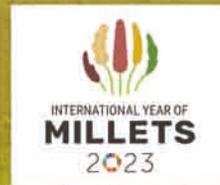




# Technological Opportunities for Increasing Farmers Income in Karnataka



**ICAR-Agricultural Technology Application Research Institute**

H.A.Farm Post, Bhoopasandra Road, Hebbal, Bengaluru - 560024



## **TECHNOLOGICAL OPPORTUNITIES FOR INCREASING FARMERS INCOME IN KARNATAKA**



**ICAR-AGRICULTURAL TECHNOLOGY APPLICATION RESEARCH INSTITUTE  
H.A.Farm Post, Bhoopasandra road, Hebbal, Bengaluru - 560024**

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## MESSAGE

Agriculture directly or indirectly provides employment to more than half of our population. With just 2.4 per cent of the global geographical area, the nation has to sustain 17.7 per cent of the global population. Yet, it is a matter of great pride that India is among the fastest growing economies of the world. The Government of India, under the dynamic leadership of Prime of India Sh. Narendra D. Modi ji, has envisioned that the nation not only achieves the food and nutrition security for its huge population, but at the same time, ensures economic security for every farmer. The much needed vision to double farmers' income (DFI) by 2022 was based on the unwavering faith of the government in the capabilities of farming community across the length and breadth of the country.

The Indian Council of Agricultural Research (ICAR) has ably shouldered the responsibility of achieving the national agenda on DFI through its frontline extension network of Krishi Vigyan Kendras (KVK). The KVKs implemented multipronged and location specific strategies in each district to facilitate doubling farmers' income since 2016-17. The focus was on enhancing productivity of crops and livestock, reduction in cost of production through resource use efficiency, facilitating diversification towards high value crops and enterprises, processing/value addition of farm produce, collective and direct marketing of the produce and income generation from non-farm sector.

It is gratifying to note that the state level documentation of successful farmers are being published by ICAR Agricultural Technology Application Research Institute (ATARI) Bengaluru for Karnataka and Kerala. I congratulate ICAR, the Division of Agricultural Extension, and ATARI Bengaluru for guiding KVKs to come out with district level analysis of successful examples for encouraging other farmers to emulate and excel with the help of technological support.

I congratulate the authors from each KVK and the editorial team at ICAR ATARI Bengaluru for bringing out state-wise summary and district-specific synthesis of doubling farmers income initiatives in Karnataka and Kerala.

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## FOREWORD

Ever since the first announcement made by Hon'ble Prime Minister of India in February 2016, the Doubling of Farmers' Income (DFI) has become a national buzzword. The entire nation has strongly believed in the vision of the Prime Minister and solidly supported the ambitious goal. The country is well-endowed with the natural resources although widely varying climatic parameters like rainfall, temperature and humidity did pose great bit of challenge to farming community. Fortunately, the Indian Council of Agricultural Research (ICAR) has always led the nation in its pursuit of development of agriculture driven through science and technology. The vast network of Krishi Vigyan Kendras has created a niche for itself as the most dynamic, vibrant and credible cutting-edge level farm science institution, thereby shaping the future of the farming community. The possibility of technology-driven doubling of farmers' income has been proved beyond doubt by the national-level compilation of 75000 farmers' success stories, which was released by the Hon'ble Prime Minister, as a part of the 75th year of Independence. It is extremely gratifying to note that ICAR-ATARI, Bengaluru is publishing the district-wise synthesis of composition and changes in farmers' income due to KVK interventions in the states of Karnataka and Kerala. I congratulate the entire team of ICAR-ATARI, Bengaluru, wholeheartedly, for coming up with state-wise documents for Karnataka and Kerala.

The Agricultural Extension Division of ICAR takes this opportunity to congratulate all the farmers and their family members for joining hands with the team of ICAR-ATARI, Bengaluru in this great achievement. My sincere appreciations to all the scientists of KVKs in Karnataka and Kerala for guiding and supporting farmers with all their might.

I am sure that the document will inspire many more thousands of farmers to achieve higher income, not just double, but manifold.

**(Udham Singh Gautam)**





## ICAR-Agricultural Technology Application Research Institute, Zone XI

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### Preface

Indian economy witnessed great progress since independence, in terms of infrastructural development, liberalization in other economic sectors, education and communication systems, and changes in demand patterns for food and other agricultural raw material. Such a development accelerated the pace in recent years, and it is necessary that associated changes must come into agricultural systems, to remain contextual and take advantage of developments in non-agricultural spheres. Hon'ble Prime Minister of India in sharing a renewed vision for the farmers of the country, has effectively set a new era for agriculture by initiating the ambitious target of Doubling Farmers Income (DFI). Hon'ble Prime Minister reiterated that productivity must be defined as a measure of gainful income (the outcome) and not only as a measure of production per unit of asset (the output).

To bring this vision into a reality, the Government of India took a policy decision in 2016-17 to achieve doubling farmers income by 2022. The approach to DFI broadly covered a) income enhancement; b) social security cover; c) access to institutional credit; d) risk cover; and e) access to knowledge. Therefore, it was important to take advantage of scientific knowledge and technology. In this context, the Indian Council of Agricultural Research (ICAR) led from the front by constituting state level coordination committees to work out state-specific DFI strategies, which analysed the agro-climatic zone based cropping/farming systems and identified the thrust areas, potential technologies and feasible approaches to achieve the national goal. To facilitate this under the over-arching leadership of the Agricultural Extension Division of ICAR, Krishi Vigyan Kendras (KVKs) took up the responsibility of planned frontline extension interventions. Besides ensuring profitability in the existing cropping patterns, the KVKs aimed at augmenting the farm household income through diversification into high value crops, intensifying livestock production and exploring agri-business opportunities in each district. The efforts could enable the contact farmers to get the benefits of the right technologies made available at the right time using the right approaches.

The district-level analysis of successful farmers in Karnataka has brought forward new insights into the technology-enabled doubling of farmers income. Each district has chosen distinctive approaches specific to prevailing agro-climatic situations, socio-economic limitations and market preferences. Sector-wise analysis has clearly brought out the contribution of field crops, horticulture, livestock, fisheries and supplementary enterprises to farmers' income in each district. The positive gains were visible across all land classes, including the landless category of rural households. The impact has been possible due to the total dedication and committed involvement of all the scientific, technical and administrative staff working in all the KVKs of Karnataka. The Nodal Officers for KVKs in the Directorate of Extension in UAS Bangalore, UAS Dharwad, UAS Raichur, KSNUAHS Shivamogga, KVAFSU Bidar and UHS Bagalkot are instrumental in monitoring and guiding the KVKs for proper planning, implementing and documenting the impact with respect to each farmer. The entire process of documentation was done objectively and systematically. The farmers and family members of the farm households deserve wholehearted appreciation for being part of the national mission to achieve doubling of income.

Editors



## List of Abbreviations

AAS	Atomic Absorption Spectrometer
AMC	Arka Microbial Consortium
ARC	Apical Root Cutting
ARYA	Attracting and Retaining Youth in Agriculture
ASCI	Agriculture Skill Council of India
ATARI	Agricultural Technology Application Research Institute
ATMA	Agricultural Technology Management Agency
CIFA	Central Institute of Freshwater Aquaculture
CMT	California Mastitis Test
DAESI	Diploma in Agricultural Extension Services for Input Dealers
DFI	Doubling Farmers Income
DSR	Direct Seeded Rice
EDP	Entrepreneurship Development Programme
EPN	Entamo Pathogenic Nematode
eSAP	Electronic Solutions against Agricultural Pests
FLD	Frontline Demonstration
FoCT	Friends of Coconut Tree
FPO	Farmer Producer Organization
FYM	Farm Yard Manure
GIFT	Genetically Improved Farmed Tilapia
HYV	High Yielding Variety
ICAR	Indian Council of Agricultural Research
ICM	Integrated Crop Management
ICT	Information and Communication Technology
IFS	Integrated Farming System
IIHR	Indian Institute of Horticultural Research
IISR	Indian Institute of Spices Research
IMD	Indian Meteorological Department
INM	Integrated Nutrient Management
IPDM	Integrated Pest and Disease Management
IPM	Integrated Pest Management

KAPC	Karnataka Agricultural Price Commission
KMF	Karnataka Milk Federation
KVAFSU	Karnataka Veterinary Animal and Fisheries Sciences University, Bidar
KVK	Krishi Vigyan Kendra
MANAGE	National Institute of Agricultural Extension Management
MPTs	Multi Purpose Trees
NABARD	National Bank for Agriculture and Rural Development
NATP	National Agriculture Technology Project
NGO	Non Governmental Organizations
NHM	National Horticulture Mission
NSA	Net Sown Area
ODOP	One District One Product
OFT	On Farm Trial
PMFME	Prime Minister Formalisation of Micro Food Processing Enterprises Scheme
PPVFRA	Protection of Plant Varieties and Farmers' Rights Authority
RKVY	Rashtriya Krishi Vikas Yojana
SAMETI	State Agriculture Management & Extension Training Institute
SCC	State Coordination Committee
SGSY	Swarnajayanti Gram Swarozgar Yojana
SNF	Solids-not-fat
SSI	System of Sugarcane Intensification
TBP	Tungabhadra Project
TC	Tissue Culture
UAHS / KSNUAHS	Keladi Shivappa Nayaka University of Agriculture and Horticultural Sciences, Shivamogga
UASB	University of Agricultural Sciences, Bengaluru
UASD	University of Agricultural Sciences, Dharwad
UASR	University of Agricultural Sciences, Raichur
UHS	University of Horticultural Sciences, Bagalkote
UMMB	Urea Molasses Mineral Block

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# Introduction

In India, the early agricultural development strategies focused primarily on raising agricultural output for attaining food security. The announcement for doubling farmers' income (DFI) by the Prime Minister of India on 28 February 2016, and its subsequent inclusion in the budget speech of the Union Finance Minister on 29 February 2016, propelled the momentum towards enhancing farmers' income. Since then, doubling farmers' income has been at the centre stage in the debates on agriculture. On 13 April 2016, the Government of India constituted a committee on DFI. The Inter-Ministerial Committee under the chair of Mr. Ashok Dalwai, Additional Secretary, Ministry of Agriculture and Farmers Welfare, Government of India examined issues related to farmers income and suggested a seven-point strategy: (i) enhancing production of crops and livestock through intensification; (ii) raising productivity through better management and irrigation; (iii) reducing cost of production through adoption of technologies and conventional practices; (iv) higher realization of net income through modern/ electronic marketing; (v) processing/value addition to farm produce; (vi) diversification into high-value crops; and (vii) adoption of supplementary agricultural/ non-agricultural enterprises backed by skill development programs. The government initiated several steps in this direction with a focus on intensification, diversification, shift from subsistence to commercialization and business orientation towards agro-based small-scale enterprises.

The Indian Council of Agricultural Research (ICAR), being the premier organization in the field of agricultural research, education and extension, initiated efforts to develop state-specific DFI strategy documents focusing on technologies, technology delivery mechanisms and market linkages. The State Coordination Committees (SCCs) were constituted under the chair of a Vice Chancellor of an Agricultural University in the State with a Director of an ICAR Institute as convener. The members of the SCC comprised all other Vice Chancellors and Directors of ICAR Institutes in the state, nominees from the Government of India, Department of Agriculture and Farmers Welfare, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Food Processing Industries and Ministry of Water Resources, and senior officers of the State Development Departments. Besides, representatives from CGIAR system, Commodity Boards and Farmer Organizations were co-opted as additional members as per the need. In devising the strategy, the SCCs took into consideration the agro-ecologies, natural resource endowments, land use and cropping patterns, productivity gaps, biotic and abiotic constraints, development indicators, infrastructure and government programs. The state-specific documents provided the roadmap for extension system to ensure delivery of technologies and good agricultural practices.



Towards achieving the goal of DFI, the ICAR utilized its vast network of Krishi Vigyan Kendras (KVKs). The KVKs constitute the widely acclaimed frontline extension system of ICAR. There are 33 KVKs in Karnataka, including two KVKs in each of the four larger districts viz., Belagavi, Vijayapura, Kalaburgi and Tumakuru. The KVKs are functioning under the administrative and technical supervision/guidance of ICAR Institutes, Agricultural Universities, Development Departments, Non-Government Organizations and other Institutions. Each KVK has a multidisciplinary team of specialists, an agricultural farm to demonstrate the latest agricultural technologies, demonstration units, need-based laboratories for providing the diagnostic services and communication infrastructure for extending advisory services. Farm and laboratory-based production units enable KVKs to make available seeds, plants and other inputs to facilitate adoption of new technologies. The KVK serves as a perfect platform for the convergence of all development departments and agencies towards science-led agricultural development in a district.

Agriculture, horticulture, livestock production, sericulture, supplementary enterprises, processing and value addition, and farm-based income generating activities formed the core interventions of the KVKs. Improved crop varieties, soil and water management practices,

low-cost and no-cost production technologies, eco-friendly and effective pest management strategies, farm mechanization, alternative crops and cropping patterns, integrated farming systems, low-cost processing technologies, intensive/semi-intensive livestock production, fisheries, and diversification into high-value crops like vegetables, fruits and flowers, were the major interventions. Small-scale processing and value addition, vermi-composting, mushroom production, nursery raising were promoted as per the needs and interests of the farming community.

The subject matter specialists in each KVK formulated and conducted capacity development programs at regular intervals to bridge the knowledge and skill gaps of farming communities and other stakeholders on relevant and important topics. KVKs worked with farmers, individually and collectively, at all stages of agricultural production and post-harvest management. KVKs enabled and supported farmers in procurement of inputs, grading, packaging and selling farm produce by linking them with specific agencies. KVKs extended incubation support and initial handholding to promote agri-entrepreneurship among rural youth. The laboratories, production units and farm resources available with the KVKs were shared in the incubation process to enable the budding entrepreneurs to build their enterprises.

Documentation of success stories was taken up to infuse confidence that doubling of farmers income is possible through technology adoption. Format was designed and shared with all the KVKs for creating database of successful farmers. Based on the individual farmer's data, the household income in 2020-21 has been compared with that of 2016-17 to know the extent of change in income and in its constituents. Annual net income during 2020-21 as well as during 2016-17 are estimated at nominal prices. Price effect because of higher minimum support price or enhancement in general prices is also there in the estimates. This document is based on the successful cases of 3648 farmers supported by 33 KVKs in the state.

The results justify that scientific knowledge, when integrated with farmers experience, can contribute significantly to the income enhancement process. The document is a tribute to all the hardworking farm families of the nation. It may be recalled that the farming sector was the only ray of hope for the livelihood amidst the rampaging COVID 19 pandemic that hit the economy hard. As part of the Platinum Jubilee celebrations of Independence, an attempt has been made to document successful farmers from across the country keeping 2016-17 as the benchmark year and 2020-21 as the impact year. Brief summary for the state as a whole is followed by the impact of each KVK are presented in this document.

# Karnataka State Summary



**K**arnataka state has a total of 86.81 lakh holdings spread across 118.05 lakh hectares of the operated area. Marginal and Small farmers account for 80.41 per cent of the total holdings operating 43.94 per cent of the total cultivated area. The gross cropped area was 120.59 lakh hectares. Out of the net area sown, the net irrigated area was 30.39 per cent. Food crops accounted for 77.20 per cent of the gross cropped area. Cereals accounted for 41.65 per cent whereas the share of oilseeds was 12.31 per cent and that of pulses was 21.15 per cent. Among cereals, maize accounted for the largest area of 27.86 per cent, followed by paddy 26.37 per cent, sorghum 17.86 per cent, and finger millet 17.01 per cent. In terms of percentage share of the irrigated area to the total area, sugarcane accounted for the highest



share followed by paddy. Karnataka is the leading state for horticulture crops with an area of 23.25 lakh hectare. Karnataka ranks first in area under plantation crops with 48.56 per cent of the area under horticulture crops. Vegetables occupy 20.64 per cent, fruit crops occupy 16.68 per cent and spices cover 12.81 per cent of the area. The total value of horticulture produce was worth Rs.46254 crores during 2019-20. Cashew, spices, small onion, small cucumber, coffee and processed products of horticulture were the major exported commodities from the state. Karnataka has rich resources under livestock with 84.69 lakh cattle, 29.85 lakh buffalo, 61.69 lakh goats, 110.51 lakh sheep and 594.95 lakh poultry birds. The state produces 7901000 tonnes of milk, 59994 lakh eggs and 253604 tonnes of meat annually.

The Indian Council of Agricultural Research has established Krishi Vigyan Kendras (KVKs) in the state to promote technology driven agricultural development. Out of 33 KVKs, 26 are with State Agricultural Universities (UAS Bengaluru, UAS Dharwad, UAS Raichur, UAS Bagalkot, UAHS Shivamogga and KVAFSU Bidar), two are with ICAR Institute (IIHR Bengaluru) and five are with Non-Government Organizations. As part of the national agenda of doubling farmers' income, the ICAR KVKs took up documentation of successful farmers who could enhance their income with the help and support of technological interventions by the KVKs. A brief summary of interventions made under different components is given below.

## **1. Sector-specific Interventions**

### **1.1 Field crops**

- Introduction of improved varieties of paddy viz., (Gangavathi Sona, RNR-15048, MAS-26, KHP 13 and KKP-5), direct seeding of rice (DSR), mechanical sowing and integrated crop management practices.
- Introduction of new varieties of finger-millet (ML-365, KMR-340, 630 and MR-6), sorghum (SPV-2217) and foxtail-millet (DHft-109-3).

- Integrated pest management (IPM) of fall armyworm in maize.
- Introduction of new pigeonpea varieties viz., BRG-3, 4, 5, GRG-811, TS-3R, BSMR-736 and intercropping in maize.
- Introduction of sugarcane variety VCF-517, adoption of nutrient management practices and biological control of root grub.
- Promotion of new groundnut varieties (GPBD-4, G2-52, DH-256, ICGV-03043, K-6 and KDG-128) and cultivation of groundnut in paddy fallows.
- Introduction of new varieties of chickpea (JAKI-9218 and BGD 111-1), greengram (DGGV-2, BGS-9), blackgram (LBG791), horsegram (PHG-9, CRIDA-18), safflower (PBNS-12), sunflower (KBSH 53, RFSH 1887) and soybean (DSb-21).
- Promotion of micro-nutrient and pest management in cotton.
- Promotion of intercropping in sugarcane, cotton, maize, pigeonpea and groundnut.
- Adoption of dryland production technologies such as compartment bunding, seed hardening/treatment with CaCl<sub>2</sub>, farm pond supported protective irrigation, improved pulses production technologies such as pulse-magic and nipping.

### **1.2 Horticultural crops**

- Introduction of new varieties/hybrids of chilli (Aka Kyathi and Arka Haritha), weed management and bio-intensive pest/disease management.
- Introduction of new hybrids of tomato (Arka Rakshak and Arka Abhed) and integrated pest/disease management practices.
- Promotion of new varieties of french bean (Arka Arjun, Sharat and Suidha).

- Nutrient management in coconut to reduce nut dropping.
- Banana disease management and foliar nutrition.
- Nutrient and disease management in arecanut and arecanut husk decomposition.
- Mango pest and disease management and mango-special as micro-nutrient supplement.
- Introduction of new onion varieties (Bhima Super and Bhima Shakti) and management of pests and diseases.
- Ginger rhizome rot management.
- Introduction of a new turmeric variety Pratibha and its processing at farm level for value addition.
- Promotion of new varieties of ridgegourd (Arka Prasan), okra (Arka Nikitha) and tuberose (Arka Prajwal).

### 1.3 Animal husbandry

- Promotion of balanced nutrition, area specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties (DHN-6, CoFS-29, 30, 31 Co-3, 4 and 5) and fodder seed production units.
- Introduction of breeds of backyard poultry (Swarnadhara), low cost incubation, hatchery units and feed supplementation with azolla.
- Cost-efficient nutrition management with locally prepared feed formulations.
- Semi-intensive and intensive sheep and goat farming and micro-nutrient supplementation and deworming practices.

### 1.4 Farm and non-farm enterprises

- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of fruits, plantation, and vegetable crops.
- Mulberry cultivation and silkworm rearing for cocoon production.
- Bee keeping for honey production and its value addition.
- Millet processing and value addition.
- Value addition direct and digital marketing strategies.
- Custom hiring of farm machinery and coconut climbing.
- The above interventions have enabled farmers to increase productivity, reduce cost of production, diversify and intensify cropping pattern of farming system and value to farm produce and realising better price in the market.

A brief summary of the impact on household income has been presented here.

## 2. Impact on household income

The data in Table 1 compares the household income before and after the interventions. The average income of farm household has more than doubled (2.47 times) between 2016-17 and 2020-21. The share of enterprises in household income, although small, the net enterprise income experienced nearly four-fold increase during this period. Livestock income increased by 3.1 times, consolidating its share in the household income to 11.26 per cent in 2020-21 from 8.98 per cent in 2016-17. Horticulture, the dominant source of household income, experienced 2.5 times increase in its contribution to household income.



**Table 1: Level and change in household income**

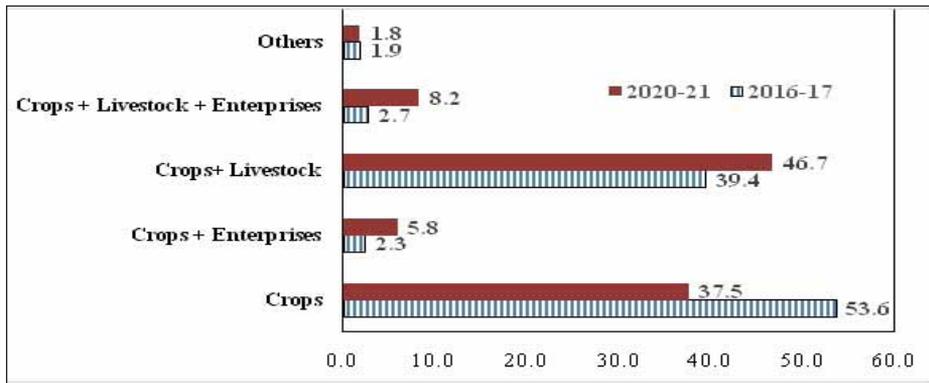
Crops and Enterprises	Net income (Rs/household at current prices)		% increase in income	% share in total income		% share in additional income
	2016-17	2020-21		2016-17	2020-21	
Field crops	78925	153727	94.78	30.65	24.17	19.76
Horticulture	144549	364361	152.07	56.13	57.28	58.06
Livestock	23104	71591	209.75	8.98	11.26	12.82
Fisheries	1921	7687	300.16	0.75	1.21	1.52
Farm and non-farm enterprises	8233	31801	330.38	3.49	6.08	7.84
<b>Overall</b>	<b>257512</b>	<b>636099</b>	<b>147.02</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions. However, the households at the bottom of land distribution benefitted relatively more. The income of the landless families increased 3.5 times and marginal and small farm households by 2.6 and 2.5 times, respectively. The medium and large farm households could realize 2.4 times increase in their household income (Table 2).

**Table 2: Income level and change in household income by land class**

Land class	No. of households	% share in total household	Income level (Rs/household at current prices)		% change in household income
			2016-17	2020-21	
Landless	20	0.55	78702	276401	251.20
Marginal (<1.0ha)	790	21.65	109268	286108	161.84
Small (1-2ha)	1479	40.54	175155	441184	151.88
Medium (2-4ha)	865	23.72	296934	721890	143.11
Large (>4ha)	494	13.54	679367	1643701	141.95
<b>Total</b>	<b>3648</b>	<b>100</b>	<b>257512</b>	<b>636099</b>	<b>147.02</b>

Change in household income could be attributed to shift from crops-based farming to (i) crops + livestock which increased from 39.4 per cent to 46.7 per cent household (ii) crops + livestock + enterprises increased from 2.7 per cent to 8.2 per cent and (iii) crops + enterprises increased from 2.3 per cent to 5.8 per cent household as compared to benchmark year. Technical advisories and support in the form of diagnostic services, critical inputs and timely visits provided by KVKs were largely responsible for the shift towards high-income activities.



**Fig.1: Change in choice of crops and enterprises by farmers (%) due to KVK interventions**

## 2. Lessons learnt

The analysis of the success stories offers four main lessons.

- To harness the potential of agricultural technologies, there is a need to strengthen its linkages with extension systems, the handholding of farmers in their applications, and the timely supply of quality inputs.
- Diversification of agriculture is essential for the rapid increase in farm income.
- At the same time, there is also a need to strengthen local agro-enterprises such as seed production, nursery raising, and custom-hiring services.
- Landless households mainly involved in animal husbandry and supplementary enterprises to augment their income.

## 3. Institutional and policy requirements for scaling-up of interventions

- **Improve farmers access to credit:** Technology uptake demands additional investments, which need to be provided by the financial institutions.
- **Improve access to information or extension services:** Farmers information needs are diverse. Hence, there is a need to design a single-window extension delivery system for the timely access of quality information.

- **Knowledge for capacity building:** Agriculture is becoming knowledge and information-intensive. New technologies and enterprises require skills. Hence, there is a need for continuous upgradation of skills of both extension personnel and farmers.
- **Agricultural diversification:** Diversification into high-value commodities is one of the important paths for sustainable and climate-resilient agriculture. There is a need to evolve location-specific product portfolios and strategies for the implementation.
- **Input management:** KVKs do advise input dealers and farmers on the new technologies and provide small quantities of seeds, planting material, bio-agents, and bio-pesticides to facilitate the initial uptake of technologies. For scaling up, linking FPOs with input suppliers for bulk procurement must be systematized.
- **Marketing:** The market plays a catalytic role in enhancing farmers income. Direct marketing approaches by FPOs, SHGs and cooperatives need to be scaled up. Digital and online marketing strategies are being useful even in remote areas. However, supporting internet connectivity infrastructure and capacity building need attention.





**Technological Opportunities  
for Increasing Farmers Income  
in Karnataka**

***District-wise Synthesis***



# BIDAR

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## About the district

**B**idar district is comprising eight taluks/blocks namely Aurad, Basavakalyan, Bidar, Bhalki, Chittguppa, Humanbad, Hulsoor and Kamalnagar. The district comprises of 621 villages under 175 gram panchayats six municipal limits and 36 hoblies. The area under



irrigation is 47,697 ha which about 11.83 per cent of the total cultivable land. Laterite soil comprises 51.06 per cent and black soil comprises 48.94 per cent. About 65 per cent of the working population depends mainly on agriculture has a net sown area of 374503 ha (69.31%) of which 78,108 ha are sown more than once.

Bidar district has the advantage of growing a variety of field and horticultural crops owing to its varied soil and climatic conditions. Traditionally crops like pigeonpea, greengram, blackgram, soybean, cowpea, groundnut, sunflower, sesamum etc. are grown under *kharif* rainfed situation. While under irrigated situation, the district is known for intensive cultivation of sugarcane, ginger and paddy. During *rabi* season crops like sorghum, chickpea, safflower and sunflower etc. are grown extensively while paddy and sugarcane under irrigation conditions. Besides fruit crops like mango, grapes, papaya, pomegranate, mosambi, banana, sapota and vegetables cabbage, onion, cauliflower and chilli are grown.

### About KVK Bidar

The financial support from the ICAR and strong technical support from ATARI Bangalore and the University of Agricultural Sciences, Raichur have been the strong pillars on which the KVK Bidar is working to achieve the goal of improving farmers livelihoods and farming in the district. ICAR-Krishi Vigyan Kendra, Bidar established during 1985, acting as a knowledge resource centre for the district. KVK Bidar is acting as instructional institute for the farmers with various demonstrations and production units like vermicompost and vermishash unit, compost unit, apiculture unit, rain and roof water harvesting structure, borewell recharge unit, dairy unit, goat unit, azolla production unit, mango-special production unit, nursery and guava mother plant block, hydroponics, bio-fuel unit, millets processing unit, seed hub project for seed production activities etc. In Bidar district, the soybean crop was introduced as new crop during 1990's through regular and constant efforts of KVK Bidar. Now it has occupied largest area in the district covering about 2.02 lakh ha and in the state in area. KVK has also succeeded in popularizing first elite varieties in pigeonpea (BSMR 736, ICP

8863 (Maruti), GRG-811 and GRG-152) greengram (Selection-4, BGS-9), blackgram (TAU-1, DU-1 and DBGV-5), soybean (JS-335 and Dsb-21), sugarcane (Co-86032, Co-671 and Co-94012), chickpea (Annigeri-1, JG-11, BGD-103, Jacki, GBM-2, NBeG-49, NBeG-3 and Kabooli), ginger (Maheem) and turmeric (IISR Prathiba).

Transplanting/dibbling method in pigeonpea, which was developed and popularized as Bidar technology, has spread to other states of the country. Use of pulse-magic in pigeonpea, nipping in pigeonpea, SSI method in sugarcane, IPM practices in pigeonpea and chickpea, raised bed planting method in ginger and micro-nutrient formulations such as ginger-rich, mango-special and vegetable-special were popularized. KVK Bidar trained the farmers in processing and packaging of millets. KVK Bidar also providing quality seeds of pigeonpea, greengram and chickpea through Seed Hub Project activity. KVK Bidar has adopted the new extension methodologies like rapid roving survey, online weekly series programme, KVK Krishi Patashale, Whats app groups, technology videos uploaded in KVK Youtube channel, other various social media and e-SAP which attracted the farmers towards KVK. Handholding support to many progressive farmers has helped them to bag district, state, national awards such as ICAR Haldar Organic Farmer Award, Plant Genome Saviour Farmer Award, Jagjivan Ram Abhinav Kisan Puraskar, Innovative Farmer Award and Fellow Farmer Award by IARI, etc. Further, KVK Bidar has bagged Zonal Best KVK Award during 2013-14.

## 1. Sector specific interventions by KVK Bidar

### 1.1 Field crops

- Introduction of new varieties in soybean viz. DSB-21 and JSS-335 has helped the farmers to realise assured yield.
- Replacing the local varieties with the improved varieties in greengram (BGS-9 and S-4), blackgram (DU-1, TAU-1 and DbGv-5), pigeonpea (BSMR-736 and GRG-811) and chickpea (BGD-103 and JG-11).
- Promotion of secondary micro-nutrient in particular the sulphur and micro-nutrient

like zinc and boron has augmented the quality and yield of soybean and other pulses like pigeonpea, chickpea, blackgram and greengram.

- Demonstration of eco-friendly IPM practices to manage the major pests in soybean, pigeonpea, chickpea, blackgram and greengram through different activities helped the farmers to reduce the cost of cultivation.
- The technologies like transplanting/dibbling in pigeonpea and dibbling in soybean and chickpea have helped reduce the seed cost and to maintain 100 per cent population of the crops.
- Nipping practice in pigeonpea is the farmer friendly technology to get more number of pods per plant.
- Use of micro-nutrient (pulse-magic and chickpea-magic) in soybean, pigeonpea, chickpea, blackgram and greengram has helped in bold grain and development increased the quality yield.
- Adoption of intercropping system in *kharif* and *rabi* season with suitable combination of crops contributed to increased productivity and income per unit area.
- Promotion of SSI method in sugarcane has increased the yield as it is helpful to maintain optimum population.
- Introduction of *in situ* vermi-composting has reduced the trash burning in sugarcane.
- Introduction of Swetha sesamum variety for summer season has benefited the farmers to realise more income per unit area.
- ICM practices in oilseeds crops viz., niger, sunflower, safflower, sesamum and linseed.

## 1.2 Horticultural crops

- Replacing the poor performing field crops

with high value vegetable crops like tomato, brinjal, chilli, okra and onion has helped to realise the doubling the farm income.

- Demonstration of micro-nutrient foliar spray (mango-special, vegetable -special and citrus-special) supported the farmers to harvest quality yield at low cost.
- Popularization of traps in fruits and vegetables attracted the farmers to adopt in larger area as a component of IPM practices.
- Introduction of sequence cropping system with short duration vegetable crops was useful in increasing farm income.
- Demonstration of elite varieties/hybrids in tomato (Arka Samrat and Arka Rakshak), chilli (Arka Harita), tuberose (Arka Nirantara and Arka Prajwal), okra (Arka Niketan), ridgegourd (Arka Prasanna), onion (Bheema Super and Bheema Shakti) and turmeric (IISR Prathibha).
- In ginger, replacing the local variety with Mahim and Maran, introduction of raised bed method of planting in paired row with appropriate size seed rhizome, correction of micro-nutrient through foliar spray with IISR ginger rich and IDM practices to manage the rhizome rot disease helped in achieving higher production and income.
- IPDM practices in papaya to manage the leaf curl and ring spot virus.
- Promotion of IPM in watermelon through farmers field school approach.

## 1.3 Animal husbandry

- Management of animal health and improving the quality as well as productivity of the milching animals through demonstration of integrated dairy management (CMT kit, rubber mats, mineral mixture and bypass fat).
- Establishment of cafeteria fodder crops (Hedge Lucern and Sesbenia) with



improved varieties (Super Napier, CoFs-29, CoFs-31 and Co-3) to overcome fodder security to the farm animals.

- Rearing of improved breeds (Goat-Sirohi, Cow-Deoni and Gir, Buffalo-Murrah) through capacity building.
- Encouraging the farmers to adopt balanced nutrient management through enrichment of the fodder, silage making, UMMB blocks and azolla.

#### 1.4 Fisheries

- Promotion of inland fish farming with improved breeds (Catla, Rohu, Mrigal and Common carp) using multi-layer fish farming through capacity building and demonstration activities.
- Started bio-floc fish farming through capacity building by KVK programmes.

#### 1.5 Farm and non-farm enterprises

- Seed production through seed hub specially pigeonpea, greengram and chickpea crops.
- Scientific production of compost and vermicompost through capacity building and method demonstrations.

- Encouraged the women members of SHG (Tridala) to get involved in income and employment generating activities viz., organised marketing of processed and value added millet products (kichidi mix, malt mix, roti mix, millet papads and millet sev).

### 2. Impact on household income

Table 3 depicts the data and information in the diversified areas of Bidar district with respect to doubling of farmer's income before and after the intervention of Krishi Vigyan Kendra. In field crops, farmer's income increased up to 98 per cent and share in additional income was 35 per cent. This is due to the use of technologies like ICM, IPM and introduction of new varieties etc. In horticultural crops, farmers income increased up to 341.81 per cent and the share in additional income was 44.42 percent. Apart from crops, farmers benefited with 253.57 percent increase in income by livestock with an additional income of 12.77 percent. KVK trained the women farmers who did not have the land, to involve in processing and value addition of millets, fruits and vegetables and have increased their income by 100 percent which led to additional income of 7.74 per cent. Therefore, the DFI farmers in total have increased their income by from 186.13 per cent.

