji. 2021. Understanding the aspirations and profile of the skilled rural youth to promote occupational opportunities. *The Mysore Journal of Agricultural Sciences*, 55(4):76-82.

Srinivasa Reddy, D. V., Ramesh, P. R., Manjunath, R., Bhandi, N. H., Malawadi, M. N. and Savitha, M. S., (2022), Rainwater Harvesting Technologies in Arid and Semi-Arid Region of Karnataka to Mitigate Climate Change Impacts, *Mysore J. Agric. Sci*., 56 (1) : 341-348 (2022).

Kolekar D.V., Chandre Gowda M.J. and Sairam C.V., 2021. Support of Desi cows in the daily livelihood of farm households in Karnataka. *Indian Journal of Dairy Science*, 74(5):445-448.

Dubey S.K., Atar Singh, Singh A,K., Chahal V.P., Randhir Singh, Mishra A., Singh S.K., Singh S.S., Lakhan Singh, Tripathi A.K., Prasad V.G., Anjani Kumar, Chandre Gowda M.J., Deka, B.C., Rajbir Singh, Sadhana Pandey and Rajeev Singh, 2021. Unanticipated Dividends of Technology Dissemination: Experiences of Cluster Frontline Demonstrations of Pulses in India. *Journal of Community Mobilization and Sustainable Development*, 16(1): 1-6.

5.2 Research Papers Presented in Conferences

Chandre Gowda M.J., 2021, Role of ICTs and e-Resources in Agricultural Education under the New Education Policy 2020. Lead Paper p29-32, In: Souvenir, National Conference on ICT based e-Resources for Smart Agriculture – A journey towards Atmanirbhar Bharat Post COVID 19 pandemic situations, 16-17 March 2021, UAS Raichur, 141 p.

Bhandi, N.H., Srinivasa Reddy, D. V. and Hiregoudar, L.G., (2021), Greengram + redgram intercropping system as climate resilient technology in rainfed area. (Edited by Drs Shiva Dhar, Babu, Subhash Raj R., Upadhyay, P.K., Singh, T., Yadav, S.K., Meena, R.P., Kumar, A., Yadav, D.D., Sarangi, S.K., Singh, D.N., Gupta, G., Jinger, D., Ramalu, B., Kumar, D., Prajapat, K., Rajpoot, S., Bamboria, S., Ravishankar, N., Kumar, V., Ramanjaneyulu, A.V. and Choudhary, S.K. 2021.) Agri Innovations to Combat Food and Nutrition Challenges In: Extended Summaries *of 5th International Agronomy Congress. The* Indian Society of Agronomy, IARI, New Delhi 110012, 1: 93-94.

Ramesh, P.R., Loganadhan, N, Srinivasa Reddy, D.V. and Praveen Kumara, (2021), (Edited by Drs Shiva Dhar, Babu, Subhash Raj R., Upadhyay, P.K., Singh, T., Yadav, S.K., Meena, R.P., Kumar, A., Yadav, D.D., Sarangi, S.K., Singh, D.N., Gupta, G., Jinger, D., Ramalu, B., Kumar, D., Prajapat, K., Rajpoot, S., Bamboria, S., Ravishankar, N., Kumar, V., Ramanjaneyulu, A.V. and Choudhary, S.K. 2021.) Agri Innovations to Combat Food and Nutrition Challenges In: Extended Summaries of 5th International Agronomy Congress. The Indian Society of Agronomy, IARI, New Delhi 110012, 1:188-189.

Srinivasa Reddy, D.V., Raju G. Teggelli, Shreenivas, B.V., Yusuf Ali, Zaheer Ahamed and Rahul Patil, (2021), Improvement in productivity of the pigeon pea through foliar application of pulse magic in north eastern dry zone of Karnataka. (Edited by Drs Shiva Dhar, Babu, Subhash Raj R., Upadhyay, P.K., Singh, T., Yadav, S.K., Meena, R.P., Kumar, A., Yadav, D.D., Sarangi, S.K., Singh, D.N., Gupta, G., Jinger, D., Ramalu, B., Kumar, D., Prajapat, K., Rajpoot, S., Bamboria, S., Ravishankar, N., Kumar, V., Ramanjaneyulu, A.V. and Choudhary, S.K. 2021.) Agri Innovations to Combat Food and Nutrition Challenges In: Extended Summaries of

5th International Agronomy Congress. The Indian Society of Agronomy, IARI, New Delhi 110012, Vol. 1: 217-218.

Devaraj, T.N., Mallikarjuna, B.O., Jayadevappa, G.K. and Srinivasa Reddy, D.V., (2021), Performance of drought tolerant finger millet variety ML-365 in rainfed farming for higher yield. (Edited by Drs Shiva Dhar, Babu, Subhash Raj R., Upadhyay, P.K., Singh, T., Yadav, S.K., Meena, R.P., Kumar, A., Yadav, D.D., Sarangi, S.K., Singh, D.N., Gupta, G., Jinger, D., Ramalu, B., Kumar, D., Prajapat, K., Rajpoot, S., Bamboria, S., Ravishankar, N., Kumar, V., Ramanjaneyulu, A.V. and Choudhary, S.K. 2021). Agri Innovations to Combat Food and Nutrition Challenges In: Extended Summaries of 5th International Agronomy Congress. The Indian Society of Agronomy, IARI, New Delhi 110012, Vol. 2 :1062-1063.

5.3 Publications by KVKs

5.3.1 Research papers

Agasimani, A. D., Roopa S. Patil, Annapurna Neeralgi and Shivashenkaramurthy, M., (2021), Suitable ingredients for preparation of chats supplemented with jackfruit seed paste, *Frontiers in Crop Improvement*, 9(3): 784-786.

Ajithkumar, K., Asma Hombal, Savitha, A. S., Yenjerappa, S. T., Shivakumar K., Govindappa, M. R., and Krishnamurthy, D., (2021), Screening of linseed (*Linumusitatissimum* L.) germplasm under epiphytotic conditions against major foliar diseases, *J. Oilseeds Res*., 37(3): 221-224.

Akkamahadevi, D. Agasimani, Roopa S. Patil, Annapurna Neeralgi and Shivashenkaramurthy M., (2021), Suitable Ingredients for Preparation of Chats Supplemented with Jackfruit-Seed Paste, *Frontiers in Crop Improvement*, 9(3): 784-786.

Akshaykumar, Malashree Ramachandra and Mahesh kumar, (2022), Storage stability of fluid bed dried solid state fermented (SSF) lactic cultures in milk, *Indian Journal of Dairy Science*, 75(1): 31-36.

Akshaykumar, N. M., Sunilkumar, Ningdalli Mallikarjun and Vidyasagar, (2021), Impact of KVK trainings on promotion of backyard poultry farming in Bidar district, *International Journal of Current Microbiology and Applied Sciences*, 10(2): 129-133.

Akshaykumar, Sunilkumar, N. M., Ningdalli Mallikarjun, Archana, Sreedhara, J. N. and Ashritha, B, (2021), Impact of KVK trainings on promotion of scientific dairy farming in Bidar district, *The Pharma Innovation Journal*,10(11): 2806-2809.

Anup Das, Krishnappa Rangappa, Savita, B,, Utpal Dey, Meghna Haloi, Jayanta Layek, Ramkrushna, G. I., Lal, R., Nishant Deshmukh, A.,Yadav, G.S., Babu S., Ngachan, S.V., (2021), Conservation tillage and nutrient management practices in summer rice (*Oryza sativa* L.) favoured root growth and phenotypic plasticity of succeeding winter pea (*Pisum sativum L.*) under eastern Himalayas, *India Heliyan*, 7: 1-14.

Aparna, Radha krishnan, Sanju Balan, Indulekha, V.P., Simi, S. and Sruthi Krishnan, (2021), Potential Economics and Constraints of Mushroom Cultivation in Wayanad, Kerala, *Journal Krishi Vigyan*, 9 (2): 171-176.

Archith, T.C., Devappa, V., Manjunath, B. and Chirag Reddy, (2020), Identification and molecular characterization of mung bean yellow mosaic virus in French bean through coat protein gene. *Legume Research,* 44(10): 1198-1202.

Ashoka, P. and Shaishadhar, G. B., (2021), Effect of irrigation and nutrient management approaches on maximizing productivity and economics of maize (Zea mays L.)- Chickpea (*Cicer arietinum* L.) cropping sequence under command area, *International Journal of Agricultural Sciences,* 17(1): 272-277.

Ashoka, P. and Shantveerayya, (2021), Different approaches for Bio fortification: A review, *International Journal of Chemical Studies,* 9(1): 297-301.

Ashwini R., Amaresh Y. S., Sunil Kulkarni, Yenjerappa, S.T., Shekhargouda Patil and Hanchinal, S. G., (2021), In vitro Evaluation of various Fungicides against Spore Germination Inhibition of Erysiphe cichoracearum, *Research Trend,*13(2): 367-373.

Atheefa Munawery, Pavithra, S., Naresh, N.T., Roopashree, D.H., and Mahesh, H. M., (2020), Integrated crop management in small onion – An impact of frontline demonstration on yield and economics. *Int.J.Curr.Microbiol. App.Sci.,*11: 3267-3270.

Athira, K. A., Panjikkaran, S. T., Aneena, E. R., Sharon, C. L., (2021), Moringa Oleifera-Proximate and Anti-nutritional Composition- *Indian Journal of Nutrition and Dietetics*, 58(3): 390.

Athira, K. A., Thomachan, Seeja, E.R., Aneena, Sharon, C.L. and Lakshmi, P.S., (2021), Moringa-The Miracle Wellness Tree: A Review*, Agricultural Reviews,* 10.18805/ag.R-2316.

Banakar, P.S., Kulangara, A., Soren, N.M., Dominic, G., Terhuja, M., Prasad, C.K., August, (2021), *In vitro* evaluation of newer unconventional feedstuffs for livestock, *The Indian Journal of Veterinary Sciences and Biotechnology*, 17(3): 78-83.

Basila, Y., Anitha, S., Menon, M.V., Sreelakshmi, K. and Beena, V.I., (2021), *In-situ* green manuring and herbicide on weed biomass, productivity and profitability of upland rice, *Indian J. Weed Sci.,*53(1): 1-6.

Chandrashekar, S. K., Basavaiah, Divya, S.H., (2021), Economic performance and factors discriminating enterpreneurship of commercial chawki rearing centres of Karnataka, *Agri.Res. J.,* 58(2): 312-317.

Chithra, G. and Binu John Sam, (2021), Drip Irrigation for Efficient Water Delivery in Nutmeg, *Spice India*, 34(2): 4-7.

Chithra, G. and Binu John Sam, (2022), Friends of Coconut Tree Training Programme, *Indian Coconut Journal,* 61(13): 10-12.

Dhanush, M. and Patil, R. S., (2021), Field evaluation of insecticides and biopesticides for the control of marginal gall thrips, *Liothrips karnyi* (Bagnall) on Black pepper, *Journal of farm science*, 34(2): 220-222.

Dileepa, B. N, and Patil, R. S., (2021), Physical compatibility of chemicals used in paddy ecosystem*, Journal of Krishi Vigyan,* 10(1): 213-217.

Dilip S., Allan Thomas and Joginder Singh Malik, (2021), Attitudes of Students on School Vegetable Garden and Gardening Activities in Kerala, Indian Journal of Extension Education, 56(2): 89-92.

Dinesh Kumar, S.P., Kammar M.R and Sudha S., (2021), Performance of Dicoccum wheat variety DDK1029 under front line demonstration in Bagalkote district of Karnataka, India, *International Journal of Chemical Studies*, 9(1): 1390-1392.

Dinesha, B. L., Sharanagouda Hiregoudar, Udaykumar Nidoni, Ramappa, K. T., Anilkumar Dandekar and Ravi, M. V., (2021), Comparison of chitosan based nano-adsorbents for dairy industry wastewater treatment through response surface methodology and artificial neural network models, *Water Science & Technology*, 83(5): 1250-1264.

Ganesh, H.S, Govindappa, M.R, Aswathanarayana, D.S and Yogesh, N.L., (2021), Etiology and host range of Yellow mosaic disease of Horsegram in North Eastern Karnataka, *International Journal of Current Microbiology and Applied Sciences*, 9(2): 1-21.

Jayashree, S., Kamalabai Koodagi and Basavarajappa Bhogi, (2021), Awareness of consumers about nutritional labelling, *Int.J. of farm sciences,* 12(1): 16-19.

Kaladharan, P., Shinoj Subramannian, Pushparaj Anjelo, Arun Thulaseedharan and Vysakhan, P., (2021), Mulching brown seaweed *Sargassam wightii* during transplant on the growth and yield of paddy*, Journal of the Marine Biological Association of India*, 63(1).

Kalavathi, K.K., Prasannakumar, B.H. and Shubha, S., (2021), Bio-efficacy and Phytotoxicity of Pyriproxyfen 10% + Bifenthrin 10% EC against Whitefly and Moong Bean Yellow Mosaic Virus (MBYMV) on Greengram, *Frontiers in Crop Improvement*, 9 (2): 540-545.

Kamalabai Koodagi, Pavithra, S., Jayashree, S., Atheefa Munawery and Mahesh, H. M., (2021), Skill development training on mushroom farming for income generation, *J.Krishi Vigyan,* 10(1): 268-272.

Komali Joseph, Jaiprakash Narayan, R.P. and Kapil Patil, (2021), Studies on genetic variability and divergence in onion, *International Jr. of Chemical studies*, 9(1): 496-502.

Kotresh Prasad, *et al*., (2021), Carcass characteristics and meat quality of broiler goat, *Indian Journal of Animal Research, Online.*

Krupashankar, R. and Bhat, S. N., (2021), Effect of IFFCO Nanofertilizer on Growth, Grain Yield and anaging *Turcicum* Leaf Blight Disease in Maize, *International Journal of Plant & Soil Science,*33(16): 19-28.

