

# ICAR - KRISHI VIGYAN KENDRA KASARAGOD



*A  
Journey  
With The Farmers*



*25 Years of*  
**ICAR KRISHI VIGYAN KENDRA KASARAGOD**  
*A Journey With The Farmers*

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# **ICAR KRISHI VIGYAN KENDRA KASARAGOD**

## **A Journey With The Farmers**

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# Contents

Foreword	i
Preface	iii
Message	v
1. Krishi Vigyan Kendras (KVKs): An Institutional innovation for transforming Indian agriculture	1
2. Kasaragod: The land of unity in diversity	9
3. Krishi Vigyan Kendra - Kasaragod: A pride of place	13
4. On Farm Trials: The learning curve in assessing and refining technologies	29
5. Front Line Demonstrations: Seeing is believing	45
6. Capacity building programmes: Knowledge and skill empower you	79
7. Empowering Women: The technology edge	101
8. Innovations in extension and entrepreneurship development: Farmers on the centre stage	115
9. Role models from Kasaragod	127
10. Aligning with the national goals	139
11. Looking ahead	149
Endnotes	151



# FOREWORD



**T**ransforming Agriculture is Transforming India, as agriculture continues to be the backbone of Indian economy today, even in the face of tremendous progress made in the secondary and tertiary sectors. In a country where over 60.0 per cent

population lives in villages, where agriculture and allied sectors is estimated to contribute nearly 13.9% of the GDP and provides employment to over half of the country's work force, the progress of the nation is directly linked with advancement in agriculture and education.

The role of science and technology in agriculture is crucial in not only ensuring food security of the country and affordability of the food items for the public at large, but also in providing farmers a competitive edge in the present day global commodity markets. It is in this context that the Government of India, through ICAR, established the large network of Krishi Vigyan Kendras (KVKs) across the country for conducting

technology assessment and refinement, knowledge dissemination and providing critical input support for the farmers with a multi-disciplinary approach.

As a first line extension system, KVKs have brought in visible changes in agricultural production system, in terms of raising productivity, increasing capacity building of farmer and extension functionaries, promoting improved varieties/breeds and technologies in agriculture, animal husbandry, fisheries and other allied enterprises. KVK is a key player in this system, providing precious feedback to the agriculture department/research institutes/SAUs on the performance of recommended technologies at the grass root level. This unique institution has also shown tremendous ingenuity in developing solutions to location-specific problems through this process of assessment and refinement of technologies. Value addition and post-harvest processing in agriculture, promoting self help groups, empowering women and rural youth also come under the ambit of KVK. The phenomenal growth of the KVK network, with over 680 KVKs at present, its ever-expanding reach and its diversification in terms of mandated activities stand testimony to the ever-increasing relevance

of this institution in agricultural extension and rural development.

With 14 Krishi Vigyan Kendras (KVKs) established in Kerala, each district in the state now has a KVK, contributing immensely to the agricultural and rural development landscape in the state, in synergy with all the stakeholders in the system. ICAR-KVK, under the administrative control of CPCRI, Kasaragod, over the last 25 years since its inception in 1993, has been rendering a yeoman service to the Kasaragod district in all spheres of activities, touching every aspect of human life. It has played a pivotal role in technology testing, validation, fine-tuning and large-scale demonstrations not only in the plantation crops, but also technology solution for all crops/ allied enterprises and associated problems, relevant to the district. It has led from the front in transforming agriculture in the district to an environment-friendly, integrated and sustainable one, promoting paddy and vegetable cultivation towards ensuring food and nutrition security for the people, technologically empowering the women stakeholders for shouldering bigger financial and decision-making roles in the family and donning social/community leadership roles. It has equally excelled in entrepreneurship development front also, with unique achievements like promoting a 'Farmer-

Producer Company' in the district under its aegis and 'Amrutham Nutri-mix', a rural women enterprise ensuring nutritional security for the rural children and financial security of the rural women at the same time. It is heartening to note that that this micro-enterprise has now entered the Kudumbashree platform, the biggest and most successful women SHG platform in India, worthy of replication and up-scaling at the national level.

I am happy that KVK-Kasaragod is bringing out a compilation "ICAR-KVK, Kasaragod: A Journey With The Farmers", showcasing its interventions by KVK and the impact that it has created in all spheres of life in Kasaragod district, its primary constituency. I appreciate the efforts of the Director, ICAR-CPCRI, Programme Co-ordinator & his KVK team for their efforts in bringing out this valuable document, which I sincerely hope, would lead to a better appreciation of the role and responsibilities of this KVK among the administrators and policy makers, farmers and other stakeholders.



**(Dr. Trilochan Mohapatra)**

Secretary, DARE & Director General, ICAR



# PREFACE



Krishi Vigyan Kendras, farmer-science institutions of ICAR at district level, are envisioned to play a key role in the transfer of agricultural technologies among the farming community and working as a vital link between research and extension systems in the

district. This KVK for the Kasaragod district, one of the 14 KVKs in Kerala, was established on 01 January 1993, under the administrative control of ICAR-CPCRI, Kasaragod and since then has grown to occupy a pride of place in the district as a unique institution with its reach, mandate, methodology and approach.

In this silver jubilee year of its existence, it has been our endeavour to put together an account of the manifold contributions of KVK, as summarized in this compendium, for a better understanding and appreciation of its role and contribution to the overall development of the district, among the farmers, administrators and policy makers. In the introductory chapter, we trace the origin, mandate and relevance of KVKs in the present scenario. Chapter 2 unravels the history, culture, landscape and the agricultural tradition of Kasaragod and Chapter 3 gives an overview of the history and activities of the ICAR-KVK, Kasaragod.

On-farm trials are the testing grounds for the promising technologies coming out from the research institutions and its fine-tuning before large-scale roll-out through extension agencies, and on-farm testing looks for most appropriate technology solution for the most pressing problems in a given locality/specific target group. Rightly so, chapter 4 gives an account of the select interventions in this critical area and the game-changing impact that they brought in. Understanding the farmer psyche, FLDs are devised as the ideal tools to put across convincingly the performance of new varieties/recommended production technologies on farmers' fields under real farm conditions, for increasing productivity and higher farm returns. Befittingly, chapter 5 is devoted to an exhaustive account of the most spectacular achievements in this area.

Knowledge and skill empowerment can work wonders, changing life irrevocably, as some farmers/homemakers/SHGs have experienced (chapter 6). Land and other natural resources are no longer limitations, if you are determined. Apiculture and meliponiculture are sure-shots to sustainable livelihoods, as some enterprising farmers from Kasaragod have convincingly shown. The prosperity and growth of any nation depend on the status and development of its women. The Krishi Vigyan Kendra-Kasaragod, since its inception in 1993, has made pioneering contributions in improving the

technical competence of women of Kasaragod district in agriculture and allied fields for higher production, generating self-employment, diversification of food sources in the region, value addition and other areas of nutritional and environmental concerns, as outlined in chapter 7. Entrepreneurial development programmes (EDP) were designed to help potential candidates to start new ventures, or to help existing entrepreneurs to improve their skills, or to solve particular business problems. KVK-trained women entrepreneurs are now the engines of financial security in the family and flag-bearers of social equity.

The KVK has been actively participating in the agricultural development programmes initiated in the state with tangible impact. On its mission to promote organic agriculture in the district, it could introduce an array of new varieties and alternative technologies in various crops/cropping situations tailored to the aspirations of the farmers, in the wake of promulgating Kasaragod as an organic district in 2010. Espousing the unique cause of promoting paddy cultivation, the KVK has ushered in a revolution of sorts in paddy mechanization and, setting an example, it could rejuvenate 40 acres of paddy fields which was kept fallow for over 20 years. From the national perspective, this KVK was on the forefront in creating awareness on the ambitious programmes like Sankalp Se Siddi and contributing its might in these initiatives of the Govt. of India.

Overall, apart from interventions related to plantation crops, technology solutions for paddy, vegetables and

fruits and spice crops received major attention in this narrative. A few exemplary cases where the institution of KVK came to the rescue of farmers in distress, as in the case of banana pseudo-stem weevil attack, are highlighted. Success stories abound and these success stories of award-winning/model farmers and farm-innovators, apart from adding spice to the narrative, should motivate the fellow-farmers.