**Table 3: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	125467	248737	98.25	66.44	46.03	35.07
Horticulture	45685	201839	341.81	24.19	37.35	44.42
Livestock	17698	62572	253.57	9.37	11.58	12.77
Farm and non-farm enterprises	0	27207	100.00	0.00	5.04	7.74
<b>Overall</b>	<b>188850</b>	<b>540356</b>	<b>186.13</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Among the benefited farm households, small farmers accounted for 50.45 percent land class large farmers (>4ha) accounted 6.31 percent. The percent change in household income was highest (210.59%), small farmers (1 to 2 ha) followed by medium farmers (197.78%). Large farmers (>4 ha) recorded minimum (127.16%) increase in household income (Table 4).

**Table 4: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	19	17.12	116699	298966	156.19
Small (1-2 ha)	56	50.45	174015	540479	210.59
Medium (2-4 ha)	29	26.13	175163	521607	197.78
Large (>4 ha)	7	6.31	560071	1272246	127.16
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>188850</b>	<b>540356</b>	<b>186.13</b>



**Sri Balaji Wadekar, Keroor village inland fishery unit**



**Srimant Patel, village Suntan, ICM in greengram**



**Sri Namdev Metre, Gogga village, Nursery unit**





# KALABURAGI-I

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## About the District

Kalaburagi is located in the northern part of the state and lies between latitude 17° 10' and 17° 45' and between longitude 76° 10' and 77° 45'. The district comprises seven taluks, 32 hoblies



and 220 gram panchayats. The geographical area of the district is 10.94 lakh ha. The net area sown is 8.68 lakh ha and having a cropping intensity of 114.39 per cent. About 1.24 lakh ha area is sown more than once. In the district, 0.91 lakh ha (8.32%) area is under irrigation. The remaining 7.77 lakh ha (91.68%) area is rainfed. The pulses are major crops of the district which occupies about 67 per cent followed by the cereals which contributes to 20.85 per cent, oilseeds are grown around 3.59 per cent, commercial crops 3.17 per cent and horticultural occupies 2.15 per cent of area. Among the pulses, pigeonpea occupies 63 per cent followed by the chickpea, which is about 25 per cent, the remaining 12 per cent area sown with greengram and blackgram. Kalaburagi is called as the pulse bowl of the state. Horticultural crops occupy 1.5 per cent of total area banana is the major crop of district. Kalaburagi is rich in livestock with 5,16,753 cattle, 1,18,740 buffalo, 1,01,973 sheep and highest goat population in state with 4,11,412. The poultry population in district 4,83,433. Annually 209 lakh tonnes milk produced in the district and egg production of 323 lakh per day.

### **About KVK Kalaburagi-I**

Though the mandates of Krishi Vigyan Kendra are well set, location-specific problems will be solved based on the requirement of the farming community of the district. Krishi Vigyan Kendra, Kalaburagi is one of the institutes which have been established under the aegis of University of Agricultural Sciences, Dharwad and functioning since the latter part of 1999, very recently it is functioning under UAS, Raichur from 2009. The Krishi Vigyan Kendra is involved in popularizing, developing, dissemination of technology, methods of social organization, improving ground timely management of weeds, diseases and insect pests, procuring inputs from right source and safe handling on a micro watershed base.

The Kendra has conducted a series of training programme both on and off campus for extension personnel, rural youth, practicing farmers and farm women. Krishi Vigyan Kendra, Kalaburagi involved

in disseminating the latest technologies through consultancy services viz., field visits, farmers visit to KVK, on phone through mail and mass media like radio talks, tips and TV programmes. The latest technologies will be documented and published in local languages through leaflets / folders and technical bulletins to meet the demands of local farmers.

## **1. Sector specific interventions by KVK Kalaburagi-I**

### **1.1 Field crops**

- Introduction of improved varieties of pigeonpea (GRG-152, GRG-811 and TS3R), chickpea (BGD-103 and Phule Vikram) and greengram (BGS-9).
- Seed hardening and use of bio-fertilizers.
- Different inter cropping systems in pigeonpea.
- Pulse-magic to enhance the yield of pulses.
- Nipping in pigeonpea and chickpea.
- Introduction of new varieties of foxtail-millet (HN-46), other millets and encourage processing and marketing.
- Introduction of sorghum varieties like GS-23 and SPV-2217.
- ICM technologies in cotton and sugarcane
- Introduction of sunflower hybrids (RSFH-700 and RSFH-1887) and safflower varieties (ISF-764 and PBNS-12).

### **1.2 Horticultural crops**

- Introduction of IHR released varieties of rose (Arka Savi and Arka Parimala), marigold (Arka Bangara-2, Arka Agni and Arka Abhi), crossandra (Arka Kanaka), guava (Arka Kiran), papaya (Arka Surya and Arka Prabhat), onion (Arka Kalyan), chilli (Arka Kyathi and Arka Meghana) and drumstick (Bhagya).
- Training and pruning technique in ridgegourd, tomato, guava, custard apple, grape, rose, marigold and chrysanthemum.

- Demonstration and promotion of banana-special, citrus-special, mango-special and vegetable-special for increasing yield and quality and introduction of technologies released from IIHR, Bengaluru.
- Capacity development programme conducted on pruning, nursery and dryland horticulture management.

### 1.3 Animal husbandry

- Upgradation of local non-descript female goats with Sirohi buck.
- Establishment of fodder cafeteria comprising of perennial leguminous and non-leguminous fodder crops viz., multicut fodder sorghum (CoFS-29, CoFS-31), super napier, lucerne and hedge lucerne.
- Balanced cattle feed formulation comprising of low cost locally available materials viz., crushed maize grains, wheat bran, cotton seed cake, mineral mixture and salt for increasing milk yield and fat.
- Suitable goat breeds like Sirohi or Jamunapari for semi intensive and or stall fed goat farming system.
- Demonstration and promotion of livestock supplementary fodder viz., azolla, hydroponics and solar hydroponics.
- Management of livestock disease (HS and BQ) by vaccination before onset of monsoon. Foot and mouth disease vaccination done twice in a year with a gap of six months.

- Demonstration and promotion of indigenous cow breeds like Gir, Sahiwal and or Deoni cows.
- Demonstration and promotion of improved backyard poultry varieties viz., Swarnadhara and Giriraja birds.

### 1.4 Farm and non-farm enterprises

- Seed production of pulses like GRG-811, greengram BGS-9 and sunflower RSFH-700, CoFS-29 and 31.
- Horticultural nursery for seedling of fruits, vegetables and other commercial crops.
- Vermicompost and worm production.
- Value addition of pulses and millets.
- Various extension activities like *minutenalli megha* and *mahiti* (Instant short message).

## 2. Impact on household income

Income of farm households, before and after the interventions, more than doubled (3.5 times) between 2016-17 and 2020-21 (Table 5). KVK Kalaburagi-I interventions on farm and non-farm enterprises also contributed to the household income. The income from livestock increased to 7.1 times and this sector consolidated its share in the household income to 15.06 per cent in 2020-21 from 7.65 per cent in 2016-17. Horticulture component experienced 5.4 times increase in income over benchmark year. It proved to be the dominant source of household income with contribution of 46.22 per cent to the additional income.

**Table 5: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	70329	142856	103.12	64.80	36.59	25.73
Horticulture	29905	160225	435.79	27.55	41.04	46.22
Livestock	8299	58814	608.72	7.65	15.06	17.92
Farm and non-farm enterprises	0	28564	100.00	0.00	7.32	10.13
<b>Overall</b>	<b>108532</b>	<b>390458</b>	<b>259.76</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>



Farmers from all land classes benefitted from the technical interventions (Table 6). However, the income of the marginal families increased 5.5 times (453.72%). Small and medium farm households were benefited by 4.3 and 4.0 times increased income respectively. Large farm households could realize 2.8 times increase in their household income.

**Table 6: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	11	10.00	38164	211318	453.72
Small (1-2 ha)	50	45.45	64708	276345	327.06
Medium (2-4 ha)	30	27.27	94813	383515	304.49
Large (>4 ha)	19	17.27	286261	805432	181.36
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>108532</b>	<b>390458</b>	<b>259.76</b>



**Capsicum cultivation in polyhouse**



**Cowpea and redgram intercropping**



**Full bloom chrysanthemum field**



**KVK scientist visitto dairy unit**

# KALABURAGI-II

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## About KVK Kalaburagi-II

Additional Krishi Vigyan Kendra in Kalaburgi district (KVK Kalaburgi-II) was established in January 2012 at the right side bank of Bhima river in Raddewadgi village, Jewargi taluk under the University of Agricultural Sciences, Raichur. The operational area covers three talukas (Jewargi, Chittapur and Sedam). For doubling the farmer income, KVK took up unique extension activities along with the support of technological interventions with the available facilities such as training hall with audio-visual aids, seed processing unit under seed hub project, soil, water and plant testing laboratory. Model IFS unit, farm pond lined with HDPE, shadenet and polyhouse nursery unit, sheep and goat rearing unit, transplanted pigeonpea, millet demonstration, fodder cafeteria unit and varietal demonstration of pigeonpea and chickpea are serving as demonstration and production units in the KVK farm. DAESI-Diploma in agricultural extension services for input dealers program, sponsored skill development program in the area of repair and maintenance of farm equipment, nursery production of various horticultural crops and marketing of fodder seeds are the other important flagship activities.

## 1. Sector specific interventions by KVK Kalaburagi-II

### 1.1 Field crops

- Introduction and promotion of new high yielding varieties in pigeonpea (GRG-811, GRG-152, BSMR-736 and TS-3R), greengram (BGS-9), blackgram (DU-1 and DBGV-5), chickpea (JG-11, BGD-103 and NBeG-47), sorghum (GS-23), foxtail-millet (HN-46), safflower (ISF-764) and wheat (UAS-304) rust resistant variety.
- Promotion of high yielding and insect pest and disease resistant varieties in groundnut (DH-256 and Kadiri Lepakshi).



- Introduction and promotion of summer greengram (TRCRM-147) and blackgram (TRCRU-22).
- Introduction of intercropping of pigeonpea with foxtail-millet (1:2), greengram (1:2), blackgram (1:2) and sunflower (1:1).
- Nipping technology and foliar application of pulse-magic in pigeonpea and chickpea.
- Demonstration of tractor operated cotton shredder for cotton crop residue management.
- Demonstration of compartment cum bund former for soil and water conservation.
- Demonstration of safe use of pesticide.
- Demonstration and promotion of post emergent herbicide application in sugarcane and pigeonpea.
- *In situ* green manuring of sunhemp and nutrient management in sugarcane.
- Nutrient and leaf reddening management in *Bt*-cotton.
- Integrated management of fall armyworm, *Spodoptera frugiperda* in sorghum.
- Integrated pest and disease management in *Bt*-cotton, groundnut, pigeonpea and early shoot borer in sugarcane.
- Integrated management of collar rot disease in groundnut and dry root rot in chickpea.
- Integrated crop management of sorghum, safflower, pigeonpea, chickpea, greengram and blackgram.
- Promotion of high yielding rose variety (Arka Savi).
- Demonstration and promotion of multicut variety in coriander (Arka Isha).
- Integrated crop management technologies in acid lime, chilli, watermelon, cucumber, ginger, garlic and banana.
- Promotion of bunch covering technology in banana.
- Demonstration of low cost onion storage structure for small farmers.
- Micro nutrient management in banana, acid lime and chilli.
- Integrated nutrient and disease management in betelvine.
- Integrated approach for the management of tomato leaf minor (*Tuta absoluta*).
- Integrated management of chilli murda complex disease.
- Demonstration of pruning and training technologies in guava, acid lime and mango.
- Integrated approach by using water traps and lures in management of brinjal shoot and fruit borer.
- Demonstration of seedling planter, mulching sheet whole maker and mulching cum bund maker in watermelon.
- Demonstration of nursery techniques in water melon and chilli.

## 1.2 Horticultural crops

- Introduction of new and suitable high yielding varieties in marigold (Arka Bangara-2) and okra (Arka Nikita and Arka Anamika).
- Promotion of season oriented new high yielding varieties in onion (Bhima Dark red, Bhima Kiran and Arka Niketana).

## 1.3 Animal husbandry

- Demonstration and promotion of high yielding fodder crops and varieties (Cofs-29 and 31, Hedge lucerne and Lucerne).
- Demonstration of stall fed rearing technique in goat and sheep.
- Ecto-parasite (ticks) management in cows and buffalos.
- Deworming techniques in sheep and goat.

- Demonstration and promotion of seasonal vaccination and animal health camps in cattle.
- Demonstration and promotion of silage and green fodder hey making.
- Introduction of new breeds of goats for stallfed rearing (Barberi, Sirohi and Jamunapuri).

#### 1.4 Farm and non-farm enterprises

- Production and supply of drumstick (Bhagya) and curry leaf (Suvasini) seedlings.
- Seed production of pulses.
- Demonstration of tree mulberry techniques for silkworm rearing for cocoon production.

- Bee keeping for honey production and its value addition.
- Millet processing and value addition.

#### 2. Impact on household income

Average income of farmers household income before and after interventions, more than doubled (2.69 times) between 2016-17 and 2020-21 (Table 7). The income from livestock increased 2.35 times. The horticulture component experienced 3.1 times increase in income over the benchmark year. The share of field crops in household income experienced 1.95 times increase during this period and proved to be the dominant source of household income with contribution of 75.39 per cent to the additional income.

**Table 7: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	153171	369633	141.32	90.12	80.87	75.39
Horticulture	15652	84767	441.58	9.21	18.54	24.07
Livestock	1142	2692	135.70	0.67	0.59	0.54
<b>Overall</b>	<b>169965</b>	<b>457091</b>	<b>168.93</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefited from the technical intervention (Table 8). However, the household at the middle of the land distribution (small holders) benefited relatively more. The income of the small families increased 2.99 times (199.86). The medium and marginal farm households were benefited by 2.68 and 2.62 times increased income, respectively. The large and landless farm households could realize 2.61 and 2.52 times increased income, respectively.



**Table 8: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	1	0.91	275000	694000	152.36
Marginal (<1.0 ha)	11	10.00	48982	128595	162.54
Small (1-2 ha)	45	40.91	68170	204412	199.86
Medium (2-4 ha)	29	26.36	128857	345937	168.47
Large (>4 ha)	24	21.82	461578	1205863	161.25
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>169965</b>	<b>457091</b>	<b>168.93</b>



**Sheep rearing unit**

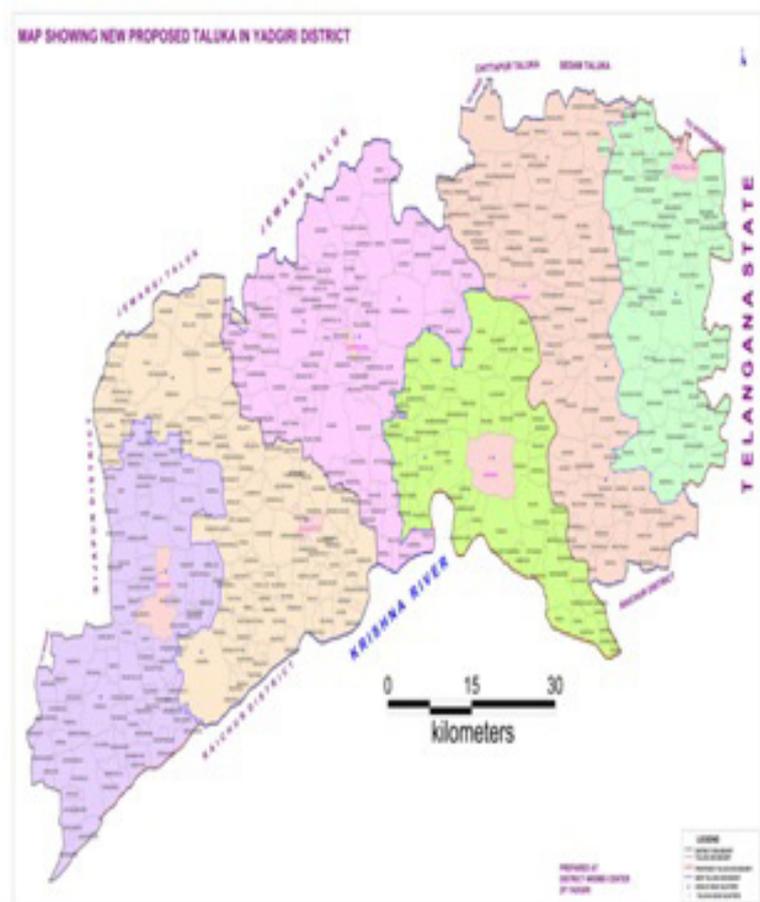


**Nipping operation in pigeonpea crop**

# YADGIR

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## About the district

Yadgir district lies in the northern plains of Karnataka and has semi-arid type of climate. It is predominantly an agricultural district divided into two agro climatic zones namely eastern



transition and north eastern dry zone. The zones indicate the predominance of rain dependent dryland agricultural area. The normal rainfall of the district is 810 mm. The net sown area in the district is 72.1 per cent of the total cultivable land area, which is 3239.1 square kilometers. The southwest monsoon sets in the middle of June and extends till the end of September. Bulk of the annual rainfall occurs during this season, which constitutes over 77 per cent of the annual rainfall. Rainfall occurs during the winter monsoon owing to north eastern monsoon. Dry climate prevails for most part of the year.

The major crops grown in the district are pigeonpea, cotton, paddy, groundnut, sorghum, greengram, blackgram. Among horticulture crops chilli, onion, pomegranate, papaya, dragon fruit and other vegetables crops. In terms of productivity the yields of principal crops is lesser than the state average. There are 36 lift irrigation schemes and 445 minor irrigation tanks in the district. Shahapur and Shorapur both taluks have full irrigation. Yadgir taluk has 65per cent irrigated area. Cattle, poultry, sheep, goats and buffaloes constitute the major livestock of the district. Though 18.73 per cent of men and 25.86 per cent of women are agricultural laborers, they do not have yearlong employment. There is also temporary migration of full families or male workers.

### **About KVK Yadgir**

ICAR KVK Yadgir was established in the year 2017 in Kawadimatti of Surpur taluk under University of Agricultural Sciences, Raichur. KVK is having 50 acres of irrigated land, administrative building and farmer's hostel. It includes demonstration plots of vegetables, pigeonpea, guava, mango and sapota. KVK produces fruit crop seedlings and supplies to the farmers. It has a slatted-floor sheep unit with 200 sheep capacity and a feed plant. The millet processing unit has been established for encouraging millet farmers. The KVK has developed demonstration plot of 16 fodder varieties and supplies root slips, fodder seeds and stem cuts of different varieties to farmers which helped to developed more than 500 acres of fodder land in the district. KVK has formed two farmers producing

organizations one on Millet farmers and other on Kenguri sheep farmers and giving technical support to two FPOs on horticulture crops.

## **1. Sector specific interventions by KVK Yadgir**

### **1.1 Field crops**

- Introduction of improved varieties of paddy (GNV-1089) for water saving and higher yield.
- Promotion of direct seeding of rice (DSR) and drum seeder for irrigation water management and integrated crop management (ICM) practices. Promotion of baler for paddy straw management.
- Introduction of new greengram variety BGS-9 for disease resistance and use of yellow sticky traps and pulse-magic for higher greengram yield.
- Promoted mechanical harvesting through combined harvester for time and labour management.
- Introduction of new pigeonpea varieties GRG-811 and GRG-152 for wilt and drought resistance and use of pheromone traps for pest management. Use of pulse-magic and nipping for increase in pigeonpea yield.
- Introduction of high yielding groundnut varieties K-1812 (Kadiri Lepakshi), DH-256, DH-86, GPBD 4 and KDG 128.
- Promotion of Integrated nutrient management, seed treatment, irrigation water management through sprinkler irrigation for increasing groundnut yield.
- Promotion of solar operated nipping machine and use of chickpea-magic for increasing chickpea yield.
- Management of pink bollworm (PBW) through use of pheromone traps and management of cotton reddening through use of zinc and magnesium sulphate.
- Promotion of tractor operated shredder for cotton plants management.

## 1.2 Horticultural crops

- Introduction of new varieties/hybrids of chilli (UARChH-43, BCH-42 and Arka Haritha).
- Promotion of yellow and blue sticky traps for sucking pest management.
- Promotion of vegetable-special and microbial consortium *Pseudomonas fluorescence* for increase in chilli yield and integrated pest management in chilli murda complex.
- Introduction of new hybrids of tomato (Arka Rakshak and Arka Abhed) and integrated pest and disease management practices.
- Management of ring spot virus through IPM and promotion of micro nutrient mixture for increasing papaya yield.
- Introduction of new varieties L-49 and Taiwan pink, integrated approaches for fruit fly and ICM in guava.
- Popularization of high yielding watermelon variety Arka Shama and use of plastic mulch for irrigation water and weed management.
- Promotion of fruit fly traps, pest and disease management, mango-special as micro-nutrient supplement, post-harvest management including safe ripening and marketing in mango.
- Introduction of new onion varieties (Bhima Kiran, Bhima Super and Bhima Shakti), ICM, and integrated pest/ diseases management.

## 1.3 Animal husbandry

- Promotion of fodder crops cultivation with improved varieties like CoFS 29, 31 and hedge lucerne, *Sesbania grandiflora*, super napier and *Styloxanthus haemata*.
- Established more than 500 acres of fodder cultivation in the district by providing quality fodder seeds and stem cuttings.

- Promotion of small scale silage making using plastic bags and drums for small ruminants.
- Technical support to semi-intensive and intensive sheep rearing continuous support and information regarding health management, feeding management and marketing.
- Introduction of Sirohi and Osmanabadi goat breeds in the district.
- Feed formulation and scientific feeding and health management of dairy buffaloes.
- Capacity development for the rural youths on scientific profitable sheep rearing, dairy farming and desi poultry birds rearing.
- Promotion and induction of Kenguri sheep rearing farmers producers company at Yadgir benefitting 300 farmers.

## 1.4 Fisheries

- Promotion of fish rearing in farm ponds.
- Introduction of improved varieties like all male tilapia and scientific feeding management.

## 1.5 Farm and non-farm enterprises

- Demonstration of laser land-leveling technology, baler for straw management, DSR and drum seeder for water management in paddy crop.
- Promotion of solar operated nipping machine and solar operated sprayer.
- Introduction of soil moisture indicators for irrigation water management in horticulture crops and vegetables.
- Promotion of compartment bund and summer ploughing for *in situ* soil moisture conservation.
- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of fruit, plantation and vegetable crops.



## 2. Impact on household income

Income of farm households, more than doubled (2.92 times) between 2016-17 and 2020-21 (Table 9). The share of enterprises in household income, although small it was added to the total income during this period. The average income from field crops was increased by 1.4 times. Income from fisheries was also a new venture in the district and income from livestock increased 7.6 times over benchmark year. Livestock sector consolidated its share in the household income to 17.30 per cent in 2020-21 from 6.69 per cent in 2016-17. Horticulture component experienced 6.2 times increase in income over benchmark year. It proved to be the dominant source of household income with contribution of 62.67 per cent to the additional income.

**Table 9: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	165633	225254	36.00	70.14	32.66	13.14
Horticulture	54731	338996	519.39	23.18	49.15	62.67
Livestock	15789	119340	655.87	6.69	17.30	22.83
Fisheries	0	4545	100.00	0.00	0.66	1.00
Farm and non-farm enterprises	0	1636	100.00	0.00	0.24	0.36
<b>Overall</b>	<b>236152</b>	<b>689772</b>	<b>192.09</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 10). The income of small households were benefitted by 3.5 (246.57%) and large farm households could realize 2.9 times increased income, respectively. Medium farm 2.8 times (178.05%) and marginal farmers increased 2.5 times (152.32%). increase in their household income, respectively.

**Table 10: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	12	10.91	76163	192170	152.32
Small (1-2 ha)	29	26.36	139416	483172	246.57
Medium (2-4 ha)	33	30.00	213494	593627	178.05
Large (>4 ha)	36	32.73	388178	1110200	186.00
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>236152</b>	<b>689772</b>	<b>192.09</b>



**Demonstration of Pheromone Trap for pink bollworm management in Cotton crop**



**Tractor operated baler for Paddy straw management**







The district is bestowed with varied soil resources comprising 57.6 per cent black and 42.4 per cent red soils. Within the black soils, 44.2 per cent is deep black soils followed by 41.6 per cent medium black and 14.2 per cent shallow soils. Among the red soils, 48.9 per cent area is constituted by loamy soils while remaining 51.1 per cent comprises of sandy soils. The soils are poor in nitrogen, phosphorous, zinc and iron but rich in potassium.

The district consists of 5 talukas, 37 hoblies, 168 gram panchayats and 878 villages. The irrigated area is 1,46,245 ha of which 1,22,277 ha are irrigated by canals, 2,615 ha through tanks, 15,177 ha through wells and 265 ha are irrigated by tube wells while another 5,911 ha are irrigated through other sources. The livestock population of the district is 19,45,315. The district receives very low and erratic precipitation with an average annual rainfall of 621 mm. Maximum rainfall occurs between June and September.

Traditionally crops like redgram, greengram, sorghum, groundnut, sunflower, bajra etc. are grown under rainfed situation in *kharif* season while under irrigated situation, intensive cultivation of paddy, cotton and chilli. During *rabiseason*, crops like sorghum, chickpea, sunflower etc. are grown extensively while groundnut, chilli and paddy are grown under irrigated conditions. Besides, in several pockets of the district, fruit crops like mango, sweet orange, papaya and sapota are grown. Cultivation of jasmine and crossandra has picked up of late. Raichur is known for sweet orange cultivation in the state.

### **About KVK Raichur**

KVK Raichur is one of such institute which has been established and functioning since the later part of 1994. Krishi Vigyan Kendra is located in zone VIII under the umbrella of University of Agricultural Sciences, Raichur. Since inception KVK Raichur has made remarkable achievements in the transfer of technology in an area of paddy, IPM cotton, sunflower, groundnut, chickpea, sorghum and horticulture crops. In this endower centre achieved remarkable success and bagged ICAR National Krishi Vigyan Kendra Award 2005-06.

With the main objective of transfer of technology, KVK is working in accordance with mandates. KVK has 20 ha of irrigated land for demonstration, well established administrative building in an area of 660 sq. mt. To serve the farming community soil and water testing laboratory, disease forecasting unit are established with the support of ICAR and NHM respectively. KIOSK and all season live museum at the centre to provide round the clock information. In order to disseminate information to large number farmers ICAR has sanctioned e-Linkage KVK. The Kendra has initiated need based SMS (Short Messages Service) service to farmer on regular basis. KVK is working in collaboration with line departments like Agriculture, Horticulture, Animal Husbandry, Zilla Panchayat, Department of Women and Child Welfare, NABARD, KMF, Watershed, Forestry and NGOs. KVK also provides technical back staff for the programmes like NHM, ATMA, SGSY, RKVY and others.

## **1. Sector specific Interventions by KVK Raichur**

### **1.1 Field crops**

- Integrated pest management in redgram, cotton, chilli, chickpea and paddy.
- Eco-friendly management using bio-pesticides, traps, bio-agent and mealing disruption technology through pheromone cluster demonstrations on integrated crop management in pulses and oilseeds. Specifically redgram, chickpea and blackgram under pulses, sunflower, mustard and groundnut under oilseeds.
- IPM in brinjal, IPDM in chilli, ridgegourd and cucumber.
- Introduction and demonstration high yielding short duration blast tolerant paddy varieties viz, RNR-15048, GNV-1089 and GVG-05-01, salinity tolerant variety GNV-1109 (threshold limit EC 11.0 dS/m) and necrosistolerant sunflower hybrid RSFH-1887 and RSFH-700
- Popularization of direct seed rice (DSR) during *kharif* season at tail end region of canals.

- Introduction and demonstration of high yielding foxtail-millet variety HN-46 in place of local variety (HMT-101).
- Introduction of legumes or oil seed crops, viz, cowpea, blackgram and mustard as paddy fallows.
- Introduction and demonstration of wild resistant pigeonpea variety TS-3-R and GRG-811 in *kharif* season followed by pulse-magic and nipping operation.
- Popularization of ICM technologies in different crops viz., pigeonpea, sunflower, cotton, chilli, paddy (*rabi*)sorghum, chickpea and groundnut.
- Popularization and demonstration of multicut fodder sorghum variety COFS-31.
- Popularization of different integrated farming system modules under rainfed and irrigated farming situation.
- Popularization of Soil test based integrated nutrient management practice and integrated pest management options in different crops as well as *in situ* soil moisture conservation practices for yield maximization as cost reduction.
- Sensitized farmwomen in developing nutri-herbal kitchen garden for year round nutritional securing among farm families.

### 1.2 Horticultural crops

- Introduction of new varieties/hybrids in chilli (Arka Harita and UAS RCH-42).
- Integrated pest and disease management with special preference to adoption of bio-intensive technologies.
- Population use of pheromone traps with community approach for management of pests in chilli, cucurbits, cotton, brinjal, tomato and mango.
- Nursery establishment and its management in vegetable seedling production.

- Promotion of good management practices in fruit crops (mango, papaya, pomegranate, lime and mosambi).
- Management of micro-nutrient deficiency through use of mango-special, vegetable-special and citrus-special.
- Promotion of new hybrids/varieties in onion (Arka Kalyan, Bhima super and Bhima dark red).
- Promotion of flower crop production (Marigold, Jasmine, Rose and Tuberose).

### 1.3 Animal husbandry

- Demonstration of Kenguri ramlamb fattening under stallfed system of rearing.
- Popularization of fodder bank with forage crops like leguminous and non-leguminous fodder crops.
- Popularization of high yielding perennial fodder crops in livestock like CoFS-29, CoFS-31, Hedge Lucerne, *Styloxanthus* and *Sesbenia grandiflora*.
- Up-gradation of local non-descriptive goats with Sirohi breed.
- Introduction of probiotics use for better health and growth pattern in calves, lambs and kids.
- Popularization of urea molasses mineral blacks, area-specific mineral mixture, feed and fodder management.
- Scientific fertilization practices, popularization of silage/azolla feeding and stress management among animals.
- Popularization of improved breeds of poultry (Giriraja and Swarnadhara), low-cost incubation and hatchery unit and feed supplementation with azolla.
- Promotion of goatery, sheep rearing, broiler farming and backyard poultry for supplementation of family income.
- Popularization of livestock based IFS.

### 1.4 Farm and non-farm enterprises

- Encouraging farmers to practice bee keeping as subsidiary enterprise.
- Vermiculture/vermicomposting training programmes conducted.
- Horticultural nursery for seedlings of fruit, plantation, vegetable and flower crops.
- Seed production of cereals, pulses, oilseeds and fodder crops.
- Bee keeping for honey production and its value addition.

- Millet processing and value addition.
- Custom hiring of farm machinery.

### 2. Impact on household income

The average income of farmer household was more than doubled (2.83 times) between 2016-17 and 2020-21 (Table 11). Income from fisheries increased enormously 37.8 followed by horticulture (2.98 times) and livestock (2.83 times). Horticulture is the dominant source of income contributing 48.44 per cent to the additional income. The horticulture has the major share in income during 2016-17 as well as during 2020-21.

**Table 11: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	165661	405596	144.83	34.17	29.55	27.03
Horticulture	217660	647711	197.58	44.89	47.19	48.44
Livestock	97572	276125	183.00	20.12	20.12	20.11
Fisheries	946	35748	3679.04	0.20	2.60	3.92
Farm and non-farm enterprises	3019	7404	145.26	0.62	0.54	0.49
<b>Overall</b>	<b>484859</b>	<b>1372584</b>	<b>183.09</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all classes of land holding were benefitted in Raichur district from technical intervention (Table 12). However, relatively higher benefit was observed in household of large and small land classes. The income of large farm household increased by 2.91 times (191.66%) followed by small farm household by 2.81 times and marginal landholders by 2.63 times. The least change in household income among different land classes was noticed in medium farmers recording 2.54 times.

**Table 12: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	15	13.51	160318	422175	163.34
Small (1-2 ha)	37	33.33	173011	487381	181.71
Medium (2-4 ha)	21	18.92	413625	1049572	153.75
Large (>4 ha)	38	34.23	955974	2788159	191.66
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>484859</b>	<b>1372584</b>	<b>183.09</b>



**Scientist interaction with farmers in mango orchard**



**High density guava orchard management**



**Scientific management of fish pond**



**Promotion of high yielding fodder varieties**



# KOPPAL

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## About the district

**K**oppal has a total of 4.18 lakh land holdings cultivating 5.52 lakh hectares with average land holding of 1.75 ha. It consists of seven talukas viz., Koppal, Gangavathi, Kushtagi, Yelburga, Kanakagiri,



Karatagi and Kukanoor. The gross cropped area was 4.33 lakh hectares. With 3.95 lakh ha of net area sown, the net irrigated area was 18.01 per cent. Food crops accounted for 23.78 per cent of the gross cropped area. Cereals accounted for 53.89 per cent of the gross cropped area, whereas the share of pulses (41.88%) and that of oilseeds (15.83%). Among cereals, maize accounted for the largest area (19.82%), followed by paddy (17.38%), pearl-millet (8.88%) and sorghum (5.99%). Koppal district is contributing (10.30%) of state paddy production alone and consider as a rice bowl of Karnataka. Koppal is also one of the leading districts for horticulture crops with an area of 0.42 lakh ha and 39.67 per cent of total cultivable area. Koppal is also rich in livestock with 2.60 lakh cattle, 0.77 lakh buffalo, 1.56 lakh goats, 5.47 lakh sheep and 35.34 lakh poultry birds.

### About KVK Koppal

KVK was established in the year 2004 and is functioning under University of Agricultural Sciences, Raichur. KVK is undertaking quality seed production of promising varieties, production of quality planting material, vermicompost, micro-nutrient mixture to meet out the demand of the farming community in the district along with establishment of soil and water testing laboratory.

To implement the mandate effectively, the following activities are envisaged for each KVK

- On-farm testing to assess the location specificity of agricultural technologies under various farming systems.
- 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.
- To work 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 to farmers.
- In addition, KVK organize frontline extension activities, identify and document selected farm innovations and converge with ongoing schemes and programs within the mandate of KVK.