Lekha, G. and Muralidharan, P., (2021), Matchwood (*Ailanthus exelsa*) sawdust as an alternate substrate for oyster mushroom (*Pleurotus Florida*) cultivation, *Journal of Krishi Vigyan,* 9(2): 134-137.

Manju, J.V., Preethu, K. P. and Marimuthu, R., (2021), Effect of Integrated Nutrient Management on yield of Black pepper*, J Krishi Vigyan,* 10(1): 73-76.

Manjunath B., Rajendra Prasad, B.S., Pavithra, S., Manjunath, R., Mallikarjuna gowda, A.P., Savita S. Manganavar, Gayathri, B. and. Chithra, Y. D., 2021, Assessment on Management of Yellow Mosaic Virus in Pole beans through Integrated Approach, *Int.J.Curr.Microbiol. App. Sci.*, 9(5): 172-179.

Manoj, P.S. and Ratha Krishnan P., (2021), Yield enhancement in Nendran banana through the application of secondary and micro nutrients, *Kerala Karshakan e- journal*, 9(6): 4-5.

Manu, C.R., PoornimaYadav, Saparia Sathyan, (2021), Mnagement of yellow Vein Mosaic Disease of Okra Using Suitable Resistant Varieties, *J. Krishi Vigyan,* 10(1): 168-170.

Massar, D., Patil, P.B., Pujar, L. and Muktamath, V., (2021), Parenting practices as predictors of adolescents externalizing and internalizing problems, *Journal of community mobilization and sustainable development*, 16 (1): 1-6.

Meghana, N., Prakash Kerure, Srinivasa, V., Kantharaj. Y. and Shashikala, S Kolakar, (2021), Assessment of onion (*Allium cepa*L.) varieties for growth and yield attributes under central dry zone of Karnataka, *The Pharma Innovation Journal*,10(12): 1712-1715.

Molu, K., Sharon, C.L., Thomachan, Seeja, E.R., Aneena, Lakshmy, P.S., Nivya, E.M. and Rajeesha, C.R., (2021), Standardisation of Jackfruit Seed Incorporated Chocolates and its Quality Evaluation, *Asian Journal of Dairy and Food Research*. 10.18805/ajdfr. DR-1662.

Molu, R. K., Sharon, C. L., Panjikkaran, S. T., Aneena, E. R., (2021), Process Optimisation and Quality Evaluation of Passion Fruit and Pineapple based Probiotic Drink, Asian *Journal of Dairy and Food Research.*

NajithaUmmer, Berin Pathrose and Indulekha, V. P., (2021), A new record on infestation of a millipede in agricultural crops of Kerala. *Journal of Insect Environment,* 24(4): 553-554.

Neelkant, D., Dilipkumar, Manjunath Patil, B., Bhagvantappa, Venkatgiri and Pallavi, (2022), Hematobiochemical and hemodynamic changes in induction agents in drip form using guaifenesin and ketamine with or without dexmedetomidine under isoflurane anaesthesia for various surgeries in cattle, *Journal of Experimental Zoology*, *India,* 25(1): 1147-1155.

Neelkant, Dilipkumar, D., Manjunath Patil, Bhagvantappa, B., Venkatgiri and Pallavi, (2021), Clinical and physiological changes in induction agents in drip form using guaifenesin and ketamine with or without dexmedetomidine under isoflurane

anaesthesia for various surgeries in cattle, *The Pharma Innovation Journal*, 10(11): 2485-2489.

Ningdalli Mallikarjun, Sunilkumar, N. M., Akshaykumar, Rakesh Varma and Jyoti, (2021), Effect of micronutrient: Vegetable special on enhancing productivity and to improve the socio economic status of tomato growers of Bidar district of Kalyan Karnataka, *The Pharma Innovation Journal*, 10(12): 529-532.

Nivya, E. M., SeejaThomachan Panjikkaran, Aneena, E. R., Sharon, C.L., Lakshmy, P.S., (2021), Cardiovascular diseases and dietary approaches, *International Journal of Multidisciplinary Research and Growth Evaluation* (online),3(1): 2582-7138.

Ojus, S., Dilipkumar, D., Bhagavantappa, B., Vijay Kumar, M., Sandeep Halmandge, Manjunath Patil and Venkatgiri, (2022), Physiological and biochemical analysis of dogs undergoing femoral fracture repair using advanced locking plate system II and locking compression plate, *The Pharma Innovation Journal*,11(1): 1137-1141.

Pallavi, Dilipkumar, D., Manjunath Patil, Bhagavantappa, B. and Venkatgiri, (2022), Tibiotarsus Fracture Repair by Using Titanium and Stainless Steel Locking Reconstruction Bone Plates in Backyard Poultry, *Journal of Experimental Zoology*, India, 25(1): 273-277.

Parashuram M Patil, Chougala, D.C., Adarsh. H.S.,(2021),Turmeric + Chilli Intercropping: Way towards Doubling Farmers Income, *International Journal of Science and Research,*10(5): 655-657.

Patil, A. S., Balaganur, V., Anilkumar, G. K. and Pugashetty, B. K. (2021). Female seudohermaphroditism in a pug dog - diagnosis and surgical management. *Journal of Experimental Zoology India*, 24(2).

Patil, A. S., Balaganur, V., Pugashetty, B. K. and Tarasingh, D. L. (2021), Comparative evaluation of conventional suturing technique v/s skin staples for the treatment of aural haematoma in dogs, *Journal of Experimental Zoology India*, 24(2).

Patil, A.S., Prarthana, R., Tharasingh, D.L., Jayashree, P. and Pugashetti, B. K., 2021, Comparative studies on use of polypropylene mesh vs. mosquito net nylon mesh for large ventral (Abdominal) hernia repair in cattle, *The Pharma Innovation Journal*, 10(6): 294-297.

Patil, A. S., Prarthana. R., Pugashetti, B. K., Tharasingh, D. L. and Jayashree, P., (2021), Surgical management of prostatic hyperplasia in unilaterally cryptorchid (Abdominal testis) dogs, *The Pharma Innovation Journal,* 10(7): 99-103.

Patil, S., Jayashree, P., Pugashetty, B. K., Anilkumar, G. K. and Tarasingh, D. L., (2021), Comparative studies on use of polypropylene mesh vs. mosquito net nylon mesh for large ventral (Abdominal) hernia repair in cattle, *Journal of Experimental Zoology India,* 24(2): 1479-1482.

Pooja Halyal and Geeta Tamgale, (2021), Opinion about Kitchen Garden and Nutritional Knowledge of Vegetables in the Diet among the Gardeners in Dharwad District of Karnataka, *International Journal of Current Microbiology and Applied Sciences,*10(2): 2260-2268.

Pooja Halyal and Geeta Tamgale, (2021), Production and Utilization Pattern of the Kitchen Garden by the Rural and Urban Families in Dharwad District of Northern Karnataka. *Multilogic in Science,* 11(38):1869-1875.

Prabhudev, P.M, Suchithra Kumar, M. H., Hanumanthappa M., Girish R., Yallesh Kumar, H. S and Hanumantharaya, L, (2021), Seasonal incidence of citrus leaf miner, Phullocnistis citrella Stainton (Lepidoptera:Gracillaridae) in the hilly region of Chikkamagaluru district, *Journal of Entomology and Zoology Studies*, 9(1): 1152-1156.

Prahlad, G.S.,Yadahalli, Nagaraj,J. N.,Sreedhara, Anupama, C., Shreevani, G.N., and Patil, M.C., (2020), Impact of KVK trainings on promotion of backyard poultry farming in Kalyan-Karnataka, *Intl. J.Curr.Microb. Applied Sci.,* 9(6): 407-411.

Prakash, K. M., Joseph, J., Santhosh Kumar, A. P., (2020), Morphological Characterization of black pepper (*Piper Nygrum)* accessions from Kerala, *Indian Journal of Plant Genetics*, 33(3): 352-359.

Prasanakumar, N.R., Venkataravanappa, V., Rachana, R.R., Sridhar, V., Govindappa, M. R., Basavarajappa, M.P., Hemalatha, K.J., Ashwathnarayana, D.S., Krishana Reddy, M and Samuel, D. K., (2021), States of the out break of Thrips parvisnees (Karny) on chilli in Karnataka, *Pest Management in Horticultural ecosystems*, 27(2): 286-290.

Preethu, D. C., Savita,S.M., Dinesha, M. S., Rajendra Prasad, B.S. and Lata, R. Kulkarni, (2021), *Comparative Study on Effectiveness of Various Compost Cultures on Composting of Farm Wastes*, *International Journal of Plant & Soil Science,* 33(22): 117-125.

Preethu, K. P., Manju, J .V. and Marimuthu, R., (2020), IIHR vegetable special - A boon for vegetable growers in Idukki District*, Trends in Biosciences*, 13(12): 789-792.

Pushpalatha, M., Bidari, B. I., Hebbara, M., Shashidar, G. B., Savita, B., Hundekar S. T., and Hegde, R. V., (2021), Diagnosis and Recommendation Integrated System (DRIS) Norms for Identifying Yield Limiting Nutrients in ByadgiChilli Fruits Grown in Northern Transitional Zone and Dry Zones of Karnataka (India), *International Journal of Plant and Soil Science,* 33(20): 101-109.

Rajeev, M.S. and Muralidharan, P., (2021), Evaluation of high yielding turmeric varieties for Alappuzha district. *Journal of Krishi Vigyan,* 9 (2): 53-56.

Rajendra Prasad, B. S., Manjunath, B., Savita, S, M. and Mallikarjuna Gowda, A. P., (2021), Plant protection module on management of diamondback moth*, plutella xylostella and* other lepidopteran pests in cabbage, *Indian Journal of Agricultural Sciences,* 91(12): 43-47.

Ravi Malipatil, Yenjerappa, S.T., Amaresh, Y. S., Sreedevi, S.C. and Jaiprakash Narayan, R. P., (2021), Efficacy of different fungicides by *in-vitro* against *Colletotrichum gloeosporioides*, the causal agent of mango anthracnose, *International Journal of Chemical Studies*, 9(1): 3408-3412.

Rhea Marie Gracias, Dilipkumar, D, Bhagavantappa, B., Vivek R Kasaralikar, Prashantkumar Waghe, Venkatgiri and Manjunath Patil, (2022), Evaluation of glycopyrrolate, fentanyl citrate, triflupromazine hydrochloride, midazolam and ketamine hydrochloride induction with isoflurane maintenance for the repair of tibial fractures in dogs, *The Pharma Innovation Journal*,11(2): 1740-1743.

Rhea Marie Gracias, Dilipkumar, D., Bhagavantappa, B., Vivek R Kasaralikar, Prashantkumar Waghe, Manjunath Patil and Venkatgiri, (2022), Evaluation of tibial fracture healing by estimation of biochemical and physiological parameters in dogs, *The Pharma Innovation Journal*, 11(2): 1654-1657.

Roopashree, D. H., Kamalabai, S., Nagaraju and Raghavendra, S., (2020), Nutrient uptake and chemical properties of soil after harvest of baby corn (Zea mays L.) as influenced by organic manures and fertilizers, *The Bioscan*., 15(3): 381-384.

Safia, N. E. and Girija, V., (2021), Factors Influencing Entrepreneurial Behavior of Women Participants in Vocational Training by Krishi Vigyan Kendra. Indian Res. *Journal of Extension Educatio*n, 21(4): 52-55.

Sajeev, M V., Radhakrishnan, A., Mohanthy, A. K., Joshy, C. G., AkberAli, V P., Gopika, R., Mathew, S and Ravisankar, C. N., (2021), Factors influencing fish consumption preferences: Understandings from the tribes of Wayanad, Kerala. *Indian Journal of Extesnion Education*, 57(4):1-5.

Samir Humeida Ali, Pawan Singh, Kotresh Prasad, C., Mukesh Bhakat, Tushar Kumar Mohanty, Girish Panchabai, Ranjana Sinha, (2021), Sexual behavior and semen quality of crossbred bulls after supplementation of flaxseed and with rubber mat floor, *The Indian Journal of Veterinary Sciences and Biotechnology*,17(3): 65-68.

Santhosha, H. M., Roopa Patil and Manju, M. J., (2021), Study of floral biology and standardization of soft wood cutting propagation technique in

Bhatkal jasmine (*Jasminum sambac* var Bhatkal Jasmine), *The Pharma Innovation Journal,* 10(11): 1846-1850.

Santosha, H. M., Patil, R. S. and Manju, M. J., (2021), Study of floral biology and standard ization of soft wood cutting propagation technique in Bhatkal jasmine (*Jasminum sambac* var Bhatkal Jasmine), *The Pharma Innovation Journal*,10(11): 1846-1850.

Shahanas E., SeejaThomachan Panjikkaran, Sharon, C.L., Aneena, E.R., Lakshmy P.S., (2021), Standardisation of Jackfruit Seed Incorporated Chocolates and its Quality Evaluation, *J. Food Process Technol*, 12(9).

Sharanabasava, S. A. and Patil, R. S., (2021), Studies on population dynamics of tea mosquito bug on cashew in Uttara Kannada, Karnataka. *Journal of Farm Science*, 34 (3): 333-334.

Sharon, C. L., Usha, V., Aneena, E.R., Lakshmy, P.S., Thomachan and Seeja, (2021), Antagonistic Effect of *Lactobacillus Acidophilus* against enteropathogens and its utilization for development of Probiotic food mixtures. *Plant Archives*, 21(10).

Shivalingappa Hotakar, Shubha S. Kolhar B. C. and S. C. Rathod (2021) Management of Powdery Mil dew of Okra through Nativo (Tebuconazole 50% + Trifloxystrobin 25% WG) Chemical under Field Conditions.*Frontiers in Crop Improvement,* 9: 262-265.

Shivalingappa Hotakar, Shubha S. Kolhar, B. C. and Rathod, S. C., (2021), Assessment of promising verities of pigeon pea for wilt and yield potentially. *The Farma Innovation J.,* 10(12): 1256-1258.

Shivashenkara murthy. M., Nayak, G. V., Channabasappa, K.S., Shanjaya, B. Patil and Rajakumar, G. R., (2021), Effect of nutrient management and cultivars on sugarcane yield and economics, *Journal of Pharmacognosy and Phytochemistry*, 10(2): 157-161.