The way Kasaragod has responded to KVK initiatives is phenomenal. In adopting integrated farming systems revolving around coconut/arecanut based cropping systems, eschewing chemical pesticides for eco-friendly organic alternatives, and rejuvenating paddy cultivation to a large extent, farmers of Kasaragod district have shown exemplary courage and determination. Bringing back the old glory of the rich farming tradition of Kasaragod deserves wholesome appreciation and the KVK has rightly been their trusted partners, literally their 'friend, guide and philosopher' for the last 25 years. And, we are aware keeping that tradition of trust intact in future as well is the real challenge for us.

In this backdrop, we are privileged to dedicate this book to the farming community of Kasaragod district, our most esteemed clientele.



**(P. Chowdappa)**

Director

# MESSAGE



I am very happy to know that ICAR-KVK Kasaragod is completing 25 years in the service of farmers. Since its establishment (1st January 1993) the KVK has been actively engaged in providing frontline extension services to the farmers of the district. Established

under the administrative control of ICAR-CPCRI, Kasaragod, the KVK has won the national best KVK award for the biennium 2002-03.

During the last two and a half decades, the KVK has played a significant role in the scaling up of proven agricultural technologies in the district. Some of the initiatives of the KVK include development of organic farming practices, testing of the efficacy of organic plant protection agents, watershed based development activities, promotion of farming system approach for maximizing farm income and ensuring sustainability, promotion of farm mechanization in agricultural and horticultural crops, promotion of Indian bee and

meliponiculture, introduction of high yielding varieties of crops and institutional approaches to address malnourishment through promotion of nutrimix.

These accomplishments were the result of well-coordinated implementation of the relevant action plans addressing the needs of the farming community with the able support of the host institution. On this occasion, I congratulate the present and the past staff of the KVK for their contribution over the years. I am very pleased to note that the KVK, through the publication "ICAR Krishi Vigyan Kendra Kasaragod- A Journey With The Farmers" has attempted to chronicle the evolution of the KVK as an institution dedicated to development of scientific farming in the district. I wish this document will inspire, augment and promote the efforts of many other KVKs in fine-tuning their efforts and making an impact among the farming community.

A handwritten signature in blue ink, appearing to read 'Sreenath Dixit', written over a horizontal line.

**(Sreenath Dixit)**

Director, ATARI



# KRISHI VIGYAN KENDRAS (KVKs): AN INSTITUTIONAL INNOVATION FOR TRANSFORMING INDIAN AGRICULTURE

Agricultural extension in India is largely in the domain of central/state governments (though agriculture is in the State List as given in the Seventh Schedule of the Constitution of India), implemented largely through governmental institutions and to a small extent through Non-Governmental Organizations (NGOs). In India, agricultural extension and extension education are interchangeably used for “Extending Information” as a means of educating people to solve their problems. As a result, agricultural extension in India was more of “Informative Extension”, as the basic premise is that the individual farmer is the ultimate decision maker in agriculture and governments do intervene to enable them to take desired decisions through institutional interventions and favourable policy initiatives for achieving enhanced production and productivity. Krishi Vigyan Kendras (KVKs) or Farm Science Centres, an institutional innovation that effectively link agricultural research and extension at the district level in India, are the catalysts for inducing this positive change. Literally, Krishi Vigyan Kendras are serving as repositories of scientific knowledge relevant to the entire district, its jurisdictional area.

Over the years, extension programmes of ICAR are mainly implemented by the scientists of the ICAR Research Institutes and Agricultural Universities under the National Agricultural Research System (NARS). The Transfer of Technology (ToT) system is mainly

devoted to demonstrating the latest technologies to the farmers and extension workers, testing and refining the technologies for the benefit of the rural masses in consideration of their socio-economic conditions and getting the first-hand feedback to reorient the research, education and training system. To achieve these objectives, a number of transfer of technology projects were sponsored by the ICAR like the All India Co-ordinated Project on National Demonstrations (AICPND), Operational Research Project (ORP), Lab to Land Programme (LLP) etc. Inevitably, there was overlapping, both spatial and temporal, and less than optimum utilization of resources as multiple agencies undertake ToT activities promoting the cultivation of their mandate crops focusing on area expansion and evaluating/ refining/ popularizing technologies pertaining to these crops. But a holistic approach to identification of the needs of the rural locality in its totality and extending a need-based support to the target area was largely missing.

Agriculture continues to be the backbone of Indian economy today, even in the face of tremendous progress made in the secondary and tertiary sectors. In a country where over 60 per cent population lives in villages, where agriculture and allied sectors (including agriculture, livestock, forestry and fishery) is estimated to contribute nearly 13.9% of the national GDP and 17.0% of the Gross Value Added (GVA) during 2016-



17 (at 2011-12 prices), and provide employment to over half of the country's work force, the progress of the nation is directly linked with advancement in agriculture and education. From the realization that agricultural education should be on a continuum where lower and higher education and training should be treated as mutually inclusive and taking a cue from the experience of Community Development Programme introduced in 1952, the Education Commission (1964-66) recommended for establishment of "Agricultural Polytechnics" for imparting vocational education in agriculture. The Indian Council of Agricultural Research (ICAR) appointed Dr. Mohan Singh Mehta in 1973 for formulating the institutional framework for vocational training in agriculture. The committee suggested establishment of "Farm Science Centres", later named as Krishi Vigyan Kendras (KVKs), as endorsed by the ICAR Standing Committee on Agricultural Education. The landmark development was in 1974, when ICAR established the first Krishi Vigyan Kendra (KVK) at Puducherry (Pondicherry) as a pilot project, under the administrative control of TNAU, Coimbatore.

This landmark decision to establish the institution of KVK was of national importance in accelerating agriculture production, improving the socio-economic conditions of the farming community and providing self employment opportunities to the growing rural population. The phenomenal growth of the KVK network, its ever-expanding reach and its diversification in terms of mandated activities stand testimony to the ever-increasing relevance of this institution in agricultural extension and rural development landscape.

## **KVK: An unique institution**

The KVK is one of the first line innovative schemes of the ICAR devoted to vocational training of the practicing farmers, farm women and young prospective farmers. The approach and methodology of KVK is quite unique. The KVKs are the primary destination for the farmers in the country to know about the agricultural technologies being generated. They act as the training centres for the prompt transfer of the technologies reducing the time lag between technology generation and their transfer. The activities of a KVK also include on farm testing to establish the location specificity of agricultural technologies under various farming situations, frontline demonstrations to establish its production potentials on the farmer's field, training of farmers to update their knowledge and skills in improved agricultural technology and training of extension personnel to orient them in the area of transfer of technology and development. The basic covenant is that one KVK for each district, even though there are a few exceptional cases of more than one in a few larger districts.

## **Guiding principles**

The success of these Kendras depends on adherence to the three basic principles: that accelerating agricultural and allied production should be the prime goal; "seeing is believing" and "learning by doing" should be the principle methods of imparting skill training and training efforts should not be made to make economically good people better, but to raise the living condition of the poorest of the poor. The



main idea is to influence production system with social justice by creating a favourable condition for the have-nots. The Kendra, therefore, should select in each area such activities which are more likely to give major benefits to the weaker sections of the society.

## Institutional strength

Krishi Vigyan Kendra, a plan scheme designed and managed by the ICAR for the past four decades, will continue to play a vital role because of its following unique features:

- Creation of valuable resources in terms of technical manpower and assets
- Confirmation of technologies to suit local specificity
- Showcasing the frontier technologies
- Capacity building among stakeholders
- Front runner in technological application, information and inputs
- Participatory approaches in planning, implementing, executing and evaluation

## Vision

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

## Mission

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

## Mandate

- Technology Assessment and Demonstration for its Application and Capacity Development

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 sectors 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 would produce quality technological products (seed, planting material, bio-agents, livestock) and make it available to farmers, organize frontline extension activities, identify and document selected farm innovations and converge with ongoing schemes and programmes within the mandate of KVK.

## Organizational set up of KVK

The Krishi Vigyan Kendras are fully funded through



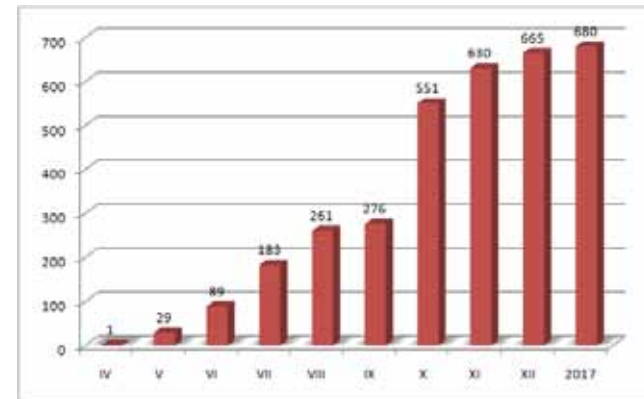
Agricultural Technology Application Research Institutes or ATARIs (formerly Zonal Project Directorates or ZPDs) under the division of Agricultural Extension of ICAR. The major activities of Agricultural Extension Division are technology assessment, demonstration and capacity development through a network of Agricultural Technology Application Research Institutes (ATARIs) and Krishi Vigyan Kendras (KVKs). There are eleven ATARIs with headquarters at Ludhiana, Kolkata, Barapani, Kanpur, Hyderabad, Jodhpur, Jabalpur, Pune, Patna, Gauhati and Bengaluru.