## 1. Sector specific interventions by KVK Koppal

### 1.1 Field crops

- Promotion of improved of paddy varieties like GNV10-89 for saline soils, RPBio-226 BPH tolerance and high yielding GNV-1109, Tungabhadra Sona and RNR-15048 in 25,000 hectares of TBP area.
- Promotion of direct seeding of paddy, mechanical transplanting and integrated crop management practices in paddy.
- Increased returns by marketing of organically cultivated paddy.
- Nipping technology practices in pigeonpea and chickpea and use of pulse-magic and chick pea-magic increased 15 to 20 per cent yield.
- Area spread of millets with new high yielding varieties of foxtail-millet (SiA-2644, HN-46 and DHFt-109-3), little-millet (DHLM 36-3), barnyard-millet (DHBM 93-3), kodo-millet (RK-390-25) and brown top-millet (HBr-2).
- Introduction of new varieties of chickpea (BGD 103 and JG-11), greengram (BGS 9), blackgram (DBGV-5 and DU-1) and sunflower (KBSH 53 and RFSH 1887).
- Eco-friendly pest management by using of pheromone traps and bio-pesticides reduces the cost of cultivation in paddy and maize.
- Integrated pest management (IPM) of fall armyworm in maize and gall midge in paddy.

## 1.2 Horticultural crops

- Integrated nutrient management in important vegetable crops of the district viz; onion, tomato, chilli, brinjal, ridgegourd, bittergourd, okra and cabbage
- Integrated nutrient management in important in mango, banana, grape, guava, sapota, pomegranate and acid lime
- Micro-nutrient management by Arka vegetable-special in crops like onion, tomato, chilli, ridgegourd, and cabbage.
- Micro-nutrient management in mango and banana to reduce fruit dropping and fruit splitting.
- IPDM in mango, banana, guava, grape, tomato, chilli, onion, gourds, brinjal and okra.
- Crop diversification in drumstick cultivation and cultivation of new plantation crop cocoa.
- Cultivation of IHR tuberose variety Arka Prajwal and marigold variety Arka Bangara-2.
- Cultivation of high yielding okra hybrids Arka Wichita and variety Phule Vimukta.
- Value addition of grapes through raisin making.

## 1.3 Animal husbandry

- Adopted non-conventional feed ingredients like azolla on wet basis with helped 10 to 30 per cent commercial feed replacement in backyard and commercial poultry farming.
- Introduction progesterone coated nano-particles for augmenting fertility in dairy buffaloes and cows.
- Introduction of fodder block combination of grass, cereal and legume crop to provide the balanced feed ration (Hybrid/super Napier, Multicut sorghum CoFs-29/31,

Hedge lucerne and Sesbania) and also encourage to become entrepreneur in fodder seed production.

- Introduction of breeds of backyard poultry (Aseel and Kadaknath), low-cost incubation and hatchery unit and feed supplementation with azolla.
- Promotion of balanced nutrition, area-specific mineral mixture, species specific mineral mixture for small ruminants and clean milk production practices in dairy animals.
- Cost-efficient nutrition management with locally-prepared feed formulations.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation and deworming practices.
- Encouragements to dairy start up with indigenous animals like Sahiwal and Gir due to high demand for A<sub>2</sub> milk.

## 1.4 Fisheries

- Promotion of short duration, high value fish farming by introducing tilapia, Pangasius and amur carp in farm ponds.

## 1.5 Farm and non-farm enterprises

- Millet processing, value addition and direct and digital marketing strategies.
- Oyster mushroom cultivation.
- Value addition to flax seeds and groundnut (Laddu and chutney powder) and direct marketing strategies.
- Custom hiring of farm machinery and thresher.
- Promotion of nutrition garden.
- Value addition to lemon and tamarind (pickles chutney and tamarind candy).
- Value addition to Sugandi banana (flour and roti).



- Promotion of traditional paddy toranasas alternate income enterprises.
- Promotion of beekeeping and vermicomposting.

## 2. Impact on household income

The average income of farm households involved in the survey was more than doubled (2.63 times) between 2016-17 and 2020-21 (Table 13). Income

from fisheries is an additional as it was zero during 2016-17. Income from livestock increased 6.7 times from Rs. 12865 to Rs. 86931 households. Livestock sector consolidated its share in the household income to 18.93 per cent in 2020-21 from 7.37 per cent in 2016-17. Horticulture component experienced 3.1 times increase in income over benchmark year. It proved to be the higher source of household income with contribution of 38.60 per cent to the additional income.

**Table 13: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	109256	191782	75.53	62.56	41.76	28.99
Horticulture	52102	161991	210.91	29.84	35.27	38.60
Livestock	12865	86931	575.70	7.37	18.93	26.02
Fisheries	0	1081	100.00	0.00	0.24	0.38
Farm and non-farm enterprises	405	17515	4220.44	0.23	3.81	6.01
<b>Overall</b>	<b>174628</b>	<b>459300</b>	<b>163.02</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Although all land classes benefitted from the technical interventions (Table 14). However, the households at the bottom of land distribution benefitted relatively more. Marginal and medium farm households were benefitted by 3.7 and 3.2 times increased income, respectively. The small and large farm households could realize 3.1 and 2.2 times increase in their household income.

**Table 14: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	17	15.32	34012	127543	274.99
Small (1-2 ha)	35	31.53	91156	282033	209.39
Medium (2-4 ha)	35	31.53	124860	402396	222.28
Large (>4 ha)	24	21.62	468540	1035793	121.07
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>174628</b>	<b>459300</b>	<b>163.02</b>



**Demonstration on bee-keeping**



**Scientists visit to tuberose field**



**Scientist with farmer in paddy field**



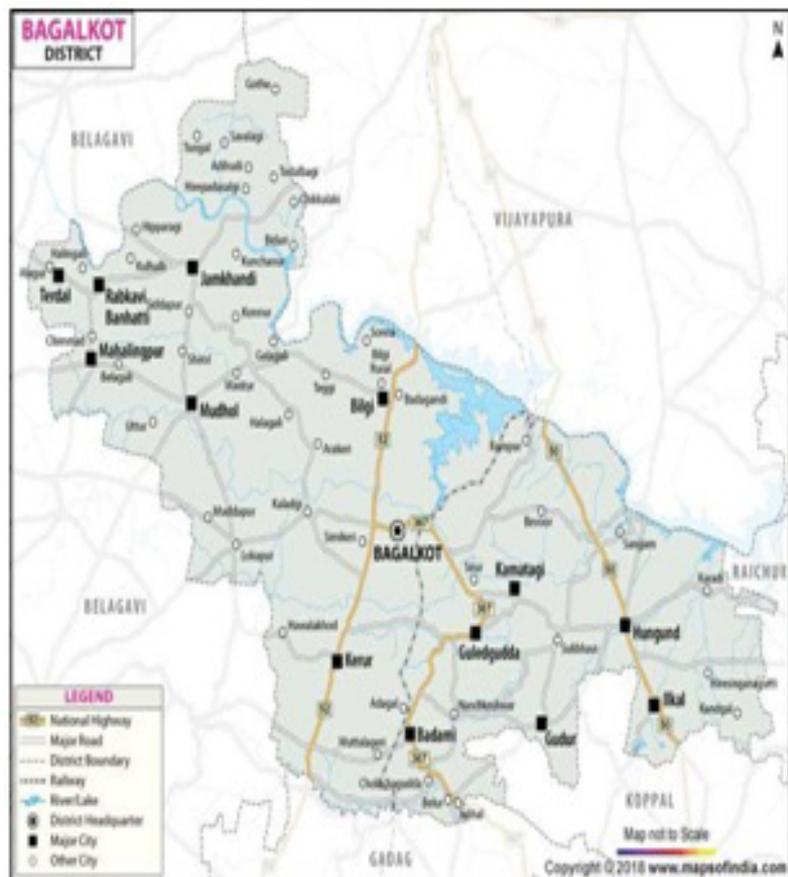
**Checking the insects trap in chickpea plot**



# BAGALKOTE

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## About the district

Bagalkote is the 15<sup>th</sup> most populous district in Karnataka. It has an agro climatic condition that supports crop production, horticulture, forest produce, animal husbandry and fisheries and thus is conducive



for development of agro-based industries. Fairly well distributed rainfall offers a longer crop-growing period. The important rivers flowing in the district are Krishna, Ghataprabha and Malaprabha, which are the main source of irrigation. Alamatti Dam is major reservoir, and due to its backwaters, the recharge of the groundwater has increased substantially in the district. Agriculture is the largest employer in Bagalkote, with over 65 per cent of the working population engaged in it.

The district has a total of 6,58,777 ha geographical area of which 4,69,783 ha is net sown area (71.3%). There are 2.27 lakh farmers in Bagalkot, of which 80 per cent are small and marginal farmers. Sorghum (38.30%), maize (32.23%), wheat (16.96%) and bajra (12.47%) occupy a total of 2,01,250 ha under cereals. Chickpea (54%), pigeonpea (31.89%) and greengram (11.7%) are the major crops under pulses (2,08,344 ha). Oilseeds occupy a total of 61,347 ha of sunflower (52.16%) occupies major area followed by groundnut (41.20%). Among commercial crops sugarcane is cultivated in an area of 1,55,241 ha (including planted and ratoon cane) with a productivity of 93.75 t/ha. Among horticulture crops grapes (33.20%), pomegranate (28.50%), and banana (20.32%), occupy major area followed by sapota (5.94%), watermelon (3.74%), guava (3.23%) and lemon. Vegetables occupy 76,616 ha, major crop being onion cultivated in an area of 31,356 ha (40.92%). Among vegetables chilli (3.56%), tomato (1.26%) and leafy vegetables (1.25%) are cultivated. As per 2012 livestock census, district possesses 2,79,415 cattle, 2,34,802 buffaloes, 7,33,600 sheep, 3,24,741 goat, 33,467 pigs and 13,72,196 poultry birds.

### About KVK Bagalkot

ICAR-Krishi Vigyan Kendra under University of Agricultural Sciences, Dharwad, is functioning in the district since 2005. KVK has played pivotal role in introducing advanced technologies/varieties in agriculture, horticulture, animal husbandry, which has resulted in enhancing farmers income. Along with KVK interventions, facilities available with development departments have resulted in doubling farmers income. Successfully adopted interventions are summarized in following paragraphs.

## 1. Sector specific interventions by KVK Bagalkot

### 1.1 Field crops

- Introduction of improved varieties in groundnut Dh-256, chickpea JAKI-9218, JG-14, BGD-111-1, greengram DGGV-2, pigeonpea TS-3R, GRG-811 and seed production in pulses under seed hub.
- Root grub management, striga management, nutrient management, pre and post-emergent weed management, water management (drip and sprinkler) and intercropping in sugarcane.
- *In situ* green manuring, mechanised harvesting, inter-cropping with pulses, trash decomposition techniques in sugarcane for reduced use of nitrogenous fertilizers.
- Fall armyworm management in maize and sorghum.
- Introduction of sweet corn and expansion of area under sunflower.
- Balanced and judicious use of fertilizers, use of proper seed rate and use of quality seeds in pulses and oilseeds.
- Seed treatment with bio-agents spraying, bio-agents for disease management and micro-nutrient management in agricultural crops.
- Inter cropping and mixed cropping in oilseed, pulses and cereals.
- Integrated pest management and disease management in field crops.
- Introduction of agro-forestry with sandal wood, teak and mahagani as additional source of income.

### 1.2 Horticultural crops

- Pre and post emergent weed management, introduction of variety Bhima super and management of twisting disease in onion.

- Crop diversification in horticulture crops.
- Contract farming in marigold, watermelon, muskmelon and papaya.
- Use of bio-agents for seed treatment, enriching vermi compost drenching with bio-agents and soil application in different horticulture crops.
- Seed production of brinjal, drumstick, and nursery raising in horticulture crops.
- Gaillardia flower production and intercropping in orchards and forest species.
- Pest disease and nutrient management in turmeric, papaya, pomegranate, banana, capsicum, lime and coconut.
- Improved pruning method in different horticulture crops.
- Use of Arka vegetable-special, citrus-special, banana-special and microbial consortia in horticultural crops.
- Use of light traps and solar traps for pest management in different crops.

### 1.3 Animal husbandry

- Introduction and expansion of sheep and goat units with location specific breeds.
- Introduction of silage making, fodder varieties and tree fodder varieties.
- Management of mastitis, introduction of vaccination and disease management in cattle, sheep and goat.
- Lamb fattening and calf fattening.
- Nutrition management, disease management and scientific dairying.

- Clean milk production.

### 1.4 Fisheries

- Introduction of fisheries in convergence with department of fisheries in farm pond (Inland fisheries), training and exposure.

### 1.5 Farm and non-farm enterprises

- Value addition to wheat, ragi, turmeric, sorghum, dicoccum wheat and blackgram.
- Direct marketing and marketing at farm gate.
- Introduction of nutri-garden and multi-storey cropping system.
- Introduction of mulberry for silkworm and fodder.
- Buyback system for cotton seed and lint and marigold.
- Nursery for seedlings, fruits and vegetable crops.

## 2. Impact on household income

The average income of farm families has intervention increased more than double (Table 15). The share of fisheries enterprise in household income, although small, experienced huge increase during reporting period. Livestock, farm and nonfarm enterprises contributed to 2.72 and 2.66 times increase in income, respectively. The field crops contributed to doubling income to the extent of 2.15 times. It was evident from the Table 15 that, there was decline in field crops in percentage share in total income from 46.84 to 42.47. While, contribution from horticulture, livestock and fisheries was in increasing trend.

**Table 15: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	248283	534474	115.27	46.84	42.47	39.30
Horticulture	212280	525803	147.69	40.05	41.78	43.05
Livestock	57557	156985	172.75	10.86	12.48	13.65
Fisheries	45	9386	20550.01	0.01	0.75	1.28
Farm and non-farm enterprises	11909	31705	166.22	2.25	2.52	2.72
<b>Overall</b>	<b>530074</b>	<b>1258353</b>	<b>137.39</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all classes of landholdings got benefitted from the interventions. However, farmers in small, marginal and medium land holding size category benefitted better than landless and large farmers (Table 16). The income of small, marginal and medium farmers increased by 2.7 times (170.02%), 2.67 times (167.48%) and 2.52 times (151.80%), respectively. While the income of large farmers increased by 2.25 times (128.48%) and that of landless farmers increased to 2.25 times (125.38%).

**Table 16: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	1	0.91	327000	737000	125.38
Marginal (<1.0 ha)	9	8.18	127527	341116	167.49
Small (1-2 ha)	23	20.91	223349	603082	170.02
Medium (2-4 ha)	36	32.73	312531	786946	151.80
Large (>4 ha)	41	37.27	986470	2253924	128.48
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>530074</b>	<b>1258353</b>	<b>137.39</b>



**KVK scientist with farmer in chickpea field**



**KVK scientist interaction with onion farmer**

# VIJAYAPURA-I

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ICAR-Krishi Vigyan Kendra, Vijayapura-I



## About the district

Vijayapura is one of the largest district in Karnataka with 10541 sq. km. area covering 5.49 per cent of the State. It falls under the agro-climatic zone of Northern dry zone-3 of Karnataka state. Vijayapura



district consists of five talukas namely Vijayapura, Basavan Bagewadi, Indi, Muddebihal and Sindagi. Agriculture is a major sector in the district economy which provides employment to a large proportion of predominantly rural people. The gross cropped area is 9,14,880 ha and the net cropped area is 830084 ha (79 %). Area sown more than once is 84796 ha and the cropping intensity worked out is 110 per cent.

*Rabi* crops are predominantly grown, covering about 56 per cent of the total sown area. The important *rabi* crops grown are *rabi* sorghum, chickpea, safflower and wheat. Using well irrigation, fruit crops like banana, grapes, pomegranate and lime are grown extensively. If favorable early *kharif* monsoon rains are received, the medium black soils are put under double cropping. Greengram, groundnut and sunflower are grown in the *kharif* season. In canal irrigated command areas, double cropping is in vogue. In black soils, hybrid cotton, maize, sunflower and pulses are grown in the *kharif* season followed by sorghum, chickpea, wheat and sunflower in *rabi* summer. In irrigated red soils, hybrid cotton, groundnut, maize and pulses are grown in *kharif* season followed by sunflower, maize, wheat and groundnut.

### About KVK Vijayapura-I

ICAR-Krishi Vigyan Kendra (KVK), Vijayapura, was established in the year 2004. The mandate of KVK is technology assessment and demonstration for its application and capacity development. To implement the mandate effectively, the following activities are envisaged such as on-farm testing to assess the location specificity of agricultural technologies under various farming systems. 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, work 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, providing farm advisories using ICT and other media means on varied subjects of interest to farmers. In addition,

KVK produces quality technological products (seed, planting material, bio-agents, value added products) and makes it available to farmers, organizes frontline extension activities, special training programmes, identifies and documents selected farm innovations and converge with ongoing schemes and programs within the mandate of KVK. KVK has developed 50 acres of land as an "Instructional Farm" for imparting skill and knowledge on the principle of "Learning by Doing" and "Seeing is believing". In this farm, there is rain water harvesting unit, crop cafeteria, orchard, poly house, nursery, silvi pasture, Agri-horti system, fodder cafeteria, hydroponics unit, goatary unit, dairy unit, poultry unit, vermicompost unit, tailoring unit, nutri-garden, terrace garden, kitchen garden and seed production farm. It has also implemented laser land leveling technology in seven acres of land and organic farming technology in 4 acres. There is well equipped Soil and Water Testing Laboratory with Automatic Absorption Spectrometer (AAS) for analyzing major and micro nutrients to serve the farming community. It also has agriculture museum wherein the technologies released by the University of Agricultural Sciences have been displayed. Apart from this, there is also a well-furnished training hall with all necessary audio-visual aids facility.

Major achievements of KVK Vijayapura are wider row spacing in Bajra and Sunflower. Bacterial blight management in pomegranate. TS-3R variety in Redgram, JG-11 variety in chickpea, Single eye bud planting method in sugarcane (SSI), Onion – *Rabi* Jowar relay cropping system, ICM in Irrigated Wheat (UAS-304), compartment bunding in black soils, introduction of new perennial fodder crop hybrid napier Co-5, promotion of vermicompost production, skill development trainings for rural youth, special trainings, value addition, soil and water testing laboratory.

## 1. Sector specific interventions by KVK Vijayapura-I

### 1.1 Field crops

- Introduction of improved varieties of sorghum viz., CSV-29 R, SPV-2217, Phule Revati, and integrated crop management practices.

- Introduction of new varieties of wheat viz., UAS-334, UAS-304 and integrated crop management practices.
- Integrated pest management of fall armyworm and biological control of root grub in maize.
- Adoption of wider row spacing technology in bajra for moisture conservation.
- Introduction of new pigeonpea varieties viz., TS3R, GRG-811, GRG-152, BSMR-736 and integrated crop management practices.
- Introduction of new varieties of chickpea viz., JAKI-9218, BGD-111-1 and JG-11, greengram (DGGV-2) and sunflower (RFSH-1887).
- Adoption of nutrient management practices, striga management and biological control of root grub in sugarcane.
- Promotion of a new groundnut varieties viz., GPBD-4, G2-52 and integrated crop management practices.
- Promotion of ICM and IPM in cotton.
- Adoption of dryland production technologies such as compartment bunding, seed hardening/treatment with  $\text{CaCl}_2$  and farm pond supported protective irrigation.
- Improved pulses production technologies such as use of pulse-magic and nipping.
- Promotion of banana-special for enhancing yield potentiality in banana crop.
- Promotion of vegetable-special in different vegetables for enhancing yield.
- Integrated pest and disease management in grape and pomegranate.
- Lime pest and disease management, citrus-special as micro-nutrient supplement, post-harvest management and value addition.
- Introduction of new onion varieties (Bhima Super, Bhima Shakti and Arka Lalima) and management of pests and diseases.
- Promotion of solar traps for the management of fruit sucking moth in pomegranate.
- Promotion of methyl eugenol fruit fly traps, yellow and blue sticky traps for pest management in fruit and vegetable crops.
- Promotion of bio-agents viz., *Trichoderma*, *Pseudomonas*, *Paecilomyces* for management of disease in fruit crops.

## 1.2 Horticultural crops

- Introduction of new varieties/hybrids of chilli (Arka Kyathi and Arka Meghana) and bio-intensive pest/disease management.
- Introduction of new hybrids of tomato (Arka Rakshak) and integrated pest and disease management practices.
- Introduction of new hybrids of marigold (Arka Bangar-1 and Arka Bangar-2).

## 1.3 Animal husbandry

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties viz., DHN 6, CoFS-29, 31 and Co-5 and fodder seed production units.
- Introduction of breeds of backyard poultry (Swarnadhara), low-cost incubation and hatchery units and feed supplementation with azolla.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation and deworming practices.

## 1.4 Fisheries

- Promotion of aquaculture in farm pond by introduction of new fingerlings viz. Rohu and common carp.



### 1.5 Farm and non-farm enterprises

- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of fruit crops.
- Bee keeping for honey production and its value addition.
- Millet processing and value addition.
- Value addition to lime.
- Promotion of nutri-garden.

## 2. Impact on Household Income

The average income of farm households, before

and after the interventions, has more than doubled (1.47 times) between 2016-17 and 2020-21 (Table 17). The share of enterprises in household income, although small, experienced 2.71 times increase during this period. Income from fisheries has increased 3.45 times and from livestock 3.5 times. Livestock sector consolidated its share in the household income to 14.14 per cent in 2020-21 from 9.80 percent in 2016-17. Horticulture component experienced 2.6 times increase in income over benchmark year. It is proved to be the dominant source of household income with contribution of 53.01 per cent to the additional income.

**Table 17: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	114538	218130	90.44	41.28	31.74	25.28
Horticulture	135743	352977	160.03	48.92	51.36	53.01
Livestock	27201	97193	257.31	9.80	14.14	17.08
Fisheries	0	345	100.00	0.00	0.05	0.08
Farm and non-farm enterprises	0	18622	100.00	0.00	2.71	4.54
<b>Overall</b>	<b>277482</b>	<b>687267</b>	<b>147.68</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes are benefitted from the technical interventions (Table 18). However, the households at the bottom of land distribution benefitted relatively more. Marginal and Small farm households were benefitted by 2.6 and 2.5 times increased income, respectively. The medium and large farm households could realize 2.3 and 2.4 times increase in their household income respectively.

**Table 18: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	19	17.27	72242	188053	160.31
Small (1-2 ha)	34	30.91	193512	494637	155.61
Medium (2-4 ha)	28	25.45	238434	571543	139.71
Large (>4 ha)	29	26.36	548100	1351915	146.65
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>277482</b>	<b>687267</b>	<b>147.68</b>



**Demonstration of Arka Kyati and Arka Meghana chilli hybrids**



**Compartment bund machine demonstration**



**Demonstration of scientific method of vermicomposting**



**Rabi sorghum CSV 29R in the farmer field**



# VIJAYAPURA-II

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ICAR-Krishi Vigyan Kendra, Vijayapura-II

## About KVK Vijayapura-II

ICAR-Krishi Vigyan Kendra, Vijayapura-II was established at Indi in September 2016. KVK has developed 54-acre farm within short time as an instructional farm for imparting skill and knowledge to farmers. KVK is involved in pigeonpea seed production during *kharif* and chickpea and sorghum seed production during *rabi*. Every year KVK has made availability of around 50-60 quintals TS-3R certified seeds to the farmers. KVK has Osmanabadi goats and practical demonstration on different management practices. KVK has poultry breeds like Swarnadhara, D.P cross for educating farmers on poultry farming. KVK has horticulture orchard composing of guava, sapota and pomegranate plants. KVK has fishpond of size 80"x70" with Rohu, Catla, Common carp/Amur fishes. KVK has eight vermicompost production units, azolla production unit and citrus-special production unit. KVK has newly established soil and water testing laboratory under NMSA scheme.

As part of the national agenda of doubling farmer's income, the ICAR KVK Vijayapura-II took up documentation of successful farmers who have enhanced their income with the help and support of technological interventions given by the KVK. A brief summary of interventions, the impact in terms of household income under different components, and the change in income for different land-class categories is given below

## 1. Sector specific interventions by ICAR-KVK Vijayapura-II

### 1.1 Field crops

- Introduction of improved varieties of pigeonpea viz., TS-3R, GRG-811; application of pulse-magic (mixture of micro-nutrients and PGPR), nipping techniques and integrated pest and disease management (IPDM) practices.



- Introduction of improved varieties of chickpea viz., JAKI-9218, JG-11, BGD-111-1 and NBeG-47; application of chickpea-magic spray (mixture of micro-nutrients and PGPR), nipping techniques and integrated pest and diseases management (IPDM) practices.
- Integrated pest management (IPM) for fall armyworm in maize and micro-nutrient ( $\text{FeSO}_4$  and  $\text{ZnSO}_4$ ) application in maize.
- Leaf reddening and pink boll worm management in cotton.
- Introduction of high yielding varieties groundnut(G2-52) and gypsum application in groundnut.
- Introduction of wheat variety like UAS-304, UAS-375 and dicoccum wheat variety DDK-1029.
- Introduction of sunflower new hybrids viz., RSFH – 1887 and KBSH-53.

### 1.3 Horticultural crops

- Baharandmicro-nutrient management, promotion of citrus-special and IPDM in lime.
- Management of shoot borer and promotion of grape special ingrape
- Introduction of season-specific high yielding variety Bhima Super for *kharif* and late *kharif* and Bhima Shakti for *rabi* season in onion.
- Promotion of vegetable -special application in all vegetables.
- Introduction of new varieties/hybrids of chilli (Arka Kyathi and Arka Meghana), IPDM practices, root-knot nematode management and demonstration of integrated management of chilli murda complex.
- Introduction of new hybrids of tomato (Arka Samrat) and application of AMC.
- Introduction of new varieties in Ajwain like AA-1 and A-93.

- Foliar application of boron in watermelon.
- Promotion of new varieties of ridgegourd (Arka Prasan) and okra (Arka Nikitha).

### 1.4 Animal husbandry

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties viz., DHN-6, CoFS-31, Co-5; Lucerne fodder and introduction of silage making.
- Introduction of breeds of backyard poultry (Swarnadhara)and feed supplementation with azolla.
- Skill training on scientific goat and poultry farming.
- Promotion of feed formulation for dairy animals.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation and deworming practices.

### 1.5 Farm and non-farm enterprises

- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of lime.
- Millet processing and value addition.
- Vermicompost production.

## 2. Impact on household income

The average income of farm households after the interventions has doubled (2.60 times) between 2016-17 and 2020-21 (Table 19). The share of enterprises in household income, although small, experienced 1.1 times increase during this period. Livestock sector consolidated its share in the household income to 11.37 per cent in 2020-21 from 9.74 per cent in 2016-17. Horticulture component experienced 2.80 times increase in income over benchmark year and it has proved to be the dominant source of household income with contribution of 55.88 per cent to the additional income.

**Table 19: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	124293	283602	128.17	39.12	34.28	31.26
Horticulture	159315	444038	178.72	50.16	53.68	55.88
Livestock	30957	94015	203.70	9.74	11.37	12.38
Fisheries	00	2072	0.00	00	0.25	0.41
Farm and non-farm enterprises	3113	3465	11.31	0.98	0.42	0.07
<b>Overall</b>	<b>317678</b>	<b>827192</b>	<b>124.38</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes were benefitted from the technical interventions (Table 20). However, the households at the bottom of land distribution benefitted relatively more compared to other higher land holdings. The marginal and small farm households were benefitted by 2.6 and 2.7 times increase in income respectively. The medium and large farm households could realize 2.5 times increase in their household income during the period 2020-21 compared to benchmark.

**Table 20: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	01	0.90	109268	286108	161.84
Small (1-2 ha)	18	16.22	153615	411144	167.65
Medium (2-4 ha)	58	52.25	295449	736537	149.29
Large (>4 ha)	34	30.63	535072	1361724	154.50
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>218680</b>	<b>559102</b>	<b>126.66</b>



**Demonstration of new variety of groundnut**



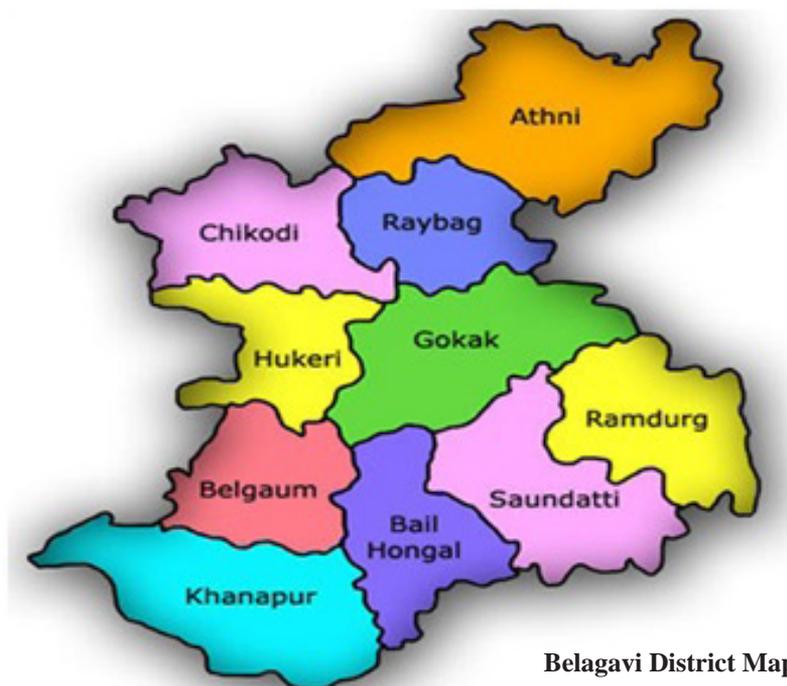
**Scientist discussion with farmers in lime orchard**



# BELAGAVI-I

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ICAR-Krishi VigyanKendra, Belagavi-I





## About the district

Belagavi district is the largest in Karnataka with 13,445sq.kms. The district comprises of three agro climatic zones namely Hilly Zone, Northern Transition Zone and Northern Dry Zone. Rainfall pattern ranges from 2468mm in hilly zone to 278mm in dry zone which. The district has different soil types like deep clack soil, medium black soil, red sandy soil, late rite and red loam soil. Hence, the district offers much diversified agriculture scenario and cropping pattern. Geographically the district consists of total 13.44 lakh ha area in which 14.1 per cent is forest area (1.90 lakhs) and net cultivated area includes 46.5% which translates to 6.53 lakh hectare.

Cereal crop cover an area of 3.96 lakh hectare and 1.88 lakh hectares under pulses, which collectively contribute to 50 per cent of the total area sown in the district. Sugarcane is the major contributor to the economy of the district grown in an area of 2.06 lakh ha which covers 20 per cent cropped area and there are 24 sugarcane factories the district with sugar production of 11.93 lakh MTs. Horticulture crops covers of 53,622 hectare out of which vegetables accounted for 68 per cent the total horticulture area and fruit crops in 21 per cent. Indigenous cattle population is 70 per cent and 30 per cent is cross breed cattle with total cattle population of 5.92 lakh, 8.29 lakh buffalos, 7.88 lakh sheep, 4.91 lakh goats, 27.4 lakh poultry and 719 fishing tanks in the district.

## About KVK Belagavi-I

The ICAR KVK has established Krishi Vigyan Kendra (KVK) at Tukkanatti, Gokak-taluk, Belagavi district in the year 1995. KVK has been training farmers, farm women, unemployed rural youth and extension workers working in the village level. The KVK has the expertise in the areas of agronomy, horticulture, plant protection, entrepreneurship development, income generating, institution building and on all aspects of animal husbandry, fisheries and home science. Sugarcane being the major crop of all taluks, maize, soybean, wheat, chickpea, groundnut, vegetables, animal husbandry and fisheries are the other major crop and enterprise of this jurisdiction.

## 1. Sector specific interventions by KVK Belagavi-I

### 1.1 Field crops

- IPM measures for stem borer and fall army worm in maize.
- High yielding varieties in *rabi* sorghum like SPV-2217 and BGV-44.
- Varieties for higher productivity in wheat namely DWR-165, DWR-225 and UAS-334.
- TS-3R varieties of pigeonpea and ICM measures have contributed to the higher production.
- Introduction of JAKI-9218 and GBM-2 varieties of chickpea and large area cluster demonstration with integrated crop management.
- Varietal demonstration of soybean varieties like JS-335, DSB-21 with IPM measures.
- Bio-intensification of soybean with pigeonpea
- Introduction of varieties in groundnut like TGLPS-3, ICGV-06184 and GPBD-4 with INM measures.

### 1.2 Horticultural crops

- Introduction of turmeric varieties like IISR-Pratibha, IISR-Pragati and Pitambar.
- IPM in turmeric for leaf spot and rhizome rot.
- IPM in green chilli for fungal and bacterial wilt, murda complex, fruit borer and powdery mildew.
- Introduction of disease resistant hybrids like Arka Abhed and Arka Rakshak along with ICM measures.
- Integrated pest management in brinjal for nematode infestation, sucking pests and shoot borers.
- IPM and INM measures in cabbage for diamond black moth and *Spodoptera*.
- High-density mango and guava plantation with proper package of practice.

- IPM in banana for sigatoka leaf spot disease.
- INM in banana through fertigation and bunch feeding.
- Nematode and Uzi fly controlling measures in sericulture.

### 1.3 Animal husbandry

- Integrated health management in dairy animals.
- Integrated health management in goat and sheep.
- Silage making using sugarcane top and maize.
- Area specific mineral mixture for dairy animals.
- Different fodder crops for balanced nutrition for ruminants.

### 1.4 Fisheries

- Introduction of fast-growing species like Pangasius, GIFT Tilapia, Amur common carp and Roopchand.
- Fish seed nursery production and fingerling production for higher productivity.
- Pelleted feeding for balanced nutrition in fish farming.
- Modified cost-effective aeration through

solar power operated system

- EDP in value addition of fishes and fish seed production.

### 1.5 Farm and non-farm enterprises

- Cost reduction through solar operated nipping machine in chickpea
- Millet processing (roti making) to enhance the income.
- EDP in groundnut oil extraction and groundnut value added products.
- Nutri-garden for nutritional security of farm families.

## 2. Impact on household income

KVK interventions have contributed significantly to magnify the income of farmers. Field crops recorded 127.41 per cent increase in income. The maximum increase in income realised from horticulture to the tune of 317.62 per cent and animal husbandry have performed well compared to base year. Dairy being the major component, realised the gain of 181.04 per cent. Meanwhile, farm and non-farm enterprises like sericulture, value addition of farm produce and nursery production have found 207.63 per cent growth. Overall, field crops contributed 46 per cent to the increase in income and horticulture (32.24%) was the second highest contributor in doubling the income of the farmers of Belagavi district (Table 21).