Shivashenkaramurthy. M., Nayak, G.V., Channabasappa, K. S., Shanjaya B. Patil and Rajakumar G R, (2021), Effect of nutrient management and cultivars on quality of sugarcane juice and liquid Jaggery,*Journal of Pharmacognosy and Phytochemistry*, 10(2): 1502-1510.

Shivashenkaramurthy, M., Manju, M. J., Roopa, S., Patil, Annapurna Neeralagi and Siddappa S. Kannurr, (2021), Assement of Paddy variety uplied situation of Uttara Kannada District. *The Pharma Innovation Journal*, 10(12): 988-992.

Shubha S, Shivalingappa Hotakar, Vivek S. Devaranavadagi, Kolhar, B. C. and Rathod, S. C., (2021), Assessment of promising verities of sorghum for charcoal rot and yield potentiality. *The Farma Innovation J.,* 10(12): 1259-1262.

Shubha S, Vivek S Devaranavadagi and Shivalingappa Hotakar, (2021), Effect of nipping on growth and yield of chickpea (*Cicer arientium* L.) under rainfed conditions of Karnataka *The Farma Innovation J.,*10(12): 848-851.

Shubha S, Vivek S Devaranavadagi and Shivalingappa Hotakar, 2021 Introduction of Ajwain (*Trachyspermum ammi* L.) Varieties in Northern Dry zone of Karnataka *Biological Forum,* 13(04): 932-934.

Shubha S, Vivek S. Devaranavadagi and Shivalingappa Hotakar, (2021), Effect of wide row spacing on growth and yield of pearl millet (*Pennisetum glaucum* L.) under rainfed conditions of northern Karnataka. *The Farma Innovation J.,* 10(12): 1723-1725.

Siddappa C. Angadi, Chidanand P. Mansur and Mouneshwari R. Kammar, (2021), Review of indigenous technology knowledge on soil and water conservation,*The Pharma Innovation Journal*, 10(12): 1285-1289.

Siddappa C. Angadi, Chidanand P. Mansur and Mouneshwari R. Kammar, (2021), Indigenous technical knowledge on soil and water conservation, soil health management and tillage techniques in Bagalkot district, *The Pharma Innovation Journal*,10(12): 1290-1292.

SivakumarT, JijiT and George, T., (2020), Laboratory studies and field evaluation of new

generation insecticides against banana pseudostem borer, *Odoiporus longicollis* (Olivier). *Pest Management in Horticultural Ecosystems*, 26(2): 184-191.

Smita Sivadasan K and Shinoj Subramannian, (2021) Supplementation of Bypass fat during early lactation in high yielding cross bred cows ensures good returns. *Journal of Krishi Vigyan*, 10 (1): 283-286.

Sreelakshmi C. and Allan Thomas, (2021), Technology need analysis in characterization of dominant crops and animal husbandry specialized homegardens.*The Pharma Innovation Journal,* 10(10): 474-476.

Sudha S., Kammar, M. R., Dineshkumar, S. P. and Airadevi Angadi, (2021), Integrated Disease Management for the control of bacterial blight in pomegranate in Karnataka, *Journal of Krishi Vigyan*,10(1): 118-122.

Sunil, C.M., Chandrakala H. and Yogesh, G. S., (2021), Impact of Training and Demonstration on Integrated Crop Management in Transplanted paddy in Chamarajanagara District of Karnataka, India, *J. of Extn.Edu,* 32(4): 6630-6634.

Sunilkumar N M, Archana, Rakesh Varma, Akshay Kumar and Ningdalli Mallikarju, (2022), Assessment of knowledge levels of trained farmers on IPM practices in redgram (*Cajanus cajana*) in ICAR - Krishi Vigyan Kendra Bidar, Karnataka, *The Pharma Innovation Journal*, 11(2): 1883-1886.

Sunilkumar N M, Rakesh Varma, Akshaykumar, Ningdalli Mallikarjun and Sidramappa V Manige, (2022), Effectiveness of 'KVK Krishi Patashale' in Bidar district of Karnataka (KVK Bidar: A pioneer institute to initiate an online weekly series of agricultural training program, *The Pharma Innovation Journal*, 11(2): 1879-1882.

Sunilkumar, N. M., Rakesh Varma, Akshay Kumar, Ningdalli Mallikarjun and Archan,(2021), Impact of beekeeping training on knowledge level of farmers in Bidar district of Karnataka, *The Pharma Innovation Journal*,10(11): 2885-288.

Syeda Samina Anjum, Negalur, R. B., Savitha, B., Heena, M. S. and Ravi, Y., (2021), Assessment of Pigeon pea varieties for dry root-rot tolerance under Vijayapur District of Karnataka State. *Green Farming*, 11 (6): 56-59.

Vani Chandran and Bindu Podikunju, (2021), Constraints Experienced by Homestead Vegetable Growers in Kollam District, *Indian Journal of Extension Education,* 57 (1): 32-37.

Vanishree, S., Udayakumar Nindoni, Shilpa Huchchannanavar and Ambaresh Ganachari, (2021), Development and evaluation of ready to cook sambar powder using pigeonpea (Cajonus Cajan), *The Pharama Innovative,* 10(12): 769-771.

Veenesh Rajpoot, Pawan Singh, Kotresh Prasad, C., (2021), Feeding and Breeding Management Practices of Dairy Animals in Muzaffarnagar District of Uttar Pradesh, *The Indian Journal of Veterinary Sciences and Biotechnology*,17(2): 64-67.

Veerendra Kumar, K.V., Saju George and Harish, M.N., (2021) Management of Yellowing and Spike shedding in Black Pepper at Kodagu District of Karnataka, *Journal of Krishi Vigyan*, 10(1): 164-167.

Venkatesh, L. and Manju, M. J., Kavya, K. L. and Singh, K. P., (2020) Study on Utility of Different Multipurpose Trees as Black Pepper Standards in Lateritic Soil of Uttara Kannada District of Karnataka, India, *International Journal of Current Microbiology and Applied Sciences*, 9(12): 1-10.

Venkatesh, L., and Kariappa, I. S., (2021), Macro propagation of *Dendrocalamus stocksii* – A Bamboo species of Uttara Kannada District of Karnataka, *Bioinfolet,* 18 (1B): 206-207.

Vivek S Devaranavadagi, Shubha S and Kolhar, B.C., 2021, Effect of different soil and water conservation technologies on growth and yield of pigeonpea in rainfed conditions of Karnataka. *The Pharma Innovation*, 2021: 10(12): 504-507.

Vivek S Devaranavadagi, Shubha S and Rathod, S.C., (2021), Evaluation of sorghum varieties

under compartment bunding in rainfed situation. *The Pharma Innovation*, 10(12): 376-379.

Vivek S. Devaranavadagi, Shubha S. and Mallappa B., (2021), Performance of Nipping on Growth and yield of Pigeon pea (*Cajanus cajana* (L.) Mill sp) under Rainfed Conditions of Karnataka. *Biological forum*, 13(4): 796-799.

5.3.2 Training manuals/ technical bulletins

Akkamahadevi, D. A., Kalavati, K. B., Prasannakumar, H., Geeta, S. T., Jayashree Pattar and Punita B. C., (2021), Uttama gunamattada mavu utpadana tantrikategalu, ICAR-KVK, Dharwad.

Ambika, D.S, Thulasiram K.Shashidhar, K. R., (2021), Integrated pest management in cabbage, ICAR- KVK Kolar.

Atheefa Munawery, Pavithra, S., Mahesh, H. M., Naresh, N. T., Roopashree, D. H. and Kamalabai Koodagi, (2021), Savayava krishi mathu parisara snehi thantrikategalu.

Bhavana, A., Gayathri, B., Papireddy, Tanweer Ahmed, Vinoda, K.S., Vishwanath, Sindhu, Aruna, G.R. and Jadhav Balaji, (2021), Nyoonya poshane tadegattalu uttama aahaara kramada abhyaasa haagu pustikara tinisugalu, ICAR- KVK Chikkaballapura.

Bhavana, A., Gowda, P.A., Gayathri, B., Manjunath, R., Tanweer Ahmed, Vinoda, K.S., Vishwanath, Sindhu Aruna, G.R. and Jadhav Balaji, (2021), Anabe besaaya haagu moulyavardhane.

Chithra, G. and Binu John Sam, (2021), Drones to Re-define Farmer Drudgery Mitigation – Facilitated to farmers by ICAR-KVK, Thiruvananthapuram, ICAR –ATARI News Letter Zone XI, 2(2).

Chithra, G. and Binu John Sam, (2021), Environment Pollution, Environment Committee, Chapter published in Kerala Legislative Assembly Compendium, Govt. of Kerala, ICAR- KVK Thriruvananthapuram.

Gayathri, Papireddy, Bhavana, Vinoda, K.S. Vishwanath, Sindhu, Tanweer Ahmed, Aruna, G.R and Jadhav Balaji, (2021), Pramukha tarakaari belegalalli rasaavari mukhaantara poshakaamshagala nirwahane, ICAR- KVK Chikkaballapura.

Gayathri, Tanweer Ahmed, Bhavana, Vinoda, K.S, Manjunath R, Vishwanath, Sindhu, Aruna, G.R and Jadhav Balaji, (2021), Saavayava Krishi inda mannina samrakshane, ICAR- KVK Chikkaballapura.

Girish R., Krishnamurthy, A.T., Ravi, C.S., Kriran, M.R., Satheesha N., Praveen K.M., (2021), Coco beleya utpadana tanthrikathe, KVK, Chikkamagaluru, 21p

Jissy George, Muralidharan, P and Arathy Anil, (2021), Value added products of vegetables. ICAR-KVK-Alappuzha.

Krishnamurthy, A.T., Kantharaju, Y., Satheesha, N., Girish, R., (2021), Parishishta jati Krishi samudayadavara jeevanopaya bhadrathege moulyavardhaneya udyamasheelathe koushalay abhivrudhi kuritu tarabethi karyakrama. KVK, Chikkamagaluru.

Manjunath, R., Narasareddy, Tanweer Ahmed, Aruna, G. R., Vinoda K.S., Vishwanath, Bhavana, Gayathri, Sindhu and Jadav Balaji, (2021), Jenu krishi koushalyabhivruddi tarabheti kaipidi ICAR-KVK Chikkaballapura.

Manjunath, B., Mallikarjuna Gowda, A.P., Chithra Y.D., Venkate Gowda, J., Veeranagappa, P., Jagadish, N., Manjula, B.V. and Shivaprasad, S., (2021), Nursery Techniques, ICAR- KVK Bengaluru Rural.

Manjunath, B., Mallikarjuna Gowda, A.P., Shivaprasad, S., Venkate Gowda, J., Veeranagappa, P. Jagadish, N., Manjula, B.V. and Sukanya, G.V., (2021), Skill training for rural youths (Modern techniques in Bee keeping), ICAR- KVK Bengaluru Rural.

Netravati Yattinamani *et al.,* (2021), '*Arogyada Ghani Siridhanyagalu'* (importance of Millets) Bulletin No.1, ICAR- JSS KVK, Suttur, Mysuru district.

NetravatiYattinamani*etal*.,(2021),'*Siridhanyagala Samskarane hagu moulyavarhdane'* (Processing and value addition of Millets) Bulletin No.3, ICAR JSS KVK, Suttur, Mysuru district.

Rincy K. Abraham, Justy D.Varughese and Anaswara Ann Samuel, (2021), Kayika Pravardhanam Phalavrikshangalil.

Ravi. S. and Muralidharan. P., 2021. Layer Farming. ICAR-KVK-Alappuzha.

Saju George, Prabhakara and Veerendra Kumar, K.V., (2021), Energy use efficiency, Krishi Vigyan Kendra, Kodagu.

Shamaraj and Netravati Yattinamani *et al.,* (2021), '*Siridhanyagala Sudharitha Besaya Kramagalu*, (improved agronomic practices in Millets) Bulletin No.2, ICAR JSS KVK, Suttur, Mysuru district.

Shashidhar K.R, Thulasiram. K, Ambika D.S, Jyothi Kattegoudar, Swathi G.R (2021), Integrated management of major pests of mulberry, ICAR-KVK Kolar.

Shashidhar. K.R, Thulasiram K, Anil kumar. S, Chikkanna G.S, Umesha Naik (2021), Organic based nutrient management in mulberry for sustainable leaf production. ICAR- KVK Kolar.

Shreevani G. N., Sanganna M. Sajjanar, Prahlad, U., Yadahalli, G S and Hemalatha, K. J., (2021). "Scientific Bee Keeping".

Veeranagappa, P., Mallikarjuna Gowda, A.P., Venkate Gowda, J., Manjunath, B. and Shivaprasad, S., (2021), Skill training for rural youths (vermicompost preparation), ICAR- KVK Bengaluru Rural.

Veeranagappa, P., Mallikarjuna Gowda, A.P., Venkate Gowda, J., Manjunath, B., Shivaprasad, S., Jagadish, N., Manjula, B.V. and Sukanya, G.V., (2021), Skill training for rural youths (vermicompost preparation), ICAR- KVK Bengaluru Rural.

Venkate Gowda, J., Mallikarjuna Gowda, A.P., Veeranagappa, P., Manjunath, B., Shivaprasad, S. and Manjula, B.V., (2021), Skill training for rural youths (Improved cultivation practices & mehcnaization in coconut).

Venkate Gowda, J., Mallikarjuna Gowda, A.P., Veeranagappa, P., Manjunath, B., Shivaprasad, S. and Manjula, B.V., (2021), Skill training for rural youths (Improved cultivation practices & mehcnaization in coconut), ICAR- KVK Bengaluru Rural.

Vinoda, K.S., Aruna, G. R., Pallavi, Bhavana, Gayathri, Manjuntha R., Vishwanath, Sindhu, Jadav Balaji and Tanweer Ahmed, (2021), Reshme Goodina Karakushala Vastugala Tayaarike, ICAR-KVK Chikkaballapura.