### Expansion of the KVK network

The Planning Commission approved the ICAR proposal to establish 18 KVKs during the Fifth Five Year Plan period (1974-79). Since then, several new KVKs were established by ICAR during every 5 Year Plan Periods. With the growing demand for more such Kendras, the Governing Body (GB) of the Council established 12 more KVKs in 1979 using Agricultural Produce Cess Fund. Based on the recommendations of the review committee on KVKs and Planning Commission, 89 more KVKs started functioning in the country by the end of Sixth Plan. During the Seventh Plan, 20 more KVKs were established. Addressing the nation on 15th August 2005, the Prime Minister of India announced that by the end of 2007, there will be one KVK in each of the rural districts of the country. By the end of the Tenth Plan (2002-07), the number of KVKs grew to 551. The number of KVKs was increased to 630 and 665 during the 11th and 12th five year plan periods, thereby establishing one KVK in each district

covering the entire country with a network of Krishi Vigyan Kendras. Further KVKs were allotted to newly formed districts and additional KVK were established in districts with large geographical area to facilitate farmers of rural areas.

At present, there are 680 KVKs, out of which 460 are under State Agricultural/Veterinary Universities and Central Agricultural University, 64 under ICAR Institutes, 102 under NGOs, 36 under State Governments, and the remaining 15 under other educational institutions.



Expansion of the KVK network during the last four decades.

### Transform Agriculture, Transform India

An agricultural invention-and-innovation continuum in all facets of agriculture and allied activities with its effective diffusion is key to sustainably increase the agricultural production and productivity coupled with environment sustainability. The role of science





and technology in agriculture is crucial in not only ensuring food security of the country and affordability of the food items for the public at large, but also in providing farmers a competitive edge in the present day global commodity markets. To realize their true potential, farmers must have access to the state-of-the-art technologies, necessary inputs and related information. It is in this context that the Government of India, through ICAR, established the large network of over 600 Krishi Vigyan Kendras (KVKs) across the country for conducting technology assessment and refinement, knowledge dissemination and providing critical input support for the farmers with a multi-disciplinary approach.

### **Performance of KVKs: A relook**

Krishi Vigyan Kendra (KVK) is the only institution at the district level in India for technological backstopping in agriculture and allied sectors. During the four decades since its inception, several committees have assessed the performance of the KVKs. Invariably, all the committees have appreciated the huge potential of KVKs in delivering technologies to the farming communities including training farmers, farm women and rural youth. However, there is still a lot to be desired. The High Power Committee (2014) constituted by the ICAR to review all issues pertaining to KVK system has suggested sweeping measures for improving their efficiency and relevance so as to meet the current expectations of stakeholders, which has since been accepted and the recommendations are being implemented.

A recent study by the National Institute of Labour Economics Research and Development (NILERD) to evaluate the impact of KVKs on dissemination of improved practices and technologies, in terms of outreach, knowledge and accessibility, found that KVKs are playing a proactive role in transferring new technology at field level with beneficial impacts. They have an edge in technology transfer over other service providers by virtue of having better technical expertise and demonstration units. About 40 percent of the farmers reported that they implemented the technology immediately after its dissemination by KVK and that 25 percent did so from the next agricultural season. With the intervention by KVKs, about 80 percent of the farmers have modified their agricultural patterns in terms of diversification of crops and changes in cropping pattern, seed planting technique, use of fertilizers and pesticides, changes in machinery used and in water use pattern. More than 50 percent of the farmers have mechanized their farm operations.

Evidently, with the intervention of KVKs, there has been an increase in adoption of new technologies, resulting in improved production and higher productivity, enhanced incomes and reduction of drudgery, underscoring the positive contributions of KVK's technology transfer initiatives. Most significantly, the gender-sensitive technologies have helped in reduction of drudgery, income enhancement and development of self-confidence among women. Some factors that hamper technology transfer and adoption include limited alternatives and difficulty in getting



suitable technologies; inadequate input delivery system, availability of planting material and other farm inputs; poor socio-economic status of farmers and small holdings; lack of forward and backward linkages especially post harvest management; issues pertaining to marketing, value addition, and so on.

However, there is still a sizable section of the farming community outside the loop, still unaware of technological developments in the field of Agriculture, Horticulture and Animal Husbandry, as the countrywide survey (July 2012-June 2013) by NSSO of nearly 35,000 households revealed that over 59% of the farm households continue to remain far removed from new technologies and guidance from state run research institutes including KVKs. Such findings make it imperative that the KVKs improve their functioning, being more proactive and creative in connecting with the rural masses.

### **For KVKs to be more vibrant**

The need to strengthen the KVKs more in terms of infrastructure, human resources, reviewing and expanding the mandate and address the shortcomings in catering to the changing needs is most evident. It recommends that there is a need for a uniform procedure for transfer of technology from research labs to KVKs at a faster pace; measures to be adopted to increase the outreach of KVKs by adopting innovative techniques (such as forming farmers groups, train farmers-trainers, redefining cluster approach, continuous interaction at village level, improved demonstration and use of Information &

Communication Technology), exemption of KVKs from unrelated duties and re-look into the existing policies regarding subsidies, capacity building of KVK staff, better distribution of inputs, etc.

KVKs are envisioned to play an important role in transforming rural India. As such, the interventions of KVKs should ideally target the family and not the individual farmer. KVKs should also cater to the needs of small and marginal farmers with innovative mind sets. A number of farmers are doing various innovations that should be taken a note of. There is also a need to follow bottom-up approach and researches done at field level should reach the laboratories for validation. KVKs must develop farmer-entrepreneurs, who can further help in technology transfer through a mechanism of farmer to farmer extension. KVK trainings should promote entrepreneurship among rural youth, helping them in gaining self employment. Promotion of diversified farming systems should also receive due attention. KVK's demonstrations must be cost-effective for adoption by farmers.

KVKs are meant for enhancing capacities of farmers and other extension staff, but often the KVK staff lack in capacity especially in the fast emerging areas of agricultural technology which are more knowledge & skill driven. Apart from updating technical skills in the area of their respective subject, the KVK staff, need to be trained on innovation management. Capacities to perform several functional skills related to networking and partnership building; enhancing access to technology, expertise, markets, credit and inputs;



setting up/strengthening user groups, advocacy for institutional and policy changes, reflective learning etc., have to be enhanced through trainings, action learning initiatives, exchange of good practices across KVKs.

Currently, there is over dependence of KVKs on institutional funding from ICAR. KVKs should look for funds from various government schemes/ NABARD / Agricultural Skill Council of India for skill & entrepreneurship development in rural areas. Lot more need to be done though to achieve the convergence between ATMA and KVK operational to the desired operational level. The ATARIs need to be proactive not only in effective monitoring & evaluating the performance of KVKs under their jurisdiction, but also in guiding/facilitating the KVKs to play wider roles to promote and apply new knowledge.

For improved operation, implementation and better outcomes, it is necessary to develop KVKs as resource centres on farm technologies; technology transfer should come as a complete package covering backward-forward linkages; modernization of soil testing labs; defining responsibilities of each organization involved with transfer of technology; keeping the farmers needs in focus while providing training; focus upon new emerging areas like climate change, post-harvest management and non-farm activities.

KVKs have made important contributions to improving production, productivity and farmers' income. The ICAR has also made tremendous efforts to recognize and reward the innovative and good work done by KVKs. Over the years, several KVKs have been doing outstanding innovative work in their mandated activities across the country and duly bestowed with the prestigious ICAR Best KVK awards. There are increasing efforts from the part of the Government also to strengthen the existing KVKs to carry out its wide range of mandated activities and initiation of new components. The Union Budget 2016-17 has proposed to hold a national level competition amongst KVKs with prize money of Rs.50 lakh to foster positive competition amongst them. It is expected that in due course of time, KVKs would play an increasingly important role in transforming agriculture, a key ingredient to transform India.