**Table 21: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	129382	294233	127.41	62.68	52.11	46.02
Horticulture	36362	151858	317.62	17.62	26.90	32.24
Livestock	29716	83512	181.04	14.40	14.79	15.02
Fisheries	0	1307	100.00	0.00	0.23	0.36
Farm and non-farm enterprises	10954	33696	207.63	5.31	5.97	6.35
<b>Overall</b>	<b>206413</b>	<b>564606</b>	<b>173.53</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

The study on doubling the farmers income shown that income of the large farmer has raised to 191.4 per cent where medium and marginal farmers income raised to 182.56 per cent and 179.55 per cent respectively. Although small farmer's household income raised to 155 per cent increase in household income is relatively low. Poor access to infrastructure like irrigation, farm machineries, and credit facilities are limiting the rate of increase in income (Table 22).

**Table 22: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	32	28.83	123847	346216	179.55
Small (1-2 ha)	44	39.64	185735	475160	155.83
Medium (2-4 ha)	30	27.03	267919	757043	182.56
Large (>4 ha)	5	4.50	547776	1594808	191.14
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>206413</b>	<b>564606</b>	<b>173.53</b>



**Demonstration of blackgram DBGV-5 variety**



**Fish rearing in farm pond**



**Scientists visit to sorghum demonstration plot**

# BELAGAVI-II

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## About KVK Belagavi-II

The additional KVK for Belagavi district ICAR-Krishi Vigyan Kendra Belagavi-II was established on 30 September 2011. KVK is located on Belagavi-Raichur state highway (SH-20), 28 km away from Belagavi city. The operational area of the KVK includes Belagavi, Bailhongal, Ramdurg, Savadatti and Khanapur taluks. KVK has demonstrated dry land horticulture, agro-forestry, seed production blocks, automated fertigation unit, vermicompost units etc., demo units in an area of 63 acres to educate farmers for getting remunerative income for sustaining their livelihood. KVK has made its presence felt amongst farming community and built up an excellent rapport with various line departments and stakeholders based on its mandate. The vision of the KVK is 'Take it to the Farmers' to ensure their livelihood security through sustainable agriculture. KVK is disseminating knowledge to promote agriculture and allied sectors for enhancing the farm productivity for increasing the income of the farmers. As part of doubling farmers income KVK has introduced number of technological interventions on various field and horticulture crops, animal husbandry and non-farm enterprises. The following interventions have created impact towards enhancement of farm income in the region.

### 1. Sector specific interventions by KVK Belagavi –II

#### 1.1 Field crops

- Introduction of improved varieties in cereals: paddy (RNR-15048 and MGD-03), *rabi* sorghum (SPV-2217) and wheat (UAS-304).
- Demonstration of high yielding varieties in pulses: greengram (DGGV-2) and chickpea (Jaki 9218 and BGD 111-1).
- Promotion of promising varieties in oilseeds: groundnut (GPBD-4 and G2-52) and soybean (Dsb-21, Dsb-23, KDS-753 and KDS-726).



- Promotion of intercropping systems sugarcane+onion, sugarcane+chilli, sugarcane + soybean and cotton+soybean.
- Integrated crop management practices in maize and *Bt.* cotton.
- Soil test based integrated nutrient management in sugarcane and maize.
- Promotion of micro-nutrient mixtures like pulse-magic and chickpea-magic.
- Integrated pest management (IPM) of fall armyworm in maize, *rabi* sorghum and pinkbollworm in *Bt.* cotton.
- Promotion of bio-pesticide (*Metarhizium anisopliae*) for management of white grub in sugarcane.
- Eco-friendly pest management using pheromone traps in maize, *rabi* sorghum and soybean.
- Integrated farming system for sustainable income.

## 1.2 Horticultural crops

- Introduction of new variety Bhima Super in onion and Arka Prasan in ridgegourd.
- Introduction of new hybrid in okra (Arka Nikita) and tomato (Arka Samrat).
- Integrated crop management practices in chilli, carrot, onion, tomato, ridgegourd, bitter gourd, cabbage and watermelon.
- Integrated nutrient management in onion and garlic.
- Promotion of chrysanthemum and capsicum under protected cultivation.
- Introduction of banana as crop diversification and its integrated crop management.
- Promotion of fruit fly traps in mango orchards.
- Crop diversification with rose and tuberose.

- Integrated pest and disease management in banana, mango, cabbage, ridgegourd and bitter gourd.
- Promotion of micro-nutrient mixtures like vegetable, banana and mango-special.

## 1.3 Animal husbandry

- Promotion of fodder production.
- Promotion of scientific goat and poultry rearing.
- Integrated dairy management for sustainable milk production.
- Promotion of clean milk production, use of area specific mineral mixture and bypass fat in dairy animals.

## 1.4 Fisheries

- Promotion of inland fish farming

## 1.5 Farm and non-farm enterprises

- Promotion of seed production of improved varieties of soybean (DSb-21, KDS-753 and KDS-726), greengram (DGGV-2), chickpea (JAKI-9218 and BGD-111-1), *rabi* sorghum (SPV-2217) and onion (Bhima Super).
- Horticulture nursery for vegetable seedling production.
- Promotion of solar operated nipping machine in chickpea.
- Promotion of organic jaggery production.
- Value addition of mango and lime for pickle making, branding and marketing.
- Promotion of apiary for honey production.

## 2. Impact on household income

It is evident from Table 23 that the results of technology interventions, proved that the average household income of the farm families increased during 2020-21 as compared to the benchmark year 2016-17. Household income of the farm families increased 313.68 per cent from horticulture crops,

303.84 per cent from livestock and 156.08 per cent field crops. Enhanced income was realized by the farmers who adopted entrepreneurial activities (627%). The major share for doubling farmers income was contributed from field crops (65%) and horticulture crops (22%) as additional income.

**Table 23: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	129147	330715	156.08	80.67	70.43	65.13
Horticulture	21837	90337	313.68	13.64	19.24	22.13
Livestock	5588	22567	303.84	3.49	4.81	5.49
Fisheries	0	364	100.00	0.00	0.08	0.12
Farm and non-farm enterprises	3517	25572	627.00	2.20	5.45	7.13
<b>Overall</b>	<b>160090</b>	<b>469554</b>	<b>193.31</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Income of farmers from all land holding classes were benefited from the KVK interventions. Fifty eight per cent of the benefitted farmers were under small and medium class of land holding and their income has been increased significantly (217.7% and 207.5%). Marginal and large farmers experienced increased household income by 189.8 per cent and 175.9 per cent respectively (Table 24).

**Table 24: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	25	22.73	61882	179389	189.89
Small (1-2 ha)	44	40.00	86394	274504	217.74
Medium (2-4 ha)	20	18.18	198901	611713	207.55
Large (>4 ha)	21	19.09	394452	1088278	175.90
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>160090</b>	<b>469554</b>	<b>193.31</b>



**Demonstration of onion variety Bhima Super**



**Onion seed production for enhancement of farmers income**



**Demonstrating the pheromone trap in soybean**



**Observation on tillers in paddy**



**Demonstration of IPDM in Cabbage**



**Eco-friendly management of pests in maize**

# DHARWAD

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## About the district

**D**harwad district is situated in the western sector of the northern half of Karnataka State. The district has three distinct agro-climatic zones viz., Northern dry zone-3 and Northern transitional zone-8 and



hilly zone-9 with five talukas viz., Dharwad, Hubli, Kalaghatagi, Kundagol and Navalgund. On the agricultural front, the presence of black soil helps in raising crops like cotton, wheat, sorghum and oilseeds. The major *kharif* crops are soybean, greengram, blackgram, cotton, chilli, onion, sugarcane and groundnut. The major *rabi* crops are sorghum, wheat, chickpea etc., supporting enterprises like dairy, sheep and goat are also flourishing. Chickpea occupies highest area of 85477 ha. Sorghum is cultivated in the area of 49073 ha, soybean occupies an area of 34554 ha and cotton occupies an area of 53005 ha. In horticulture crops, major area is covered by red chilli with an area of 46514 ha, onion with an area of 24627 ha and mango 9018 ha area. Dharwad district is self-sufficient in milk production and there is much scope for poultry, small ruminants and fisheries.

### About KVK Dharwad

ICAR KVK Dharwad was established during 2004 under the administrative centre of University of Agricultural Sciences Dharwad. The center has full-fledged human resource, infrastructure and technological backstopping to meet the needs of district farmers. The KVK farm is used to demonstrate the latest agricultural technologies and undertake trials before their transfer to the fields of farmers. Various demonstration units like azolla unit, vermicompost unit horticulture nursery production unit, integrated fish cum poultry unit, food-processing unit, and various crop demonstrations are established in the farm to provide first-hand information to the farmers.

## 1. Sector specific interventions by KVK Dharwad

### 1.1 Field crops

- Introduction of improved varieties of oilseeds viz., groundnut (GPBD-4, G2-52 and Dh-256), soybean (DSb-21) and integrated crop management practices.
- Introduction of improved varieties of pulses viz., greengram (DGGV-2 and IPM-02-14), blackgram (DU-1) and chickpea (JG-11,

JAKI-9218 and BGD-111-1) and integrated crop management (ICM) practices.

- Introduction of improved varieties of cereals viz., paddy (Mugad Siriand Abhilasha) sorghum (SPV-2217), wheat (UAS-304, UAS-375 and UAS-446) and integrated crop management practices.
- Introduction of new varieties of millets viz., little-millet (DHLM-36-3), foxtail-millet (DHft-109-3) and integrated crop management practices.
- Integrated pest management (IPM) of fall armyworm in maize.
- Management of pink bollworm (*Pectinophora gossypiella*) in Bt.Cotton.
- Mechanical harvesting techniques in greengram and chickpea.
- Enhancing productivity and profitability of cotton based intercropping system (cotton+peas).

### 1.2 Horticultural crops

- Integrated crop management in mango (Alphanso), guava (L-49), onion (Bhima Super), chilli (Byadagi varieties) and turmeric (Salem).
- Demonstration of late *kharif* onion variety Bhima Super, management of pests and diseases.
- Integrated nutrient management in guava with special reference to bronzing.
- Integrated pest (kajji bug, fruit fly) management in guava.
- Vegetable crop production under mulching technique.
- Integrated pest management in tomato pin worm (*Tuta absoluta*).
- Mango pest and disease management, mango-special as micro-nutrient supplement, post-harvest management including safe ripening and marketing.

- Weed management and bio-intensive pest/disease management in flower crops like chrysanthemum, marigold, jasmine and rose.
- Introduction of intercropping system in horticulture crops (mango+radish+palak, mango+maize, mango+marigold, mango+soybean and guava+onion).
- Introduction of multi storied cropping system (arecanut+pepper).
- Introduction of high valued crops in protected cultivation (western cucumber).

### 1.3 Animal husbandry

- Promotion of balanced nutrition and clean milk production practices in dairy animals.
- Promotion of fodder varieties DHN-6, CoFS-29, Lucerne, RL-88, Anand-2 and drumstick
- Introduction of breeds of backyard poultry (Swarnadhara, Kadaknath and Giriraja), low-cost incubation and hatchery unit and feed supplementation with azolla.
- Integrated dairy management.
- Nutrient supplementation and deworming practices in sheep and goat.
- Introduction of sheep and goat breeds (Tellicherry, Boer, Dorper and Sirohi)
- Promotion of integration of sheep and goat cum poultry farming.

### 1.4 Fisheries

- Promotion of composite inland fisheries (Catla, Rohu, Common Carp) in farm pond.
- Introduction of improved breeds of fish (Amur).

### 1.5 Farm and non-farm enterprises

- Demonstration of foxtail-millet and vermicelli as an entrepreneurial activity.

- Demonstration on nutrition garden to ensure nutritional security in schools, and household level.
- Millet processing and value addition.
- Seed production of pulses (greengram, blackgram and chickpea) and onion.
- Vermicompost production technology.
- Mulberry cultivation and silkworm rearing for cocoon production.
- Introduction of low cost onion grader for highermarketprice.
- Horticultural nursery for seedlings of fruit, plantation and vegetable crops.
- Introduction of nipping machine in chickpea for higher yield.
- Awareness on onion storage structure.
- Introduction of low cost traps (yellow sticky trap, fruit fly trap) for pest management in fruits and vegetables.

## 2. Impact on household income

The average income of farm households has more than doubled (2.35 times) between 2016-17 and 2020-21 (Table 25). The share of enterprises in household income, although small, experienced 32.69 times increase during this period. Income from fisheries was an additional bonus for them as farm ponds were never used for fishery activity earlier. Livestock sector consolidated its share in the household income. Horticulture component experienced 2.60 times increase in income over benchmark year and it contributed 35.52 per cent to the total additional income next, to field crops (41.98%).

**Table 25: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	178341	349883	96.19	59.24	49.31	41.98
Horticulture	90245	235383	160.83	29.98	33.17	35.52
Livestock	31459	90465	187.57	10.45	12.75	14.44
Fisheries	0	1773	100.00	0.00	0.25	0.43
Farm and non-farm enterprises	982	32111	3169.45	0.33	4.53	7.62
<b>Overall</b>	<b>301026</b>	<b>709615</b>	<b>135.73</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 26). However, the households of small and marginal land holdings were benefitted to the maximum extent. Marginal and small farm households were benefitted by 2.52 and 2.56 times increased income, respectively. The medium and large farm households could realize 146.40 per cent and 124.55 per cent increase in their household income.

**Table 26: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	19	16.96	141125	356300	152.47
Small (1-2 ha)	20	17.86	168782	433546	156.87
Medium (2-4 ha)	37	33.04	238868	588566	146.40
Large (>4 ha)	36	32.14	522772	1173869	124.55
<b>Total</b>	<b>112</b>	<b>100.00</b>	<b>301026</b>	<b>709615</b>	<b>135.73</b>



Scientists discussing about pruning in rose



Scientists visiting the wheat demonstration plot

# GADAG

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## About the district

Gadag district has seven blocks viz., Gadag, Ron, Naragund, Mundaragi, Shirahatti, Gajendragad and Laxmeshwar. The district is having geographical area of 4656 sq. km. with a total population



of 10.65 lakh. The district's area is shared by two agro-climatic zones of Karnataka viz., Northern Dry Zone (Zone-3) and Northern Transition Zone (Zone-8). Agriculture is the main occupation of the district. Total cultivable area in the district is 3.93 lakh ha of which 82 per cent is rainfed and 18 per cent (62454 ha) under irrigation which is mainly confined to Naragund block under Malaprabha Command Area project. Average annual rainfall of the district accounts to 641.6 mm with 70 per cent of probable drought years. This makes agriculture difficult to farming community. Total rainfall in two spells as South West Monsoon (368.6 mm from June to September) and North East Monsoon (161.2 mm from October to December) were characterized by long dry spells, early and mid-season drought during *kharif* and terminal drought during *rabi* affects the productivity of crops. Vertisols (70%) predominates in the district followed by alfisols (30%) with multi nutrient deficiency leads to poor soil fertility.

Cereals, pulses, oilseeds and commercial crops are grown in the district. Sorghum, Maize, Greengram, Wheat, Sunflower, Groundnut, Cotton, Chickpea and Dry chilli are the important field crops of the district. The gross cropped area in agriculture and horticulture put together works out to 4.82 lakh ha (Net cropped area of 3.71 lakh ha). The overall cropping intensity in the district accounts to 135 per cent. Cereals (22%) and pulses (39%) share major area of gross cropped area followed by oilseeds (17.42%), Commercial crops (21%). Major horticulture crops like onion, red chilli, mango, cashew, flower crops and vegetables etc. covers 52441 ha area. Among horticulture crops, fruit crops (8.29%) dominate the area under cultivation.

### About KVK Gadag

Instructional farm of KVK Gadag spreads over an area of 66 acres of which 38 acres is under protective irrigation. Cultivation of field crops under natural farming, organic farming, alternate land use systems, different horticultural crops, forest plants, animal husbandry activities like dairy unit, sheep and goat rearing, fodder production are demonstrated for the benefit of farmers. Farm is facilitated with soil and water conservation structures like farm pond, farm bunds and bore-

well recharging unit. The core idea behind cropping system being demonstrated in the farm is to realize higher returns with minimum use of external inputs under marginal lands.

The Krishi Vigyan Kendra is promoting new production technologies, alternate land use systems technology and facilitation of processing and value addition technology for adoption by farmers. A brief summary of interventions, the impact in terms of household income under different components and the change in income for different land class categories are given below.

## 1. Sector specific interventions by the KVK Gadag

### 1.1 Field crops

- Introduction of improved varieties in greengram (DGGV-2), pigeonpea (TS-3R), chickpea (JAKI-9218), *rabi* sorghum (SPV-2217), foxtail-millet (DHFT-109-3), groundnut (DH-256 and GPBD-4), safflower (ISF-764) and integrated crop management practices.
- Popularization of intercropping systems like greengram+pigeonpea, maize+pigeonpea, foxtail-millet + pigeonpea to achieve sustainable income under rainfed situation.
- Adoption of integrated crop management practices in maize, sunflower, groundnut, *Bt.* cotton to achieve high productivity.

### 1.2 Horticultural crops

- Introduction of improved varieties in onion (Arka Kalyan and Bhima Super), white onion (Bhima Shubra), red chilli (Byadagi kaddi/dabbi) besides improved varieties of vegetables developed by ICAR IHR, Bangalore.
- Promotion of dryland mango and cashew cultivation.
- Adoption of integrated crop management practices in flower crops especially in chrysanthemum, tube rose and gaillardia

### 1.3 Animal husbandry

- Introduction of improved breeds of goat (Jamunapari Buck) and poultry birds (Giriraj and Swarnadhara).
- Popularization of azolla cultivation, perennial fodder production, silage making, and mineral mixture for balanced nutrition were made.

### 1.4 Non-farm enterprises

- Created awareness on production of vermicompost to reduce input cost and improve productivity.
- Seed production activities in greengram, chickpea, *rabi* sorghum, safflower, groundnut, onion and chilli were taken-up to make quality seeds available to the farmers.

- Grading for better market price and value addition in millet crops.

## 2. Impact on household income

The average income of farm households after interventions were increased by 3.08 times from 2016-17 to 2020-21 (Table 27). Though livestock population is limited in district, highest per cent share (45.46%) in additional income of the family was recorded after interventions in livestock were made. Livestock sector increased its share from 23.00 to 38.19 per cent from 2016-17 to 2020-21. Horticulture and field crops have considerable per cent share in additional income (28.89% and 23.15%) next to livestock sector. Significant achievements were made to increase net income (Rs.99 to Rs.3792 or 38 times) from farm and non-farm enterprises.

**Table 27: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	35326	69594	97.01	49.84	31.79	23.15
Horticulture	19148	61912	223.33	27.02	28.28	28.89
Livestock	16300	83598	412.87	23.00	38.19	45.46
Farm and non-farm enterprises	99	3792	3730.30	0.14	1.73	2.49
<b>Overall</b>	<b>70874</b>	<b>218896</b>	<b>208.86</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Technological interventions equally benefitted farmers from all land classes (Table 28) in the district. However, small farmers with 1 to 2 ha holding were benefitted comparatively higher (3.25 times) than farmers with medium and large holdings. Marginal farmers were benefitted by 2.8 times increased income from interventions, which is least among all groups.

**Table 28: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	20	18.02	41473	116376	180.61
Small (1-2 ha)	63	56.76	73752	240301	225.82
Medium (2-4 ha)	27	24.32	83438	238025	185.27
Large (>4 ha)	1	0.90	138300	404350	192.37
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>70874</b>	<b>218896</b>	<b>208.86</b>



**Foxtail-millet + pigeonpea intercropping system**



**ICM practices for quality flower production in chrysanthemum**

# HAVERI

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## About the district

Haveri district has a total geographical area of 4848 sq. kms of which 3,75,000 ha is cultivable. Haveri district has two agro-climatic zones, viz., Northern transition Zone (Zone VIII) (Shiggoan,



Savanur, Byadgi, Haveri, Hirekerur, Rattihalli and Ranebennur) and hilly zone (Zone IX) (Hanagal). The district has both black soil (medium deep and deep) (60%) and red sandy loam soil (40%). Major crops and cropping systems are maize-rabi sorghum, maize-maize, maize-sunflower, maize-groundnut, cotton-fallow, paddy-paddy, soybean-rabi sorghum, groundnut-rabi sorghum, sugarcane, millets-fallow, sunflower-fallow, maize-vegetables, mango, banana and arecanut. Net sown area (NSA) and gross cropped area (GCA) are 3.62 lakh ha and 4.25 lakh ha, respectively with the cropping intensity of 117.4 per cent. Common mixed cropping systems in the region are maize+pigeonpea, cotton+chilli, cotton+groundnut and millets+ pigeonpea. In river adjacent areas, paddy and sugarcane are the major crops. In black soils, hybrid cotton, maize, sunflower and pulses are grown in *kharif* season followed by sorghum, chickpea and sunflower in *rabi*/summer. In irrigated red soils, hybrid cotton, groundnut, maize and pulses are grown in *kharif* season followed by sunflower, maize and groundnut in *rabi*/summer season.

### About KVK Haveri

Krishi Vigyan Kendra, Haveri located at Hanumanamatti, Ranebennur taluk, Haveri district is the first established KVK in Karnataka in 1976. There are demo units of dairy, poultry, sheep farming, azolla cultivation, vermicompost production, horticulture nursery and crops (millets, sorghum, sunhemp, coconut, tamarind and sapota). Soil testing lab and *Trichoderma* productions are also done by KVK for giving service to the farmers. Since last decade KVK is working on the millets, oilseeds and pulses to enhance area and production in the district.

## 1. Sector specific interventions by KVK Haveri

### 1.1 Field crops

- Introduction of new varieties of foxtail-millet (DHFt 109-3) and little millet (DHLm 36-3).
- Promotion of a new groundnut varieties of groundnut GPBD-4, GPBD-5, Dh-101, Dh-256 and integrated crop management (ICM) practices.

- Introduction of new varieties of greengram (DGGV 2), sunflower (KBSH 53) and soybean (DSb 21 and DSb 34).
- Promotion of high yielding of *rabi* sorghum var. SPV-2217
- Integrated pest management (IPM) of fall armyworm in maize. Releases of *Neumoria rellii*, installation of pheromone trap and spraying of Emamectin benzoate.
- Promotion of organic manures, major and micro-nutrients fertilizers based on soil test, spraying of 19:19:19 and micro-nutrients in maize, cotton, paddy and sugarcane.
- IPM in cotton: Installation of pheromone trap and spraying of Thiamethoxam 25 per cent; installation of sticky trap and spraying of neem oil, systemic insecticides.
- Introduction of new pigeonpea varieties viz., BSMR-736, TS3R and GRG-11, its intercropping in maize.
- Seed treatment with *Trichoderma*, spraying of bavistin and Emamectin benzoate,
- Improved pulses production technologies such as use of pulse-magic and nipping.

### 1.2 Horticultural crops

- Promotion of vegetable seed production and horticulture crop nursery activities.
- Pruning, canopy management, micro-nutrient, pest and disease management, post-harvest management including safe ripening and marketing in mango.
- Introduction of new green chilli hybrid (Arka Kyathi), weed management and bio-intensive pest/disease management.
- In banana crop, panama wilt and sigatoka disease management and nutrient management.
- Drainage, nutrient, and disease management in arecanut.
- Introduction of onion variety Bhima Super, management of nutrient, pests and diseases.

- Promotion of integrated crop management practices in ginger including rhizome rot disease management.
- Precision farming in tomato.
- Integrated disease and nutrient management in betelvine.

### 1.3 Animal husbandry

- Introduction of new fodder varieties CoFS-31, hybrid napier Co-5 and hedge lucerne, sesbania and balanced nutrition in dairy animals.
- Integrated management of repeat breeding in dairy animals.
- Diagnosis of subclinical mastitis and control for clean milk production.
- Integrated health management in sheep including micro-nutrient supplementation, deworming practices and vaccination.
- Introduction of breeds of backyard poultry Swarnadhara, Gramapriya, low-cost incubation, and hatchery unit.
- Skill development trainings to rural youth / women, income generating activities related to dairy and sheep farming.

### 1.4 Fisheries

- Creating awareness on fish farming in farm ponds and natural water resources.

- Promotion of composite fish farming in farm ponds.
- Introduction of new fish variety amur crop for higher yield and income.

### 1.5 Farm and non-farm enterprises

- Seed production of millets, sorghum, *rabi* sorghum, sunhemp (green manuring crop) and fodder crops.
- Use of machinery to reduce drudgery, trainings on nutri-garden and skill development to women and rural youth.
- Value addition and processing of millets.
- Production of Quality planting material of Horticultural crops.

## 2. Impact on Household Income

The average income of farm households in Haveri district as per survey in 2016-17 was Rs.1,26,915. After 5 years due to KVK interventions, the average income enhance to Rs. 2,92,302 (Table 29). Livestock sector consolidated its share in the household income to 13.96 per cent in 2020-21 from 10.42 per cent in 2016-17. Horticulture component experienced 2.78 times increase in income in 2020-21 as compared to 2016-17. Field crops contribution to household income provided the major source with a share of 36.86 per cent.

**Table 29: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	73235	134202	83.25	57.70	45.91	36.86
Horticulture	33904	94353	178.29	26.71	32.28	36.55
Livestock	13227	40797	208.43	10.42	13.96	16.67
Fisheries	0	59	100.00	0.00	0.02	0.04
Farm and non-farm enterprises	6549	22891	249.54	5.16	7.83	9.88
<b>Overall</b>	<b>126915</b>	<b>292302</b>	<b>163.90</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers with different land class were benefitted from the technical interventions (Table 30) by the KVK. The income of marginal and small farm households were increased by 2.31 and 2.37 times respectively, while, the medium and large farm households realized 2.20 and 2.45 times increase in their household income.

**Table 30: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	38	34.55	59169	136592	130.85
Small (1-2 ha)	38	34.55	106664	252766	136.97
Medium (2-4 ha)	27	24.55	216396	477517	120.67
Large (>4 ha)	7	6.36	259489	637807	145.79
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>160430</b>	<b>376171</b>	<b>133.57</b>



**Integrated crop management in groundnut**



**Demonstration on use of PGPR and *Trichoderma* bio-capsules in ginger**

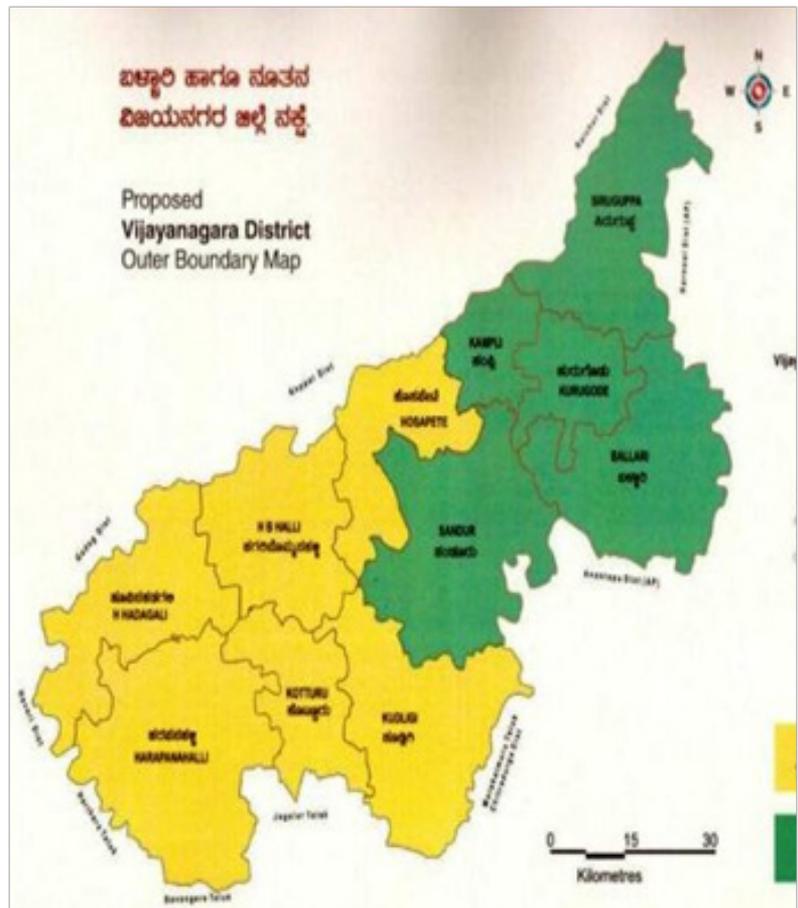


**Method demonstration on use of California mastitis test kit**

# BALLARI

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ICAR-Krishi Vigyan Kendra, Ballari



## About the district

**B**allari district is located in Northern Dry (Zone-3) agro-climatic zone of Karnataka. It has been historically characterized by low rainfall, high temperature and high wind velocity. The cultivable area



is 548500 ha, with cropping intensity of 124 per cent. Ballari district receives an annual average rainfall of 638 mm out of which 61 per cent of the precipitation (383 mm) occurs during June to September. The annual precipitation ranges from 522.1 mm in Ballari to 811.8 mm in Sandur taluk. There are two rivers that flow in the district namely Tungabhadra and its tributary Vedavathi/Hagari. An estimated 70 per cent of population in district is occupied in agriculture and allied activities. The total number of landholders is 2.80 lakh and 40 per cent of the labor force engaged in agriculture is male and rest females. Ballari District has 30.3per cent of the cultivable area under irrigation. Total net irrigated area is 161,233 ha and gross irrigated area is 247,849 ha The area under other sources of irrigation is tanks 2,054 ha (1%), wells 7,159 ha (4%), bore wells 53,256 ha (33%) and lift irrigation 11,943 ha (7%). The area under rainfed situation is 3,07,160 ha

Cereals (paddy, maize, sorghum and bajra) accounts for 46.78 per cent of the gross cropped area, followed by pulses (chickpea) with 18.31 per cent area, that of commercial crops (cotton and chilli) is 10.19 per cent, whereas the share of oilseeds (groundnut) is 9.75 per cent. Area covered under horticulture crops in only 27815 ha which accounts for 5per cent of cultivable area. But there is ample scope to promote dryland horticulture crops. There are 39,17,417 animals in Ballari district, which includes 3,43,275 cattle, 1,59,107 buffalos, 12,72,828 sheep, 2,98,232 goats and 18,43,975 poultry birds. Non-availability of fodder is a serious problem during drought situation.

### About KVK Ballari

The ICAR-Krishi Vigyan Kendra, Ballari is situated at Agricultural Research Station, Hagari which is about 15 Km away from the Ballari city. KVK was established in January 1995. It is an innovative institution imparting training to the practicing farmers, farmwomen, youth and extension functionaries about improved technologies in the field of agriculture, horticulture, animal husbandry, fisheries and other allied enterprises. It has responsibilities of testing and refining the developed technologies and conducting frontline

demonstrations of new technologies in the farmers field. The KVK has got a well-equipped training hall, a diagnostic lab, soil, water and plant testing lab as well as well-furnished information centre.

## 1. Sector specific interventions by KVK Ballari

### 1.1 Field crops

- Cultivation of paddy through direct seeded rice method.
- Adoption of dryland production technologies such as compartment bunding, seed treatment with  $\text{CaCl}_2$  and farm pond supported protective irrigation.
- Eco-friendly management of major pests and disease of paddy.
- Integrated pest management (IPM) of fall armyworm in maize.
- Integrated pest management (Pink bollworm) and integrated nutrient management in cotton.
- Integrated approach for charcoal rot management in maize.
- Introduction of improved varieties of paddy viz., Gangavathi Sona and RNR-15048.
- Promotion of high yielding chickpea varieties BGD-103 and JG-11.
- Promotion of high yielding foxtail-millet varieties SIA-2644, HMT-100-1 and HN-46.
- Promotion of high yielding safflower variety PBNS-12.
- Enhancement in pulses production through use of pulse-magic.

### 1.2 Horticultural crops

- Promotion of technologies to address the field problems in chilli viz., murda complex, fruit rot, powdery mildew and micro-nutrient deficiency.
- Integrated disease management of bacterial leaf blight in pomegranate.
- Introduction of Fig value addition strategies to minimize the post-harvest losses.

- Integrated nutrient management in chilli through promotion of vegetable -special.
- Integrated nutrient management in banana through promotion of banana-special.
- Integrated pest management for pinworm management in tomato.
- Integrated pest and disease management in papaya.

### 1.3 Animal husbandry

- Semi-intensive and intensive ram lamb fattening by rearing Kenguri sheep with scientific rearing practices.
- Introduction of high yielding and quality perennial forages like CoFS-31, Super Napier, Hedge Lucerne, sesbania.
- Introduction of backyard poultry (Giriraja, Aseel) with needed feed supplementation.
- Scientific feeding practices and management practices to improve breeding efficiency in dairy animals.
- Summer management practices in buffaloes with provision for wallowing to improve production and reproduction.

### 1.4 Fisheries

- Promoting freshwater fish rearing in farm ponds.

### 1.5 Farm and non- farm enterprises

- Value addition in Fig through direct and

digital marketing strategies.

- Banana processing, value addition and marketing.
- Promotion of value added products in milk.
- Mushroom production and value addition.
- Seed production of cereals, pulses, oilseeds and fodder crops.
- Promotion of horticultural nursery for production of fruit and vegetable crop seedlings.
- Millet processing and their value addition.
- Promotion of vermicompost production as subsidiary occupation.
- Promotion of organic farming and organic products.

## 2. Impact on Household Income

The net income of farm households, has more than doubled (2.49 times) between 2016-17 and 2020-21 (Table 31). Horticulture components showed 2.82 times increase in household income contributing 61.01 per cent share of additional income created. Livestock sector registered 11.20 times increase in the household income during 2020-21 compared to 2016-17. Farm and non-farm enterprises also proved to be the dominant source of household income with contribution of 28.54 per cent to the additional income, which was nil during benchmark year.

**Table 31: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	102822	84035	-18.27	47.80	15.67	-5.85
Horticulture	107728	303787	181.99	50.08	56.63	61.01
Livestock	4554	51001	1019.99	2.12	9.51	14.45
Fisheries	0	5889	0.00	0.00	1.10	1.83
Farm and non-farm enterprises	0	91722	0.00	0.00	17.10	28.54
<b>Overall</b>	<b>215104</b>	<b>536435</b>	<b>149.38</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>



Farmers from all land classes benefitted from the technological interventions (Table 32). However, the households with small land holdings benefitted relatively more. The income of the marginal land holding families increased 3.51 times (250.95%). Small and medium farm households were benefitted by 2.51 (151.46%) and 2.42 (142.12%) times increased income, respectively. The large farm households could realize 2.33 (133.58%) times increase in their household income.