5.3.3 Books/Book chapter:

Ashoka, P. and Ram Swaroop Meena, (2021), Irrigation Technology, by DBS imprints, New Delhi.

Chethan, N. and Ramesha, T. J., New technologies in fish culture, KVK Dakshina Kannada.

Chithra, G. and Binu John Sam, (2021), Automatic Family Drip System (AFDS) for Increased Vegetable Production in Urban Sector. Bio resources and Commercial Utilization – Trends Supply Chain and Sustainability, Kerala State Biodiversity Board, Kerala.

Girish Shahapurmath, Inamati, S. S., Shabaz Noori and Kannur, S., (2021), Forestry Terminologies. International Books and Periodical Supply Service, Delhi-11034 (India).

Kannur, S., Inamati, S. S. and Girish Shahapurmath., 2021, the Silviculture of Indian Trees. International Books and Periodical Supply Service, Delhi-11034 (India).

Mahantesh, M.T and Ravi, M.V., (2021), Small poultry farming, *Published by KVK, Gangavathi.*

Mallikarjuna Gowda, A.P., Chaithra, G., Manjunath, B., Venkate Gowda, J., Veeranagappa, P., Meghana, Shwetha, Manjula, B.V., Jagadish, N. and Sukanya, G.V., (2021), Impact of Impact of Village adoption programme at thuruvanahalli.

Mallikarjuna Gowda, A.P., Chaithra, G., Manjunath, B., Venkate Gowda, J., Veeranagappa, P., Meghana, Shwetha, Manjula, B.V., Jagadish, N. and Sukanya, G.V., (2021), Impact of Diploma in Agriculture Extension Services for Input dealers (DAESI programme) on trained input dealers of Bengaluru Rural District.

Mallikarjuna Gowda, A.P., Chithra, Y.D., Manjunath, B., Venkate Gowda, J., Veeranagappa, P., Deepa, J., Jagadish, N., Manjula, B.V., Sukanya G.V. Foot prints of 15 years of ICAR KVK, Bengaluru Rural District (Kannada and English).

Patil, S. V. and Rajakumar, G. R., (2021), Cultivation of Agricultural Crops: A Complete Guide, Satish Serial Publishing House, Azadpur, Delhi.

Ravi, M.V., Narayana Rao and Balanagoudar, S. R., (2021), Laboratory manual on Problamatic soils and waters management. *Published by COA, Raichur*.

Ravi, Y., Annapurna Neeralgi, Manju, M. J., Roopa Patil and Shivashenkaramurthy M, (2021), Banana Powder (BaKaHu) recipes for Nutritional and Economic sustainability- A Revolution.

Resmi, J., Sumiya, K.V., Sreelakshmi, K., Darsana, S, and Haritharaj, (2021), Empowering Attappady tribal communities by strengthening traditional farming practices, Bulletin No. 1, KVK Palakkad, and KAU.

Shamsiya, A. H./(2021), Current Topics in Nutrition , Chapter- 27 Common Medicinal Plants for Health and Nutrition, Published by- Romanson Publishing House, Thambanoor , Thiruvanthapuram.

Suma Nair, (2021), Gender Friendly Tools and Equipments in Farm Mechanization chapter in in Engendering Agricultural Development Dimensions & Strategies.

Aparna Radhakrishnan, (2021), Extension Toolkits for Gender Responsive Value Chain chapter in Engendering Agricultural Development Dimensions & Strategies.

Venkatesh, L., Manju, M.J., Shripad Kulkarni & Siddappa Kannur, (2021), Multi-purpose tree species in Agroforestry.

Venkatesh, L., (2021), Cultivation of sandalwood tree, My Aim is to produce 100 to 200 tonne of Sugarcane from 1 acre land.

Venkatesh, L., (2021), Importance of Bamboo cultivation, My Aim is to produce 100 to 200 tonne of Sugarcane from 1 acre land.

Chapter - 6

Human Resource Development

The ICAR-ATARI Zone XI is undertaking human resource development besides KVKs coordinating and monitoring of KVKs.

6. Human Resource Development

6.1 Enterpreneurship Development in Dairying for Farmers of Karnataka

ICAR-ATARI, Bengaluru in collaboration with Atal Incubation Centre-SRS-ICAR-NDRI Foundation, Bengaluru organized a five-day capacity development on "Entrepreneurship Development in Dairying" from October 1-5, 2021 for progressive dairy farmers nominated by KVKs of Karnataka. The programme was inaugurated by Sushri Shobha Karandlaje, Hon'ble Union Minister of State for Agriculture and Farmers Welfare, GoI at Southern Regional Station, ICAR-NDRI, Bengaluru. The five-day programme included knowledge sharing by resource persons on dairy animal breeding, feeding, reproduction, health and dairy cattle waste management. In addition, the farmers were also taught about entrepreneurial opportunities in dairy products manufacturing, quality assurance, marketing strategies, MSME schemes and financial support from banks to entrepreneurs. Farmers were also taken to field visit to goshala and dairy farms for getting first-hand experience on the various practices of dairying and entrepreneurial opportunities. Dairy farmers were also demonstrated manufacturing of various dairy products such as kunda, khoa and paneer. A total of 33 dairy farmers participated in the programme and got certificates on successful completion of the training programme.

Inauguration of the programme by Sushri Shobha Karandlaje, Hon'ble Union Minister of State for Agriculture and Farmers Welfare, GoI

6.2 Virtual Training on ICAR-IIHR Technologies for KVK Professionals

ICAR-ATARI, Bengaluru in collaboration with ICAR-IIHR, Bengaluru organized an online training programme for the KVK professionals of ATARI, Zone XI on "ICAR-IIHR Technologies" during December 17-18, 2021. The main objective of the programme was to facilitate KVK professionals through capacity building on ICAR-IIHR technologies so as to disseminate among farmers, for doubling their income. The programme was inaugurated by DDG (Agricultural Extension), ICAR, New Delhi. Dr. V. Venkatasubramanian, Director, ICAR-ATARI, Bengaluru, the Guest of honour of the training programme enlightened the gathering on potential of specific district action plans through right technologies and right methodologies that will help in bringing development in farming community. He stressed on the need for farm mechanization and production of quality inputs and planting materials in participatory research mode in connection with different KVKs and ICAR institutes on pilot basis.

The chief guest, Dr. A. K. Singh, Deputy Director General (Agricultural Extension), ICAR, New Delhi stressed the need for conducting regular trainings for upgrading the skills and knowledge of KVK professionals, creation of region-wise upgraded technology models on farm fields to generate awareness and increase the adoptability of new technology, need for creation of WhatsApp groups of horticulture experts linking KVK professionals. He urged for concession/reduction in license fees to KVKs for the technologies produced by ICAR-IIHR. Later, in his presidential remarks, Dr. B.N.S. Murthy, Director, ICAR-IIHR, Bengaluru expressed his happiness and appricated KVK professionals for effective dissemination of IIHR technologies.

A view of concluding session of online training programme for the KVK Professionals

During the two days programme, nine sessions were organized covering all ICAR-IIHR technologies including fruits, vegetables, flowers, medicinal plants, post-harvest management and processing, mushroom, farm mechanization, pest and diseases management and bio fertilizers and micro nutrient management in various horticultural crops. A total of 70 KVK Subject Matter Specialists have actively participated in training programme.

6.3 Sensitization Workshop on Food and Agriculture Standards of India

ICAR-ATARI, Bengaluru and Bureau of Indian Standards (BIS) Ministry of Consumer Affairs, Food & Public Distribution Government of India, Bengaluru Branch Office (BNBO) jointly organized Sensitization Workshop on Food and Agriculture Standards of India for the Scientists of KVKs viz., Bengaluru Rural, Chikkaballapur, Kolar, Tumakuru-I, Hassan, Ramanagara and Mandya with off-line (Physical participation) and online for remaining KVKs of the Zone-XI on 18 September, 2021 in the Conference Hall of ICAR-ATARI, Bengaluru. Above 100 KVK Heads and Scientists were participated in the workshop.

Shri Amit Roy, Director & Scientist-F, Bengaluru Branch Office (BNBO), BIS gave welcome. In his address, he briefed about the Bureau of Indian Standards (BIS). He said that BIS is the National Standards Body under the Ministry of Consumer Affairs, Food & Public Distribution Government of India. He expressed that the agriculture is the backbone of economic system of a country and food is one of the most essential requirement for human life. BIS through Food and Agriculture Department (FAD) formulates Indian Standards for food, feed, agricultural equipment and systems covering the entire food supply chain. In this area, a total of 2100 Indian Standards have been formulated.

Dr.V.Venkatasubramanian, Director, ICAR-ATARI, Bengaluru in his address emphasised that the Government of India is very much keen to develop a quality culture and quality consciousness across the country and standards/ Standardization plays an immensely significant role in this direction.

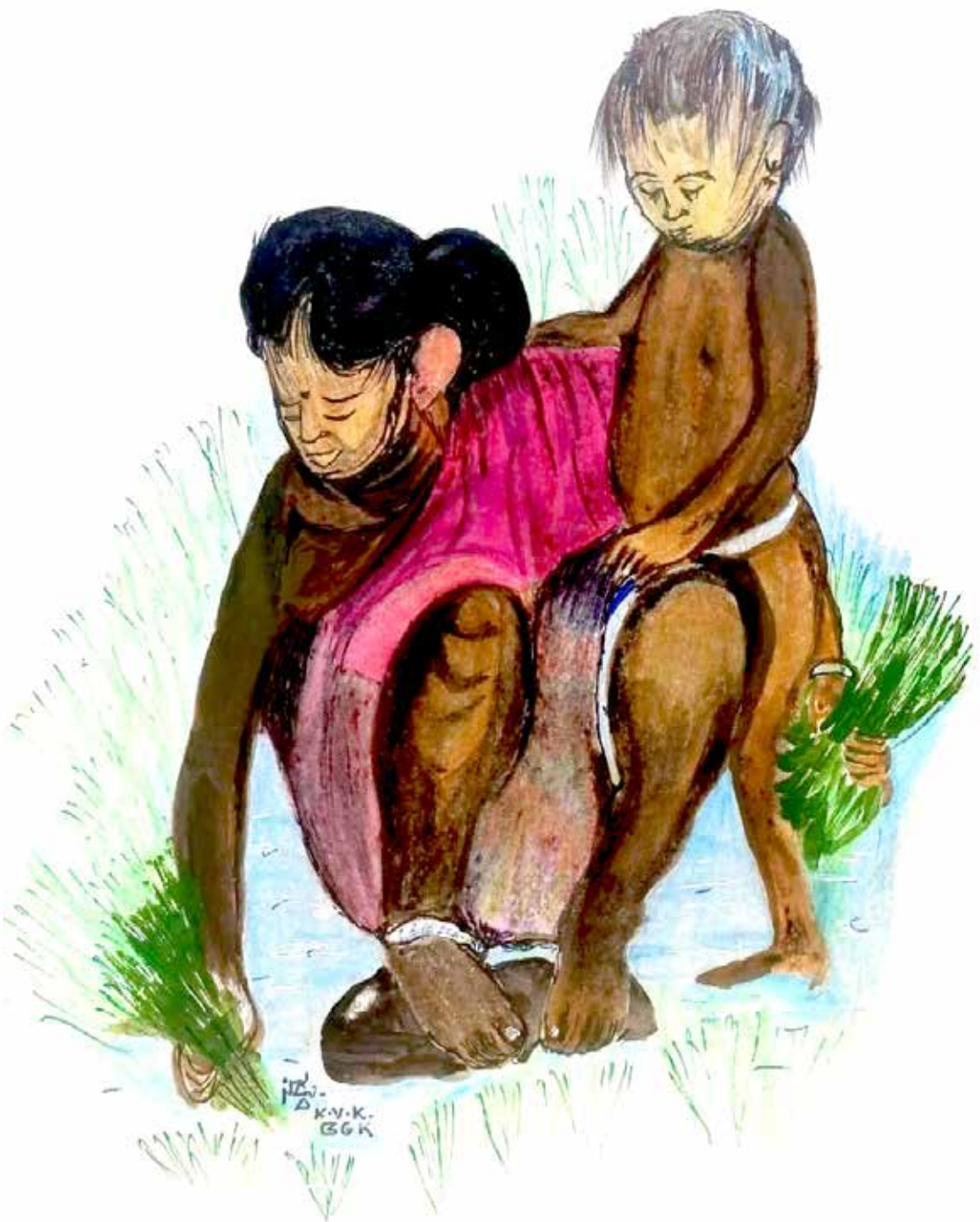
Ms.Nagavalli. S, Scientist-D, Bengaluru Branch Office (BNBO), BIS gave presentation on Overview of BIS Activities/EBIS features & Indian Standards relevant to KVKs. She highlighted the major activities of BIS viz., Formulation of Indian Standards, Certification of various Products with standard mark (popularly known as ISI Mark), laboratory testing of various products as per Indian standards, Management Systems Certification and Hallmarking of Gold & Silver, Foreign Manufacturing Certification Scheme, Compulsory Registration Scheme for electronic products and other important activities of BIS like conducting promotional activities, imparting training to corporate entities/individuals, Standardization quality system, and Quality management system certification apart from other allied services. Then open house discussion was conducted with participants and clarified various doubts/ information asked by the participants. Workshop ended with vote of thanks by Smt.Shivangi Rai, Standards Promotion Officer, Bengaluru Branch Office (BNBO), BIS. Dr.B.T.Rayudu, Principal Scientist, ICAR-ATARI, Bengaluru coordinated the Workshop.

Sensitization Workshop on Food and Agriculture Standards of India
held at ICAR-ATARI, Bengaluru on September 18, 2021

Chapter - 7

Workshops, Meetings and Conferences

Director/scientists/officers of the institute were conducted/ participated in workshops/ meetings/ conferences as well as human resources development.