*“Give a man a fish, and you feed him for a day;*

*Teach a man to fish, and you feed him for a lifetime”*

**- Maimonides, the Spanish philosopher (1135-1204)**





## KASARAGOD: THE LAND OF UNITY IN DIVERSITY

Lying at the northern tip of Kerala, bounded by the Western Ghats in the east and Arabian Sea in the west and twelve rivers flowing across its terrain, Kasaragod is an enchanting beauty of nature. There are different views on the etymology of "KASARAGOD": it may be the combination of two Sanskrit words kaasaara (which means lake or pond) and kroda (which means a place where treasure is kept) or it is the place where Kaasaraka trees (*Strychnos nux vomica* or Kaanjiram) are in abundance. It is true either way as there are large number of rivers, lakes and ponds in the coastal belt of the district, besides the thick flora consisting of innumerable varieties of trees, shrubs etc. particularly a plenitude of Kaasaraka trees.

Kasaragod offers a variety of art forms which speaks volumes on the rich cultural heritage of the region. The spectacular pageant of Theyyam deities raises Kasargod into a land of fabulous fantasies. The symphonic melody created by Yakshgana of the Tulunadu culture, along with the thrilling Poorakkali, Kolkali, Duff Mutt, Oppana is absolutely enchanting. The Kasargod is a land of different languages with Malayalam, Tulu, Kannada, Konkani, Marati, Biary and Tamil, with the native population south of Chandragiri speaking mainly Malayalam and north predominantly speaking Tulu.

### Formation of the Kasaragod district, triggering development

Kasaragod became a part of the present state of



Kerala following the reorganization of states and formation of Kerala in November, 1956. The district was Kasaragod taluk in Kannur district. Fulfilling the long-felt aspirations of the people and with an intention of bestowing maximum attention on the development of the backward area, Kasaragod district was formed on 24th May, 1984 as the 14th district of Kerala by carving out a major portion of the erstwhile Kannur district.



Major towns in Kasaragod district are Nileswar, Kanhangad, Kasaragod, Uppala, Kumbala, Cheruvathur and Thrikaripur. Being the northernmost district of Kerala, Kasaragod is located at 12.5°N 75.0°E. Average elevation is 19 metres (62 feet). As of now, Kasaragod has 6 block panchayats, viz; Karadka, Manjeswar, Kasaragod, Kanhangad, Parappa and Nileswar and 38 grama panchayats, and 3 municipalities viz; Kasaragod, Kanhangad and Nileswar.

## Geography

The district is marked off from the adjoining areas by the Western Ghats which run parallel to the sea and constitute an almost continuous mountain wall on the eastern side. The ghats dominate the topography. The coastline is fringed with low cliffs alternating with stretches of sand. A few miles to the interior, the scene changes and the sand level rises towards the barrier of the Ghats and transforms into low red laterite hills interspersed with paddy fields and coconut gardens. Based on physical features, the district falls in to three natural divisions: the low land bordering the sea, the mid land consisting of the undulating country and the forest-clad high land on the extreme east. There are mainly four types of soils namely, sandy, sandy loam, laterite and hill or forest soil.

Adoor, Eleri, Karadka, Malom, Parappa, Panathady and Muliya are some of the reserve forests in the district. These forest areas have different types of medicinal plants and shrubs. The river-sea joining lands were once abundant with Mangrove forests; But, now they are seen only in Chittari, Manjeshwar,

Mogral, Uppala, Shiriyar rivers. There are 12 rivers in this district. The longest is Chandragiri (105 kms) originating from Pattimala in Coorg and embraces the sea at Thalagara, near Kasaragod.

## Climate

The climate of the district is classified as warm, humid and tropical. The average maximum temperature is 31.2°C and minimum is 23.6°C.

The mean annual rainfall of the district is 3581mm, which is highest in the state (the state average is 3063). The south west monsoon starts towards the end of May or the beginning of June, heralded by thunderstorms and hold till September. October-November brings the north-east monsoon. Out of the total rainfall, the months June, July & August experience 2/3 of the quantity.

## Demographics

As per the 2011 census, Kasaragod district has a population of 1,307,375, roughly equal to the nation of Mauritius or the US state of New Hampshire. This gives it a ranking of 375th in India (out of a total of 640). The district has a population density of 654 inhabitants per square kilometre. Its population growth rate over the decade 2001–2011 was 8.18%. Kasaragod has a sex ratio of 1079 females for every 1000 males, and a literacy rate of 89.85%.

## Land use pattern and importance of agriculture

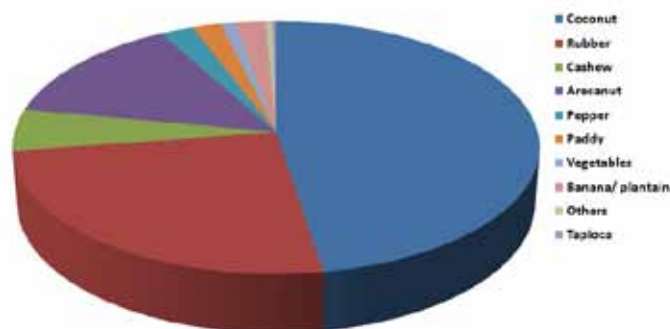
Agriculture forms the mainstay of the population



of the district. The soil in the three natural divisions generally fall under three types. Diversity of crops and heterogeneity in cultivation are the key notes of agriculture here. The eastern tract comprises of forests and hilly areas. The hilly areas are mostly cleared and put to private cultivation; the important crops being rubber, cashew and ginger. In the skeletal plateau areas, cashew trees are cultivated, while in some patches, arecanut, pepper and cocoa are grown. In

Particulars	Area in ha
Forest Area	5,625
Land put to non-agricultural use	19,758
Barren & uncultivable	8,562
Land under miscellaneous tree crops	4,568
Cultivable waste	13,308
Fallow other than current fallow	1,319
Current fallow	3,228
Net sown area	139,765
Area sown more than once	8,770
Total cropped area (gross)	148,535

the coastal tract, paddy, coconut, arecanut, cashew, tobacco, vegetable and tapioca are cultivated. Average size of land holding is 0.469 ha according to 1990-91 census, with the marginal/small holdings (less than 1 ha) predominant (84.7 %). Fisheries sector has wide scope for development in Kasargod which has a long sea coast (80 kms) extending from Trikaripur to Bangra-Manjeshwar. There are many fish landing centers in this district and transporting facilities.



Area, Production and Productivity of major crops cultivated in the district

Sl. No	Crop	Area (ha)	Production (Metric tons)	Productivity (kg /ha)
1	Coconut	63791	705 million nuts	11052 nuts
2	Rubber	33860	30200	892 kg/ha
3	Cashew	7182	6323	880
4	Arecanut	18733	51406	2744
5	Pepper	3084	2077	673
6	Paddy	2665	6095	2287
7	Vegetables	1336	687	2011
8	Banana/ plantain	2879	16165	12446
9	Pulses	141	102	723
10	Tapioca	413	12926	31298
11	Sweet potato	61	1138	18656
12	Tobacco	13	21	1615
13	Ginger	16	66	4125
14	Turmeric	34	103	3029
15	Nutmeg	141	178	1262
16	Mango	2421	10202	4214
17	Jack	2553	10	3917
18	Pineapple	46	296	6435
19	Papaya	759	5176	6819
20	Cocoa	293	235	802

Source: Farm Guide, 2017: Farm Information Bureau,  
Government of Kerala; Department of Agriculture Development & Farmers Welfare

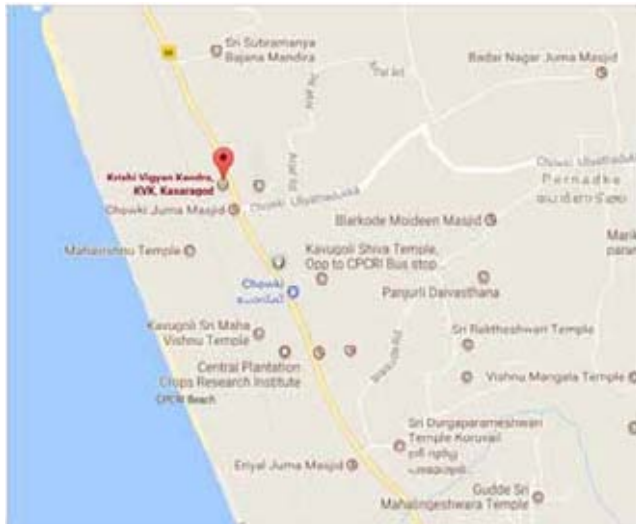




## KRISHI VIGYAN KENDRA-KASARAGOD: A PRIDE OF PLACE

This KVK for the Kasaragod district in the northern part of Kerala was established on 01 January 1993 (under VIII Five Year Plan) under the administrative control of ICAR-CPCRI. It is situated in Chowki, about five kilometers away from Kasaragod town on NH 66 towards Mangalore.