**Table 32: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	17	14.91	98070	344181	250.95
Small (1-2 ha)	61	53.51	113143	284506	151.46
Medium (2-4 ha)	28	24.56	286412	693452	142.12
Large (>4 ha)	8	7.02	991675	2316373	133.58
<b>Total</b>	<b>114</b>	<b>100.00</b>	<b>215104</b>	<b>536435</b>	<b>149.38</b>



Value added fig sheet before being cut and rolled



Installation of pheromone traps for the management of pink bollworm in Bt. cotton



KVK Scientists visit to large scale intensive buffalo rearing unit



Bagging of fruits for fruit fly management in guava

# DAVANAGERE

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## About the District

**D**avanagere district consists of Harihara, Jagalur, Channagiri, Honnali, Nyamati and Davanagere taluks. Total geographical area of the district is 454573 ha with gross cropped area of 315794 ha of net sown



area of 253467 ha and net irrigated area of 137063 ha mainly through Bhadra right bank canal. Cereals accounted for 65.72 per cent, whereas, pulses 04.02 per cent, oilseeds 04.75 per cent, commercial crops 1.93 per cent, fruits, vegetables and floriculture 5.37 per cent, plantation crops occupy 18.21 per cent area of gross cropped area. The district has 2 agro-climatic zones namely; Central Dry Zone (Zone-IV, Jagalur, Harihara and Davanagere taluks) and Southern Transitional Zone (Zone-VII, Channagiri, Nyamathi and Honnali taluk). Poultry, dairy, sheep, goat farming, inland fisheries, nursery are the major enterprises in the district. There are 1,24,184 crossbred cows whereas, 2,07,891 indigenous cows, 1,75,896 buffalo, 1,03,187 goats, 3,43,011 sheep and 31,93,472, poultry birds. Fish production is becoming a major enterprises in the district.

### About KVK Davanagere

ICAR-Krishi Vigyan Kendra, Davanagere is functioning since 2005. Krishi Vigyan Kendra is striving hard to make farming a comfortable and profitable venture for farming community. Krishi Vigyan Kendra has reached 456 villages out of 810 villages through diverse outreach activities. The Krishi Vigyan Kendra has the urge to learn new things, adopt to the relevant changes and stand by the farmers in crucial situations. It has developed collaboration with all development departments, educational institutions, NGOs, besides universities and ICAR institutes during the past 17 years. Krishi Vigyan Kendra has initiated many innovative programmes like Saturday Organic Bazaar since 2013 where organically produced farm products are directly sold to consumers by growers.

*KasaRasaAbhiyana*, involves campaigns, awareness programmes and supply of decomposing culture for scientific degradation of urban waste since 2014. Capacity development of rural youths in coconut climbing has produced dedicated service providers. Production and supply of banana-special since 2010 is most accepted by farmers, KVK is implementing flagship programmes like NICRA project (2011-21), biofuel project (ongoing since 2011), DBT project (2009-12) and Miyawaki mini forest demonstration unit. The achievements of Krishi Vigyan Kendra were recognized through

**‘Pandit Deendayal Upadhyay Rashtriya Krishi Vigyan Protshahan Puraskar-2018’** by ICAR, New Delhi, **‘Best NICRA KVK Award-2019’** by ICAR-CRIDA, Hyderabad and **‘Best KVK Award – 2022’** by ICAR-NRCB, Tiruchirappalli, Tamil Nadu.

## 1. Sector Specific interventions by KVK Davanagere

### 1.1 Field crops

- Promotion of maize pigeonpea (6:1) intercropping system.
- Introduction of BRG-2, BRG-5 and TS-3R varieties of pigeonpea.
- Introduction of GPBD-4, G2-52 and K-6 new varieties of groundnut.
- Introduction of JAKI-9218 and JG-11 varieties of chickpea.
- Promotion of DSR and mechanized transplanting in paddy.
- Introduction of Rashmi and DBGV-5 blackgram, SPV-2217 sorghum, ML-365, GPU-28, GPU-48 varieties of finger millet, DHFt 109-3 foxtail-millet varieties for higher yield.
- Promotion of pulse-magic, chickpea-magic and nipping technologies in pulses for enhanced yield.
- Promotion of integrated nutrient management and integrated pest management practices in rice, maize, cotton pigeonpea sorghum, finger millet and groundnut.

### 1.2 Horticultural crops

- Introduction of Panniyur-1 and Panniyur-5 varieties of black pepper as intercrop in arecanut, Arka Rakshak in tomato, Arka Sharath and Arka Suvudha in frenchbean, HA-3 and HA-4 varieties in fieldbean, Vengurla-4 variety of cashew for enhanced yield in horticulture crops.
- Promotion of Taralabalu banana-special, vegetable-special and mango-special for micro-nutrient management resulted in increased yield and quality of produce.

- Nutrient and disease management in arecanut, coconut, mango and betelvine and decomposition of arecanut husk.
- Introduction new onion varieties, Arka Kalyan, Bhima Shakti, Bhima super for higher yield.
- Pruning and ripening technologies in mango
- Good management practices for management of mites and coconut black headed caterpillar in coconut.

### 1.3 Animal husbandry

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties DHN-6, CoFS-29, 30, 31 Co-3,4 and 5 and fodder seed production units.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation, balanced nutrition and deworming practices.
- Promotion of artificial insemination.

### 1.4 Farm and non-farm enterprises

- Initiated Saturday organic bazaar in Krishi

Vigyan Kendra premises since 2013, organic producer farmers are selling their value added organic products directly to consumers.

- Initiated safely ripened mango selling in Krishi Vigyan Kendra premises by the growers since 2018 to enhance income to mango growers.
- Introduction of fresh water aquaculture breeds Amur common carp, Jayanti Rohu, GIFT tilapia and Pangasius.

## 2. Impact on household income

The average income of farmers before (2016-17) and after (2020-21) was increased by 197.98 per cent. The farm and non-farm enterprises resulted in 539 per cent increase in income followed by horticulture component (223%) and livestock (180%). The horticulture component contributed 72.27 per cent additional income to farmers followed by enterprises (17.46%) and livestock contributed 5.27 per cent. The increase in area under arecanut, pomegranate and dragon fruit, have contributed significant increase in income of farmers. Higher arecanut prices in last few years and large area brought under lift irrigation system resulted in 72.27 per cent of additional income in horticulture component (Table 33).

**Table 33: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	101286	139998	38.22	23.88	11.08	4.61
Horticulture	271139	878032	223.83	63.93	69.47	72.27
Livestock	24522	68767	180.42	5.78	5.44	5.27
Fisheries	0	3228	100.00	0.00	0.26	0.38
Farm and non-farm enterprises	27190	173839	539.35	6.41	13.75	17.46
<b>Overall</b>	<b>424137</b>	<b>1263865</b>	<b>197.98</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

The change in income of farmers belonging to different land holding categories is depicted in Table 34. Marginal land holding farmers realized 415 per cent change in income through Krishi Vigyan Kendra interventions followed by small holders 367 per cent and medium holders (205%). The lower land holding category farmers realized higher change in the income and possibly due to there enterprises and dairy activities.

**Table 34: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	3	2.73	121363	362933	199.05
Marginal (<1.0 ha)	10	9.09	86746	446821	415.09
Small (1-2 ha)	26	23.64	124778	583522	367.65
Medium (2-4 ha)	34	30.91	273083	834465	205.57
Large (>4 ha)	37	33.64	889040	2430398	173.37
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>424137</b>	<b>1263865</b>	<b>197.98</b>



**Demonstration on paddy transplanting with walk behind transplanter (4-5 acres per day)**



**Introduction of pigeonpea (BRG-5) as an intercrop in maize**



**Discussing on the use of banana special with banana growers**

# CHITRADURGA

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ICAR-Krishi Vigyana Kendra, Chitradurga



## About the district

Chitradurga district is a drought prone district, located under Agro Climatic Zone-4 (Central Dry Zone). It receives scanty, unevenly distributed rainfall, having shallow and poor soils. Chitradurga district



has a total geographical area of 7.707 lakh hectares, and the net cultivable area is 4.009 lakh ha out of which 3.75 lakh ha is under rainfed and 0.25 lakh ha is under irrigated, which constitutes only 6.23 per cent of total cultivable area. Among cereals, maize accounted for 28.3 per cent of total geographical area followed by finger millet with 13.2 per cent. Groundnut has highest share of 34.3 per cent of area under oilseed crops. In recent years, large area is being brought under perennial horticultural crops like pomegranate, mango, sapota, mosambi, arecanut and coconut for better returns. Among horticultural crops, arecanut and onion occupy major cultivable area of 31.91 and 26.58, respectively followed by coconut which comprises about 26.32 per cent of the area. Thus, the traditional rainfed agricultural lands are gradually coming under more remunerative agri+horticulture systems. The cultivation of mulberry under tubewell irrigation, rearing silkworms, fisheries, poultry farming, sheep rearing and dairy, apiculture, floriculture and vegetable cultivation are also becoming more remunerative enterprises.

### **About KVK Chitradurga**

ICAR KVK Chitradurga established in the year 2000 and functioning as per ICAR mandate presently under the administrative control of University of Agriculture and Horticultural Sciences (KSNUAHS), Shivamogga with the aim to provide services to the farming community in the district. Keeping in view of the district proneness to drought condition intermittently. KVK aims to transfer appropriate technologies through integrated approach to the farming community for sustainable production and livelihood. In this context, our KVK has developed good infrastructure facilities including soil and water testing laboratory, bio-agent production unit, model farm for demonstrations of innovative technology for the benefit of the farmers. A team of experienced scientists with supporting staff enable the KVK in addressing farmers issues through providing advisory services and introducing innovative technology.

KVK is conducting frontline demonstrations on proven technologies in farmers field to enable the farming community to adopt and also organizing

capacity development programs to farm women and rural youth. Collaborative projects on cutting edge technology are being implemented under funding by Department of Agriculture, Government of Karnataka and other agencies. The KVK has strong linkage with relevant departments of district, taluk and village level besides NGOs in delivering services to the farmers more efficiently.

## **1. Sector specific interventions by KVK Chitradurga**

### **1.1 Field crops**

- Introduction and promotion of new groundnut varieties namely GPBD-4, G-2-52 (protected irrigated condition), Dh-256, ICGV-03043, K-6 and intercropping of redgram, cowpea and fieldbean.
- Introduction of new varieties of finger millet (ML-365, KMR-340, 630 and MR-6) and foxtail-millet (DHft 109-3 and HMT – 100-1).
- Introduction of new pigeonpea varieties viz., BRG-1, 2, 4, 5, TS3R, BSMR-736 as sole crop and its intercropping in maize.
- Introduction of new varieties of chickpea (JAKI- 9218 and JG-11), greengram (KKM-3), blackgram (Rashmi), horsegram (PH-9), safflower (PBNS-12), sunflower (KBSH-78, 44, 53) and soybean (DSb-21).
- Soil test based fertilizer recommendation in major agricultural crops viz., groundnut, maize, finger millet, chickpea and cotton.
- Saline water management technologies such as rain water harvesting, intermittent ponding, protective irrigation, application of organic manures, incorporation of green manuring crops and cultivation of salinity and sodicity tolerant crops.
- Promotion of micro-nutrient and pest management in cotton.
- Integrated pest management (IPM) of fall armyworm in maize.

- Adoption of dryland production technologies such as compartment bunding, seed hardening/treatment with  $\text{CaCl}_2$  and farm pond supported protective irrigation.
- Improved pulses production technologies such as use of pulse-magic and nipping technologies.
- Integrated pest and disease management practices in agricultural crops namely, pigeonpea (pod bore, sterility mosaic and wilt), groundnut (thrips, red headed caterpillar, collar rot and leaf minor), sunflower (bud necrosis and downy mildew), greengram (yellow mosaic), chickpea (pod borer and wilt), maize (fall armyworm and leaf blight), ragi (stem borer and neck blast) and fieldbean (pod borer).

## 1.2 Horticultural crops

- Introduction of new onion varieties (Bhima Super, Bhima Shakti and BhimaDark red).
- Demonstration of hybrids in onion (Arka Keerthiman and Arka Lalima)
- Farmers participatory onion seed production programmes (ArkaKalyan and Bhima Super)
- Integrated pest and disease management in onion for thrips, purple blotch and bulb rot.
- Demonstration of Arka mango-special in mango for higher productivity and integrated pest and disease management practices for powdery mildew, leafhoppers and fruit flies.
- Demonstration of Arka banana-special for higher bunch yield in banana and integrated pest and disease management practices for sigatoka leafspot, wilt and weevils.
- Demonstration of high yielding varieties/hybrids in watermelon (Arka Muthu, Arka Shama and Arka Akash) and integrated

pest and disease management practices for watermelon bud necrosis virus and thrips.

- Integrated crop management practices in chrysanthemum for higher flower yield and management for leaf blight and thrips.
- Integrated nutrient management to control nut dropping and nut splitting in arecanut and integrated pest and disease management practices for spindle bug, mites, bud rot and leaf spot in arecanut.
- Integrated crop management in coconut for higher productivity and management for root wilt, black headed caterpillar, and rugose whiteflies.
- Integrated pest and disease management practices for management of bacterial blight wilt, thrips and fruit sucking moth in pomegranate.
- Integrated nutrient management in fieldbean.
- Soil test based fertilizer recommendation in major horticultural crops like arecanut, coconut, banana, pomegranate, papaya, mango, guava, tuberose, rose, chrysanthemum, watermelon, muskmelon, drumstick, onion, tomato, chilli and gherkins.
- Soil and water conservation technologies in horticultural crops viz., cultivation and incorporation of green manuring crops, mulching, drip irrigation, rain water harvesting and trenches formation.

## 1.3 Animal husbandry

- Promotion of fodder varieties CoFS-29, 30, 31, Co-3,4 and 5 and super napier and fodder seed production units.
- Introduction of breeds of backyard poultry (Swarnadhara and Giriraja), low-cost incubation and hatchery unit and feed supplementation with azolla.
- Promotion of balanced nutrition, area specific mineral mixture and clean milk production practices in dairy animals.



- Cost efficient nutrient management with locally available and low cost mixtures like ragi straw, millets, soybean and groundnut.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation and deworming practices and regular monitoring of animal health.
- Animal health camp for vaccination.

#### 1.4 Farm and non-farm enterprises

- Nutrient management in mulberry cultivation.
- Promotion of areca husk composting for low cost compost production.
- Seed production of cereals, pulses, oilseeds, fodder crops and onion.
- Horticultural nursery for seedlings of major fruit and plantation crops (coconut, arecanut, drumstick, mango, tamarind and jamun).
- Promotion of bee-keeping in onion seed production and sunflower for honey production and its value addition.

- Millet processing and value addition (foxtail-millet laddoo, ragi-malt, multigrain aatta, ragi cookies and biscuit and chakkuli).
- Custom hiring of farm machinery and coconut climbing, seed cum fertilizer drill in groundnut, cycle-weeder, coconut frond chopper and groundnut decorticator).
- Promotion of forest crops as wind breaks, plantations and to maintain biodiversity with support of rural industries like bamboo and craft making.

#### 2. Impact on household income

The average income of farm households is more than doubled (2.10 times) as compared to base year (Table 35). The rate of increase in income was the highest from farm and non-farm enterprises (146.80%). Horticulture component experienced 2.13 times increase in income over benchmark year. Horticulture is the dominant source of household income with contribution of 83.57 per cent to the additional income on share in total income was also highest in horticulture sector.

**Table 35: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	43736	86211	97.12	7.84	7.33	6.87
Horticulture	457608	974533	112.96	82.05	82.85	83.57
Livestock	38183	70571	84.83	6.85	6.00	5.24
Farm and non-farm enterprises	18208	44938	146.80	3.26	3.82	4.32
<b>Overall</b>	<b>557735</b>	<b>1176254</b>	<b>110.90</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 36). Small farm households were benefitted by 117.90 per cent increase whereas medium farm households could realize 115.61 per cent increase in their household income.

**Table 36: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	3	2.75	75577	161840	114.14
Small (1-2 ha)	21	19.27	315867	688260	117.90
Medium (2-4 ha)	43	39.45	439564	947730	115.61
Large (>4 ha)	42	38.53	834093	1726673	107.01
<b>Total</b>	<b>109</b>	<b>100.00</b>	<b>557735</b>	<b>1176254</b>	<b>110.90</b>



**Exposure visit to vermicompost unit at Golulagundnahalli, Hiriyr**



**Greengram FLD plot at LakkihalIi, Hiriyr**



**Integrated crop management in chrysanthemum**



**Bumper harvest of onion**



**Onion seed plot**



# TUMAKURU I

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ICAR-Krishi Vigyana Kendra, Tumakuru – I



## About the district

**T**umakuru district has a total of 4.14 lakh land holding spread across 6.76 lakh hectares of the operated area. Marginal and small farmers account for 74.97 per cent of the total holdings



operating 39.76 per cent of the total cultivated area. The gross cropped area was 5.40 lakh ha. Out of 4.70 lakh ha of net area sown, the net irrigated area is 1.56 lakh ha (33.19%). Food crops accounted for 38.07 per cent of the gross cropped area. Cereals accounted for 32.19 per cent of the gross cropped area, whereas the share of oilseeds was 15.56 per cent and that of pulses was 6.25 per cent. Among cereals, finger millet accounted for the largest area of 75.74 per cent, followed by maize (16.35%) and paddy (5.97%). Tumakuru is one of the leading districts for horticultural crops with an area of 2.08 lakhs ha under plantation, fruits and vegetable crops. Among them, plantation crops occupy majority of the area (85.3%), fruit crops 12.35 per cent, and vegetable crops 2.31 per cent of the area. Commercial crops like cotton and sugarcane are cultivated in an area of 1,965 ha. Tumakuru has rich resources under livestock with 5.27 lakh cattle, 1.81 lakh buffalo, 3.27 lakh goats, 10.61 lakh sheep and 21.07 lakh poultry birds. The district produces 4,26,000 tonnes of milk, 2,283 lakh eggs and 9,033 tonnes of meat annually.

### **About KVK Tumakuru -I**

Krishi Vigyan Kendra, Tumakuru-I is located within the Agricultural Research Station campus located in Konehally, Tiptur taluk of the district. It is serving as the knowledge and resource centre for dry land agriculture primarily on the coconut-based farming system and millets based farming system. Vocational training programmes the KVK on coconut climbing, millets processing and value addition, mini dhal mills have attracted greater demand by the rural women and youth. For improved agricultural technologies by the farmers.

## **1. Sector specific interventions by KVK Tumakuru -I**

### **1.1 Field crops**

- Assessment of paddy varieties Gangavathi Sona for southern dry zone of Tumakuru and demonstration of DSR method of paddy cultivation.
- Improved production technologies in castor.

- Demonstration of finger millet variety ML-365, KMR- 630 and KMR-340.
- Frenchbean, as a intercrop in coconut garden.
- ICM in little millet, pigeonpea, tomato (Arka Abhed), chilli (Arka Kyathi) and ICM practices improves the overall performance of crop and resulted higher yield and net income.
- Management of nutrient requirement in little-millet.
- Promotion of pigeonpea varieties for terminal drought.
- Improved pulses production technologies such as use of pulse-magic and nipping.

### **1.2 Horticultural crops**

- Integrated pest management in coconut.
- Integrated crop management in tomato, chilli, arecanut and mango (Alphanso).
- Integrated nutrient management in banana to reduce the incidence of fruit fly, powdery mildew and fruit drop and INM in coconut to reduce nut drop.
- Promotion of chilli hybrid KBCH-1 and Arka Kyathi and Arka Harita has resulted higher return with market demand and less incident of anthracnose, powdery mildew and bacterial wilt.
- Introduction of tamarind variety GKVK-17.
- Management of rugose whitefly in coconut.

### **1.3 Animal husbandry**

- Promotion of fodder varieties CoFS-29 and 31 and fodder seed production units for higher yield.
- Management of anestrus in heifers.
- Management of dairy cow during the transition phase through supplementation of bypass fat.

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Integrated scientific management in sheep/goats.

#### 1.4 Fisheries

- Introduction of composite fish culture in farm pond.

#### 1.5 Farm and non-farm enterprises

- Seed production of cereals, pulses and fodder crops.
- Horticultural nursery for seedlings of fruit, plantation and vegetable crops.
- Millet processing and value addition centre to cater to the needs of millet growers.
- Value addition to coconut, tamarind and millets and market linkages.

- Mushroom cultivation using arecanut waste as income generating activity in SHG group and training.
- Branding and market linkage of value added brown top millet products as income generating activity.

## 2. Impact on household income

The average income of farm household has more than doubled i.e., 2.30 times between 2016-17 and 2020-21 (Table 37). The share of enterprises in household income, experienced 4.30 times increase during this period. The share of field crops in household income increased by 1.94 times during this period. Horticulture component increased by 2.30 times in income over benchmark year. It proved to be the dominant source of household income with contribution of 59.70 per cent to the additional income.

**Table 37: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	39306	76316	94.16	12.85	10.81	9.25
Horticulture	175521	414327	136.06	57.37	58.69	59.70
Livestock	86337	194630	125.43	28.22	27.57	27.07
Farm and non-farm enterprises	4805	20682	330.46	1.57	2.93	3.97
<b>Overall</b>	<b>305969</b>	<b>705955</b>	<b>130.73</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 38). The medium farm households could realize 2.15 times increase in their household income where small and large farm households were benefitted by 2.41 and 2.33 times increased in their household income, respectively.

**Table 38: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Small (1-2 ha)	73	66.36	256944	619616	141.15
Medium (2-4 ha)	35	31.82	384762	830744	115.91
Large (>4 ha)	2	1.82	716500	1673500	133.57
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>305969</b>	<b>705955</b>	<b>130.73</b>



**Discussion with farmer in black pepper field**



**Scientist interaction with farmer in arecanut field**



**Composting unit**

# TUMAKURU II

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ICAR-Krishi Vigyana Kendra, Tumakuru-II

## About KVK Tumakuru-II

The ICAR-Krishi Vigyan Kendra, Tumakuru-II was established in March 2009. This is the first additional KVK established in the country. The district consists of ten taluks, viz., Koratagere, Gubbi, Chikkanayakanahalli, Tumakuru, Pavagada, Sira, Turuvekere, Kunigal, Madhugiri and Tiptur. As an additional KVK, it caters to Sira, Koratagere, Pavagada, Madhugiri (Central Dry Zone-IV of agro climatic regions of Karnataka) and Tumakuru (Eastern Dry Zone V). This KVK is functioning under ICAR Indian Institute of Horticultural Research (IIHR), Bengaluru. KVK has an area of 17 ha (15 ha under instructional farm). Apart from the mandated activities like OFTs, FLDs and capacity development programmes, KVK is also involved in production of more than 10 technological products, covering bio-fertilizers, bio-control formulations, micro-nutrient specials, seeds and planting materials. As part of the national agenda of doubling farmers income, the ICAR KVK Tumakuru-II took up documentation of successful farmers who could enhance their income with the help and support of technological interventions by this KVK.

## 1. Sector specific interventions by KVK Tumakuru-II

### 1.1 Field crops

- Introduction of new varieties of finger-millet (ML 365, KMR 340 and KMR 630), and foxtail-millet (DHfT 109-3).
- Introduction of improved varieties of paddy viz., aerobic paddy- MAS-26, MAS-946-1 and Paustic-9, and integrated crop management practices.
- Integrated pest management of fall armyworm in maize.
- Introduction of new pigeonpea varieties viz., BRG- 2,4 and 5.



- Promotion of a new groundnut variety K-6 and integrated crop management in groundnut.
- Improved pulses production technologies such as use of foliar micro-nutrient spray and nipping
- Promotion of micro-nutrient and pest management in cotton.
- Promotion of intercropping in maize, pigeonpea and groundnut.
- Adoption of dryland production technologies such as trench cum bunding, land levelling, silt application and farm pond, check dams and micro-irrigation system supported protective irrigation.
- Introduction of new onion varieties (Arka Kalyan, Bhima Super, Bhima Shakti and Arka Bheem), INM (AMC, Vegetable-special) and management of pests and diseases.
- Promotion of new varieties in ridgegourd (Arka Prasan), okra (Arka Anamika) and tuberose (Arka Prajwal).
- Promotion of mucuna as a mulch crop to enhance the soil productivity in coconut and arecanut.
- Promotion of farmers participatory seed production activity in vegetable crops like onion, ridgegourd, okra and drumstick.
- Adoption of dryland horticulture in fruit crops viz., amla NA-7, NA-5, tamarind Gottigere, cashewnut- Ullal - 3 and 5, jamun- Dupdal and mango-Alphanso.

## **1.2 Horticultural crops**

- Introduction of new varieties/hybrids of chilli (Aka Kyathi, Arka Haritha), INM (AMC, Vegetable-special), weed management and bio-intensive pest/disease management.
- Introduction of new hybrids of tomato (Arka Rakshak, Arka Abhed), INM (AMC, Vegetable-special) and integrated pest and disease management practices.
- Promotion of new varieties of frenchbean (Arka Arjun, Arka Sharat and Arka Suvridha) and ICM (AMC, vegetable-special) practices.
- Nutrient management in coconut to reduce nut dropping (application of potash and boron).
- Banana disease management and banana foliar nutrition using banana-special.
- Integrated crop management in arecanut and arecanut husk decomposition.
- Arecanut + pepper intercropping system.
- Mango pest and disease management, mango-special as micro-nutrient supplement, post-harvest management including safe ripening low cost technology and marketing.

## **1.3 Animal husbandry**

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties CoFS 29, 31 and fodder seed production units.
- Cost-efficient nutrition management with locally-prepared feed formulations.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation and deworming practices.

## **1.4 Farm and non-farm enterprises**

- Seed production in cereals (paddy -Paustic-9), pulses (redgram-BGR-2, 4 and 5), oilseeds (groundnut K-6) and fodder crops (fodder sorghum-CoFS-29, 31).
- Horticultural nursery supporting seedlings of fruit and plantation crops.
- Mulberry cultivation and silkworm rearing for cocoon production.
- Bee-keeping for honey production and value addition.

- Millet processing and value addition.
- Low cost scientific mushroom cultivation.

## 2. Impact on household income

The average income of farm households, before and after the interventions, more than doubled (2.46 times) between 2016-17 and 2020-21 (Table 39). Horticulture component experienced 2.3

times increase in income over benchmark year. Income from livestock also increased two-fold. Percentage share in total income has increased 6 times from 2016-17 to 2020-21 under Farm and non-farm enterprises. Horticulture sector proved to be the dominant source of household income with contribution of 67.18 per cent to the additional income.

**Table 39: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	21280	49846	134.24	13.88	13.19	12.72
Horticulture	112434	263295	134.18	73.33	69.67	67.18
Livestock	18019	41440	129.98	11.75	10.97	10.43
Farm and non-farm enterprises	1599	23312	1357.67	1.04	6.17	9.67
<b>Overall</b>	<b>153332</b>	<b>377893</b>	<b>146.45</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 40). However, the households belonging to small and marginal category benefitted relatively more, compared to other classes. The income of the marginal farmers increased 2.9 times (189.8%), the highest among all classes, followed by small farm households with 2.5 times of increased income (147.68%). The medium and large farm households could realize about 2.3 times increase in each of their household income.

**Table 40: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	31	27.93	88728	257152	189.82
Small (1-2 ha)	48	43.24	121178	300140	147.68
Medium (2-4 ha)	23	20.72	249797	580415	132.35
Large (>4 ha)	9	8.11	300824	690898	129.67
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>153332</b>	<b>377893</b>	<b>146.45</b>



**Scientist discussion with farmer in chilli field**

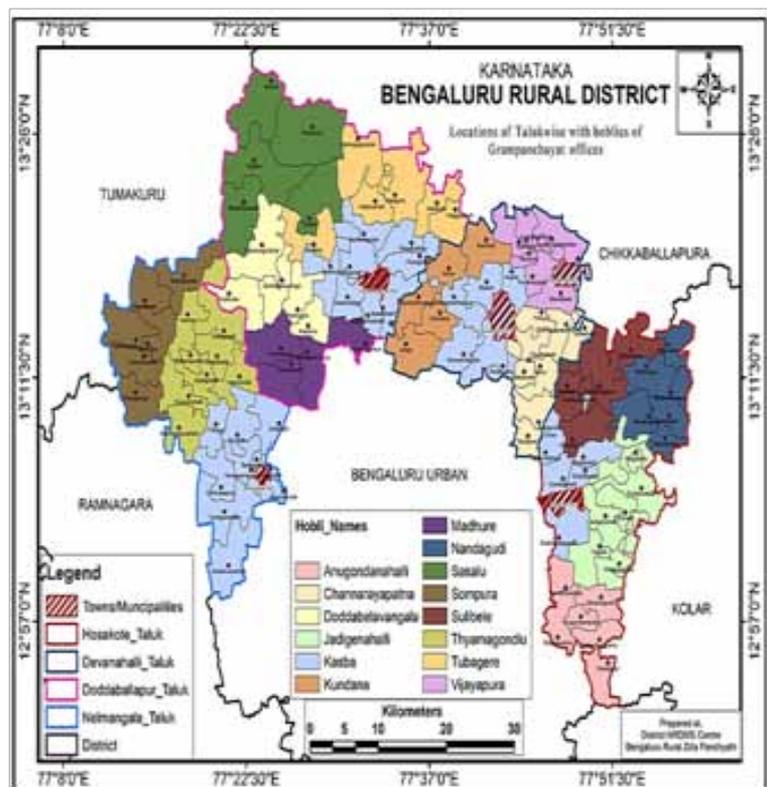


**Scientist discussion with farmer in black pepper field**

# BENGALURU RURAL

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ICAR-Krishi Vigyana Kendra, Bangalore rural



## About the district

There are four talukas Doddaballapura, Devanahalli, Hosakote and Nelamangala, in the district. In rural areas, agriculture is the main occupation, along with subsidiary enterprises like floriculture, animal husbandry, sericulture, bricks making and garment factories. The district is endowed with agricultural and horticultural crops such as ragi, rice, groundnut, sugarcane, castor, grapes, mulberry. There are adequate infrastructural facilities such as transport and



communication, banking, credit, and marketing. Though the region is not rich in mineral resources, its non-metallic mineral resources are utilized for bricks, tiles, and stoneware manufacture. For many years, weaving has also been a major occupation for a large section of the population. The soil and climatic conditions are congenial for the cultivation of mulberry, rearing of silkworms, and production of silk, besides other agro-based industries. There are a number of wineries and quantity of production of wine has been increasing over the years.

### **About KVK Bengaluru Rural**

The ICAR-Krishi Vigyan Kendra Bengaluru Rural District was established at Hadonahalli, Tubagere hobli, Doddaballapura taluk in March 2006. The centre earlier had a jurisdiction of eight taluks (Doddaballapura, Devanahalli, Nelamangala, Hosakote, Magadi, Kanakapura, Channapatna and Ramanagara) till Ramanagara was made as a separate district during 2007. The KVK administrative block, farmers hostel, staff quarters, plant propagation unit and demonstration units. The KVK is providing quality training to the farmers/farm woman on proven technologies.

The capacity development programmes include improved cultivation practices, enhancing the skills and building the confidence to solve the existing agriculture problems. In addition, the centre is also conducting sponsored programmes under RKVY, SGSY, ATMA, NHM, etc. A brief summary of interventions, the impact in terms of household income under different components and the change in income for different land-class categories are given below:

## **1. Sector specific interventions by KVK Bengaluru Rural**

### **1.1 Field crops**

- Assessment of pigeonpea varieties for terminal drought conditions.
- Introduction of drought and blast resistance finger millet var. ML-365.
- Integrated crop management in redgram.
- Integrated crop management in chickpea.

- Integrated crop management in maize.
- Integrated pest and disease management in maize.
- Introduction of foxtail-millet var. DHFT-109-3 for higher yield and marketability.
- Improved production technologies in castor.
- Assessment of suitable pigeonpea varieties for vegetable purpose.
- Eco-friendly management of fall armyworm in maize.
- Demonstration of popcorn as alternative crop for finger millet under rainfed situation
- Addressing drought and blast vulnerability through finger millet var. ML-365 under double cropping system.
- Integrated crop management in pigeonpea BRG-3.
- Assessment of nano-fertilizers (N and Zn) on growth and yield of maize.
- Potassium management in maize through Bio-K.

### **1.2 Horticultural crops**

- Assessment on management of diamond back moth in cabbage.
- Assessment of nutrient management in potato.
- Enhancing quality of grapes through integrated crop management.
- Fertigation in tomato for enhancement of yield.
- Introduction of new hybrids of tomato (Arka Rakshak, Arka Abhed) and integrated pest and disease management practices.
- Nematode management in capsicum under protected cultivation.
- Assessment on management of yellow mosaic virus in polebean through integrated approach.
- Assessment on management of mosaic virus in ridge gourd through integrated approach.

- Intercropping in arecanut.
- Integrated nutrient management in polebean.
- Soil test based nutrient management for tissue culture banana.
- Management of late blight and fruit borer in tomato through integrated approach.
- Integrated management of DBM in cauliflower.
- Management of shoot and fruit borer in brinjal.
- Integrated crop management in rose.
- Management of yellow mosaic virus in pole bean through integrated approach.
- Assessment of nutrient management in marigold.

### 1.3 Animal husbandry

- Demonstration of multicut fodder sorghum: COFS-31 for green fodder and silage.
- Ration balancing through integrated approach in dairy animals.
- Probiotics for optimum post-weaning growth in lambs.
- Demonstration of NARI nirbeeja grafts of subabul for nutritious fodder.

### 1.4 Fisheries

- Demonstration of genetically improved Rohu Jayanthi for sustainable aquaculture production.

### 1.5 Farm and non-farm enterprises

- Assessment of local crop residue as substrate for oyster mushroom cultivation.
- Integrated nutrient management in mulberry.
- Nutrition garden in schools.
- Nutrition garden for farm families.
- Assessment on management of mites and thrips in mulberry.
- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of fruit, plantation and vegetable crops.
- Bee-keeping for honey production and its value addition.
- Millet processing and value addition.
- Marketing of the value added products through “Rural Mart”.

## 2. Impact on household income

Income of farm households, involved in the survey has more than doubled (2.34 times) between 2016-17 and 2020-21 (Table 41). Income from livestock that increased more than four folds (407.98). Horticulture sector increased the farmers income by 154.03 per cent. Horticulture sector consolidated its share in the household income increased to 78.77 per cent in 2020-21 from 72.89 per cent in 2016-17. It is the dominant source of household income with contribution of 83.12 per cent to the total additional income.