WORKSHOPS/MEETINGS/CONFERENCES

Director/scientists/officers of the institute conducted/participated in the following meetings/ workshops/ conferences/ seminars/ capacity development programmes held during reporting period:

Dr. V. Venkatasubramanian, Director

- Participated in the Interaction programme of Hon'ble Prime Minister with beneficiary families during the PM-KISAN function on 14 May, 2021.
- Participated in the Annual Review-cum-planning workshop of UAS B KVKs during 15-16 April, 2021.
- Participated in the Annual Review-cum-planning workshop of Kerala and Lakshadweep KVKs during 20-23 April, 2021 and 28 April, 2021.
- Participated in the Annual Review-cum-planning workshop of UAS D KVKs during 26-28 May, 2021.
- Participated in the Annual Review-cum-planning workshop of UAHS Shivamogga KVKs during 11-12 May, 2021 and 19-20 May, 2021.
- Participated in the Annual Review-cum-planning workshop of UAS R KVKs during 9-10 June, 2021.
- Participated in the Attended 49th IRC Meeting of ICAR–CPCRI, Kasaragod on 21 June 2021.
- Acted as Convener - International Conference on Sugarcane Research: Sugarcane for Sugar and Beyond (Cane Con2021)-ICAR-SBI Coimbatore on 19 June 2021 and delivered special address during valedictory function on 22 June 2021.
- Attended "Azadi Ka Amrut Mahotsav", Lecture #12, by Speaker: Sh. Pratap Chandra Sarangi, Hon'ble Minister of State, Animal Husbandry, Dairying and Fisheries and Micro, Small and Medium Enterprises on 24 June 2021
- Attended Workshop for review cum action plan finalization KVKs of zone XI, Technology Demonstration Component NICRA on 26 June 2021.
- Attended Brainstorming Session on "Gender and Nutrition Based Extension in Agriculture by National Academy of Agril. Sciences, New Delhi on 28 June 2021.
- Annual Zonal Review Workshop 2021 between 06-08 July 2021.
- Member of the Selection Committee for the post of Director of Extension, GKVK, UAS, Bangalore on 1st July 2021
- Attended the virtual meeting under the chairmanship of DDG (AE) on PO and Kisan Sarthi on 12.7.2021.
- Review Meetings of KVKs (Discussion with DEEs/KVK Heads) on 12.7.2021 Video Conference under the Chairmanship of Dr. JVNS Prasad on 13.7.2021 regarding NICRA selection of additional districts for the next phase of NICRA- TDC
- Attended Capacity Development Programme on skill Development Management for KVKs of the ATARI Zone 11 in coordination with Agriculture Skill Council of India, Bengaluru on 17.7.2021
- Attended a meeting on Corona Viruses: Burgeoning and Enduring Threats on 14.7.2021 under the Chairmanship of DDG (Agr. Edn.).
- Attended Virtual launch of tree plantation campaign by ICAR CARI Jhansi on 16.7.2021.
- Attended 93rd ICAR Foundation day and award function of ICAR on 16.7.2021.

- Attended Virtual meeting for network project on Aspirational District by ICAR-ATARI Kolkata on 19.7.2021.
- Attended Regional Committee V – Mid Term Review Meeting (Regional Committee V, ICAR-IASRI) on 27.7.2021.
- Zonal Workshop 2021 for KVKs of Zone - XI comprising of Karnataka, Kerala and Lakshadweep during 30 to July, 2021 with the theme of 'Doubling the Farmers' Income through Strengthening KVKs with Inclusive Technologies and Innovative Approaches.
- Virtually attended the ICAR Foundation Day farmers meeting organized by Agriculture Extension Division, ICAR, New Delhi on 16 July, 2021.
- Zonal Review cum Action Plan Workshop and ZPMC meeting of Farmer FIRST on 6th August, 2021.
- Virtually attended the programme on 'International Year of Millets 2023': Campaign on Nutri-garden and Tree Plantation' organized by ICAR on 17 September, 2021.
- Virtually attended the address of Hon'ble PM during Natural Farming - Pre-Vibrant Gujarat Summit 2021 Anand on 16 December, 2021.
- Attended 62nd meeting of Expert Committee on Access and Benefit sharing through Virtual Mode by National Biodiversity Authority, Chennai on 11.8.2021
- Attended Workshop on Banana Flour (BaKaHu) Value Addition & Khadya Vaividhya conducted at KVK Uttara Kannada on 11.8.2021.
- Attended Selection Committee for considering promotion case of Technical Personnel (T-2 to T-3) at NIANP, Adugodi, Bengaluru on 11.8.2021.
- Attended Assessment of ARS Scientist under the Career Advancement Scheme at ICAR-NIVEDI, Ramagondanahalli, Yelahanka, Bengalur on 15.8.2021.
- Attended Selection Committee for the post of Subject Matter Specialist, Programme Assistant and Driver at ICAR- Taralabalu KVK, Davanagere on 16-17.8.2021
- Attended Horticultural Technology Assessment & refinement and development of appropriate Horticultural Technologies through KVK – Extension for Hort. Technologies conducted by MANAGE-IIHR, Bengaluru 27-29 July 2021 on 29.9.2021.
- Attended 28th Foundation Day celebrations and to participate in the National Webinar on Banana Value Chain and Marketing - New Business Horizons. Delivered felicitation address on 21.8.2021.
- Attended Webinar on "Skill Agriculture for Hill Agriculture" by Division of Social Sciences & Training, ICAR-IIHR, Bengaluru at 9.9.2021.
- Chief guest of the inaugural programme and deliver an important session on 'Management of Wild Animals menace in Hill Agriculture by ICAR CTCRI, Thiruvananthapuram in collaboration KVK Idukki, Department of Agriculture and other line departments of KVK Idukki on 21.9.2021.
- Attended Assessment of ARS Scientist under the Career Advancement Scheme at NIVEDI, Bengaluru, ICAR-NIVEDI, Bengaluru physically.
- Attended inaugural function of Entrepreneurship Development training programme in Dairying on 02-06 October 2021 conducted AIC- SRS-ICAR-NDRI Foundation (ASINF), Bengaluru on 02.10.2021.

- Attended the Rescheduling of Taskforce Committee Meeting on 13.10.2021 conducted by ICAR-CMFRI, Kochi.
- Attended virtual meeting on introduction to the echo network on 16.10.2021.
- Attended Interaction meeting of Secretary, DARE & DG, ICAR with all ICAR Scientists on 25.10.2021.
- Attended SBI Foundation day, Coimbatore on 25.10.2021.
- Attended Meeting for review of progress under Project on FPO formation and promotion under the Chairmanship of DDG (AE) on 26.10.2021.
- Attended Review meeting on special campaign and pending matters under the Chairmanship of Hon'ble MoS on 27.10.2021.
- Attended Interaction of Secretary, DARE & DG, ICAR with all ICAR Scientists on 28.10.2021.
- Attended Chemicals and Fertilizers meeting in consultation with on Petroleum Conservation Research Association.29.10.2021.
- Attended Task Force Committee for ACZ-XII meeting conducted by ICAR- Central Institute of Fisheries Education, Mumbai on 29.10.2021.
- Attended Task Force Committee for Agro Climatic Zone (ACZ) – XII on 2.11.2021 (online mode) conducted by Director General.
- Co-chaired web conference on Fruits & Vegetables for Health &Nutrition 2021 on day 3 on 10th November 2021 (Karnataka Science & Technology Academy).
- Attended "National Symposium on "Cooperative Governance: Opportunities Ahead to Create Coop 2.0" on 9th November 2021 as Panelist in Technical Session (IIPA campus, New Delhi) by Confederation of NGOs of Rural India.
- Participated in the Nutri Smart Villages: An Innovative Model for strengthening Poshan Abhiyan hosted by ICT Unit, ICAR on 10.11.2021
- Inauguration of Administrative Building of ICAR-ATARI, Patna ON 9.11.2021 (virtual)
- Workshop on Natural Farming under the chairmanship of Vice-Chairman, NITI Aayog on 30.11.2021.
- Review Meeting of Status of DFI Success Stories chaired by DDG on 1.1.2021
- Scientific Advisory Committee (SAC) of ICAR – KLE KVK, Mattikopp, Belgaum I on 2.12.21
- Participated in the ICAR regional committee meeting III on Dec 11, 2021
- Lecture on the topic "Strengthening Technology Application Programmes in Plantation Sector at
- PLACROSYM XXIV, Indian Cardamom Research Institute, Parathode, Kerala on 16.12.2021
- 24th Plantation Crop Symposium Day 3rd - Lead Talk : Strengthening technology application programme in plantation by Spice Board & Indian Society for Plantation Crops (virtual)
- Virtual meet for developing extension mechanisms for promoting agro forestry activities by ICAR - Central Agro forestry Research Institute, Jhansi on 18.12.21
- Participation as guest to Horticultural Fair-2021 at University of Horticultural Sciences Bagalkote on 25.12.2021
- Meeting on Promotion of Natural Farming under the Chairmanship of DDG (AE) on 28.12.2021 (virtual).

- Scientific Advisory Committee (SAC) of ICAR-KVK Kasargod on 28.12.22.

Dr. M. J. Chandre Gowda, Principal Scientist (Agricultural Extension)

- National Conference on ICT Based e-Resources for Smart Agriculture- A Journey Towards Atmanirbhar Bharat Post-Covid19 pandemic Situation - Lead Speaker on the topic "Role of ICTs and e-Resources in Agricultural Education under the New Education Policy 2020 at UAS Raichur on 16.03.2021.
- Resource person in the Technical Session on DFI at UAHS Shivamogga on 12-13 November 2021
- Resource person in the Orientation Training to the newly recruited staff of KVKs under KAU on 03.08.2021.
- Resource person in the Orientation Training to the SMSs (Extension) of KVKs under ATARI Patna on 17-18 November 2021.
- Expert Member in the DPC for promotion of Assistant to AAO at NIANP Bengaluru on 11.11.2021
- Resource person in the National Training Programme on PPP in Agriculture and Allied Sector at MANAGE on 01.10.2021.
- Expert Member in the DPC of Scientist at NIVEDI as DG Nominee.
- Foundation Day of UAS Bengaluru, GKVK on 01.10.2021.
- Member, Technology Identification Committee, NIANP Bengaluru, 19-20 April 2021.
- Annual review cum Action Plan Meeting of UAS Bengaluru on 16-17 April 2021.
- Annual review cum Action Plan Meeting of KAU on 21-23 April 2021.
- Annual review cum Action Plan Meeting of UAS Raichur on 05-06 May 2021.
- Member, Jury, Evaluation of Theses for the award of Best Thesis, MANAGE.
- Chairman, DPC for promotion of LDC to UDC, ATARI Bengaluru, 30.06.2021.
- Review Meeting of ICAR Regional Committee VII on 25.03.2021.
- Meeting of CSISA network project on 07.01.2021.
- Scientific Advisory Committee (SAC) meeting of KVK Ballari on 8 February, 2021 (FN).
- Scientific Advisory Committee (SAC) meeting of KVK Bidar on 8 February, 2021 (AN).
- Scientific Advisory Committee (SAC) meeting of KVK Thrissur on 8 March, 2021.
- Scientific Advisory Committee (SAC) meeting of KVK Kannur on 9 March, 2021.
- As Member Secretary of RAC, coordinated RAC meetings on 30.03.2021.
- ICAR Regional Committee Meeting on 12.04.2021.
- Annual Review –cum Action Plan Meeting of KVKs under UAS Bengaluru during 15-17 April 2021.
- Annual Review –cum Action Plan Meeting of KVKs under KAU Kerala during 21-23 April 2021.
- Annual Review –cum Action Plan Meeting of KVKs under UAS Raichur during 5-6 May 2021.
- Skill Development Webinar organized jointly by ATARI Bengaluru and ASCI on 14.07.2021.
- Zonal Workshop of KVKs under Zone XI during 30-31 July 2021.

- As Member, Steering and Monitoring Committee, participated in DBT Programme on 28.01.2021, 17.02.2021, 11-12 August, 2021, 24.09.2021, 30.09.2021.
- Scientific Advisory Committee (SAC) meeting of KVK, Malappuram on 28 October, 2021.
- Scientific Advisory Committee (SAC) meeting of KVK, Chikkaballapur on 24 December 2021.
- Scientific Advisory Committee (SAC) meeting of KVK, Mandya on 29 December 2021.
- As PI, Chaired and conducted project team meetings of National Network Research Project on ARYA – 12.01.2021, 06.02.2021, 06.03.2021, 29.06.2021, 26.07.2021, 04.08.2021, 06.08.201, 10.08.2021, 13.08.2021, 16.08.2021, 17.08.2021, 27.08.2021, 08.09.2021, 22.11.2021, 20.12.2021
- DFI Cell meetings on 01.09.202, 02.09.2021, 22.09.2021 and 23.09.2021.
- As Nodal Officer/ Scheme Officer, review meetings were conducted on 18.01.2021, 05/23.02.2021, 12.07.2021, 24.08.2021, 30.09.2021, and 25.11.2021

Dr. D.V. Srinivasa Reddy, Principal Scientist (Agronomy)

- Attended online mid-term review of ICAR Regional Committee meeting of Zone-VIII on 12-04-2021 conducted by CMFRI, Kochi under the Chairmanship of DDG (Fisheries), ICAR, New Delhi.
- Attended Annual Review cum Action Plan workshop for the UAS-B KVKs during 16-17th April 2021 in virtual mode.
- Attended Review cum Annual Action Plan workshop for the KVKs of Kerala and Lakshadweep during 20-23rd April 2021 through video conferencing.
- Attended Review cum Action plan workshop for the KVKs of UAHS, Shivamogga during 19-20th May 2021 in virtual mode.
- Attended Review cum Action plan workshop for the KVKs of UAS, Dharwad during 26-28th May 2021.
- Attended Annual Review cum Action plan workshop for the NICRA KVKs of ATARI, Bengaluru on 26th June 2021.
- Attended Zonal Workshop 2021 of ATARI, Bengaluru during 30-31st July 2021 in virtual mode.
- Attended the Orientation programme organized for the Heads of DAMU implementing KVKs by IMD on 26-08-2021.
- Attended DAMU Annual review meeting 2021 on 24-09-2021.
- Attended Task force meeting of ACZ-XII on 29-10-2021.
- Attended the Interaction meeting of Secretary, DARE and DG, ICAR with the Scientists of ICAR on 28-10-2021.
- Attended MDP on PME in Agricultural Research Projects in virtual mode from 25-30th October 2021 organized by NAARM, Hyderabad.
- Attended Task force meeting of ACZ-X on 2-11-2021.
- Attended International Agronomy Congress 2021 during 23-27th November 2021 and presented 5 abstracts in the congress on the NICRA work of KVKs of Zone-XI.
- Attended Pre-Action Plan workshop 2022-23 for the KVKs of UAS-B at KVK Chamarajanagar during 16-17th March 2022.