Altogether, there are fourteen KVKs, one in each district, functioning in the state of Kerala. Among



them, four KVKs are attached to ICAR institutes, two under ICAR-CPCRI (Kasaragod and Alappuzha), one each under ICAR-CMFRI (Ernakulam) and ICAR-IISR (Kozhikode). Seven KVKs are functioning under the Kerala Agricultural University (Kollam, Kottayam, Thrissur, Palakkad, Malappuram, Kannur, Wayanad)

and three are under NGOs (Thiruvananthapuram, Pathanamthitta and Idukki) in Kerala.

This Kendra offers education for farmers, farm women and youth in the district to bring about desirable changes in their knowledge, skills and attitudes based on felt needs and wants. Further, this Kendra extends training to the field level extension functionaries on recent advances in agriculture and allied sectors so as to ensure proper, timely and quick diffusion of technologies for sustainable production and productivity, besides other mandatory activities such as On Farm Testing of technologies (OFT), Front Line Demonstrations (FLD) and Transfer of Technology activities. In brief, KVK-Kasaragod is functioning for the greater cause of overall development of the farming community of the district since its inception in 1993 and is completing 25 glorious years in service of the farming community of Kasaragod district.

### Instructional facilities

This Kendra maintains instructional farm with facilities like coconut garden, mixed cropping unit with pepper, banana and pine apple as component crops, fruit orchard unit, green house, bee keeping units comprising Indian bees and stingless bees, arecanut and pepper nursery units, nutrition garden, drip irrigation unit, medicinal plants unit, fresh water fisheries unit, ornamental guppy unit and vermicomposting unit as training resources. All these facilities were established





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240

based on the training needs of the clientele from time to time. The KVK is having a well developed training



hall with state-of-the-art audio visual equipments for conducting training programmes most effectively.



The present KVK administrative block was formally inaugurated by Dr. R.S. Paroda, the then Director General of ICAR on 06 December, 1998. This building accommodates the office room of the Programme Co-Ordinator, one lecture hall, staff rooms, home science laboratory, plant protection laboratory, administrative office, library-cum-museum, and a seminar hall. The seminar hall can accommodate about one hundred participants.

### Service centres

KVK, Kasaragod is having a well equipped soil testing laboratory for analysis of N, P, K, various secondary and micro nutrients, EC and pH. Farmers are availing this facility by paying a nominal fee for soil analysis. Armed with a well-equipped Plant Health Clinic, KVK, Kasaragod regularly provides recommendations for pest and disease incidence for the farmer-clients. KVK, Kasaragod is having a well equipped Post Harvest Processing Centre for providing training on value addition of seasonal fruits,



vegetables and cereals. KVK has also developed novel technologies to tackle the malnutrition of children and a food supplement, Amrutham Nutrimix is marketed extensively through the Anganawadis of Kerala by Kudumbashree Units. Besides, KVK is also extending its facilities to prospective entrepreneurs to upgrade their skills and impart practical knowledge on various agricultural technologies like spawn production, mushroom cultivation, bee keeping, bio pharmacy, nursery management, production of value added products, seed production etc. Farmers/SHGs do avail extensive training and handholding from this facility to start their own enterprises.

KVK is also operating a sales counter, making available the seeds of various vegetables, planting material of fruit trees, bio inputs like *Trichoderma*, *Pseudomonas*, *Metarhizium*, *Buevaria*, *Verticillium*, marine fish extracts, banana top-up, vegetable top-up, neem cake, nanma, menma, neem oil soap, pongamia oil soap, neem castor oil soap, neem K soap, methyl eugenol traps and cue lure traps for the benefit of visiting farmers and general public. Value added products like coconut sugar, honey etc. are also sold through this counter.

### Institutional strength

KVK has six sanctioned posts of Subject Matter Specialists in major disciplines namely Agricultural Extension, Horticultural Science, Agricultural Entomology, Home Science, Plant Pathology and Fisheries. The Programme Assistant positions are Farm Manager, Lab Technician and Computer



Programmer. At present, this KVK has faculty in four major disciplines of Agricultural Extension, Entomology, Home Science and Plant Pathology and functions on the principle of collaborative participation of scientists, subject matter experts, extension workers and farmers. As the team leader, Head (formerly Programme Co-ordinator) is the chief executive officer of the unit tasked with responsibilities of day-to-day administration and co-ordinating the mandated activities.

### Management of the KVK

The functional development of the KVK is under the guidance, cooperation and coordination of the Deputy Director General (Agricultural Extension) at ICAR Headquarters, New Delhi; the Director, Agricultural Technology Application and Research Institute (ATARI), Zone XI, Bangalore; the Director of CPCRI (parent institute), Kasaragod and the Scientific Advisory Committee of the KVK. The then Local Management Committee (LMC) functioned up to 1996 was replaced by the Scientific Advisory Committee (SAC) in 1997.

The Scientific Advisory Committee (SAC) of KVK provide necessary technical and management guidance in developing need-based and problem-oriented technical programmes, development of action plan and review of activities and guidance/suggestions to improve the functioning.

### ICAR–CPCRI: the host institution

The Central Plantation Crops Research Institute (CPCRI), Kasaragod, has its origin from the Coconut Research Station established in 1916 in the erstwhile Madras Presidency, and later developed as the Central Coconut Research Station in 1946 under the Indian Central Coconut Committee. Subsequently, the Indian Council of Agricultural Research (ICAR) established CPCRI in 1970 by merging the Central Coconut Research Stations at Kasaragod and Kayangulam, Central Arecanut Research Station at Vittal and its five substations at Palode (Kerala), Kannara (Kerala), Hirehalli (Karnataka), Mohit Nagar (West Bengal) and Kahikuchi (Assam). The research centres of CPCRI for spices, cashew, oil palm and coastal agriculture were upgraded to independent institutes and directorates since 1986.

At present, CPCRI focuses on research in coconut, arecanut and cocoa. The headquarters of the institute is situated at Kasaragod, Kerala and the two regional stations are at Kayamkulam (Kerala) and Vittal (Karnataka). There are three research centres under the institute viz., Mohit Nagar (West Bengal), Kahikuchi (Assam) and Kidu (Karnataka). The All India Co-ordinated Research Project (AICRP) on Palms with its nation-wide network of 15 centres working on coconut, four on arecanut, eight on oil palm and two on palmyrah is also functioning from here. Besides the KVK- Kasaragod, CPCRI also hosts the KVK- Alappuzha at its Regional Station, Kayamkulam.





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CENTRAL PLANTATION CROPS RESEARCH INSTITUTE

केन्द्रीय रोपण फसल अनुसंधान संस्थान ICAR

## ATARI, Bengaluru: Co-ordinating the activities of KVK

The Agricultural Technological Application Research Institute (ATARI) was established during September 1979 as the Zonal Coordinating Unit, Zone VIII at Tamil Nadu Agricultural University, Coimbatore to monitor the activities of Lab-to-Land Programme. Subsequently, the unit was shifted to Bangalore in September 1981. During 1986, this unit was given the additional responsibility to monitor all the ICAR Projects under the Division of Agricultural Extension located in this zone comprising the states of Karnataka, Kerala, Tamil Nadu, Goa and Union Territories of Puducherry and Lakshadweep. Since 2017, ATARI, Bengaluru (Zone-11) is monitoring the KVKs located in the states of Karnataka, Kerala and Lakshadweep.



The activities of KVK is regularly reviewed by the Quinquennial Review Teams (QRT) constituted for the review of KVKs as well as ICAR institutes during every

five years. The QRT team evaluates the performance of the KVK with respect to the approved mandates and the achievements of the KVK during the five year period and reports to the ICAR. Further a team constituted



by Kerala Legislative Committee to review the performance of Kerala KVKs also visited Kasaragod KVK and assessed the performance. The various committees had appreciated the achievements made by KVK Kasaragod in service of farmers.