**Table 41: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	22947	26752	16.58	22.51	11.16	2.76
Horticulture	74295	188731	154.03	72.89	78.77	83.12
Livestock	4690	23823	407.98	4.60	9.94	13.90
Farm and non-farm enterprises	0	301	100.00	0.00	0.13	0.22
<b>Overall</b>	<b>101932</b>	<b>239607</b>	<b>135.06</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes are benefitted from the technical interventions (Table 42). The income of the marginal families has increased 2.57 times (157.07%). Small and medium farm households were benefitted by 2.2 and 2.1 times increased income, respectively.

**Table 42: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	78	70.27	63348	162847	157.07
Small (1-2 ha)	25	22.52	125487	278302	121.78
Medium (2-4 ha)	8	7.21	404525	867106	114.35
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>101932</b>	<b>239607</b>	<b>135.06</b>



**Recording observation in pigeonpea field**



**Field day on ragi**



**Method demonstration of enrichment of FYM with bio-agent**

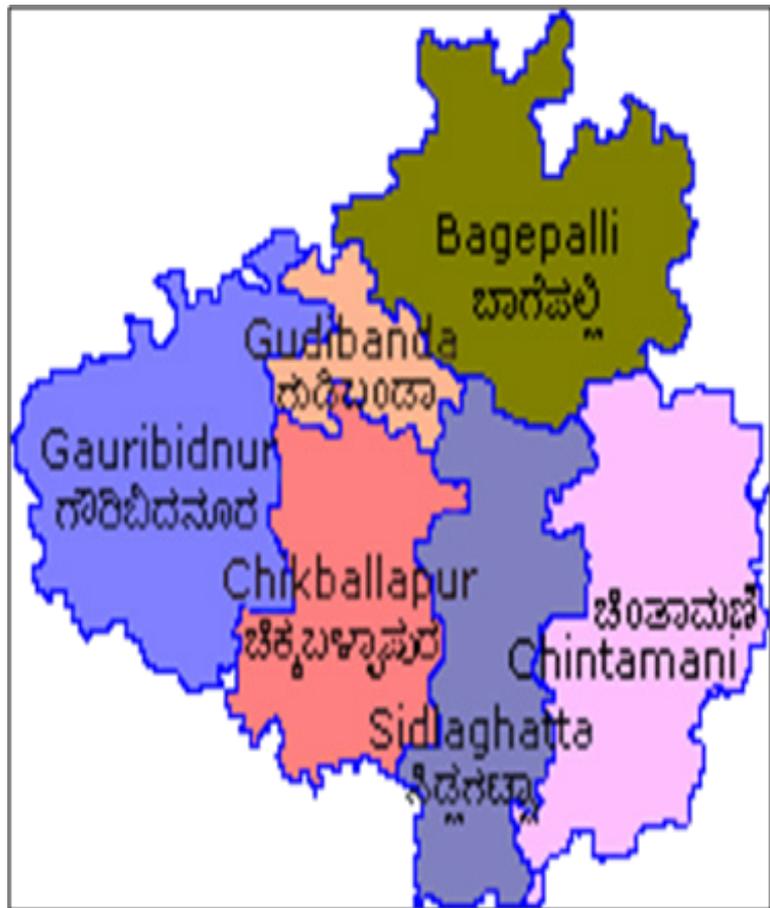


**Scientist discussion with farmers in maize field**

# CHIKKABALLAPURA

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ICAR KVK Chikkaballapura



## About the district

Chikkaballapura district of Karnataka state has six taluks comprising 1321 villages with a population of 1255104, out of which, rural population is 77.60 per cent. Total cultivators are 197814



and total geographical area of the district is 404501 ha. Average rainfall of the district is 715 mm, major crop of the district include ragi, maize, pigeonpea, groundnut, tomato, potato, grapes etc. Area under major field crops like maize is 59501 ha, ragi is 48698 ha and pigeonpeas 10720 ha. Area under major oilseed crops like groundnut is 17441ha, sunflower is 108ha and castor is 303ha. Cultivation of mango crop is highest in the district comprising 103439 ha and banana plantation is under 26585ha. Vegetable crops tomato is cultivated under 135604 ha and potato is cultivated under 58492 ha. Chikkaballapura district is known for milk and sericulture. Area under mulberry cultivation is 18905.67ha. Total population of cattle breeds in the district is 246339 out of which 83709 indigenous cattle and 162630 are exotic cattle breeds.

### **About KVK Chikkaballapura**

KVK is functioning under the administrative centre of University of Agricultural Sciences, Bangalore. It is located in the campus of Sericulture College at Chintamani. The KVK has well established an integrated farming system demonstration unit which has served as a model for many interested IFS farmers. ICAR-Krishi Vigyan Kendra, Chikkaballapura is serving the knowledge centre in the district and as an national agenda of doubling the farmers income and centre has documented the successful farmers whose income has been doubled because of various technological interventions. A brief summary of interventions, impact in terms of household income under different components and change in income of different land- class categories is given below.

## **1. Sector specific interventions**

### **1.1 Field crops**

- Introduction of improved varieties of ragi (ML-365, MR-6, KMR-630 and KMR-316), line sowing and transplanting.
- Popularisation of improved varieties in pigeonpeaviz., BRG-3, BRG-4 and BRG-5, introduction of finger-millet, fieldbean,

groundnut and cowpea as intercrops in redgram, nipping and pulse-magic spray.

- Integrated pest management in maize.
- Adoption of soil and water conservation technologies like trench cum bunds, check dams, drip and sprinkler irrigation system.
- Introduction of improved varieties (HA-4 and HA-5) and integrated crop management in fieldbean.

### **1.2 Horticultural crops**

- Introduction of new hybrids of tomato (Arka Rakshak) and integrated pest and disease management practices.
- Integrated crop management in chilli.
- Timely pruning, mango-special spray and integrated crop management in mango.
- Timely pruning, application of rose mixture and integrated pest management in rose.
- Integrated crop management in pomegranate, cabbage, chrysanthemum and polebean.

### **1.3 Animal Husbandry**

- Promotion of balanced nutrition, mineral mixture, azolla as feed supplement and clean milk production practices in dairy animals.
- Promotion of fodder varieties, CoFS-29 and CoFS-31.
- Introduction of breeds of backyard poultry (Swarnadhara, Kadaknath).
- Promotion of sheep rearing with stall method.

### **1.4 Farm and non-farm enterprises**

- Mulberry cultivation and silkworm rearing for cocoon production.
- Bee keeping for honey production.
- Mushroom production.

- Custom hiring of farm machinery.
- Value addition and direct marketing.

## 2. Impact on Household Income

The income of farm households has more than doubled (2.32 times) between 2016-17 and 2020-21 (Table 43). Income from livestock increased to four folds, fisheries (4.78 times). Livestock sector

consolidated its share in the household income to 12.96 per cent in 2020-21 from 7.47 in 2016-17. Horticulture component experienced 2.67 times increase in income over benchmark year. Horticulture is the major source of income as its share in total income has increased from 49.42 per cent to 56.89 per cent. It is the dominant source of household income with contribution of 62.55 per cent to the additional income.

**Table 43. Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	34040	34712	1.97	18.75	8.23	0.28
Horticulture	89701	239889	167.43	49.42	56.89	62.55
Livestock	13561	54636	302.88	7.47	12.96	17.11
Fisheries	21	100	378.26	0.01	0.02	0.03
Farm and non-farm enterprises	44195	92308	108.87	24.35	21.89	20.04
<b>Overall</b>	<b>181518</b>	<b>421645</b>	<b>132.29</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes got benefitted from the technical interventions (Table 44). However large farmers benefitted relatively more. The income of large families increased 3.2 times (222.2%), income of marginal and small farmers benefitted 2.32 and 2.31 times respectively, and income of medium farmers increased 2.27 times.

**Table 44: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	14	12.73	121211	281696	132.40
Small (1-2 ha)	76	69.09	182729	423358	131.69
Medium (2-4 ha)	17	15.45	240507	547911	127.81
Large (>4 ha)	3	2.73	98000	315833	222.28
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>181518</b>	<b>421645</b>	<b>132.29</b>



**Tomato plot visit by scientist**



**Yellow sticky traps in rose field**

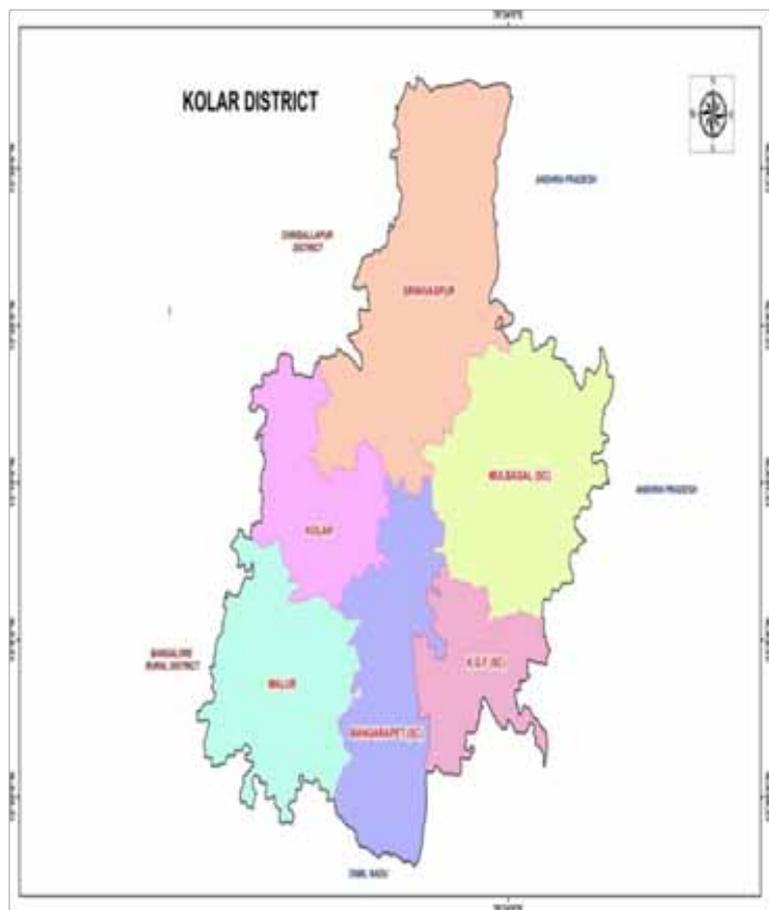


**Mango-special spray for quality fruits**

# KOLAR

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ICAR-Krishi Vigyana Kendra, Kolar



## About the district

**K**olar is located in southern Karnataka, at a distance of about 72 kms. from Bengaluru. Kolar district is in semi-arid, drought-prone region and covers an area of 8,225 sq. kms.



It stretches about 135 kms north to south and almost the same distance east to west. It is surrounded by Bangalore Rural district on the west, Chikkaballapura district on the north, Chittoor district of Andhra Pradesh on the east and Krishnagiri and Vellore districts of Tamil Nadu in the south. The major occupation of the farmers in the district is agriculture, dairy farming, sericulture and floriculture. The district is popularly known as the land of “silk and milk”. In recent years, Kolar district is gaining importance in horticulture sector and has largest area under mango in the state and maximum area under tomato and potato. Farmers in Kolar depend on borewell water for irrigation and drinking. The rainfall distribution has two peaks, one during May and another during September. It is characterized by erratic and uneven distribution. There are about 41,311 ha of land being irrigated through bore wells. The number of irrigation pump sets existing in the district is 50,366. Tanks and open wells are the other sources of irrigation.

### **About KVK Kolar**

Krishi Vigyana Kendra, Kolar was established in the year 2012. KVK has disseminated 42 technologies through frontline demonstrations in cereals, pulses, oilseeds, horticulture, sericulture and home science and 13 technologies through on farm testing. KVK Kolar also has collaborations with line departments, MANAGE, Hyderabad, SAMETI UASB, NGOs and KAPC. KVK is acting as technology backstop provider for FPOs of the district through capacity development programmes, demonstrations and visits. It has demonstrated various technologies like nutrient management through fertigation in enhancing yield and quality of tomato, foliar application of mango-special in enhancing yield and quality of mango, use of mepiquat chloride (a growth retardant) in increasing tuber yield in potato, cultivation of tree mulberry and introduction of bivoltine silkworm hybrid (FC2 x FC1) for quality cocoon production and crop stability. Through information and communication technologies like mobile advisory messages, KVK has reached more than 62 lakh farmers. KVK Kolar has created impact in women empowerment through processing and marketing of minor millets value added products, preparation

of ready to cook products and direct marketing of mango using low cost ripening chamber.

## **1. Sector specific interventions**

### **1.1 Field crops**

- Introduction of new ragi variety ML-365 along with the advanced cultivation practices.
- Introduction of new horsegram variety CRIDA-18 along with the advanced cultivation practices and increased productivity.
- Introduction of new ragi variety KMR-630 along with the advanced cultivation practices.
- Management of stem rot disease in groundnut.

### **1.2 Horticultural crops**

- Management of yellow mosaic in ridgegourd.
- Integrated pest and disease management in tomato.
- Integrated pest management in cauliflower.
- Integrated pest management in marigold.
- Good horticultural practices in mango.
- Demonstration of nutri-garden to farm families.
- Management of late blight in potato through integrated approach.
- Integrated nutrient management in polebeans.
- Fertigation in tomato in order to reduce cost of cultivation and increase yield.
- Integrated crop management in fieldbean.
- Integrated pest management in cashewnut.
- Integrated crop management of potato by enrichment of FYM with bio-agents and use of growth retardant mepiquat chloride.

- Integrated crop management of cauliflower by FYM enrichment with Arka microbial consortia, intercropping with trap crop (mustard), foliar application of boron and molybdate micro-nutrients.
- Integrated crop management of chilli by enrichment of FYM with Arka microbial consortium, foliar application of micro-nutrient mixture of vegetable-special.
- Integrated crop management of mango by water conservation technique by semi-circular basin around trunk, soil enrichment with green manuring, canopy management and foliar application of mango-special four times.
- Crop residue management using decomposers.
- Introduction of rose onion crop using Arka Bindu variety and foliar application of vegetable-special micro-nutrient mixture.
- Integrated management of yellow mosaic virus in polebean using FYM enrichment with *Pseudomonas fluorescens*, yellow sticky traps, Neem soap and foliar application of seaweed extract.
- Micro-nutrient management in marigold using  $MgSO_4$ ,  $ZnSO_4$  and borax.
- Management practices for thrips, mites and leaf roller in mulberry.
- Introduction of bivoltine double hybrid (FC1xFC2) for quality cocoon production and crop stability.
- Management of Uzi fly (*Exorista bombycis*) through sex pheromone traps in silkworm rearing.
- Recycling of farm residue with waste decomposer consortia for quality compost production.
- Demonstration of optimum micro-climatic condition through fogging technology in silkworm rearing house for better cocoon productivity.
- Vocational training programme on processing, value addition, branding and marketing of minor millets products.
- Entrepreneurship development programme on “processing of agricultural produces”.
- Capacity development programme on “processing, value addition, branding and marketing of tomato products”.

### 1.3 Animal husbandry

- Introduction of multicut fodder sorghum variety COFS-31.
- Azolla cultivation to increase milk yield and reduce production cost.

### 1.4 Farm and non- farm enterprises

- Intercropping of fieldbean under tree mulberry cropping system for additional income.
- Integrated nutrient management in mulberry for higher productivity.
- Foliar nutritional management in mulberry through eco-friendly approach.

## 2. Impact on household income

The average income of farm household before and after the interventions doubled (155.80%) between 2016-17 and 2020-21 (Table 45). The percentage increase in income is mainly due to livestock (423.87%) followed by horticulture (152.76%), non-farm enterprises (144.47%) and field crops (115.73%). The highest percentage share in additional income is from horticulture sector (60.82 %) followed by non-farm enterprises (24.12 %).

**Table 45: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	24383	52600	115.73	8.83	7.44	6.56
Horticulture	171362	433129	152.76	62.04	61.30	60.82
Livestock	8633	45225	423.87	3.13	6.40	8.50
Farm and non-farm enterprises	71856	175665	144.47	26.01	24.86	24.12
<b>Overall</b>	<b>276233</b>	<b>706619</b>	<b>155.80</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers as well as landless classes were benefitted from KVK Kolar interventions (Table 46). The income of landless farmers increased maximum to the extent of 333.20 per cent followed by marginal farmers (286.55%). The large farm households could realise 130.30 per cent increase in household income.

**Table 46: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	3	2.78	73151	316887	333.20
Marginal (<1.0 ha)	14	12.96	88255	341146	286.55
Small (1-2 ha)	57	52.78	245365	616934	151.43
Medium (2-4 ha)	26	24.07	336360	862227	156.34
Large (>4 ha)	8	7.41	705878	1625625	130.30
<b>Total</b>	<b>108</b>	<b>100.00</b>	<b>276233</b>	<b>706619</b>	<b>155.80</b>



**Integrated crop management in polebeans**

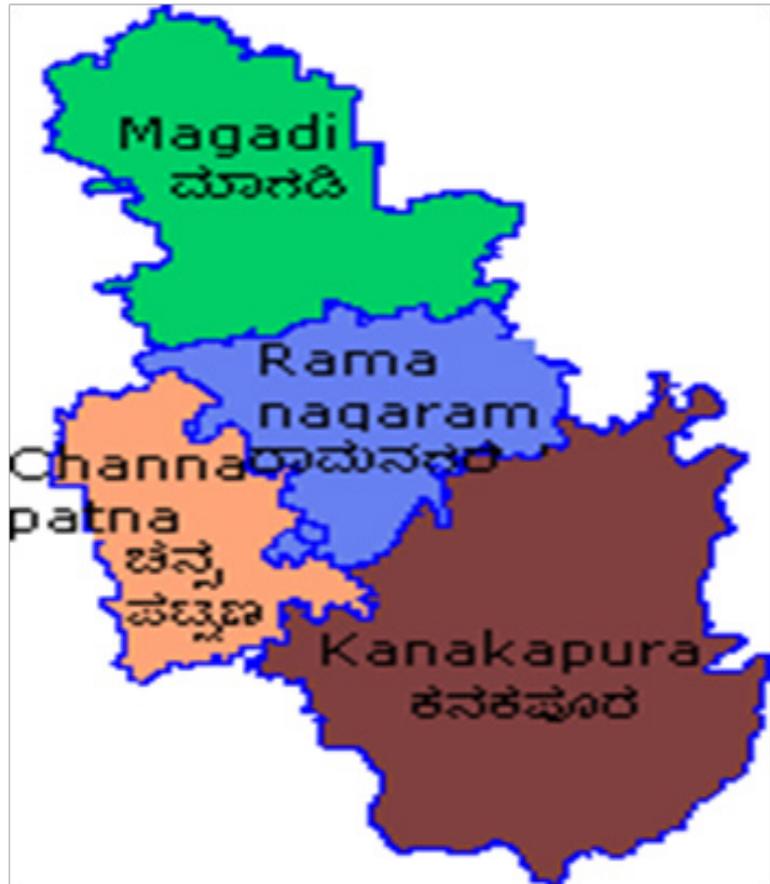


**Ragi field visit by KVK scientist**

# RAMANAGARA

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ICAR-Krishi Vigyana Kendra, Ramanagara



## About the district

Ramanagara district comprises four taluks Channarayana, Kanakapura, Ramanagara and Magadi. Ramanagara district falls under Eastern Dry Zone of Karnataka. Ramanagara District



has a geographical area of 3,55,912 ha with Net area sown to an extent of 1,72,380 ha. The land utilization for agriculture is 35.43 per cent, other uncultivated land is 19.77 per cent and 17.21 per cent covered with forest. The area under irrigation is 25.46 per cent and the average rainfall is 874mm. The major agricultural crops grown in the district are finger-millet, paddy, maize, fieldbean and groundnut is the major oil seed crop. Horticulture is a major source of income for farmers in the district with an area of 58,971ha accounting for 35.75 per cent of the net sown area. Mango, banana, tomato, brinjal, coconut, arecanut, citrus, betelvine are important horticulture based crops grown in the district. Vegetable crops are grown in an area of 27,826 ha (47.18%), plantation crops in 26,364 ha (44.71%), flowers in 3914ha (6.63%) and spices in 867 ha (1.48%). Mulberry cultivation, silkworm rearing and reeling activities are also predominant in the district. The cropping intensity of the district is 102.89 per cent and 4768 ha is under double cropped area.

### About KVK Ramanagara

Krishi Vigyan Kendra Ramanagara was established in the year 2010. Krishi Vigyan Kendra functions in collaboration with line departments are testing the latest technologies to reduce the time lag between technology generation and its adoption. KVK verifies the technologies in the socio-economic conditions of the farmers and study the constraints in production as well as to modify the technologies to suit to the local conditions. A brief summary of interventions, the impact in terms of household income under different components and the change in income for different land-class categories is given below.

## 1. Sector specific interventions by KVK Ramanagara

### 1.1 Field crops

- Introduction of new varieties of finger millet (ML-365, KMR-340, KMR-630 and MR-6), and foxtail-millet (DHFT 109-3, HMT100-1, and SIA-3156).
- Seed production, ICM in ragi and value addition.

- Introduced the technology of direct seeded rice (DSR), mechanical sowing and integrated crop management practices, weed management in paddy.
- Successful introduction of new pigeonpea varieties viz., BRG 3, BRG 5 and ICM practices.
- Integrated pest management of fall armyworm in maize and baby corn.
- Demonstration of drought resistant groundnut var. GKVK-5/KCG-6, GKVK-27, mechanization and groundnut + pigeonpea intercropping (8:2 ratio) technology.
- Popularisation of diversified fodder crops viz., guinea grass, setaria, signal grass, multicut fodder sorghum CoFS-29, CoFS-31 and DHN-6, fodder shrubs and leguminous fodder crop.
- Integrated crop management in castor DCH-177 variety.
- Double cropping system under rainfed condition.

### 1.2 Horticultural crops

- Introduction of new hybrids of tomato (Arka Rakshak, Arka Abhed), integrated pest and disease management practices, enhancement of quality and yield through foliar nutrition and integrated crop management.
- Promotion of new varieties of okra (Arka Anand), enhancement of yield through foliar nutrition (water soluble fertilizer) in var. Arka Anamika and integrated management of yellow vein mosaic virus.
- Popularisation of var. yelakki banana, disease management (Panama wilt and yellow sigatoka disease) and foliar nutrition application.
- Promotion of new var. of frenchbean (Arka Arjun and Arka Sharat), drumstick (Bhagya), multi-cut amaranth (Arka Suguna), palak (Arka Anupama), yard long bean (Arka

Mangala), chilli var. Arka Meghana, china aster (Arka Poornima), multi-cut coriander var. Arka Isha

- Integrated management of pests and diseases in yard long bean and bitter gourd.
- Nutrient management to reduce nut dropping in coconut, management of eriophyid mite in coconut through nutrient supplementation, stage specific management of coconut black headed caterpillar and popularization of coconut dehusking.
- Popularization of grain amaranth and rice bean as potential source of nutrition for rural population.
- Integrated crop management in guava, cabbage, garden pea (Magadi local) and chrysanthemum.
- Management of yellow mosaic virus in pole bean and ridgegourd.
- Nutrient management to reduce nut dropping and disease management in arecanut, husk decomposition and demonstration of mucuna as intercrop.
- Green manuring, management of stem borer in mango, pest and disease management, mango-special as micro-nutrient supplement, post-harvest management including safe ripening and marketing.
- Management of eriophyid mite damage in jasmine var. Kakada.
- Utilization of banana-special, mango-special and vegetable -special.
- Promoted eco-friendly pest management components like yellow sticky traps, blue sticky traps, pheromone traps in vegetables, mango and coconut.

### 1.3 Animal husbandry

- Popularization of diversified fodder crops and balanced feeding practices.
- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Backyard poultry (Swarnadhara), low-cost incubation and hatchery unit and feed supplementation with azolla.
- Cost-efficient nutrition management with locally-prepared feed formulations.
- Semi-intensive and intensive sheep and goat farming, micro-nutrient supplementation and deworming practices.
- Introduction of area specific mineral mixture for small ruminants.

### 0.4 Fisheries

- Introduction of short duration tilapia fishes for good economical returns.
- Promotion of composite fish culture (Catla, Rohu, Mrughal, Grass carp and Common carp).
- Introduction of floating feeds.
- Feed management in fish farming.

### 0.5 Farm and non-farm enterprises

- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of fruit, plantation and vegetable crops.
- Mulberry cultivation, silkworm rearing for cocoon production and value addition.
- Bee-keeping for honey production, value addition and pollination,
- Millet processing and value addition.
- Custom hiring of farm machinery and coconut climbing.



- Introduction of drudgery reducing implements, simple hand tools like cycle weeder, mango harvester and coconut opener.

## 2. Impact on household income

The average income of farm households included in the study has doubled (1.39 times) between 2016-17 and 2020-21 (Table 47). Income from

field crops and livestock increased 1.76 and 2.59 times, respectively. Livestock sector consolidated its share in the household income to 17.77 per cent in 2020-21 from 15.88 per cent in 2016-17. Horticulture component experienced 2.36 times increase in income over benchmark year. It proved to be the dominant source of household income with contribution of 63.99 per cent to the additional income.

**Table 47: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	20158	35648	76.85	9.25	6.83	5.10
Horticulture	142769	337255	136.22	65.55	64.64	63.99
Livestock	34590	89602	159.04	15.88	17.17	18.10
Fisheries	0	536	100.00	0.00	0.10	0.18
Farm and non-farm enterprises	20297	58692	189.16	9.32	11.25	12.63
<b>Overall</b>	<b>217815</b>	<b>521733</b>	<b>139.53</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from marginal, small and medium land classes were benefitted from the technical interventions (Table 48). However, the households at the bottom of land distribution benefitted relatively more. Marginal and small farm households were benefitted by 2.59 and 2.28 times in income, respectively. The medium households could realize 2.47 times increase in their household income.

**Table 48: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	27	24.32	158399	410517	159.17
Small (1-2 ha)	60	54.05	215035	491966	128.78
Medium (2-4 ha)	24	21.62	291608	721271	147.34
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>217815</b>	<b>521733</b>	<b>139.53</b>



**Field day in ragi demonstration**



**Demonstration of paddy variety**



**Off campus training on arecanut management**



# MANDYA

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ICAR-Krishi Vigyana Kendra, Mandya



## About the district

**M**andya District is one of the most agriculturally prosperous districts in Karnataka. The construction of K.R. Sagara reservoir (1930) has substantially marked transformation in cropping patterns, composition of crops, yield level, ultimately leading to better economic conditions



of the people. The total geographical area of the district is 4,98,244 hectares, and more than half of the district total land area is used for agriculture. Mandya district comprises of seven taluks, viz., Maddur, Malavalli, Srirangapatna, Nagamangala, Krishnaraj Pete and Pandavapura. The major crops of the district are ragi (85,467 ha), rice (79,892 ha), sugarcane (30,630 ha), pulses (predominantly horsegram and to some extent pigeonpea, cowpea, greengram, blackgram and avare) and oilseeds (mainly groundnut and sesame). Sericulture is a rural cottage industry, which has given employment to 41393 sericulturists in Mandya district.

The total area of horticulture crops is around 66,342 ha and increasing due to its high yield potential and higher income. Farmers in the district grow a variety of fruits and vegetable crops. Irrigated horticulture crops occupy 43763.7 ha whereas rainfed horticulture crops are grown on 22587.8 ha. Coconut, banana, mango and sapota are grown both as rainfed and irrigated crops. The major vegetables grown in the district are tomato, french beans, chilli, onion, and various cucurbits.

### About KVK Mandya

Krishi Vigyan Kendra, Mandya was first started as remanded KVK in 2000, under National Agriculture Technology Project (NATP). Later started functioning as full pledged KVK from 2004. The Krishi Vigyan Kendra is located on Mandya Melukote main road 8 km away from the Mandya city. Paddy, sugarcane, ragi, sericulture, horticulture, pulses and oilseeds, fodder and dairy are the major crops and subsidiary enterprises. KVK has well established demonstration units on agriculture and allied sectors like sericulture, horticulture crops, vermicompost unit, and animal components to diffuse and display the improved technologies. The KVK is serving farmers by producing and supplying quality planting material viz., coconut seedlings, mulberry cuttings, fodder cuttings, sugarcane nodes, paddy seedlings and fruit and vegetable saplings.

KVK has the seed hub project for production of quality pulse seed under farmer's participatory mode (blackgram, greengram, cowpea, fieldbean

and horsegram). KVK is having plant health clinic to diagnose the pest and disease, providing timely and appropriate control measures to the farmers. In addition, KVK is producing bio-control agents viz., *Trichoderma viride* and *Pseudomonas fluorescens* in solid and liquid formulation and supplying to the farmers. Soil and water testing laboratory available to test soil pH, EC, organic carbon, nitrogen, phosphorus, potassium and micro-nutrients (Zn, Fe, Cu, Mn) and recommendations based on soil test are provided. In the context of value addition, products like ragi malt, ragi biscuits and ragi papad are produced and also providing training to SHG's to produce and market the above mentioned products.

## 1. Sector specific interventions by KVK Mandya

### 1.1 Field crops

- Introduction of improved varieties of paddy viz., Gangavathi Sona (Salt tolerant var.), BR-2655 (Blast tolerant var.), direct seeding of rice (DSR), mechanical sowing and integrated crop management (ICM) practices.
- Introduction of finger millet varieties KMR-340, 630 and Indaf-7 suitable for *rabi* season.
- Introduction of maize hybrid MAH-14-5, integrated nutrient management and integrated pest management especially with respect to fall army worm.
- Introduction of sugarcane var. VCF-0517, single eye bud seedlings, integrated trash management approaches and integrated root grub management practices.
- Introduction of improved pulse varieties such as LBG-791 in blackgram, KBC-9, in cowpea and adoption of improved pulse production technologies.

### 1.2 Horticultural crops

- Introduction of new hybrids of tomato (Arka Rakshak and Arka Abhed), integrated nutrient management and pest and disease management

- Introduction of new hybrids of chilli (Arka Kyathi), integrated nutrient management and pest and disease management
- Introduction of new varieties of frenchbean (Arka Arjun), ridgegourd (Arka Prasanna) and okra (Arka Nikitha).
- Integrated nutrient management in coconut and arecanutto reduce nut dropping and integrated approaches for management of rhinoceros beetle and red palm weevil.
- Pest and disease management and nutrient management advised for banana crop including bunch treatment.
- Improved cultivation practices, nutrient, pest and disease management in small onion for improved yield.
- Integrated crop management in ginger including rhizome rot management.
- Integrated crop management practices in chrysanthemum, cabbage and polebean.

### 1.3 Animal husbandry

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties CoFS-29, 30, Co 3,4 and fodder seed production units.
- Improved sheep and goat farming practices including stall feeding method,

micro-nutrients supplementation and deworming.

- Promotion of indigenous cow breeds.

### 1.4 Fisheries

- Improved practices for fish culture.

### 1.5 Farm and non-farm enterprises

- Linkage for cereal and pulse seed production system.
- Horticulture nursery for plantation crops.
- Improved mulberry cultivation and silkworm rearing for cocoon production.
- Millets processing and value addition.
- Mushroom cultivation and value addition.

## 2. Impact on household income

Income of the farmers involved in the study has more than doubled (2.4 times) between 2016-17 and 2020-21 (Table 49). Income from field crops and horticulture crops, have increased by 100 per cent at 15.16 per cent respectively. Whereas highest increase in income was reported under livestock (318.42) sector. The share of livestock in household income accounts to 7.12 per cent in 2020-21 which was 4.16 per cent in 2016-17. Further, the horticulture component proved to be dominant source of household income with contribution of 49.80 per cent.

**Table 49: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	86914	174325	100.57	41.80	34.32	29.14
Horticulture	98822	248200	151.16	47.53	48.87	49.79
Livestock	8642	36162	318.42	4.16	7.12	09.17
Farm and non-farm enterprises	13530	49224	264.00	6.51	9.69	11.90
<b>Overall</b>	<b>207908</b>	<b>507910</b>	<b>144.30</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Among all land classes which are benefitted from the technical interventions (Table 50) marginal and small households benefitted relatively more by 3.58 and 2.4 times increased in income, respectively. The medium and large farm household could realize 2.22 times increase in their household income.

**Table 50: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	13	11.82	14159	50749	258.42
Small (1-2 ha)	71	64.55	122763	299685	144.12
Medium (2-4 ha)	26	23.64	70986	157476	121.84
<b>Total</b>	<b>110</b>	<b>100</b>	<b>207908</b>	<b>507910</b>	<b>144.30</b>



**Demonstration on use of Sampoorna for quality cocoon production**



**Demonstration on integrated crop management in cabbage at Brahmadevarahalli**



**Quality checking in capsicum field**



**Intercropping in mulberry**

# CHAMARAJANAGARA

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ICAR-Krishi Vigyana Kendra, Chamarajanagara



## About the district

Chamarajanagara district is situated in the Southern dry zone (Zone-6) of the state with an average annual rainfall of 730 mm and its distribution is more during May-June and September- October



months. Red loam (81,340 ha), red sandy loam (27,500 ha) and medium black (91,181 ha) soils are prominent. District is mainly characterized by semi- arid rain-dependent flat-lands along with forested hills. The cultivable area is 2,10,862 ha, out of which 71,805 ha is irrigated by various sources and the remaining 1,39,057 ha (65.95%) is under rainfed condition. The average size of land holdings is 1.46 hectares as against the state average of 2.13 hectares. Bestowed with minor forest products viz., honey, gums and resins, soap nut, lichens and medicinal plants etc., nendran is a unique Banana cultivar cultivating in the larger area, having good processing value in Kerala and Tamil Nadu. Traditional sericulture is the main occupation in areas of Chamarajanagara, Kollegala and Gundlupet taluks. Watermelon and small onion crops are cultivated irrespective of the season - (Unique production scenario).

### **About KVK Chamarajanagara**

The Krishi Vigyan Kendra, Chamarajanagara is the district level resource and knowledge centre established in the year 2004 at Haradanahalli farm, Sathyamangala Road, Chamarajanagara. KVK comes under the jurisdiction of University of Agriculture Sciences, Bengaluru. The operational area of this KVK comes under Southern Dry Zone of Karnataka (Zone 6), comprising of five taluks viz; Chamarajanagara, Kollegala, Gundlupete, Yalanduru and Hanuru. The KVK started with a mission to disseminate the appropriate technologies to the farming community for enhancing the farm productivity to achieve sustainable income.