- Attended selection of new village for the NICRA implementation in phase-II along with the DE, UAS, Bengaluru at KVK Chikkaballapur on 3-07-2021.
- Attended selection of new village for the NICRA implementation in phase-II at KVK Tumkur-II on 13-07-2021.
- Attended selection of village for the NICRA implementation in phase-II along with DE, UAHS, Shivamogga at KVK Chitradurga on 5-08-2021.
- Attended review of KVK activities and field visits to the farmers demonstration plots at KVK Shivamogga on 6-08-2021.
- Attended NICRA village selection and review of activities along with Dr G. Venkatesh, Nodal scientist from the CRIDA at KVK Tumkur-II on 16-11-2021.
- Attended SAC of KVK Haveri on 30-12-2021in virtual mode.
- Attended SAC of KVK Bagalkote on 4-01-2022 in virtual mode.
- Attended SAC of KVK Chitradurga on 20-01-2022 in virtual mode.
- Attended selection of village for the NICRA implementation in phase-II along with DE UAS, Bengaluru at KVK Chamarajanagar on 2-02-2022.
- Attended selection of village for the NICRA implementation in phase-II at KVK Haveri on 8-02-2022.
- Attended SAC and selection of village for the NICRA implementation in phase-II along with DE KAU at KVK Kannur on 15-02-2022.
- Attended selection of village for the NICRA implementation in phase-II along with ADE, KAU at KVK Calicut on 16-02-2022.
- Attended selection of village for the NICRA implementation in phase-II along with ADE, KAU at KVK Wayanad on 17-02-2022.
- Attended selection of village for the NICRA implementation in phase-II along with ADE, KAU at KVK Palakkad on 18-02-2022.
- Attended SAC and selection of village for the NICRA implementation in phase-II along with DE, KAU at KVK Kottayam during 24-25th -02-2022.
- Attended SAC meeting of KVK Kollam on 26-02-2022 along with DE, KAU.
- Attended an interaction meeting with the KVKs of UAS-B on the practical aspects of field demonstrations at KVK Bengaluru rural on 4-03-2022.
- Attended SAC meeting of KVK Alpphuzha on 4-03-2022.
- Visited KVK Lakshadweep during 5-8th Feb 2022 and attended selection of Island for the NICRA implementation in phase-II and DAMU review including interaction with the staff on KVK activities.
- Visited KVK Thiruvanathapuram on 9-03-2022 and served as a member in the selection process for the Farm Manager and SSS-1 posts selection.
- Attended the selection committee to select the SMS (Agro met) on contractual basis for the KVK Chikkamagaluru at UAHS, Shivamogga on 6-08-2021.
- As Coordinator from the ATARI Bengaluru organized and attended capacity development programme on “Advances in IPM strategies for important crops of Karnataka, Kerala and Lakshadweep during 21-23rd September 2021 in virtual mode for the SMSs of Plant protection discipline under ATARI, Bengaluru jointly with the ICAR-NCIPM, Nerw Delhi.

- Attended and served as member in the committee to select the Best Exhibition stall in the UAS-B Krishi Mela 2021 during 12-13th November 2021.
- Attended the selection committee to select the SMS (Agro met) on contractual basis for the KVK Bagalkote on 6-01-2022 in virtual mode.
- Attended the selection committee to select the Agro met observer on contractual basis for the KVK Chikkamagaluru on 27-01-2022.

Dr. B.T. Rayudu, Principal Scientist (Agricultural Extension)

- Scientific Advisory Committee (SAC) meeting of KVK, Chamarajanagara held on 2 January, 2021
- Virtual meeting conducted by ADG(AE), ICAR New Delhi regarding KVK Portal on 28.1.2021
- Both virtual and physical National Horticulture Fair-2021 organized by ICAR-Indian Institutes of Horticultural Research, Bengaluru during 8-12 February, 2021.
- Virtual meeting to ensure 100 percent utilization of capital funds by KVKs of ICAR-ATARI, Bengaluru held on16 March, 2021.
- Virtual budget meeting of KVKs of ICAR-ATARI, Bengaluru held on 19 March, 2021
- Virtual meeting on Budget Utilization and Release of 7th CPC arrears to KVKs of ICAR-ATARI, Bengaluru held on 29 March, 2021.
- Virtual meeting on midterm review of RAC meeting held on 30.03.2021.
- Virtual annual review-cum-action plan workshop of UAS B KVKs during 16-17 April, 2021.
- Virtual annual review-cum-action planning workshop of Kerala and Lakshadweep KVKs during 20-23 April, 2021 and 28 April, 2021.
- Interaction programme of Hon'ble Prime Minister with beneficiary families during PM-KISAN function held on 14 May, 2021.
- Virtual annual action plan (2020-21) Workshop of KVKs under UAHS, Shivamogga held during 11-12 May, 2021 and 19-20 May, 2021.
- Annual action plan workshop of KVKS under UAS R held during 9-10 June, 2021.
- Virtual annual action plan (2021-22) workshop of KVKs under UAS, Dharwad held during 26 -28 May, 2021.
- Virtual meeting on action plan of CFLDs on pulses and oilseeds by CFLD KVKs of ICAR-ATARI, Bengaluru held 18 June, 2021.
- Virtual meeting on International Yoga Day celebration by KVKs of ICAR-ATARI, Bengaluru held on 21 June, 2021.
- Virtual meeting for discussion on DFI for KVKs of ICAR-ATARI, Bengaluru held on 6 July, 2021
- Virtual annual zonal review workshop 2021 held during 6-8 July, 2021.
- Virtual meeting on review of ongoing activities of KVKs of ICAR-ATARI, Bengaluru held on 12 July, 2021
- Virtual meeting on tree plantation campaign launched by Hon'ble Secretary, DARE and DG, ICAR, New Delhi on 16 July, 2021.
- ICAR Foundation Day farmers meeting organized by Agriculture Extension Division, ICAR, New Delhi on 16 July, 2021.

- Virtual KVKs Zonal Workshop 2021 organized by ICAR- ATARI, Zone XI, Bengaluru during 30-31 July, 2021
- Virtual Zonal Review cum Action Plan Workshop and ZPMC meeting of Farmer FIRST on 6 August, 2021.
- Virtual meeting on procedure to upload publications, reports, videos, data, bulletin etc by KVKs of ICAR-ATARI, Bengaluru at KRISHI Portal held on 9 August, 2021.
- Virtual Zonal Committee Meeting on Attracting and Retaining Youth in Agriculture (ARYA) Project held on 10 August, 2021.
- Virtual meeting on KVK mushroom training plenary session conducted bi ICAR-IIHR, Bengaluru on 11 August,2021.
- Virtual workshop on Nutricereal Mega Conclave organized by ICAR-IIMR, Hyderabad during 17 September, 2021.
- Sensitization Workshop on Food and Agriculture Standards of India for the Scientists of 7 KVKs organised by ICAR-ATARI, Bengaluru in collaboration with Bureau of Indian Standards (BIS) on 18 September, 2021
- Entrepreneurship Development training programme in Dairying conducted by AIC-SRS-ICAR-NDRI Foundation (ASINF), Bengaluru in collaboration with ICAR-ATARI, Bengaluru during 2-6 October, 2021.
- Virtual review meeting on special campaign on Swachhata and pending matters by Hon'ble Minister of State held on 25 October, 2021
- Virtual meeting for review of progress under Project on FPO formation and promotion held on 26 October, 2021
- Virtual Interaction of Secretary, DARE & DG, ICAR with all ICAR Scientists on 28 October, 2021.
- Virtual Knowledge Sharing Workshop on 'Natural Farming' organized by NITI Aayog, New Delhi held on 30 November, 2021.
- Scientific Advisory Committee (SAC) meeting of KVK, Gadag held on 4 December, 2021
- Second IRC meeting of ICAR-ATARI, Bengaluru held during 14-15 December, 2021.
- Virtual Address of Hon'ble PM during Natural Farming - Pre-Vibrant Gujarat Summit 2021 Anand on 16 December, 2021.
- Virtual valedictory function of Online Training for the KVK Professionals of ATARI, Zone XI on "ICAR-IIHR Technologies for Promotion through KVKs" on 17 December, 2021.
- Virtual Meet for developing extension mechanisms for promoting agroforestry activities conducted by ICAR - Central Agroforestry Research Institute, Jhansi on 18 December, 2021
- Scientific Advisory Committee (SAC) meeting of KVK, Uttara Kannada held on 24 December, 2021
- Attended online the Scientific Advisory Committee (SAC) meeting of KVK Kasaragod on 28 December, 2021 (F/N).
- Virtual meeting on Promotion of Natural Farming under the Chairmanship of DDG (AE) on 28 December, 2021 (A/N).
- Scientific Advisory Committee (SAC) meeting of KVK, Dharwad held on 29 December, 2021
- Scientific Advisory Committee (SAC) meeting of KVK, Haveri held on 30 December, 2021

Dr. Thimmappa K., Principal Scientist (Agricultural Economics)

- Participated in the Interaction programme of Hon'ble Prime Minister with beneficiary families during the PM-KISAN function on 14 May, 2021.
- Participated in the Annual Review (2020-21) Workshop of KVKs under UAHS, Shivamogga on 19 May, 2021.
- Participated in the Annual Action Plan (2021-22) workshop of KVKs of Gadag, Belagavi-I and Belagavi-II under UAS, Dharwad on 26 May, 2021
- Participated in the Annual Action Plan (2021-22) workshop of KVKs of Dharwad, Uttara Kannada and Vijayapura-II under UAS, Dharwad on 27 May, 2021
- Participated in the Annual Action Plan (2021-22) workshop of KVKs of Haveri, Vijayapura-I and Bagalkot under UAS, Dharwad on 28 May, 2021
- Participated in the webinar "Environmental Restoration" by Dr. Anil Prakash Joshi, Uttarakhand organized by ICAR-CAFRI, Jhansi on 4 June, 2021.
- Participated in the orientation programme on FPO formation organized by ICAR and NCDC, New Delhi on 9 June, 2021.
- Participated in the Annual Action Plan workshop organized by ATARI, Zone XI and UAS Raichur on 10 June, 2021.
- Participated in the ICAR Foundation Day farmers meeting organized by Agriculture Extension Division, ICAR, New Delhi on 16 July, 2021.
- Participated in the webinar on "Sustainable integrated cropping system models for enhanced income of farmers" organized by ICAR-IIHR, Bengaluru on 24 July, 2021.
- Participated in the Zonal Workshop 2021 held at ATARI Zone XI, Bengaluru during 30-31 July, 2021.
- Organized and participated in Zonal Committee Meeting on Attracting and Retaining Youth in Agriculture (ARYA) Project held on 10 August, 2021.
- Participated in the FPO progress review meeting organized by NCDC, New Delhi on 26 August, 2021.
- Participated in the FPO progress review meeting organized by NCDC, New Delhi on 01 September, 2021.
- Participated in the workshop on 'FPO Experts and stakeholders' organized by NABARD at Bengaluru on 13 September, 2021.
- Participated in the programme on 'International Year of Millets 2023': Campaign on Nutri-garden and Tree Plantation' organized by ICAR on 17 September, 2021.
- Participated in the virtual workshop on 'Agricultural Household Income and Research Impact Assessment' organized by ICAR-National Institute of Agricultural Economics and Policy Research, New Delhi on 29 November, 2021.
- Participated in the virtual Knowledge Sharing Workshop on 'Natural Farming' organized by NITI Aayog, New Delhi on 30 November, 2021.
- Participated in the address by Hon'ble PM during Natural Farming - Pre-Vibrant Gujarat Summit 2021 Anand on 16 December, 2021.
- Participated in the valedictory function of Online Training for the KVK Professionals of ATARI, Zone XI on "ICAR-IIHR Technologies for Promotion through KVKs" on 17 December, 2021.

- Participated in the Scientific Advisory Committee meeting of KVK Koppal on 4 January, 2022.
- Participated in the Scientific Advisory Committee meeting of KVK Ramanagara on 11 January, 2022.
- Participated in the Scientific Advisory Committee meeting of KVK Hassan on 25 January, 2022.
- Participated in the FPO progress review meeting organized by NCDC, New Delhi on 27 January, 2022.
- Participated in the Scientific Advisory Committee meeting of KVK Kodagu on 6 February, 2022.
- Participated in the webinar on "Smart Agriculture and Budget Implementation" which was addressed by the Hon'ble Prime Minister and Hon'ble Agriculture Minister on 24 February, 2022.