## Fostering linkages with line departments and other stakeholders

The local line departments like Agriculture development and farmers welfare, Animal husbandry, Fisheries and other Rural Development Organizations mainly transfer the technologies through the various schemes and programmes sanctioned or operated by the governments (state and central). KVK, Kasaragod with its well qualified multi-disciplinary faculty



provide adequate and distinct technical back up for effective implementation of various programmes of line departments by way of common planning, joint execution, monitoring and purposeful evaluation. This Kendra maintains close functional, collaborative and coordinative linkages with various developmental departments, financing institutions and voluntary organizations operating in the area for launching various programmes effectively. The nature of linkage with line departments and other organizations include joint diagnostic survey, participation in meetings and workshops, arranging awareness programmes, training programmes, seminars, soil testing campaigns, farmers field schools etc. This linkage and integration is being carried out with active support of the host institution in terms of human resources, training facilities, other infrastructure facilities, various outreach programmes etc.

KVKs are mandated to conduct one SAC meeting in a year during the second half of the financial year before the finalization of the action plan. The Director of Extension, KAU provides the guidance on technical programmes to be implemented by the KVK. KVK-Kasaragod organizes the SAC meetings annually in order to develop good linkages with other departments and institutions as well as to update them on KVK programmes and progress. Representatives from line departments give their valuable suggestions to plan the activities of KVK on need basis. Monthly Technological Advisory meets are also attended by the expert panel from KVK where in all the Agricultural Officers of the district meet to raise their respective



issues and problems related to agriculture. Further, the wholehearted cooperation extended by the various research institutions, line departments and the farming community and other stakeholders is crucial to the effective functioning of KVK.

Farmer participatory rural appraisals are being organized by the KVK to get a sound idea about the felt needs of the farmers in a given locality. This is done prior to planning and formulation of the forthcoming action plan so that the apt technologies needed for a locality can be chosen for FLDs and OFTs of the year.

### **Constitution of the Scientific Advisory Committee (SAC)**

1. Head of the Host Institution (Director, CPCRI):  
Chairperson
2. Director, ATARI or one of the Scientist from ATARI: Member
3. Director of Extension of concerned SAU (KAU):  
Member
4. Representative of ICAR Institute/ICAR Regional





- Research Station (if located in the district or nearby): Member
5. One expert (Professor rank) in the field of Crop Sciences (nominated by the Head of Host Organization): Member
  6. One expert (Professor rank) in the field of Horticultural Sciences (nominated by the Head of Host Organization): Member
  7. One expert (Professor rank) in the field of Animal/ Fisheries Sciences (nominated by the Head of Host Organization): Member
  8. Project Director of ATMA: Member
  9. Representative of NABARD: Member
  10. District Officer of the line department (Agriculture): Member
  11. District Officer of the line department (Horticulture): Member
  12. District Officer of the line department (Agrl. Engineering): Member
  13. District Officer of the line department (Animal Husbandry): Member
  14. District Officer of the line department (Fisheries): Member
  15. One Progressive farmer in the district (nominated by the Head of Host Organization): Member
  16. One Progressive woman farmer in the district (nominated by the Head of Host Organization): Member
  17. One Agri-entrepreneur in the district (nominated by the Head of Host Organization): Member
  18. One Chairperson of Women Self Help Group in the district (nominated by the Head of Host Organization): Member
  19. Senior Scientist and Head, KVK: Member Secretary

Besides, all the Subject Matter Specialists and Programme Assistants of KVK shall be active participants as special invitees.

### **Mandated activities of national importance in the early days (1993-1997)**

Flagship extension/developmental programmes like the Lab to Land programme, National Demonstration programme and Developmental Programme for the weaker sections were the top priority of this KVK till 1997. Subsequently, as per the guidelines from the Council, these were discontinued, giving more emphasis to Frontline Demonstrations and On Farm Testing of technologies.

### **Lab to Land Programme (LLP)**

The Lab to Land Programme was implemented in 50 ha during 1994 - 1997 by selecting 40 families from Madhur and 58 families from Mugu village in Kasaragod district. These farmers were categorized as small, marginal and agricultural labourers. Coconut/ arecanut/ paddy/ vegetable-based crop modules were demonstrated under this programme. It is observed



that the beneficiaries could realize an enhanced annual income of Rs. 3750 - 5000/- from coconut based, Rs. 4000 - 12,000/- from arecanut based and Rs. 4000/- from vegetable based cropping systems after the respective interventions.

### National Demonstration Programme (ND)

Under the National Demonstration Programme (ND), a total of 116 demonstrations were taken up during 1994-1997 at Muliyar and Pullur villages covering an area of 60 ha. The crop modules adopted were based on the main crops of paddy, coconut and arecanut. The beneficiaries could generate additional income by the introduction of new crops.

### SC/ST Development Programme

Under this programme, demonstrations were taken up in two villages namely Bombrana and Manimoola of Kasaragod district with 30 families each, covering a total area of 19 hectares. The beneficiaries categorized into agricultural labourers and marginal farmers were included under three groups, viz., homestead with paddy as main crop, homestead with coconut as main crop and homestead with vegetable on small scale. The cropping systems were remodeled by introducing various improved varieties of main crops and component crops. Poultry birds were also distributed to deserving households. The beneficiaries could realize an extra annual income of Rs. 1000/- to 3000/- through this initiative.

## Shift in focus since 1997

With the mandate of KVK revised, the activities were also reoriented towards addressing the local issues of the district by conducting On Farm Testing (OFT) to find location specificity of various technologies based on the needs of the farming community and to promote the successful technologies for wider adoption by conducting Front Line Demonstrations (FLDs).

This Kendra now offers agro-based education for all village people of different categories to bring about desirable changes in their knowledge, skills and attitudes based on felt needs and wants. The target population like practicing farmers, rural youth and farm women are being motivated through a scientific approach to help themselves by applying imparted knowledge/skills in their daily life in farming, home making and community living by efficient utilization of their own available resources, in solving current problems and in meeting changing economic and social conditions.

This Kendra extends training to the field level extension functionaries on recent advances in agriculture and allied sectors so as to ensure proper, timely and quick diffusion of technologies for sustainable production and productivity. Further, this Kendra adopts holistic approach of maintaining participatory technology development through PRA tools and techniques where in research information is passed, tested and confirmed in the farmers' fields. At the same time, this Kendra is instrumental in bringing farm-related problems as well as proper technical feed-back to the research



institutions for evolving suitable solutions as per the felt needs. In this continuous educational process, both learners and trainers contribute and receive information/resources for the overall development of the farming community.

## Methodology of problem identification and its redress through KVK interventions

This Kendra is instrumental in identifying farm-related problems and offering suitable technological interventions through a four-way process.

**Problem identification and prioritization:** The problems are identified and prioritized based on an analysis of the data/information generated through different PRA methods, interactions with the farmers, field level extension functionaries, farmers' groups, and field visits. The following criteria are used for problem identification and prioritization:

- extent of the problem,
- severity of the problem,
- importance of the problem, and
- frequency of the problems.

Once the problem is identified through the above process, information on various technological options is collected from different research institutions/ organizations as a possible solution to the problem.

## Technology identification and prioritization:

The technologies are being identified and prioritized based on problems faced by the farmers in the district. The criteria used for technology identification and prioritizations are:

- understandability of the technology,
- practicability of the technology,
- compatibility of the technology,
- sustainability of the technology,
- profitability of the technology, and
- accessibility of the technology.

## Identifying the thrust areas:

Based on the problems faced by the farmers in the district as well as the focal points for the development of agriculture in the district as suggested by both the state and central government/agencies, the next logical step is to identify a core list of thrust areas.

Based on this process, the following thrust areas are identified by the KVK to work on:

- ◇ Coconut and arecanut based integrated farming system
- ◇ Value addition through product diversification
- ◇ Organic farming
- ◇ Integrated pest management practices
- ◇ Integrated disease management practices
- ◇ Integrated nutrient management practices



- ◇ Integrated soil and water conservation measures
- ◇ Nutritional security through homestead farming
- ◇ Entrepreneurship development programmes
- ◇ Farm women empowerment through technology literacy

**KVK interventions:** In the final step of this methodological exercise, the identified and prioritized technologies are disseminated to the needy clientele through the following four activities:

- training programmes,
- on-farm testing of technologies,
- front line demonstrations, and
- extension services/activities.

These activities are prioritized according to their importance in a specified area. Accordingly, a combination of activities is being used for tackling the farmers' problems. A detailed account of each of these four interventions by the KVK-Kasaragod is given in the succeeding four chapters for a better understanding of its contributions and public perception.