## **1. Sector specific interventions by KVK Chamarajanagara**

### **1.1 Field crops**

- Introduction of improved paddy varieties (Ganagvathi Sona, KMP-220, MSN-99 and RNR-15048) and hybrids (KRH-2 and KRH-4).
- Demonstration of drum seeded rice (Paddy) and integrated crop management practices in paddy.

- Introduction of new varieties of ragi(KMR-630), Maize (MAH-14-5), greengram (KKM-03), blackgram (LBG-791), chickpea (BGD-103, Jaki-9218), pigeonpea (BRG-3, BRG-5), sunflower (KBSH-53, KBSH -78) and fieldbean(HA-4 and HA-5).
- Adoption of soil and water conservation technologies such as contour bunding, graded bunding, dead furrows and farm ponds to provide protective irrigation.
- Adoption of improved agronomic practices such as nipping and micro-nutrient application.
- Integrated weed management.
- Integrated nutrient management and soil test based nutrient applications.
- Seed production of maize hybrid.
- Promotion of improved fodder hybrids such as BNH-10, CO-03, PBN-342 and multi-cut fodder like CoFS-29, 31.
- Weather based crop management.

### **1.2 Soil science**

- Management of paddy in problematic soil through introduction of salt tolerant paddy variety Gangavathi Sona and problematic soil management practices.
- Enhancing banana productivity and quality in Chamarajanagara district through demonstrations on integrated nutrient management in banana.
- Quality vegetable production in Chamarajanagara district and integrated nutrient management practices, introduction of IIHR vegetable-special, a micro-nutrient mixture.
- Scientific management of sugarcane trash for enhancing the soil properties, recycling of organic resources for better soil health and fertility.

### 1.3 Horticultural crops

- Introduction of improved varieties of turmeric viz., IISR Prathibha and IISR Alleppey Supreme, mechanization in harvesting and integrated crop management (ICM) practices.
- Introduction of short duration turmeric variety IISR Pragathi and turmeric booster micro-nutrient mixture for enhancing the yield and quality.
- Micro-nutrient management in horticulture crops through popularization of banana-special, vegetable -special and turmeric booster.
- Introduction of seed propagation of small onion and Co-05 variety of small onion crop.
- Popularization of tomato hybrids Arka Rakshak, Arka Samrat and Arka Abhed and ICM practices.
- Promotion of self-employment of rural youth through FoCT “Friends of Coconut Tree” a skill oriented training programme.
- Nursery worker skill training programme for self-employment.
- Introduction of turmeric harvester and promotion of hygienic processing, marketing and branding in turmeric.
- Integrated panama wilt disease management through use of bio-agents.
- Introduction of improved varieties of potato viz., Kufri Jyothi and Kufri Himalini and ARC technology in potato and ICM practices.
- Integrated nutrient management in garlic.
- Popularization of rapid multiplication of turmeric to promote precision farming in turmeric cultivation.

### 1.4 Plant protection

- IPM practice in cotton.
- Demonstration of IPM practices in chickpea reduced the cost of cultivation.
- Demonstration of IPDM practises in banana and small onion.

### 1.5 Farm and non-farm enterprises

- Production of fodder varieties like CoFS -29, 31 and Co 3, 4 and 5.
- Seed production of cereals, pulses, oilseeds and fodder crops.
- Horticultural nursery for seedlings of fruits, plantation and vegetable crops.
- Mulberry cultivation and silkworm rearing for cocoon production.
- Value addition in ragi.
- Custom hiring centre and coconut climbing.

### 1.6 Others

- Plant health clinic started at KVK during the year 2013-14.
- Production of bio-agents viz., *Trichoderma harzianum*, *trichoderma viridae* and *Pseudomonas florescence* started in a small scale for demonstration purpose.
- Demonstration of bio-agents and pheromone traps.
- Production and marketing of ragi products, tamarind products and masala powders by SHGs for earning good returns.

## 2. Impact on household income

The average income of farm households, more than doubled (2.13 times) between 2016-17 and 2020-21 (Table 51). Income from farm and non-farm enterprises increased by 4.66 times and from livestock 2.28 times. Horticulture enterprise experienced 2.12 times increase in income.

It proved to be the dominant source of household income with contribution of 73.70 per cent to the additional income.

**Table 51: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	51057	101693	99.17	20.19	18.85	17.66
Horticulture	187820	399110	112.50	74.29	73.97	73.70
Livestock	11081	25375	128.98	4.38	4.70	4.99
Farm and non-farm enterprises	2864	13346	366.03	1.13	2.47	3.66
<b>Overall</b>	<b>252822</b>	<b>539523</b>	<b>113.40</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all classes benefitted from the technical interventions (Table 52). The income of the marginal farm households was relatively more (2.28 times) compared to other classes. Small, medium and large farm households were benefitted by 2.19, 2.08 and 2.05 times increased income, respectively.

**Table 52: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	22	20.00	105343	240145	127.96
Small (1-2 ha)	55	50.00	179537	394396	119.67
Medium (2-4 ha)	24	21.82	327242	682938	108.70
Large (>4 ha)	9	8.18	862722	1775778	105.83
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>252822</b>	<b>539523</b>	<b>113.40</b>



**Ready to harvest banana field**



**Turmeric variety IISR Prathibha**

# MYSURU

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ICAR-Krishi Vigyana Kendra, Mysuru



## About the district

**M**ysuru District, known as the cultural capital of Karnataka state, is located in the southern part of the state. Mysuru is well recognised on the world agricultural map through geographical indicator (GI) crops



viz., sandalwood (Mysuru sandal), Mysuru Silk, *Nanjanagud Rasabale* (banana variety), Beetle leaf (Mysuru *Chigurele*), *Erangere Badane* (Brinjal variety) and Mysuru *Mallige* (Jasmine). Mysuru ranks second highest in water resources after Tumakuru, second highest in the net irrigated area after Mandya and ranks first in cropping intensity in the south interior part of Karnataka state. The district ranks fifth in terms of total GDP in the stage and sixth in agricultural GDP. The district comes under two agro-climatic zones. While four taluks viz. K.R. Nagar, Mysuru, Nanjanagud and T. Narasipura come under southern dry zone the other three taluks viz., HD Kote, Hunsur and Periyapatana come under Southern Transitional Zone. The district has a normal cultivable area of about 3,46,874 ha with net irrigated area of about 1,37,569 ha, which accounts for 41 per cent of the total cultivable area. The gross cropped area is 50,2656 ha, the net sown area is 34,6874 ha (51.3%) and the cropping intensity works out to 145 per cent.

### About KVK Mysuru

Krishi Vigyan Kendra was started in 1994 in Suttur village located on the scenic surroundings of the river Kapila in Nanjanagud taluk, Mysuru district. KVK has four models of vermicompost units, AMC production unit, half acre horticulture based IFS model, dairy, chawki rearing center, composting, hydroponic fodder unit, azolla unit, terracotta and pottery unit, food processing and training center, soil, water and plant diagnosis unit, desi goshale comprising more than 50 indigenous cows along with vibhuti production unit, horticulture nursery unit and a seed processing unit to provide quality planting materials and seeds. To provide prescription based suggestion to farmers, KVK started agri-clinic service during 2013.

The KVK has a well-equipped training hall and a hostel to accommodate about 100 farmers at a time. KVK is providing hands-on training on a wide variety of subjects every year. JSS KVK has been organizing Krishimela as part of the annual event Adi Jagadguru Sri Shivarathrishwara Shivayogi Jathra Mahotsava (Fair) for the benefit of farmers of the district. The one-acre IFS model is the major attraction of the Krishimela. Over five lakh farmers

participate and get benefit from the six-day event every year.

## 1. Sector specific interventions by KVK Mysuru

### 1.1 Field crops

There are three seasons in the district viz., *kharif*, *rabi* and summer. *Kharif* is the predominant season which is divided into early *kharif* and late *kharif*. It extends from April to end of September. Rice, ragi, sorghum, maize, redgram, horsegram, cowpea, groundnut, cotton and tobacco are the main *kharif* crops. *Rabi* sorghum, ragi, sunflower, horsegram and cowpea are the main *rabi* crops. Finger-millet, ragi, groundnut and pulses are the main summer crops. Cereals, pulses and oilseed crops are grown in an area of 1.93 lakh ha 1.21 lakh ha and 1.37 ha respectively. The area under sugarcane is about 12,077 ha Cotton is grown over an area of about 49,933 ha. While, tobacco occupies an area of about 77,426 ha. KVK interventions in the districts are as follows;

- Introduction of improved agronomic practices such as DSR (Drum seeders), machine transplanting, INM and IPDM practices along with introduction of new varieties such as in paddy RNR 15048, KMP 220, KMP 99, KRH-4 and Gangavathi Sona.
- INM and IPDM practices in pulses along with proper weed management with the introduction of new varieties in pulses such as in blackgram LBG 791, in cowpea KBC -9, in horsegram PHG 9, CRHG -19 and groundnut Kadri Lepakshi 1812.
- Improved agronomic practices such as guli method INM and IPDM practices with value addition training in new varieties such as ragi KMR 301, KMR -630 and KMR 340.
- INM, IPDM practices, intercrop with pulse/green manure crops, weed, micro-nutrient management and Sustainable Sugarcane Initiative (SSI) method in newly released variety sugarcane VCF-517 increased the yield.

- In millets introduction of new varieties such as in little millet DHLM 36-3 and DHFT-109-3 along with value addition and market linkage yield and income level was increased.
- Through introduction of new varieties regular trainings on seed treatment, seed production, DSR (drum seeders), machine transplanting, INM and IPDM practices, mixed cropping system, regular field visits and farm advisories, market linkage for seeds, farmers were able to reduce cost, increase the crop yield and there by increased the income.

## 1.2 Horticultural crops

Horticulture is a major allied agriculture activity in the district. Horticultural crops fruit, vegetables and spices occupy 59,789 ha area. Fruits are grown over an area of 13,703 ha, while, vegetables occupy 10,614 ha. Major fruits are mango, sapota, banana and papaya. Vegetables include tomato, beans brinjal, okra, green chillies and leafy vegetables. Plantation crop coconut covers an area of 25814 ha. Flower ornamentals, aromatic and medicinal plants are also cultivated in the district.

- Introduction of new variety in vegetable crops such as in tomato var. Arka Rakshak, chilli var. Arka Harita, fieldbean var. HA-4, frenchbean var. Arka Sharat along with INM and IPDM practices and fertigation schedule.
- Supply of healthy seedlings from KVK nursery such as in papaya var. Red Lady, drumstick Bhagya and other newly released variety along with the IPM practices with fertigation schedule.
- Introduction of new variety in turmeric var. Prathibha
- High density cropping system in banana along with INM practices with regular spray of banana-special increased the yield.
- In mango introduction of mango-special along with IPDM practices, with suitable

ripening and marketing techniques increased the yield.

- Supply of use of AMC, vegetable -special, ginger special spray from agri. clinic with advisory services and suitable market linkage, field visits helped the farmers to get high yield and good price.
- Under ASCI programme FOCT training, coconut-climbing skill has been developed in coconut farmers, coconut orchard maintenance and became a master trainer.
- In gardener cum nurseryman training, many farmers learnt the skill and established the nurseries and became entrepreneur.

## 1.3 Animal husbandry

Animal Husbandry is another complimentary activity in the district. As per the livestock census (19<sup>th</sup> round), the animal population of the district is 4,40,306. The livestock comprises of 6,16,756 cattle, 66,235 buffaloes, 2,56,968 sheep and 1,96,993 goats. There are 53,070 other animals, which includes pigs, rabbits and other animals.

- Introduction of new fodder varieties such as hybrid Napier, CoFS 31, sesbania and drumstick, SAT Maize farmer able to get good fodder yield.
- Use of chaff cutter increased the palatability and helps to make silage in fodder crops and there by the milk yield was increased and reduced the cost.
- Azolla production and its use increased the fat and milk yield.
- Ration balancing technology of NIANP, use of area specific mineral mixture for repeat breeders, deworming and vaccination protocols, mastitis control by green milk production and tick management practices helps the farmers to improve the animal health and thereby the yield.
- With regular training in dairy, sheep and goat and poultry.



- KVK helped the farmers to strengthen themselves in case of knowledge, skill and suitable linkages both for purchase and sale the farmer's income was doubled.

#### 1.4 Fisheries

There is a good scope for Inland Fisheries in the district. The district is endowed with 17165 ha of rich inland water resources, comprising of three reservoirs (8585 ha). 102 major tanks (4112 ha) and 979 small grama panchayat tanks (4918 ha), besides 335 kms. of river stretch. These resources have a potential to product 15000 MT of fish annually.

- Fish farming in farm ponds with Rohu, Catla, common carp mixed farming and amur carp culture.
- Training of feeding of fingerling and adult fishes.

#### 1.4 Farm and non- farm enterprises

Farm enterprises played major role in upliftment subsidiary income of the farm community. Nurseries, chawki rearing centres, agri-machinery hiring, livestock management (poultry farms, stall-feeding goat farming) and DAESI graduated agro enterprises.

- With regular trainings on value additions, labelling, packing and marketing to SHG groups, many farmers and farm women converted into entrepreneurs.
- KVK helped the entrepreneurs to write the projects under PMFME, ODOP and Atmanirbar yojana and EDP programme.
- SHG members are linked to sell their value added products with branding.
- By regular monitoring, linkage and training under EDP programme entrepreneurs in honey production, food producers and millet grower are getting 3 to 4 times more income.
- KVK is giving skill training in coconut climbing, nursery cum gardener, Sheep and goat rearing, diary, tailoring, seed

production, organic and desi seed producers. Beneficiaries from these trainings now opened many nurseries and agro-enterprises. With training, linkage and other support from KVK many farmers transformed as agri entrepreneurs.

- KVK demonstrated white Ragi KMR 340 and has given training on value addition which is high in protein and calcium. It helped SHG members to change the variety under cultivation and started their own value addition and marketing. The seeds of the KMR 340 are sold at higher price (Rs.40) compared to the other varieties (Rs.28)
- Non-farm enterprises tend to economic empowerment of women.
- Members of self-help groups (SHGs) are encouraged to start 'Micro Enterprises' using local resources, and community investment fund/ community enterprises fund.
- Skill training, handholding and marketing support are provided by KVK
- There are around 1,000 nano/micro enterprises are working in the district. The nano/micro enterprises are still facing infrastructural and logistical problems, lack of proper market linkages, and challenges in terms of flow of institutional credit, these nano/micro enterprises play a major role in the household income.
- KVK demonstrated foxtail-millet DHFt 109-3, little millet OLM 203, DHLM 36-3 and value addition, demonstration of the millets helps to increase farmers income and also adoption in their diet.
- SHG women started selling millet rice, papad, chakkuli, nippattu, laddu and other value added products.
- Nutri-garden establishment among farm families is another unique aspect from KVK.

- Nutri-garden helps to reduce the amount spent for purchase of vegetables from outside, since farmers are using chemical free and fresh vegetables the health conditions of the farm family members improved.

### 3. Impact on household income

The average income of farm households due to KVK interventions has more than doubled (2.54 times) between 2016-17 and 2020-21 (Table 53). Income from field crops was increased 2.02 times. Income

from livestock increased 3.21 times. Livestock sector consolidated its share in the household income to 10.65 per cent in 2020-21 from 8.45 per cent in 2016-17. Horticulture component experienced 2.6 times increase in income over benchmark year and its share in total income has increased from 44.32 per cent to 45.42 per cent. It proved to be the dominant source of household income with contribution of 46.13 per cent to the additional income. The share of farm and non-farm enterprises in household income, although small, experienced 3.88 times increase during this period.

**Table 53: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	72985	147579	102.20	38.45	30.53	25.41
Horticulture	84117	219547	161.00	44.32	45.42	46.13
Livestock	16042	51462	220.80	8.45	10.65	12.07
Farm and non-farm enterprises	16655	64777	288.94	8.77	13.40	16.39
<b>Overall</b>	<b>189799</b>	<b>483365</b>	<b>154.67</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 54). The income of the landless families increased 3.4 times (242.80%). Marginal and small farm households were benefited by 2.7 and 2.6 times increased income, respectively. The medium and large farm households could realize 2.5 and 2.12 times higher income respectively.

**Table 54: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	7	6.31	36214	124143	242.80
Marginal (<1.0 ha)	35	31.53	108917	297359	173.02
Small (1-2 ha)	42	37.84	160025	420678	162.88
Medium (2-4 ha)	23	20.72	328700	816087	148.28
Large (>4 ha)	4	3.60	680238	1484606	118.25
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>189799</b>	<b>483365</b>	<b>154.67</b>



**Tree mulberry cultivation**



**Shrinivasmurthy PPVFR winner displaying seeds of different varieties at New Delhi**



**Blackgram var. LBG-791 seed production in farmers field**

# HASSAN

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## About the district

Hassan has a total of 17.76 lakhs holdings spread across 6.82 lakh hectares of the operated area. Marginal and small farmers account for 92.08 per cent of the total holdings operating 65.15 per cent of the



total cultivated area. The gross cropped area was 4.21 lakh hectares. Out of 3.45 lakh hectares of net area sown, the net irrigated area (14.79%). Food crops accounted for 57.31 per cent of the gross cropped area. Cereals accounted for 47.62 per cent of the gross cropped area, where as the share of oilseeds was 0.91 per cent and that of pulses was 9.68 per cent. Among cereals, Ragi accounted for the largest area of 47.18 per cent, followed by Maize 41.31 per cent and Paddy 10.78 per cent. Hassan is the leading Potato growing district in the state and district having an area of 1.6 lakh hectares under horticulture cropping system. Among horticulture, vegetables occupy 10.29 per cent, fruit crops occupy 3.85 per cent and spices cover 17.01 per cent of the area.

### **About KVK Hassan**

The ICAR-Krishi Vigyan Kendra was established in the year 1992. KVK Hassan is testing the latest technologies with a view to reduce the time lag between technology generation and its adoption. KVK verifies the technologies in the socio-economic conditions of the farmers and study the constraints in production as well as to modify the technologies to suit to local conditions. Keeping in view the mandate, KVK follow the principle of learning by doing. The main mandate of the KVK is technology assessment and demonstration for its application and capacity development. As part of the national agenda of doubling farmers income, the ICAR KVK Hassan took up documentation of successful farmers who could enhance their income with the help and support of technological interventions by the KVK. A brief summary of interventions, the impact in terms of household income under different components and the change in income for different land-class categories is given below.

## **1. Sector specific interventions by KVK Hassan**

### **1.1 Field crops**

- Introduction of improved varieties and hybrids of paddy viz., KRH-4, KPR-1, Gangavathi Sona, RNR 15048, direct seeding of rice, mechanical sowing and integrated crop management practices

and also promotion of organic cultivation in paddy.

- Introduction of new varieties of finger millet (ML-365, KMR-340, KMR-301 and KMR-630), mechanical sowing, harvesting, winnowing and value addition.
- Integrated crop management hybrid maize, introduction of improved hybrid MAH-14-5 and integrated pest management (IPM) of fall armyworm in maize.
- Introduction of new pigeonpea variety BRG-3 and BRG-5.
- Promotion of new groundnut varieties K-6, TAG-24, GPBD-4 and GPBD-5, GKVK-5, cultivation of groundnut in rice fallows and ground seed production.
- Introduction of new varieties of cowpea IT-39956-1, KBC-9 and cultivation of cowpea in rice fallows.
- Adoption of dryland production technologies such as compartment bunding, seed hardening/treatment with  $\text{CaCl}_2$  and farm pond supported protective irrigation.
- Improved pulses production technologies such as use of pulse-magic and nipping.

### **1.2 Horticultural crops**

- Improved Potato production technologies such as use of vegetable-special, gypsum and boron application spray on of nano nitrogen and use of mechanical planter, sprayer and harvester in potato cultivation.
- Promotion of apical rooted cuttings saplings for potato seed production, integrated crop management and integrated pest and disease management in potato
- Integrated crop management, integrated pest and disease management, nutrient management in coconut to reduce nut dropping and promotion of filed bean as intercrop in coconut orchard as an additional source of income and to enhance soil fertility.

- Micro-nutrient application and foliar nutrition in coffee
- Wilt management in pepper, pest disease management, post-harvest management and marketing in Pepper.
- Integrated nutrient and crop management in banana and mango.
- Nutrient and disease management in arecanut.
- Introduction of new varieties/hybrids of chilli viz., KBCH-1, Aka Kyathi and Arka Haritha, weed management and bio-intensive pest/disease management.
- Introduction of new hybrids of tomato (Arka Rakshak and Arka Abhed), integrated management of leaf miner *Tuta absoluta* and integrated pest and disease management practices.
- Promotion of new variety of frenchbean Arka Arjun.

### 1.3 Animal husbandry

- Promotion of integrated health management, balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals and integrated calf management.
- Promotion of infertility management in cross bred dairy cattle, control of mastitis in cows and also prevention of milk fever through nutrient supplementation.
- Promotion of fodder varieties CoFS-31, BNH-10, DHN-6, Co-3, 4 and 5 and fodder seed production units.
- Introduction of breeds of backyard poultry (Kadakhnath and Giriraja) and feed supplementation with azolla.
- Semi-intensive and intensive sheep and goat farming, integrated health management, micro-nutrient supplementation and deworming practices in sheep and goat farming.

- Disease management and nutrition supplementation to enhance piggery yield and capacity development of farmers to rear improved breeds of pigs.

### 1.4 Fisheries

- Introduction of high yielding fish varieties viz., Rohu, Catla and Common Carp.
- Introduction of new improved fish variety amur common carp for better adaptability.
- Promotion of poly-culture and composite culture of fish rearing and introduction of GIFT tilapia fish variety for farm ponds.

### 1.5 Farm and non-farm enterprises

- Improved mulberry cultivation and silkworm rearing practices for higher cocoon production.
- Introduction of Improved mulberry variety G-4, tree mulberry and intercrops in tree mulberry for additional income.
- Seed production of cereals, oilseeds and fodder crops.
- Oyster mushroom production, processing, packaging and marketing.
- Bee-keeping for honey production and its value addition.
- Millet processing and value addition.

## 2. Impact on household income

Income of farm households, surveyed for the purpose has more than doubled (2.35 times) between 2016-17 and 2020-21 (Table 55). The share of enterprises in household income experienced very high increase during this period. Livestock and fisheries sectors provided additional income to households due to KVK interventions. Horticulture component gave 2.23 times higher income over benchmark year. It proved to be the dominant source of household income with contribution of 72.72 per cent to the additional income.

**Table 55: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	35701	52835	47.99	19.53	12.25	6.90
Horticulture	146316	327012	123.50	80.04	75.82	72.72
Livestock	0	3267	100.00	0.00	0.76	1.31
Fisheries	0	150	100.00	0.00	0.03	0.06
Farm and non-farm enterprises	795	48046	5946.54	0.43	11.14	19.01
<b>Overall</b>	<b>182812</b>	<b>431309</b>	<b>135.93</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 56). However, the households at the bottom of land distribution benefitted relatively more. Marginal and small farm households were benefitted by 2.45 and 2.39 times increased income, respectively. The medium and large farm households could realize 2.29 and 2.16 times increase in their household income, respectively.

**Table 56: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	40	36.04	93521	229823	145.74
Small (1-2 ha)	54	48.65	178310	427616	139.82
Medium (2-4 ha)	15	13.51	305700	702469	129.79
Large (>4 ha)	2	1.80	1168515	2527032	116.26
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>182812</b>	<b>431309</b>	<b>135.93</b>



**Mulberry intercropping in young coconut orchard**



**Ring method application of nutrients to coconut**



**Fish rearing in freshwater ponds**



**Field demonstration in ragi field**



# KODAGU

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## About district

**K**odagu (Coorg), the thickly wooded grandeur on the Western Ghats, is the most beautiful hill station of Karnataka. It occupies an area of 4,102 square kilometers in the Western Ghats of southwestern



Karnataka. Much of the area is used for shaded coffee mixed farming system. Characteristically and historically, paddy fields are found on the valley floors, with Coffee and pepper agro-forestry in the surrounding hills. It is a hilly district, the lowest elevation of which is 900 mts. (3,000 ft) above sea-level. In July and August, rainfall is intense, and there are often showers into November. Yearly rainfall may exceed 4,000 millimeters (160 in) in some areas. Beside coffee, cardamom, black pepper, banana, arecanut are the major crops. Maize and other horticultural crops are also grown in small areas. Piggery is the major livestock activity followed the Kodagu district. The Kodagu district comprises of five taluks Madikeri, Virajpet, Ponnampet, Somwarpet and Kushalnaagar.

### **About KVK Kodagu**

The first ICAR KVK in Karnataka was established in December 1976 under Indian Institute of Horticultural Research (IIHR), Bengaluru in Kodagu (Coorg) district. KVK is located in Gonikoppal, Virajpet taluk that is 50 km away from Madikeri and 92 km away from Mysore. The main focus of the KVK and its activities concentrated on technology backstopping to farmers to enhance the farmers income through on farm testing, frontline demonstrations, capacity building training programmes, extension activities, production and supply of planting material, livestock breeds, technological inputs, soil health cards. The KVK is having well maintained buildings, farmer hostel, microbial consortium production unit, soil testing laboratory, mushroom spawn production unit, piggery unit, goatary unit, dairy, azolla unit, vermicompost unit, fodder cafeteria, coffee based inter cropping system, fruit orchards and nursery to cater to the farming community in the district.

KVK is actively involved in the service of farmer by supplying of quality planting materials like black pepper, arecanut, coffee seedlings, supply of 15 to 20 tonnes of Arka microbial consortium, organization of need based training programmes(70-90 per year) and field visit to problematic farmers fields. The rural women folk were trained in small-scale fruit processing and mushroom cultivation as an additional enterprise in the coffee based mixed farming system. This

KVK has introduced the Duroc breed of pig which are known for fast growth and production of pork with low fat and spread well among the farming community within the district as well as surrounding districts. Testing of soil for lime application and major and minor fertilizer application is regular activity. A new extension approach of aggregation of farmer, inputs produces and marketing through by nurturing Puthari farmer producer company with 1000 shareholdermembersis popular among the farming community.

## **1. Sector specific interventions by KVK Kodagu**

### **1.1 Field crops**

- Introduction of high yielding and blast resistant paddy varieties Tunga, Hemavathi and KPR-1 with ICM practices.
- Introduction of mechanization in paddy (transplantation and harvesting) to reduce the cost of cultivation.
- Application of fertilizers mainly as top dressing based on soil testing.
- Application of micro-nutrients based on soil testing (basal dose).
- Demonstration of vegetable crops after the paddy cultivation to enhance the income and productivity.

### **1.2 Horticultural crops**

- Introduction of high yielding coffee varieties Chandragiri and CxR.
- Soil test based lime and fertilizers application in coffee.
- Integrated crop management practices for better productivity of black pepper.
- Introduction of Arka microbial consortium for management of wilt disease in black pepper.
- Standardization of nursery technique and introduction of Arka Coorg Excel in black pepper.
- Management of koleroga disease in arecanut and supply of quality planting material.

- Management of citrus decline by better ICM practices in Coorg mandarin.
- Introduction of high yielding ginger varieties IISR Varada and its ICM practices.
- Introduction of Passion fruit and butter fruit as part of the diversification in the coffee estates.

### 1.3 Animal husbandry

- Popularization of Duroc breed of pig for better pork quality and piglets as part of additional income to farmers.
- Management of ascariasis and anemia in pigs.
- Clean milk production in diary.
- Production of quality fodder slips and supply to farmers.
- Effective farm waste recycling by vermi-compost method and production of bio-inputs.

### 1.4 Farm and non-farm enterprises

- Onsite production of compost using compost cultures.
- Value addition of fruits by SHG members.
- Quality planting material production of coffee, arecanut and black pepper.

## 2. Impact of household income

The average income of farm households, before and after the interventions, more than doubled (2.16 times) between 2016-17 and 2020-21 (Table 57). Horticulture component experienced 124.92 per cent increase in income over benchmark year. It is the dominant source of household income with contribution of 74.5 per cent to the additional income. The share of enterprises in household income, although small, experienced 143.85 per cent increase during this period.

**Table 57: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	35600	59300	66.57	8.65	6.66	4.95
Horticulture	295000	663500	124.92	71.65	74.48	76.92
Livestock	26500	48600	83.40	6.44	5.46	4.61
Fisheries	45300	96600	113.25	11.00	10.84	10.71
Farm and non-farm enterprises	9350	22800	143.85	2.27	2.56	2.81
<b>Overall</b>	<b>411750</b>	<b>890800</b>	<b>116.34</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

All land class farmers were benefitted from the technical interventions of the KVK (Table 58). The households at the centre of land distribution (small) got benefitted relatively more (130%). The income of the landless families increased by 219.8 per cent. The medium and large farm households could realize increase in their household income in the range of 112.6 per cent as 117.4 per cent relatively.

**Table 58: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	05	4.55	42100	92530	119.8
Marginal(< 1.0 ha)	20	18.18	132000	277600	110.3
Small(1-2 ha)	35	31.82	168900	388400	130.0
Medium (2-4 ha)	30	27.27	245800	522500	112.6
Large(>4 ha)	20	18.18	432000	939360	117.4
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>1020800</b>	<b>2220390</b>	<b>117.5</b>



**Field visit to banana orchard**



**Composting unit**



**Mushroom production unit**



**Recording polebean yield before taking to market**

# CHIKKAMAGALURU

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ICAR-Krishi Vigyan Kendra, Chikkamagaluru



## About the district

Chikkamagaluru district is situated in the south-western part of Karnataka state. Chikkamagaluru district has a total geographical area of 7201 sq.km. It is spread over 7 taluks, 34 hoblies and 227 gram panchayats. It comes under three agro climatic-zones of Karnataka viz., central dry zone (parts of Kadur taluk), southern



transition zone (parts of Tarikere taluk) and hilly zone consisting of five taluks viz., Mudigere, Sringeri, Koppa, Narasimharajapura and Chikkamagaluru. The annual rainfall is 1925 mm, having three major soil types viz., red sandy loam, clay loam and medium black soils. The gross cropped area is 33.05 lakh hectares. Out of 29.65 lakh hectares of net area sown, the net irrigated area is 3.54 lakh hectares. Food crops accounted for 43.60 per cent of the gross cropped area. Cereals accounted for 3.13 per cent of the gross cropped area, whereas the share of oilseeds was 0.64 per cent and that of pulses was 0.73 per cent. Coffee accounted for the largest area of 13 per cent, followed by arecanut 11.34 per cent, paddy 11.02 per cent, and coconut by 9.7 per cent. Chikkamagaluru district known as 'Spice Hub' with an area of 1.03 lakh hectares of spice crops. Chikkamagaluru district has rich resources under livestock with 33.61 lakh cattle, 9.82 lakh buffalo, 7.47 lakh sheep and 3.08 lakh poultry birds.

### About KVK Chikkamagaluru

ICAR-Krishi Vigyan Kendra, Chikkamagaluru is located at Mudigere, within the Zonal Agricultural Research Station. It is functioning under the administration centre of University of Agriculture and Horticultural Sciences Shivamogga. Frontline demonstrations on improved technologies suited for all the seven taluks have taken up along with capacity development of farmers, farmwomen, rural youth and extension functionaries. KVK has a fully developed instructional farm for the transfer of technologies. KVK has established demonstration units such as vermicompost unit, azolla unit, nursery unit, fodder unit, farm pond with fishery unit, dryland horticulture, agro-forestry block, sapota block, rubber block, coffee block, sheep unit, piggery unit, poultry unit, bee-keeping unit, model polyhouse, rabbit unit and hydroponic unit for the benefit of visiting farmers.

## 1. Sector specific interventions by KVK Chikkamagaluru

### 1.1 Field crops

- Introduction of improved varieties of paddy viz., KPR-1, KHP 13, Tunga-13901,

mechanical sowing and integrated crop management (ICM) practices. Integrated nutrient management in paddy (A-2 Mechanization in paddy).

- Introduction of new varieties of finger millet (ML 365) integrated crop management (ICM) practices.
- Integrated pest management (IPM) of fall armyworm in maize.
- Nutrient management in maize to increase the yield.
- Promotion of new groundnut variety GPBD-4.
- Integrated nutrient management in groundnut and demonstration on micro-nutrient management in groundnut.
- Introduction of new varieties of chickpea (JG-11) and pheromone traps.
- Improved pulses production technologies such as use of pulse-magic.
- Demonstration of cowpea (UAHS-28) in paddy fallow system.
- Demonstrations of paddy drum seeder.

### 1.2 Horticultural crops

- Intercropping of flower (marigold) cropping in young arecanut garden.
- Introduction of new varieties/hybrids of chilli (Aka Kyathi), weed management and bio-intensive pest/disease management, intercropping of chilli hybrid Arka Kyathi in onion field for doubling the farmers income.
- Introduction of new hybrids of tomato (Arka Rakshak and Raina), integrated pest and disease management practices, integrated crop management, management of tomato leaf miner *Tuta absoluta*.
- Demonstration on french bean variety Arka Sukomal in paddy fallow.
- Nutrient management in coconut to reduce nut dropping.

- Introduction of tissue culture banana yelakki in paddy fields, integrated crop management in banana (Nendran).
- Integrated crop management in arecanut (Thirthahally local), nutrient and disease management in arecanut and arecanut husk decomposition.
- Mixed cropping in arecanut and management of nut splitting.
- Introduction of new onion varieties (Bhima Super), management of pests and diseases.
- Promotion of good management practices in ginger special in ginger including rhizome rot management.
- Integrated crop management in pepper, Panniyur-1, management of termites in black pepper, wilt management in black pepper and management of yellowing in black pepper.
- Demonstration of nutrition garden in school area, demonstration of nutri-farms for year round nutrition security among farm families.
- Vegetable terrace gardening.
- Demonstration of Spine gourd variety Arka Bharath.

### 1.3 Animal husbandry

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.

- Promotion of fodder cafeteria.
- Introduction of improved backyard poultry “Gramapriya”.
- Cost-efficient nutrition management with locally prepared feed formulations.
- Semi-intensive and intensive pig, sheep and goat farming, micro-nutrient supplementation and deworming practices.
- Introduction of tilapia under feed-based aquaculture for doubling of income.

### 1.4 Farm and non-farm enterprises

- Horticultural nursery for seedlings of fruit, plantation and vegetable crops.
- Bee keeping for honey production and its value addition.
- Millet processing and value addition.
- Custom hiring of farm machinery and coconut climbing.
- Mushroom production technologies.