Dr. D. V. Kolekar, Scientist (Agricultural Extension)

- Participated in interaction programme of Hon'ble Prime Minister with beneficiary families during the PM-KISAN function on 14 May, 2021.
- Associated in organization and coordination of Annual Review-cum-planning workshop of UAS B KVKs during 15-16 April, 2021.
- Associated in organization and coordination of Annual Review-cum-planning workshop of Kerala and Lakshadweep KVKs during 20-23 April, 2021 and 28 April, 2021.
- Associated in organization and coordination of Annual Review-cum-planning workshop of UAS D KVKs during 26-28 May, 2021.
- Associated in organization and coordination of Annual Review-cum-planning workshop of UAHS Shivamogga KVKs during 11-12 May, 2021 and 19-20 May, 2021.
- Associated in organization and coordination of Annual Review-cum-planning workshop of UAS R KVKs during 9-10 June, 2021.
- Associated in organization and coordination Zonal Workshop 2021 for KVKs of Zone - XI comprising of Karnataka, Kerala and Lakshadweep during 30 to 31 July, 2021 with the theme of 'Doubling the Farmers' Income through Strengthening KVKs with Inclusive Technologies and Innovative Approaches.
- Coordinated the organization of Zonal Review cum Action Plan Workshop and ZPMC meeting of Farmer FIRST on 6th August, 2021.
- Virtually attended the ICAR Foundation Day farmers meeting organized by Agriculture Extension Division, ICAR, New Delhi on 16 July, 2021.
- Virtually attended the programme on 'International Year of Millets 2023': Campaign on Nutri-garden and Tree Plantation' organized by ICAR on 17 September, 2021.
- Virtually attended the address of Hon'ble PM during Natural Farming - Pre-Vibrant Gujarat Summit 2021 Anand on 16 December, 2021.
- Attended the Scientific Advisory Committee (SAC) Meeting of KVK, Davanagere on 23 December, 2021.
- Attended the Scientific Advisory Committee (SAC) Meeting of KVK, Mandya on 29 December, 2021.
- Attended the Scientific Advisory Committee (SAC) Meeting of KVK, Vijayapura-II on 1 January, 2022 (F/N).

- Attended the Scientific Advisory Committee (SAC) Meeting of KVK, Vijayapura-I on 1 January, 2022 (A/N).
- Attended the Scientific Advisory Committee (SAC) Meeting of KVK, Bagalkot on 4 January, 2022.
- Attended the Scientific Advisory Committee (SAC) Meeting of KVK, Wayanad on 8 February, 2022.
- Organized and coordinated the Celebration of Swachhta Pakhawada during December 16-31, 2021 at KVKs of zone XI and ATARI Bangalore.
- The ICAR-Indian Institutes of Horticultural Research, Bengaluru, Karnataka has organized the five-day "National Horticulture Fair 2021" on the theme "Start-Up & Stand-Up India" from 8-12.2.2021 in collaboration with ICAR-ATARI, Bengaluru and others. Associated in organization of this event as member of media/publicity committee and coordinated the live telecast of various demonstrations on horticultural crops to the farmers at KVKs of ICAR-ATARI, Zone-XI. Participated in the inaugural session on 8.2.2021 and technical sessions of Zone VIII for Maharashtra, Gujarat and Goa KVKs on 11.2.2021 of the National Horticulture Fair 2021 at ICAR-IIHR, Bengaluru.
- Participated in webinar on "Smart Agriculture and Budget Implementation" which was addressed by the Hon'ble Prime Minister and Hon'ble Agriculture Minister on 24 February, 2022.

Dr. Mallikarjun B. Hanji, Chief Technical Officer (Computer)

- Attended meeting chaired by DDG(AE) at Division of Agricultural Extension, ICAR New Delhi during 5-8 January 2021 to formulate/finalize the KVK EFC memorandum for 2021-22 to 2025-26.
- Attended meeting chaired by DDG(AE) at Division of Agricultural Extension, ICAR New Delhi during 8-13 February 2021 to formulate/finalize the KVK EFC memorandum for 2021-22 to 2025-26
- Attended the consultation meeting on Food, Nutrition and Livelihood security through appropriate technological interventions in horticulture crops in Lakshadweep chaired by the Administrator, Union Territory of Lakshadweep during 9-10 April 2021.
- Attended the inauguration of Mahatma Gandhi statue at Lakshadweep by Hon'ble Defence Minister of India on 2nd October 2021 and guided KVK Lakshadweep and supported Administration of Lakshadweep in release of organic certification of Lakshadweep islands, handing over of Neera chiller machines, coconut climbing machines to farmers, commissioning of fish waste management machine by the defence minister during the occasion.
- Attended the meeting called by Minister of Agriculture, Government of Karnataka at KVK Belagavi - II on 20th December, 2021 and apprised him of the activities carried out by KVK based on the funding by ICAR.
- Attended online the Scientific Advisory Committee (SAC) meeting of KVK Ernakulam on 28th January 2021.
- Attended the Scientific Advisory Committee (SAC) meeting of KVK Belagavi – I on 4th February, 2021.
- Attended the Scientific Advisory Committee (SAC) meeting of KVK Tumakuru II on 10th March, 2021.
- Attended online the Scientific Advisory Committee (SAC) meeting of KVK Belagavi-II on 2nd December 2021

- Attended the Scientific Advisory Committee (SAC) meeting of KVK Kodagu on 4th December 2021.
- Attended online the Scientific Advisory Committee (SAC) meeting of KVK Kasaragod on 28th December 2021
- Attended Review cum Annual Action Plan workshop for the KVKs of Kerala and Lakshadweep during 20-23rd April 2021 through video conferencing.
- Attended Review cum Action plan workshop for the KVKs of UAHS, Shivamogga during 19-20th May 2021 in virtual mode.
- Attended Review cum Action plan workshop for the KVKs of UAS, Dharwad during 26-28th May 2021 in virtual mode
- Attended Zonal Workshop 2021 of ATARI, Bengaluru during 30-31st July 2021 in virtual mode.

Shri. J. Mathew, Administrative Officer (AO)

- Attended EFC Zoom Meeting chaired by DDG (AE) on 23.4.2021.
- Attended EFC Zoom Meeting chaired by DDG (AE) on 21.05.2021.
- Attended ATARI Capital meeting chaired by Director, ATARI on virtual mode on 29.06.2021.
- Attended ARYA ZMC Meeting ATARI Bangalore on virtual mode on 10.08.2021.
- Attended SMD Virtual meeting regarding to review of mechanisms to ensure probity among government servants on12.08.2021.
- Attended SMD Virtual Review Meeting on Expenditure 2021-22 chaired by DDG (AE) on19.08.2021.
- Attended SMD Review Meeting Zoom RE 7th CPC on virtual mode chaired by DDG (AE) on 06.12.2021.
- Attended SMD Virtual Review Meeting on EFC chaired by DDG (AE) on 22.12.2021.
- Attended ATARI Budget Meeting with KVKs chaired by Director, ATARI on 09.02.2022.
- Attended KVK Guidelines chaired by DDG (AE) on virtual mode on 15.02.2022.
- Attended Budget Review by Dir (F) on virtual mode on 29.03.2022.
- Attended SPARROW Training organized by ICT Division on virtual mode during 21-22 March 2022.

Chapter - 8

Farmers Feedback on Assessed Technologies of Crops and Livestock

State wise farmers feedback on performance of production technologies of crops and livestock through OFTs are presented in this chapter.

8. Farmers Feedback on Assessed Technologies

Krishi Vigyan Kendras assessed crop technologies in farmer's field by considering various traits like yield, profitability, product quality, consumer preferences, disease resistance, crop duration, intercropping suitability and climate adaptation. The farmers feedback documented on the assessed technologies is as under.

8.1 Karnataka

8.1.1 Crop Varieties

Farmer's feedbacks on performance of crop varieties are given in Table 151. Farmers opined that chickpea, safflower, chilli, okra, paddy, wheat, red gram, turmeric, watermelon, groundnut, maize, black gram, foxtail millet, sorghum, proso millet, little millet, browntop millet, marigold, tuberose, field bean, ridge gourd, chrysanthemum and finger millet recorded higher yield compared to local varieties.

8.1.2 Agronomic Practices

Farmers feedback on performance of agronomic practices are presented in Table 152. Farmers opined that application of Calcium and Sulphur resulted in the better quality due to lower incidence of blight disease and fetched higher market price. Foliar Spray of DAP + $ZnSO_4$ @ 0.5% has lowered the bronzing in guava; foliar nutrition in cotton reduced leaf reddening and got higher yield; Use of pulse magic during flowering stage resulted in better quality produce in pigeon pea; application of PSB reduced the P requirement by 25%; seed treatment of *Trichoderma* in groundnut reduced root rot disease and Sulphur application in *Kharif* onion production helped to get higher yield as compared to nutrient management practices adopted by farmers.

Table 151: Farmers feedback on performance of crop varieties

Crop varieties	Farmers feedback
Paddy	RNR-15048 variety recorded higher yield over farmer varieties. It is short duration, non-lodging and best suited for cooking. Sahyadri Megha is a red rice bold grain variety and preferred by consumer. It is suitable for late season and not suitable for normal planting window during *kharif* because of birds and ear head damage due to early maturity (122 days). Sahydri Panchamukhi and Sahydri Kempumukhi are medium duration red rice varieties (130- 132 days) which are submergence tolerance. But fodder yield of Sahydri Panchamukhi is very low.
Wheat	UAS-375 recorded higher yield, tolerant to rust and good for chapatti making.
Maize	The GH-150125 hybrid performed better with respect to yield as compared local variety. This is also a short duration variety compared to local variety and MAH-14-5 is high yielding and also suitable for fodder as leaves remain green till the harvest.
Sorghum	Variety, GS-23 recorded higher yield and resistant to diseases.
Foxtail millet	The H N-46 variety performed better with respect to yield which is also a short duration variety compared to local variety.
Proso millet	HB-1 recorded more number of tillers and higher yield which is also a short duration variety.

Little millet	HS-1 recorded more number of tillers and higher yield which is also a short duration variety.
Browntop millet	HBr-2 recorded higher yield and higher net returns.
Finger millet	KMR-630 is tolerant to Finger millet blast which can be harvested 20 days early compared to local Finger millet and recorded higher yield.
Pigeionpea	Short duration compared to BRG-1, resistant *Fusarium* wilt, sterility mosaic disease and commands better market price.
Bengalgram	BGD-111-1 recorded higher grain yield of 15.50 q/ha which is followed by JAKI-9218 (14.75 q/ha) and NBeG-49 (14.42 q/ha).
Blackgram	LBG 791 performed better over both DBGV – 5 and local variety) with respect to yield with lower pest incidence.
Groundnut	G-2-52 recorded higher yield with superior fodder quality.
Safflower	ISF 764 gave higher yield and thrips incidence is less when compared to farmers' practice. The grain size is smaller in ISF 764 than A-1 safflower variety.
Chilli	GPM 120-S-1 resulted in higher yield and better market price due to uniform size. Arka Kyati hybrid having high yielding capacity with low leaf curl incidence. But pungency of the fruit is very low.
Okra	Arka Nikita showed on par result with market leading companies hybrids during summer.
Fieldbean	HA-3 is suitable for all the seasons which has good aroma and recorded higher yield.
Ridgegourd	Arka Vikram flowers early, gave higher yield and fruit borer infestation is low.
Spinegourd	Arka Bharath is not commanding better market price due to yellowing of fruits.
Turmeric	Pragathi and Petambari are short duration varieties and harvested 75 - 85 days earlier without compromising the yield and quality as compared to local check.
Garlic	DWD G-1 short duration variety with lower incidence of pest and diseases.
Onion	Bheema Shubra variety has attractive bright white colour with uniform bulb size and good marketability.
Watermelon	Arka Sham recorded higher yield and commands better price in the market due to good market demand.
Marigold	Arka Abhi recorded more number of flowers per plant with bigger size.
Tuberose	Arka Prajwal recorded higher number of flowers per spike with increased weight. This variety is suited for loose flowers and garlands. There is a need to develop smooth petal variety.
Chrysanthemum	CO-1 is yellow colored flower which recorded higher yield and has more consumer preference.

Table 152: Farmers feedback on performance of agronomic practices

Agronomic practices	Farmers feedback
Nutrient management in potato	Application of Calcium and Sulphur resulted in the better quality due to lower incidence of blight disease and fetched higher market price.
Sulphur applications in onion	Sulphur applications in *Kharif* onion production helped to get higher yield, reduced bulb totting and lowered the incidence of pest and disease.
Foliar spray for management of bronzing in guava	Foliar Spray of DAP + $ZnSO_4$ @ 0.5% has lowered the bronzing in guava.
Foliar nutrition in Cotton	Foliar nutrition in cotton reduced leaf reddening and got higher yield.
Pulse magic in Pulses	Use of pulse magic during flowering stage resulted in better quality produce in pigeonpea.
P- Solubilizers in Coffee	Application of PSB reduced the P requirement by 25% and saved input cost.
Seed treatment of *Trichoderma* in Groundnut	Seed treatment of *Trichoderma* in groundnut reduced root rot disease.

8.1.3 Pest and Disease Management Technologies in Crops

Farmers feedback on performance of pest and disease management in crops are presented in Table 153. Farmers opined that adoption of integrated pest and disease management in brinjal, tomato, sorghum, cotton and cabbage effectively controlled pests and diseases. Use of bio formulations for management of diseases in pomegranate reduced the disease incidence and improved the fruit quality.

8.1.4 Crop Technologies

Performance of crop technologies such as nipping techniques, machines transplanting, pheromone traps, Nano fertilizer, Liquid seaweed fertilizer and silo bags were assessed in farmer's field and farmers' feedback is presented in Table 154. Farmers opined that nipping techniques in Chickpea gave higher yield, mechanized transplanting in paddy helped optimum plant density and less labour requirement, use of pheromone traps-controlled pest damage, use of liquid seaweed fertilizer in tomato resulted in higher yield and uniform quality of fruits, application of Nano fertilizer in hybrid maize improved the quality of grains and use of silo bags resulted in good quality silage.

Table 153: Farmers feedback on performance of pest and disease management technologies

Pest and disease management	Farmers feedback
Management of twisting disease in onion	Use of Bio agents in seed treatment and foliar spray of fungicides and micro nutrients model reduced twisting disease in onion.
Management of bacterial and sheath blight disease in transplanted paddy through bio intensive approach	*Pseudomonas* bio fungicide with specific chemical fungicides helped in reduction of bacterial and sheath blight disease in transplanted paddy.