## Developmental Milestones

<b>1992</b>	The proposal for KVK and Memorandum of Understanding (MOU) was submitted to ICAR; consequently, it was decided to transfer vehicle and assets available at ND Unit, Anandapalli, Pathanamthitta, Kerala Agricultural University (KAU) for the establishment of KVK at CPCRI, Kasaragod
<b>1993</b>	Formal sanction for establishment of KVK in CPCRI at Kasaragod (15 (22)/92- Agrl. Extn. 01 dated January 1993) communicated from the Council; KVK-Kasaragod started functioning in the campus of CPCRI; The Officer-in-Charge and Administrative staff deployed from the host institute; Local Management Committee (LMC) for the KVK was constituted; Recruitment for the new staff positions began and eight supporting staff including a driver joined the KVK.
<b>1994</b>	Four Training Associates (Entomology, Agricultural Extension, Home Science, Plant Pathology) and four Training Assistants (Agronomy, Audio-visual Aids, Home Science and Sericulture) joined the rolls; First LMC meeting was held; Started carrying out the mandates of KVK.
<b>1995</b>	Construction of the new administrative block for KVK was initiated. Two more Training Associates (Horticulture and Agricultural Engineering) joined duty.
<b>1996</b>	KVK was allotted a vehicle improving its mobility.
<b>1997</b>	Replacement of LMC by the constitution of Scientific Advisory Committee(SAC) and first SAC meeting held.
<b>1998</b>	The new Administrative Block for KVK was inaugurated; Posts of five supporting staff were adjusted with the cadre strength of CPCRI as per the norms of revised guidelines from the Council.
<b>2001</b>	Charge of Drawing and Disbursing Officer was given to the Scientist-in-charge ( KVK) for better financial management of KVK.
<b>2002</b>	Faculty of KVK (Training Associates and Training Assistants) inducted under technical service category of ICAR and re-designated Training Associates as Senior Training Assistants and Training Assistants as such.



2004	KVK, Kasaragod was conferred with the Best KVK Award for the biennium 2002-2003
2005	Established Soil, Plant and Water Testing Laboratory
2006	Renovation of Home Science lab and a vermicomposting unit added.
2008	Model Agricultural Project (Post Harvest Processing and Nutrition Laboratory) sponsored by Kasaragod District Panchayath launched for empowering women through secondary agriculture.
2009	Fresh water fish culture unit established.
2010	Plant Health Clinic funded by National Horticulture Mission started functioning at KVK. Regular Programme Co-ordinator and Stenographer joined.
2011	Inaugurated KVK Staff Quarters Building.
2015	KVK Sales Counter opened
2016	Centenary celebrations of ICAR-CPCRI and KVK- Kasaragod played a major role in all the farmer outreach programmes of the host institution.
2018	25 years of establishment of KVK-Kasaragod

## The guiding lights behind KVK development

### Chairmen of Scientific Advisory Committee

Dr. M. K. Nair, Director, CPCRI, Kasaragod (01.01.1993 - 31.08.1997)

Dr. K. U. K. Nampoothiri, Director, CPCRI, Kasaragod (01.09.1997 - 31.12.2000)

Dr. V. Rajagopal, Director, CPCRI, Kasaragod (01.01.2001 - 31.03.2007)

Dr. George V. Thomas, Director, CPCRI, Kasaragod (01.04.2007 - 31.08.2014)

Dr. P. Chowdappa, Director, CPCRI, Kasaragod (01.09.2014 onwards)



### Directors of ATARI, Bengaluru

- Dr. M.N. Sinha, Zonal Coordinator, Zonal Coordinating Unit, Zone VIII, Bangalore (During 1994).  
 Shri. R.S. Ramamurthy, Acting Zonal Coordinator, Zonal Coordinating Unit, Bangalore (1995-1997)  
 Dr.R.K.Samanta, Zonal Coordinator, Zonal Coordinating Unit, Zone VIII, Bangalore. (1997 - 2003).  
 Dr. S. Prabhu Kumar, Zonal Coordinator, Zonal Coordinating Unit, Zone VIII, Bangalore. (2003-2014).  
 Dr. Sreenath Dixit, Director, ATARI, Zone XI ((From 2014 onwards)

### Senior Scientist and Head, KVK

- Dr. P. Gopalasundaram, Senior Scientist (Agronomy), Division of Crop Production, CPCRI. (1993 to 1994)  
 Dr. M. R. Hegde, Senior Scientist (Agronomy), Division of Crop Production, CPCRI. (1994 to 1997)  
 Dr. A. S. Sukumaran, Principal Scientist (Entomology), Division of Crop Protection, CPCRI. (1997 to 2002)  
 Dr. B. T. Rayudu, Senior Scientist (Agricultural Extension), Division of Social Sciences, CPCRI. (2002 to 2009)  
 Dr. C. Thamban, Senior Scientist (Agricultural Extension), Division of Social Sciences, CPCRI. (2009 to 2010)  
 Dr. T. S. Manojkumar, Senior Scientist and Programme Co-ordinator (April 2010 onwards)

### The Team KVK (As on 01 January 2018)

- |  |  |
|--|--|
| <input type="checkbox"/> Dr. T. S. Manojkumar, Principal Scientist and Head      | <input type="checkbox"/> Dr. Neelofar I.K. Chief Technical Officer (Prog. Asst.) |
| <input type="checkbox"/> Dr. S. Leena, Chief Technical Officer (SMS)             | <input type="checkbox"/> Sh. K. Manikandan, Senior Technical Officer             |
| <input type="checkbox"/> Dr. Saritha Hegde, Chief Technical Officer (SMS)        | (Prog. Asst.)  |
| <input type="checkbox"/> Sh R. Sanalkumar, Chief Technical Officer (SMS)         | <input type="checkbox"/> Sh, K. Ramadasan, Assistant                             |
| <input type="checkbox"/> Smt. M. P. Jayashree, Assistant Chief Technical Officer | <input type="checkbox"/> Sh. A.K. Ramdas, Driver                                 |
| (SMS)  | <input type="checkbox"/> Sh. Chaniya Naik, SSS                                   |



## Accolades for the KVK

KVK-Kasaragod was bestowed with the prestigious Best Krishi Vigyan Kendra Award for the biennium 2002-2003 at National level for its contributions in the field of agriculture and allied activities rendered to the farming community through its outreach programmes. The coconut and arecanut based integrated farming system models popularized by this KVK resulted in significant benefits by boosting the income level of farm families. Entrepreneurship development programmes on product diversification has created tremendous response towards technology literacy and empowerment among women partners of the district. More than 200 self help groups and various Kutumbasree units in the district were motivated to take up different small scale and micro enterprises. The blending of traditional knowledge with the modern methods helped to

rejuvenate old practices and to evolve locally adaptable and sustainable technologies. The awareness created on the importance of bee keeping helped to enhance the productivity of crops through better pollination. Through the dissemination of vermicomposting technology, revolutionary changes were brought out in the field of soil health management by effectively recycling available farm wastes in general and coconut palm residues in particular. KVK associated in planning and implementing various watershed management programmes and 126 micro watersheds including agronomical, structural and social interventions in collaboration with state department of agriculture.

This Kendra is in the forefront to make the good farm families better and poor ones good so as to raise their socio-economic standards for livelihood security as well as better living.





## ON FARM TRIALS (OFT) : THE LEARNING CURVE IN ASSESSING AND REFINING TECHNOLOGIES

It is estimated that about 70 percent of the technologies emanating from research institutes are not adopted by the farmers. The major reasons attributed for the poor acceptance of technologies are that the technologies are sometimes not economically viable, not operationally feasible, not matching with the needs of the farmers and most often not compatible with the farmers' overall farming situation. Naturally, the adoption of such technology prescriptions by the farmer is much lower than desired. Therefore, the research pursuits need to be fine-tuned to meet the requirements of farmers in a given situation. Here lies the significance of on-farm research and testing of technology at the farmers' level. Therefore, on-farm testing was earmarked as one of the mandates of Krishi Vigyan Kendras.

On-farm testing of technology is mainly focused on addressing important problems that are faced by a majority of farmers in the area, with their active participation and under their management. Confirmation of already proven research results under real farm situation for wider adaptability is called on farm testing. Evaluation of proven research results under real farm situation for knowing its suitability is termed as on farm trial. In short, the output of an on farm trial is the input for an on farm testing. In this activity, multiple technology options are tested and the

suitability of specific technology for the given locality gets confirmed.