## 2. Impact on household income

The data depicted on Table 59 revealed that, the average income of farm households has more than doubled (2.02 times) between 2016-17 and 2020-21. Horticulture component experienced 101.76 per cent increase in income over benchmark year. Horticulture is the main source of household income with contribution of 96.82 per cent to the additional income.

**Table 59: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	11535	25707	122.87	1.82	2.01	2.19
Horticulture	615722	1242254	101.76	97.17	96.99	96.82
Livestock	6384	12820	100.81	1.01	1.00	0.99
<b>Overall</b>	<b>633641</b>	<b>1280781</b>	<b>102.13</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 60). Small and Medium farm households were benefited by 2.04 (104.47%) and 2.03 (103.03%) times increased income, respectively. The income of the marginal families increased 2.01 times (101.75%). The large farm households could realize 2.0 times increase in their household income.

**Table 60: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	23	20.91	320227	646045	101.75
Small (1-2 ha)	54	49.09	278714	569884	104.47
Medium (2-4 ha)	23	20.91	885181	1797223	103.03
Large (>4 ha)	10	9.09	2692557	5391704	100.24
<b>Total</b>	<b>110</b>	<b>100.00</b>	<b>633641</b>	<b>1280781</b>	<b>102.13</b>



**Scientist discussion with horticultural farmers**



**Fertilizer application to paddy crop**



**Scientist discussion with farmers on maize fall armyworm**



**Demonstration of drum seeder in paddy**

# SHIVAMOGGA

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## About the district

Shivamogga district has a total of 1.85 lakh holdings spread across 2.84 lakh hectares of the operated area. The gross cropped area was 2.84 lakh hectares. Out of 2.76 lakh hectares of



net area sown, the net irrigated area was 58.59 per cent. Food crops accounted for 46.08 per cent of the gross cropped area. Cereals accounted for 45.80 per cent of the gross cropped area. Among cereals, paddy accounted for the largest area of 27.63 per cent, followed by maize 18.02 per cent. In terms of percentage share of the irrigated area to the total area, paddy accounted for the highest share followed by maize. Shivamogga is the leading district for Horticulture crops with an area of 1.53 lakh hectare. Horticulture crops accounted for 53.91 per cent of the gross cropped area. Major horticulture crops are arecanut (36.05%), coconut (4.30%) and fruit crops (5.40%). Cashewnut, spices and processed products of horticulture were the major exported commodities from the district. Shivamogga has rich resources under livestock with 6.10 lakh cattle, 1.94 lakh buffalo, 0.75 lakhs sheep and goats and 5.7 lakh poultry birds.

### About KVK Shivamogga

Krishi Vigyan Kendra for Shivamogga district was established as a remandated KVK in the Zonal Agricultural Research Station, at Navile campus of Shivamogga. The KVK is catering to hill, transitional and dry agro-climatic zones of the district. As part of the national agenda of doubling farmers income, the ICAR KVK Shivamogga took up by the KVK. A brief summary of interventions, the impact in terms of household income under different components, and the change in income for different land-class categories is given below documentation of successful farmers who could enhance their income with the help and support of technological interventions.

## 1. Sector specific interventions by KVK Shivamogga

### 1.1 Field crops

- Introduction of improved varieties of paddy viz., Gangavathi Sona, RNR 15048, KMLT - 4, KKP 5, Sahyadri Kempu Mukhi, Sahyadri Megha, Shreyas, mechanisation, direct seeded rice (DSR) and integrated crop management (ICM) practices.

- Introduction of new varieties of finger millet (ML 365, KMR 630, GPU 28, PR-202, KMR -301, MR - 6).
- Integrated pest management (IPM) of fall armyworm in maize.
- Introduction of new pigeonpea varieties viz., BRG 1, 2,3, 4, 5 and ICP 7035 and its intercropping in maize.
- Promotion of new groundnut varieties GPBD 4, G 2-52, Kadri Lepakshi-1812 and cultivation of groundnut in rice fallows.
- Introduction of new varieties of greengram (KKM-3 and DGGV-2), blackgram (LBG-625) and sunflower (KBSH 53).
- Promotion of intercropping in maize, pigeonpea and groundnut.
- Adoption of dryland production technologies such as compartment bunding, seed hardening/treatment with  $\text{CaCl}_2$  and farm pond supported protective irrigation.

### 1.2 Horticultural crops

- Nutrient and disease management in arecanut.
- Root grub management in arecanut.
- Popularization and demonstration of intercrops in arecanut.
- Created awareness and demonstrations of arecanut husk decomposition.
- Promotion of good management practices in ginger including rhizome rot management.
- Integrated crop management in banana.
- Integrated crop management in coconut.
- Introduction of new varieties/hybrids of chilli (Aka Kyathi and Arka Haritha), weed management and bio-intensive pest/disease management.
- Introduction of new hybrids of tomato (Arka Rakshak and Arka Samrat) and integrated pest and disease management practices.



- Promotion of new varieties of frenchbean (Arka Arjun, Arka Sharath and Arka Suvridha).
- Pest and disease management in mango, mango-special as micro-nutrient supplement, post-harvest management practices including safe ripening and marketing.
- Promotion of new varieties of ridgegourd (Arka Vikram), okra (Arka Nikitha) and tuberose (Arka Prajwal).
- Popularization of drumstick varieties (PKM-1 and Bhagya).
- Heart rot disease management in pineapple

### 1.3 Animal husbandry

- Promotion of balanced nutrition, area-specific mineral mixture and clean milk production practices in dairy animals.
- Promotion of fodder varieties like CoFS-29 and 31, fodder cowpea, Napier, Co-4, Co-5 and CoFS-29 fodder seed production units.
- Introduction of breeds of backyard poultry (Giriraja, Swarnadhara and Kadaknath), low-cost incubation and hatchery units and feed supplementation with azolla.
- Integrated infertility management in dairy cows.
- Mastitis control programmes.
- Cost-efficient nutrition management feed formulations by using locally available ingredients.
- Semi-intensive and intensive sheep and goat farming, mineral supplementation and deworming practices.

### 1.4 Fisheries

- Popularization of tilapia and common carp fish in farm pond

### 1.5 Farm and non-farm enterprises

- Seed production of pulses and fodder crops.
- Horticultural nursery for seedlings of fruit, plantation, medicinal and vegetable crops.
- Bee keeping for honey production and its value addition.
- Millet processing and value addition.
- Value addition in milk, fruits, cereals and digital marketing strategies.
- Custom hiring of farm machineries
- Skill oriented training on palm climbing through machine in coconut and arecanut.

### 2. Impact on household income

The average income of farm households due to KVK interventions, more than doubled (2.11 times) between 2016-17 and 2020-21 (Table 61). The share of enterprises in household income, although small, experienced 10.98 times increase during this period. Livestock increased 2.40 times. Livestock sector consolidated its share in the household income to 8.21 per cent in 2020-21 from 7.22 per cent in 2016-17. Horticulture component experienced 1.96 times increase in income over benchmark year with a contribution of 77.06 per cent to the additional income. Horticulture is the major source of income to farmers.



Integrated crop management in ginger

**Table 61: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	25729	41780	62.39	8.13	6.23	4.53
Horticulture	263097	516635	96.37	83.14	77.06	71.62
Livestock	22853	55050	140.88	7.22	8.21	9.10
Fisheries	0	4733	100.00	0.00	0.71	1.34
Farm and non-farm enterprises	4756	52235	998.22	1.50	7.79	13.41
<b>Overall</b>	<b>316436</b>	<b>670432</b>	<b>111.87</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes benefitted from the technical interventions (Table 62). Marginal and small farm households were benefited by 2.23 and 2.06 times increased income, respectively. The medium and large farm households could realize 2.11 times increase in their household income. Landless farmers who were earning almost nothing have been supported to earn Rs. 117138 per annum.

**Table 62: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	4	3.60	0	117138	100.00
Marginal (<1.0 ha)	34	30.63	172644	385378	123.22
Small (1-2 ha)	50	45.05	338884	699613	106.45
Medium (2-4 ha)	21	18.92	524116	1099893	109.86
Large (>4 ha)	2	1.80	651910	1384094	112.31
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>316436</b>	<b>670432</b>	<b>111.87</b>



**Areca nut husk composting unit**

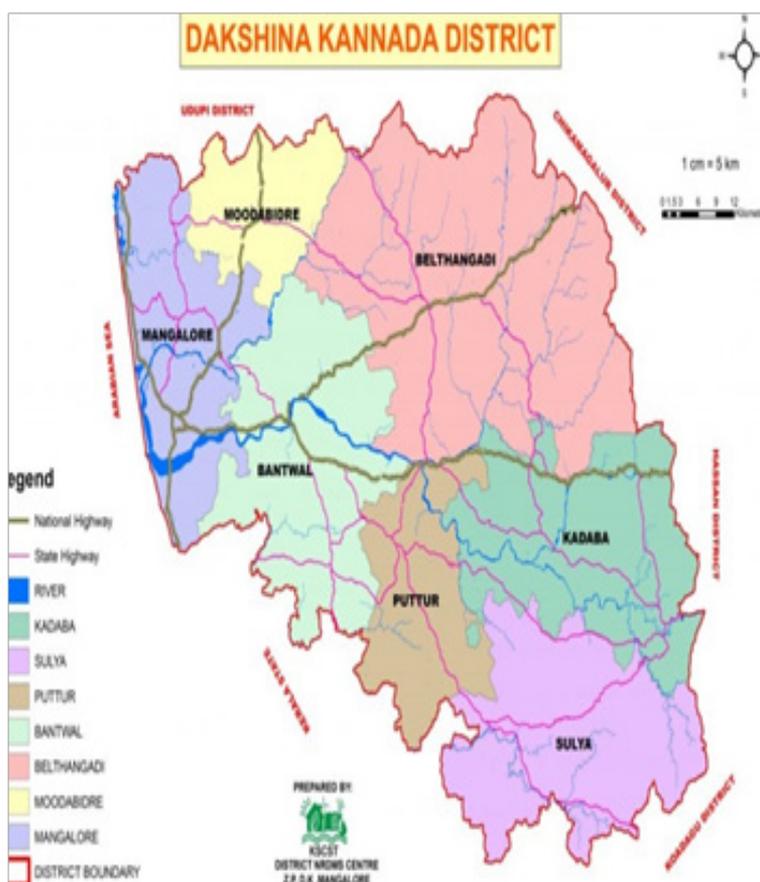


**Bee-keeping entrepreneur under ARYA project**

# DAKSHINA KANNADA

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## About the district

Dakshina Kannada district has a total of 4.03 lakh holdings with a gross cropped area of 1.57 lakh hectares. Out of 1.41 lakh hectare of net area sown, the net irrigated area is 1.17 lakh



ha (79.03%). Among cereals, paddy accounted for 8.99 per cent area. Dakshina Kannada is one of the leading districts for horticulture crops with an area of 1.25 lakhha under plantation, fruits and vegetable crops. Among them, plantation crops occupy majority of the area (87.4%). Dakshina Kannada has rich resources under livestock with 2.53 lakh cattle, 0.33 lakh goats, and 25.95 lakh poultry birds. The district produces 1,69,000tonnes of milk, 4,26,000 lakhs eggs, 5491 tonnes of meat and 143665 tonnes of fish catch annually.

### About KVK Dakshina Kannada

Krishi Vigyan Kendra, Dakshina Kannada is established by the Indian Council of Agriculture Research (ICAR), New Delhi in the year 2004 at Agriculture Research Station, Kankanady, Mangalore, Karnataka State, under the then University of Agriculture Sciences, Bangalore and has become part of Karnataka Veterinary Animal and Fisheries Sciences University, Bidar since 01-09-2011. The operational area of this KVK comes under coastal Zone, comprising of seven talukas Mangalore, Puttur, Bantwal, Sullya, Belthangady, Kadaba and Moodabidri. Apart from the mandated activities like OFTs, FLDs and capacity development programmes, KVK is also involved in production of seeds and planting materials.

As part of the national agenda of doubling farmers income, the ICAR KVK Dakshina Kannada took up documentation of successful farmers who could enhance their income with the help and support of technological interventions by this KVK. A brief summary of interventions, the impact in terms of household income under different components and the change in income for different land-class categories is given below.

## 1. Sector specific interventions by KVK Dakshina Kannada

### 1.1 Field crops

- Introduction of flood resistant red rice variety Sahyadri Panchamukhi for lowlands of coastal Karnataka.
- Integrated crop management in paddy.

- Soil acidity management.
- Potassium management in coastal paddy.

### 1.2 Horticultural crops

- Integrated pest and disease management practices in arecanut.
- Integrated pest and disease management practices in coconut.
- Nutrient management in arecanut to reduce nut dropping.
- Nutrient management in coconut to reduce nut dropping.
- Horticulture based integrated farming system.
- Integrated pest and disease management in black pepper.

### 1.3 Animal husbandry

- Promotion of fodder varieties Co-3 and 4 to tackle green fodder shortage during summer.
- Goat farming.
- Integrated farming system.
- Backyard poultry.

### 1.4 Fisheries

- Composite fish culture.

### 1.5 Farm and non-farm enterprises

- Seed production of paddy, okra and fodder crops.
- Vermicomposting.
- Value addition in cashew and pineapple
- Beekeeping.

## 2. Impact on household income

The average income of farm households after the interventions has more than doubled (2.47 times) between 2016-17 and 2020-21 (Table 63). The share of enterprises in household income, although small, experienced 4.3 times increase during this

period. Income from fisheries increased four-fold and from livestock 3.1 times. Livestock sector consolidated its share in the household income to 11.26 per cent in 2020-21 from 8.98 per cent in 2016-17. Horticulture component experienced 2.5 times increase in income over benchmark year.

Horticulture is the dominant source of household income with contribution of 58.06 per cent to the additional income. It is also the major sector in terms of total household income with a share of 57.28 per cent.

**Table 63: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	78925	153727	94.78	30.65	24.17	19.76
Horticulture	144549	364361	152.07	56.13	57.28	58.06
Livestock	23133	71654	209.75	8.98	11.26	12.82
Fisheries	1921	7687	300.16	0.75	1.21	1.52
Farm and non-farm enterprises	8985	38670	330.38	3.49	6.08	7.84
<b>Overall</b>	<b>257513</b>	<b>636099</b>	<b>147.02</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes were benefitted from the technical interventions (Table 64). However, the households at the bottom of land distribution were benefitted relatively more. The income of the landless families increased 3.5 times (251.2%). Marginal and small farm households were benefitted by 2.6 and 2.5 times increased income, respectively. The medium and large farm households could realize 2.4 times increase in their household income.

**Table 64: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Landless	20	0.55	78702	276401	251.20
Marginal (<1.0 ha)	790	21.66	109268	286108	161.84
Small (1-2 ha)	1479	40.54	175155	441184	151.88
Medium (2-4 ha)	865	23.71	296934	721890	143.11
Large (>4 ha)	494	13.54	679367	1643701	141.95
<b>Total</b>	<b>3648</b>	<b>100.00</b>	<b>257513</b>	<b>636099</b>	<b>147.02</b>



**Water quality management and scientific feeding in fish culture**



**Managing flood prone paddy field**



**Flood tolerant red rice variety**

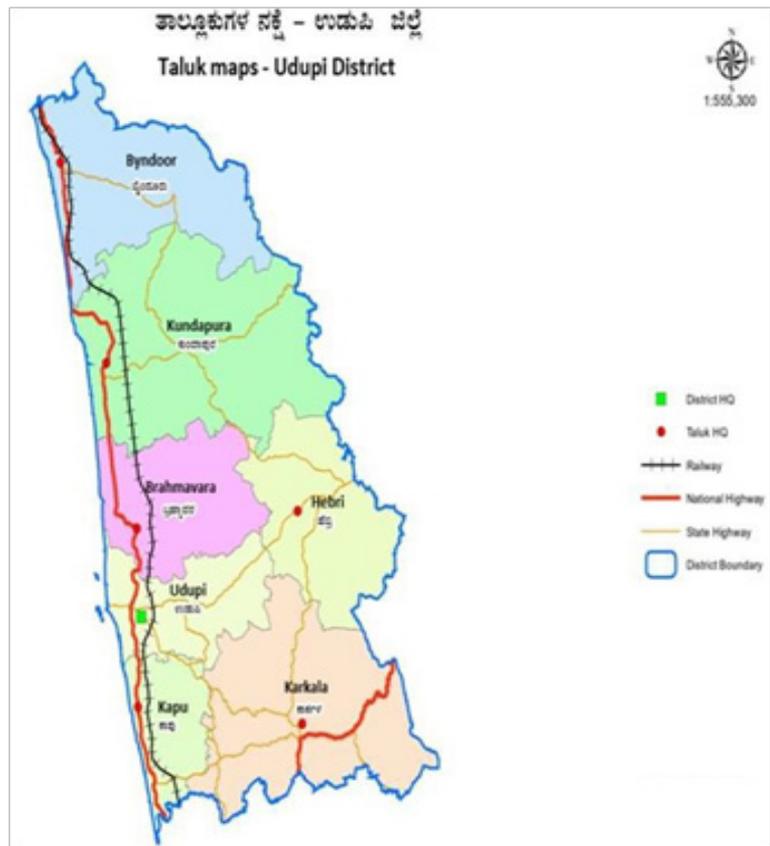


**Goatery in IFS farmer Smt. Anitha Naik, Bettampady village, Puttur taluk**

# UDUPI

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ICAR-Krishi Vigyan Kendra, Udupi



## About district

Udupi district, situated in the coastal region of Karnataka, is characterized by high rainfall (with normal rainfall of 3850 mm and with 80 per cent of the rainfall received during June to September months). The three major agro-ecological situations viz., coastal plain, rolling mid land and Western Ghats are the distinctive



characters of the district. Out of total geographical area of 3.56 lakh ha, an extent of 1.00 lakh ha (28.1%) comes under cultivated area. Net irrigated area at present is 0.29 lakh ha and the main source of irrigation is through open wells and tube wells. Paddy is the main crop of the district which is occupying an area of 37,725 ha (2021-22), 37.92 per cent of the gross cropped area followed by plantation crops such as cashew (19,411 ha) coconut (17,299), arecanut (6,881 ha) and rubber (2,225 ha). The cultivation of vegetable crops is limited to paddy fallow land during *rabi* and summer seasons. The major vegetable crops of the district are okra, ridgegourd, snakegourd, bottlegourd, bittergourd and brinjal (variety Mattugulla a GI crop of the district).

The Udupi jasmine popularly known as Udupi mallige (another GI crop of the district) cultivated in an area of 313 ha is the major revenue earning crop of marginal and small farmers. The interior talukas of Udupi district comprising of Hebri and Karkala tq is dominated by arecanut as the major commercial crop. Black pepper (282 ha), cocoa (110 ha), nutmeg are the important intercrops grown in arecanut gardens. Cashewnut which is cultivated in marginal and poor soils has low productivity of 2051 kg/hectare due to lack of poor nutrition and poor management of tea mosquito bug and stem borer.

### About KVK Udupi

ICAR-Krishi Vigyan Kendra for Udupi district was started during 2002, which comes under zone-X (Coastal zone) of agro climatic zones of Karnataka. KVK has different demonstration units like poultry farming, vermicompost unit, polyhouse, shade net house, bush pepper, udupi jasmine and okra seed production. High density planting of different varieties of cashew have been taken up in seven acres of land. In three acres of paddy plot new variety Madhura Mangala, arecanut demonstration plot have been established. In three polyhouse and shadenet houses, number of nursery activities like raising of arecanut nursery plants, gumless jack, udupi jasmine, six varieties of pepper cuttings in serpentine method of propagation, papaya, bush pepper, kokum grafts is being carried out. To meet

out the high demand for the vegetable seeds, KVK has played a major role in production of okra seeds every year.

As part of national agenda of doubling farmers, income, the ICAR-KVK, Udupi took up documentation of successful farmers who were able to enhance their income with the help of technological interventions by the KVKs. A brief summary of interventions, the impact in terms of household income under different components and the change in income for different land class categories is given below.

## 1. Sector specific intervention by KVK Udupi

### 1.1 Field crops

- Introduction of improved varieties of paddy viz., Sahyadri Panchamukhi (lowland situation and flood tolerant) for *kharif* season. MO-21(Pratyasa) for *rabi* season.
- Introduction of paddy mechanization technologies viz., machine transplanting (four rows) power operated conoweeder, combined harvester and tray method of nursery raising.
- Introduction of new varieties in blackgram viz., LBG-625 (Rashmi), DU-1, LBG-751 and cowpea (Sahyadri Yukthi) and fieldbean(HA3 and HA4).
- Introduction of new groundnut varieties viz., ICGV-91114, KCG-2, G-2-52, GPBD-4 and Dh-256 in rice fallows.
- Promotion of IWM, INM and IPM in field crops.
- Promotion of seed treatment in cereals with *Azospirillum* and *Azotobacter*, pulses and oilseeds with *Rhizobium* and PSB.
- Integrated management of sucking pests and diseases in paddy.
- Management of pest and diseases in groundnut.
- Reclamation of acid soils in paddy and groundnut.
- STCR approach and INM practices in paddy and groundnut and to alleviate secondary

and micro-nutrient deficiency and to boost crop productivity.

### 1.2 Horticultural crops

- Promotion of grafted black pepper with foot rot resistant root stocks.
- Enhancing off season flowering in udupi jasmine by practicing pruning and nutrient management.
- Introduction of high yielding papaya variety Arka Prabhath.
- Intercropping frenchbean variety (Arka Arjun and Arka Sharath) in arecanut garden.
- Promotion of new varieties of ridgegourd (Arka Prasan), spine gourd (Arka Bharath) and yard long bean (Arka Mangala).
- Arecanut root grub management through integrated pest management practices.
- Bio-intensive management of quick wilt in black pepper.
- Management of sucking pests and bud necrosis disease in watermelon.
- Bio-intensive management of fruit and shoot borer in brinjal.
- Management of *rhinocerus beetle*, red palm weevil and rugose spiraling whitefly in coconut.
- Management of wilt disease in udupi jasmine.
- Integrated plant nutrient management practices in arecanut, coconut, cashew and pepper.

### 1.3 Fisheries

- Promotion of growth performance of all male tilapia in coastal farm ponds, mixed carp seed rearing in pens, encouraging rearing of grass carp stunted fingerlings in farm ponds, culture of amur common carp in polyculture system.
- Assessment of growth performance of murels in trash fish infested coastal farm ponds.

- Feed based culture of carps in farm ponds.
- Management of water quality in carp culture pond.
- Aquatic insects control and nutritional balancing by carp nursery feed developed by ICAR CIFA, Bhubaneswar.
- Value addition of low value fish and shellfish product preparation and marketing.

### 1.4 Farm and non-farm enterprises

- Tray method of nursery raising in paddy, mechanized planting through custom hiring services, seed production in paddy, groundnut and blackgram.
- Raising of horticultural crop nursery viz., coconut, arecanut, black pepper, papaya, mango, jasmine, mattugulla and betelvine.
- Value addition of locally available fruits and vegetables such as jack, cashew, coconut, mango, pineapple, banana, sweet potato and minor fruits.
- Bee keeping for honey production and value addition.
- Oyster Mushroom cultivation, its value addition and marketing.
- Friends of coconut tree (FOCT) and coconut climbing skill training to rural youth using palm climbing device.

## 2. Impact on household income

The change in average income of farm households was more than double (2.08 times) when compared to before and after the interventions of the technologies between 2016-17 and 2020-21 (Table 65). The share of fishery income experienced 2.50 times increase, income from horticulture crops increased 2.40 times, livestock 2.03 times and field crops component experienced 1.86 times increase. Whereas, farm and nonfarm enterprises recorded 1.6 times increase in income over benchmark year. Fishery component proved to be dominant source of household income with contribution of 39.54 per cent to the additional income of the farmers

followed by horticulture component (29.21%) and farm and nonfarm enterprises (22.51%).

**Table 65: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	25607	47703	86.28	2.22	1.98	1.76
Horticulture	260690	626318	140.25	22.59	26.04	29.21
Livestock	84323	171543	103.43	7.31	7.13	6.96
Fishery	330740	825675	149.64	28.67	34.33	39.54
Farm and non-farm Enterprises	452450	734200	62.27	39.21	30.52	22.51
<b>Overall</b>	<b>1153811</b>	<b>2405440</b>	<b>108.47</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Farmers from all land classes were benefited from the technical interventions (Table 66). The income of the marginal (<1.0 ha) farm households family increased 2.56 times (156.51%). Medium (2-4 ha) and small (1-2 ha) farm households achieved 2.4 times (138.75%) and 2.33 times (133.82%) increased income, respectively. The large farm households (>4 ha) could experience 2.16 times (115.92%) increase in their household income.

**Table 66: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	27	24.32	250962.04	643737.00	156.51
Small (1-2 ha)	52	46.85	244504.71	571706.73	133.82
Medium (2-4 ha)	25	22.52	527174.44	1258652.96	138.75
Large (>4 ha)	7	6.31	1026785.71	2216997.14	115.92
<b>Total</b>	<b>111</b>	<b>100</b>	<b>2049426.90</b>	<b>4691093.83</b>	<b>109.00</b>



**University officials and farmers visiting paddy demonstration field**



**Demonstration on management of arcanut root grub through integrated management strategies.**

# UTTARA KANNADA

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ICAR-Krishi Vigyan Kendra, Uttara Kannada



## About the district

Uttara Kannada is one of the biggest districts in the state of Karnataka with abundant natural resources. The Uttara Kannada district is spread in an area of 10,291 sq.kms. with 11 talukas and



1289 villages. The district's high rainfall supports lush forests, which cover approximately 79.40 per cent of the district and 144 km. coastal line. The district comprises three agro climatic zones viz., hill zone, coastal zone and transitional zone. The agricultural system is closely interwoven organically with livestock and forests. The district has total of 1.99 lakh holdings spread across 1.46 lakh ha area. The gross cropped area is 1.47 lakh ha, out of which 1.26 lakh ha is net sown area. Net irrigated area accounts for 40.57 per cent of net area sown. Paddy is the main food grain of the district being sown in 0.48 lakh ha area followed by maize grown in 0.12 lakh ha area. Horsegram, greengram, blackgram and cowpea are the major pulses grown in 0.36 lakh ha area. Groundnut is the major oilseed crop grown.

The rich biodiversity of the Malnad region of western ghats support cultivation of crops like arecanut, black pepper, cardamom, vanilla and other spices. Arecanut is the major plantation crop in Malnad region with mixed crops like banana, cardamom, nutmeg, black pepper, coconut. Arecanut is cultivated in an area of 0.31 lakh ha. Black pepper is major spice crop mainly grown as an inter-crop in areca garden. Fruits like mango, watermelon, banana, pineapple are also cultivated. In coastal talukas, fisheries are the major occupation other than agriculture. Animal husbandry is integral part of agriculture with 3.37 lakh cattle and 0.74 lakh buffalo 0.19 lakh and goats/sheep and 5.5 lakh poultry birds respectively.

### About KVK Uttara Kannada

Krishi Vigyan Kendra, Uttara Kannada was established in 2004 under the administrative control of University of Agricultural Sciences, Dharwad at Sirsi. Krishi Vigyan Kendra is the frontline institution in the district, involved in assessment and demonstration of agricultural technologies. KVK has taken up capacity development of farmers, farmwomen, rural youth and extension functionaries besides transfer of latest relevant technologies in the district. KVK is also involved in production and supply of various technological inputs to the farmers such as paddy seed production unit, soil and water testing laboratory, vermi composting unit, *grameen*

*krishi mousamseva* unit under IMD, fodder unit, dairy unit and nursery unit.

## 1. Sector specific interventions by KVK Uttara Kannada

### 1.1 Field crops

- Introduction of *dhiancha* green manuring crops for enhancing soil fertility and productivity of paddy.
- Soil test based lime and fertilizer application.
- Introduction of PSB-68 (MGD-03) new high yielding paddy variety for disease tolerance.
- Transplanting young (15-20 days old) seedlings of paddy with spacing of 20 x 10 cm in shallow planting system for higher number of tillers.
- Split application of nitrogen at 20 day interval for three times as top dress in paddy.
- Weed management with pre-emergent herbicide butachlor followed by early post-emergent herbicide bispyribac sodium in paddy.
- Integrated pest management of stem borer, leaf folder, ear head bug and BPH in paddy.
- Integrated disease management in paddy especially blast and grain discoloration.
- Integrated weed and nutrient management in maize.
- Foliar spray of 19:19:19 and 13:0:45 water soluble fertilizer at critical stages.
- Paddy seed and seedling treatment with bio-fertilizers *rhizobium* and PSB, and bio-fungicide *trichoderma*.
- Introduction of DU-1 blackgram, DDGV-2 greengram and G2-52 groundnut variety for paddy fallows under residual moisture.
- Groundnut seed treatment with bio-

fertilizers and bio-fungicide and IPM practices.

- Introduction of sugarcane crop and production of quality liquid jaggery as additional income generating activity.
- Wider paired row system of sugarcane planting with organic nutrient management for higher yield.
- Adoption of multiple / diversified cropping system for higher profit.
- Integrated pest management (IPM) of fall armyworm in maize with more emphasis on eco- friendly aspects.

## 1.2 Horticultural crops

- Promotion of multi-storeyed cropping system in arecanut, proper drainage management, shade management by raising crops like banana between two rows of arecanut in new plantations and integrated management of bud rot and red palm weevil.
- Root grub management using bio-agent *Metarhizium anisopliae* (5kg/ acre).
- Vermicompost production using arecanut waste.
- Introduction of telescopic arecanut harvester to reduce labour cost.
- Nutrient management in coconut to reduce nut dropping and introduction of coconut climbing machine as income generation activity.
- Introduction of grafted pepper to disease resistant variety Sigandini).
- Micro nutrient management by foliar application of pepper special and bio-intensive pest/disease management practices in black pepper.
- Promotion of scientific ginger cultivation
- Introduction of new turmeric variety IISR-Pratibha for processing and value addition.

- Introduction of high yielding and disease resistant / tolerant varieties of cardamom IISR Avinash and Appangala -2.
- Management of flower drop and fruit fly in mango.
- Introduction of Udayam and Nendran banana varieties for panama wilt disease management and value addition.
- Introduction of new variety of spine gourd Arka Nilanchal and integrated crop management practices.
- Integrated management of twisting disease of onion.
- Integrated crop management viz., nipping, fertigation and mulching techniques in watermelon along with pest and disease management practices.
- Scientific management of horticulture nursery and production of quality planting materials like arecanut (SAS-1), coffee (Chandragiri), cardamom (Appangala, Mudigere-1 and IIRS-3), clove, cinnamon, nutmeg, black pepper (paniyur-1) and bush pepper.

## 1.3 Animal husbandry

- Introduction of improved backyard poultry birds Kaveri breed, o-operative farming and marketing of meat and eggs.
- Introduction of improved fodder crops DGG-2 guinea grass, fodder cowpea-Co9 to mitigate the shortage of fodder and reduce the cost of production in dairy farming.
- Promotion of preventive strategies for subclinical and clinical mastitis in dairy animals.
- Promotion of modified PG protocol to enhance the conception rate in repeating breeding animals and milk production.
- Introduction of treatment approach like PRID or CIDR synch protocols to enhance the conception rate and fertility rates in heifers, anoestrous cows and buffaloes.



- Promotion of integrated nutritional management approach to mitigate the incidence of periparturient diseases, low SNF and fat in high yielding cross bred cows.
- Introduction of Sirohi and Osmanabadi goat farming as source of additional income.

#### 1.4 Fisheries

- Introduction of improved amur common carp farming in farm ponds
- Production of fishery in farm ponds as income generating activity.

#### 1.5 Farm and non-farm enterprises

- Seed production of Abhilash, Hemavathi and red rice varieties of paddy.
- Seedling production of arecanut, black pepper, nutmeg, cardamom, coffee and drumstick.
- Apiary activities for honey production, sale of colonies and value addition to honey.
- Value addition to minor forest products and linkages with cooperatives for marketing.

- Production of quality liquid jaggery techniques.
- Introduction of sandalwood tree cultivation in the district.
- Promotion of multi-layered mahogany based agro-forestry system.
- Bund planting of sheme bamboo for additional income.
- Production of MPTs seedlings.

## 2. Impact on household income

Level and change in household income before and after the interventions projected in Table 67, indicate that, the income is more than doubled (2.51 times) during the study period. Horticulture component experienced 148.53 per cent increase in income and proved to be the dominant source of household income in the district with contribution of 66.63 per cent to the additional income. Whereas, field crops and livestock contributed 11.45 and 11.80 per cent, respectively to additional income. Livestock sector consolidated its share in the household income to 11.09 per cent in 2020-21 from 10.01 per cent in 2016-17. In the farm and non-farm enterprises, increase was 290.62 per cent and the share in total income increased to 7.74 per cent during 2020-21 from 4.96 per cent in 2016-17.

**Table 67: Level and change in household income**

Crops and enterprises	Net income (Rs/household at current prices)		Increase in income (%)	Share in total income (%)		Share in additional income (%)
	2016-17	2020-21		2016-17	2020-21	
Field crops	35445	70275	98.26	17.53	13.88	11.45
Horticulture	136501	339248	148.53	67.51	66.98	66.63
Livestock	20232	56150	177.53	10.01	11.09	11.80
Fisheries	0	1624	100.00	0.00	0.32	0.53
Farm and non-farm enterprises	10029	39177	290.62	4.96	7.74	9.58
<b>Overall</b>	<b>202207</b>	<b>506474</b>	<b>150.47</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

Among the farmers in the study, all groups of land class farmers are benefitted from the KVK interventions (Table 68). Small, marginal and medium farm households were benefitted by 2.62, 2.61 and 2.41 times increased income, respectively. Large land class reported 2.3 times increase in household income.

**Table 68: Income level and change in household income by land class**

Land class	Households (No.)	Share in total household (%)	Net income (Rs/household)		Change in household income (%)
			2016-17	2020-21	
Marginal (<1.0 ha)	38	34.23	139363	364145	161.29
Small (1-2 ha)	43	38.74	155001	406171	162.04
Medium (2-4 ha)	24	21.62	310522	747333	140.67
Large (>4 ha)	6	5.41	505270	1163293	130.23
<b>Total</b>	<b>111</b>	<b>100.00</b>	<b>202207</b>	<b>506474</b>	<b>150.47</b>



**Small scale goatery Unit**



**Field day on Paddy Variety PSB-68**



**Installation of pheromone traps for mass trapping of Fall army worm in Maize**