Integrated pest & disease management in brinjal	Vota traps helped in attracting male moths and reduced crop damage. Bt. formulation helped in controlling shoot & fruit borer which resulted in reduction of pesticides spray.
Integrated pest management of tomato pin worm	Use of pheromone traps and *M. anisoplea* bioagents are non-chemical and cost effective for the management of tomato pinworm.
Integrated approach for the management of fall army worm in sorghum	Use of pheromone traps and M.anisoplea bioagents are non-chemical and cost effective for the management of fall army worm.
Management of dry root rot disease in chickpea	Application of *Trichoderma* enriched neem cake before sowing helped in reduction of dry root rot disease.
Integrated pest management in cotton	Use of blue and yellow sticky traps, sowing of maize in thick row outside the border, erection of phenomenon traps and planting of marigold or bhendi or Pigeon pea or non Bt-Cotton at 10:1 helped in reduction of insect attacks.
Integrated pest management in cabbage	Use of low-cost technologies like pheromone traps, sticky trap, Bt liquid helped in reduction of DBM population with less chemical spray.
Management of pink bollworm (*Pectinophora gossypiella* Sunders) in Bt.cotton	Use of pheromone traps, refuse crop, release of *Trichogramma bactereae* helped in reducing the pest incidence.
Management of Rugose white fly in Coconut	It is an effective technology, but it needs to be implemented by all the farmers of the cluster.
Use of bio formulations for management of diseases in Pomegranate	Application of AMC + ACT and drenching with Aspiriligus niger + Pseudomonas + VAM reduced the disease incidence and improved the fruit quality.

Table 154: Farmers feedback on performance of crop technologies

Crop Technologies	Farmers feedback
Nipping techniques in Chickpea	Terminal nipping after 40 DAS in Chickpea resulted in additional yield of 140 kgs per acre due to more branches per plant. The tender leaves were utilized as a green leafy vegetable.
Mechanization in paddy transplanting	Mechanized transplanting ensures consistent spacing and optimum plant density. It requires less labour as compared to the traditional rice planting method.
Use of Pheromone traps and parasitoid *Trichogramma bacterea* in cotton	Use of Pheromone traps to manage Pink bollworm (*Pectinophora gossypiella* Saunders) helps to reduce the infestation. Use of parasitoid *Trichogramma bacterea* controls pest damage and reduces the pesticide spray.
Pheromone traps use in the management of Uzi fly in silkworm rearing	Use of Pheromone traps resulted in the significant reduction in defective cocoons due to effective management of uzi fly.
Nano fertilizer application	Application of Nano fertilizer (N and Zn) in hybrid maize improved the quality of grains and easy to carry.
Liquid seaweed fertilizer use	Use of liquid seaweed fertilizer in tomato resulted in higher yield and uniform quality of fruits.
Use of silo bags	Use of Silo bags resulted in good quality silage. It requires less space and can be reused.

8.1.5 Livestock Technologies

The performance of livestock technologies in cow, pig, goat, fish and poultry were assessed and farmers opinions are presented in Table 155. Farmers opined that management of tick infestation in cross breed HF cows has reduced and milk yield has increased; integrated management helped the cows to attaining early puberty and conception; preventive protocols of subclinical and clinical mastitis substantially reduced the menace of mastitis; monoculture of Amur common carp in farm ponds increased survivability and farmers obtained higher yield per pond.

Table 155: Farmers feedback on performance of livestock technologies

Livestock technologies	Farmers feedback
Management of tick infestation in cross breed HF Cows	Tick infestation in cross breed HF Cows significantly reduced and milk yield has increased by applying amitraz (1%) + cypermethrin (1%) + piperonyl butoxide (5%) solution @ 1ml/10 kg bwt topically along the midline of that from mid shoulder to tail setting and repeat after 21 days.
Dairy calf management	Integrated management helped the cows to attaining early puberty and conception.
Control of Ascariasis and Piglet Anaemia in Piglets	Technology helped in decreased piglet mortality and increased body weight gain.
Assessment of performance of Kadaknath and Giriraja Poultry for high rainfall and hilly regions of Kodagu district	Kadaknath eggs are on high demand whereas its black meat acceptance is still less by the local people compared to Giriraja chicken meat.
Low cost egg incubator and hatchery	Increased percentage of hatchability.
Demonstration of impregnated nano fibers for injection of oystrus in repeat breeding cow/ buffalo	High percentage of conception rate.
Demonstration of hybrid napier Var. CO4	Fodder yield is high and no blades in leaves, Palatability of fodder is excellent.
Probiotics for optimum growth in post weaning lambs	Use of probiotics reduced occurrence of diarrhea and increased feed intake and growth.
CIDR synch protocol for management of anestrous	Getting a non-cycling, economically burden animal pregnant is as resulted in improvement of production and economy of the farmers.

Preventive protocols of subclinical and clinical mastitis	Expressed very high satisfaction with the technology that reduced menace of mastitis in the herd. Simple user friendly and reduced rejection of milk due to low SNF.
Monoculture of Amur common carp in farm ponds	Improved survivability and yield per farm pond were higher compared to the farmers practice.

8.2 Kerala

8.2.1 Crop Varieties

Farmers feedback on performance of crop varieties are given in Table 156. Farmers opined that rice, potato and small cardamom varieties are resistant to diseases. Cluster bean and sweet potato varieties gave higher yields and Yard Long Bean variety, KAU Deepika has higher acceptability in the market due to its long, fleshy pods and attractive green colour. Farmers accepted Ash gourd variety, Thara due to its small size and easy marketability of the produce.

8.2.2 Agronomic Practices

Farmers feedback on performance of agronomic practices are presented in Table 157. Farmers opined that application of Sampoorna in paddy resulted in improved vegetative growth and recorded higher yield; precision farming in strawberry cultivation increased water use efficiency and reduced weed population; use of NPK capsules in organic ginger cultivation helped in producing more healthy plants and use of KAU Sampoorna multimix resulted higher yield in vegetable crops.

Table 156: Farmer's feedback on performance of crop varieties

Crop varieties	Farmers feedback
Cassava	Cassava variety, Sree Pavithra which is suitable for low nutrient soil condition. The cooking quality and taste are better than local varieties.
Rice	Pournami rice variety recorded higher yield, resistant to lodging and tolerant to sheath blight.
Potato	Potato variety, Kufri Karan is tolerant to late blight and reduced the use of fungicide.
Small cardamom	Small Cardamom variety, Kodagu Sugasini is drought tolerant and reduced pest and disease incidence.
Yard Long Bean	Yard Long Bean variety, KAU Deepika has higher acceptability in the market due to its long, fleshy pods and attractive green colour.
Cluster bean	Cluster bean variety KAU Suruchi is popular due to higher yield and high consumer preference.
Sweet potato	Sweet potato variety Bhusona recorded higher yield.
Ash gourd	Farmers accepted Ash gourd variety Thara due to its small size and easy marketability of the produce.

Table 157: Farmer's feedback on performance of agronomic practices

Agronomic practices	Farmers feedback
Foliar nutrition	Foliar nutrition with sampoorna in paddy resulted in improved vegetative growth and recorded higher yield.
Precision farming	Precision farming in strawberry cultivation increased water use efficiency and reduced weed population.
NPK capsules use	Use of NPK capsules in organic ginger cultivation helped in producing more healthy plants.
KAU Sampoorna multimix	Use of KAU sampoorna multimix resulted in vigorous plant growth, improved shelf life and recorded higher fruit set in vegetable crops.

8.2.3 Pest and Disease Management in Crops

Farmers feedback on performance of pest and disease management in crops are presented in Table 158. Farmers opined that application of ICAR- CTCRI formulated biopesticide Nanma effectively controlled thrips in mango, use of propiconazole for the management of false smut in paddy at booting stage resulted in 80 per cent control of false smut incidence; use of *Trichoderma* in elephant foot yam controlled collar rot and application of Tricho cake controlled bud rot in coconut; .

8.2.4 Crop Technologies

Performance of crop technologies such as waste shredder, paddy transplanter, drones, seed sheller, bunch covering devices and harvesters were assessed in farmer's field and farmers feedback is presented in Table 159. Farmers opined that paddy transplanter reduces the time taken to transplant seedlings and requires less labour; fertilizer application through drones helps in timely application of fertilizers and overcome the issues of labour shortage; nutmeg seed sheller helps to decorticate nutmeg seeds to take out the kernels that fetch higher price in the market and

Table 158: Farmer's feedback on performance of Pest & disease management in crops

Pest and disease management in crops	Farmers feedback
Thrips management in mango	ICAR- CTCRI formulated biopesticide Nanma effectively controlled thrips in mango.
Thread blight in nutmeg	Use of pre-monsoon sprays of Bordeaux mixture in nutmeg prevented abnormal leaf fall, thread blight and enhanced the yield.
Bud rot in coconut	Use of Tricho cake controlled bud rot in coconut.
Management of collar rot in elephant foot yam	Use of *Trichoderma* in elephant foot yam controlled collar rot.
Management of rice bug	Fish amino acid was effective against rice bugs which is cost effective.
Management of false smut in paddy	Prophylactic application of propiconazole for the management of false smut in paddy at booting stage resulted in 80% control of false smut incidence.

Table 159: Farmer's feedback on performance of crop technologies

Crop technologies	Farmers feedback
Waste shredder	Use of waste shredder in banana plantations helps in recycling the banana pseudostem as it cuts the pseudostem to smaller bits.
Paddy trans planter	Paddy transplanter reduces the time taken to transplant seedlings and requires less labour.
Use of drone for fertilizer application	Use of drone for fertilizer application helps in timely application of fertilizers in the field. It helps in drudgery reduction and to overcome the issues of labour shortage. But the cost of application is high compared to manual spraying.
Community approach for management of wild boar	Bio acoustics as well as fan and plate methods are highly effective for the management of wild boar.
Nutmeg seed sheller	Nutmeg seed sheller helps to decorticate nutmeg seeds to take out the kernels that fetch higher price in the market and requires less labour.
Use of drone for spraying	Use of drone for spraying helps in saving of time, labour requirement is significantly less which also saves the water. The timely availability of drone is a problem.
Macro propagation in Banana	Use of macro propagation in Banana helps the farmers to produce 12 plantlets/ rhizome over a period of four month.
KAU banana bunch covering device	KAU banana bunch covering device is easy to operate and low-cost equipment. Bananas are free from damages due to pest and bird attacks giving a blemish free appearance.
Semi –manual cassava harvester	Semi –manual cassava harvester is low-cost equipment which helps to avoid breakage of tuber.
Vegetable transplanter	Single –row manual vegetable transplanter helps in transplanting of seedlings in the soil up to a depth of 2-3 cm. In an hour 600-900 seedlings can be transplanted into the field. This reduces the drudgery of farmers to a great extent.

requires less labour; KAU Banana bunch covering device is easy to operate and low-cost equipment; use of waste shredder in banana plantations helps in recycling the banana pseudostem and semi – manual cassava harvester is a low-cost equipment which helps to avoid breakage of tuber.

8.2.5 Livestock technologies

The performance of livestock technologies in cow, ducks, fish and poultry were assessed and farmers opinions are presented in Table 160. Farmers opined that balancer feed for backyard poultry increased egg production; complete ration for dairy cattle improved milk production in dairy cows, Use of live feed live micro worms helps growth of ornamental fish and helps in increasing milk yield and partial replacement of green fodder with corn silage increased milk yield and milk quality.

Table 160: Farmer's feedback on performance of Livestock technologies

Livestock technologies	Farmers feedback
Balancer poultry feed for backyard poultry	Balancer feed for backyard poultry increased egg production, weight and maintained good health.
Complete ration for dairy cattle	Farmers are satisfied with the performance of the technology but they expressed concern regarding hike in cost of production though it was being compensated with the higher fat percentage.
Broiler duck varieties for meat production	Farmers selected Vigova Super –M Duck as a better broiler variety which is having good feed conversion efficiency and thereby showing an average body weight of 2.8kg within 60 days.
Azolla as a economic feed supplement in Ducks	Farmers are currently incorporating azolla as an economic feed supplement in daily feed there by reducing 20% of concentrate feed cost.
Biomedicines for shedding of Placenta in cows	Biomedicines for shedding of placenta in cows is a simple, easy to administer and effective technology for cows and enhancing milk yield.
Use of live feed for rearing fishes	Use of live feed live micro worms helps to improve the growth and survival of ornamental fish spawn which is found to be cost effective.
Partial replacement of green fodder with corn silage in dairy cows	The corn silage was acceptable to the cows if they were air dried before being presented to the cows for feeding. This will remove the smell associated with the silage. This technology is very useful and helps in increasing milk yield. The quality of milk is also better with high milk fat. This technology is suitable for flood prone areas as the corn silage can be stored for a longer period.

Chapter - 9

Personnel

The sanctioned staff strength of ICAR-ATARI includes:

- Research Management Position
- Scientists
- Technical Personnel
- Administrative Staff

9. Personnel

Staff of ICAR-ATARI, Zone XI, Bengaluru in position as on December 31, 2021

Cadre	Name	Designation
Research Management Position	 Dr. V. Venkatasubramanian	Director
Scientific	 Dr. Chandre Gowda M. J	Principal Scientist (Agricultural Extension)
	 Dr. Srinivasa Reddy D. V	Principal Scientist (Agronomy)
	 Dr. B.T. Rayudu	Principal Scientist (Agricultural Extension)
	 Dr. Thimmappa K	Principal Scientist (Agricultural Economics)
	 Dr. D.V. Kolekar	Scientist (Agricultural Extension)
Technical	 Dr. Mallikarjun B. Hanji	Chief Technical Officer (Computer)
	 Shri. Hemanth Kumar	Driver
Administrative	 Shri. Shaik Rukman	Assistant Finance & Accounts Officer
	 Shri. J. Mathew	Administrative Officer (additional charge)
	 Mrs. Ramola Pinto	Junior Stenographer
	 Ms. Roopakala K	Upper Division Clerk

ICAR - Agricultural Technology Application Research Institute, Zone XI
(Indian Council of Agricultural Research)

H.A. Farm Post, Hebbal, Bengaluru - 560 024, Karnataka, India

Phone : 080-234101614
Fax : 080-23410615
Web : https://ataribengaluru.icar.gov.in
Email : atari.bengaluru@icar.gov.in