The objective of an on farm testing is to test and evaluate the research results that emerged from research institutes at the farmers' fields and to refine or modify the technologies, if required, for better adoption by farmers. It is scientifically valid research with replicated field trials managed by the farmers with field-scale equipment in order to provide an accurate basis for farmer-management decisions. In this direction, KVK, Kasaragod has been regularly conducting on farm testing of proven technologies as a possible solution to the problems experienced by the majority of the farmers in the district, since 1996.

### Special features of OFTs

- Choosing suitable and relevant technology interventions
- Farmers' practices as one of the treatments
- Tests one technology at a time
- Researcher-designed and farmer-implemented method
- Trials with farmers' participation and management
- Examining viability and feasibility of the technologies
- Recording desired observations



- Suitable statistical tools employed for data analysis
- Collecting feed-back information
- Conducting follow-up activities

### **Technologies assessed through On Farm Testing (OFT)**

On-farm testing of technologies are being conducted by this KVK in various villages of the district, which is intended to solve the most important and wide-spread problems of farmers in a defined area within their farming system perspective with their active participation and under their management. Some of the OFTs which were highly effective in solving the felt needs and further popularized through frontline demonstrations (FLDs) for wider adoption are showcased here.

### **Assessment of the performance of coconut climbing devices and its refinement**

In coconut farming sector, shortage of labour, especially skilled palm climbers, is the most important constraint in taking up timely harvesting, plant protection operations and other management practices, being faced in all the coconut growing states with very few youngsters taking on this traditional profession. Coconut climbers are a very vital link in the production chain. The consistent supply of raw nuts for the market as well as for the processing sector can be ensured only by strict adherence to the regular harvesting schedule. As against the general norm of harvesting cycles of 45-60 days, farmers are currently able to

harvest only once in three to four months. This results in low productivity in coconut palms in the long run and could be solved through timely harvesting for which the usage of climbing devices has to be promoted in coconut sector. To popularize the usage of coconut climbing devices, KVK conducted an OFT to assess the performance of three climbing devices available to find out its suitability and adaptability.

The performance of three models of coconut climbing devices - Chemberi model (developed by a farmer), CPCRI model and TNAU model (ergo refined) - was tested in terms of ease for operation, safety, and efficiency (in terms of the number of palms that can be climbed per day). Results showed that Chemberi model is the best option which is performing well in terms of ease of operation and operational efficiency,



with which 12-15 palms can be climbed per hour and up to 75 palms per day. The CPCRI model is safe, but more suitable for doing plant protection operations. The model developed by TNAU can be used only in households as only 3-4 palms can be climbed per hour.

The beneficiary farmers who tested the performance of coconut climbing devices opined that if a safety device is fixed to the Chemberi model, then it would be more suitable in terms of both safety and high efficiency. Based on the feedback from KVK (as emanating from this OFT), the research institution (ICAR-CPCRI) refined the Chemberi model by attaching a safety device, comprising of a wire rope cable inserted



through a 'C' shaped pipe in a horizontal plane with two loops at either end. This zero-risk device, costing around two thousand rupees, helps to address the safety requirement of the climber, especially the rural youth and the women aspirants.

## Management of stem bleeding disease in coconut

The coconut palm (*Cocos nucifera* Linn.) is the most useful palm in the world, endearingly called 'kalpavriksha' meaning the 'tree of heaven'. Coconut is grown in more than 90 countries of the world including India and coconut production in Kerala plays an important role in the state economy and culture. Though Kerala has the largest area under the crop and rank first in production, we are lagging behind several other states in terms of productivity.

The coconut palm is affected by a number of diseases, some of which are lethal while others gradually reduce the vigour of the palm causing severe loss in yield. Main diseases affecting coconut palms are root wilt, bud rot, stem bleeding, ganoderma wilt disease etc. Among them, stem bleeding disease is a major problem faced by coconut farmers of northern Kerala, especially in Kasaragod district with an average disease intensity of 8.8% leading to an yield loss of 15 to 50%. The causal organism is *Thielaviopsis paradoxa*. Poor management practices, water logging and hard lateritic sub surface layer of soil are the predisposing factors of this disease. Farmers are unaware of the latest technologies to control the disease and are still practicing traditional methods of tying common salt



wrapped in cloth around the trunk of coconut tree above the disease spot / drive a rusted nail on the trunk and also chop off the affected tissues and apply coal tar. As this is a widely affected problem, a suitable technology developed by CPCRI, Kasaragod for controlling the disease in different disease intensities had been taken up as an OFT programme entitled “Effectiveness of management of stem bleeding disease in coconut”.

This OFT was implemented in farmers’ gardens at Madhur, Puthige, Muliya, Chemnad, Kumbadaje and Udma panchayats and Kasaragod municipality during 1996-2001. Fifteen farmers were selected for the programme with an area of 0.4 ha per plot with 65-75 palms. Technology interventions carried out were smearing with Tridemorph (5%), root feeding with Tridemorph (5%), coal tar application, soil drenching with Tridemorph (0.1%) and neem cake application (5kg/palm/year). Disease index and yield data were recorded as observations. The treatments (removal of disease affected tissue + smearing of Tridemorph (5%)



+ coal tar application + root feeding with Tridemorph (5%) taken up in the mild stages of the disease resulted in an increase of 4 to 5 nuts/palm/year. The mild and moderately diseased palms never showed recurrence/ spread of the disease attesting the effectiveness of the intervention/ treatment at the right stage leading to better yields. Farmers were made aware of the importance of the intervention technologies and their adoption at the mild stage of the disease itself and convinced them about the viability and feasibility of the technology. In the farmers’ opinion, the interventions/ treatments carried out in their fields were much effective and could control the disease and enhance the yield in the initial stages of the disease.

Due to the non-availability of Tridemorph, the on farm trial on integrated management of stem bleeding disease in coconut was modified during 2010-12 with modified technological options and conducted in 5 farmers’ fields of 0.4 ha area each at Udma and Periyattadukkam. Technological interventions selected for trials under different disease intensities were T1: Smear 5% Tridemorph @ of 5 ml/ 100 ml water + coal tar application, soil drench with 0.1% Tridemorph @ of 25 ml in 25L of water; T2: Smear 5% Hexaconazole + coal tar application, soil drench with 0.1% Hexaconazole; T3: Smear *Trichoderma harzianum* talc formulation (100 g in 50 ml water) on lesions and basal application of 5kg neem cake fortified with *Trichoderma*. From the trials conducted in 125 diseased palms, it is observed that in mild and moderately diseased palms, the disease incidence has considerably come down (60 %) when treated with *Trichoderma harzianum*



followed by Hexaconazole with 40% decrease in disease incidence in case of mild and moderately diseased palms. However, severely diseased palms succumbed to the disease in all the treatments. Based on the outcome of this OFT, the technology of smearing *Trichoderma harzianum* talc (100 g in 50 ml water) on lesions and basal application of 5 kg neem cake fortified with *Trichoderma harzianum* was further promoted among the farming community through the programmes undertaken by the department of agricultural development and farmers welfare, in view of declaring the district as an organic district since 2011.

### Management of red palm weevil in coconut

Red palm weevil, *Rhynchophorus ferrugineus* Olivier (Curculionidae: Coleoptera), a concealed tissue borer, is a lethal pest of palms and is reported to attack 26 palm species worldwide. The prevailing agro-climatic conditions and perennial status of coconut palms coupled with intensive farming practices have offered the pest an ideal ecological niche to establish, survive and damage the palms. A damage level of even 1% can cause significant economic loss. Palm injuries, damage by rhinoceros beetle, lightning and disease incidences aggravate the vulnerability to the red palm weevil damage.

Being a concealed tissue borer, early detection by farmers would be a key empowerment strategy in diagnosis and adoption of curative pest management strategies. Once the growing point is badly damaged,



the crown gets toppled and thereafter no curative treatment can save the palm. A chemical control with application of carbaryl at 1% concentration was found to be effective for the management of the pest along with other IPM modules. However, with the increasing awareness on ill effects of pesticides on environment and non-target organisms and in the event of promulgating Kasaragod as organic district, highly toxic pesticides were replaced by eco-friendly and mildly toxic molecules. Curative treatment with safer molecules like imidacloprid (0.02%) or spinosad 0.013% was also found to be effective in the management of red palm weevil (RPW) infestation. Hence, an OFT was planned using these safer molecules along with Carbaryl (widely used by farmers in this area) to find out the efficacy and suitability of these molecules.

Trials were laid out with application of Imidacloprid and Spinosad as technology options II and III where



as Carbaryl was taken as farmers' practice as technology option I. The trials were carried out in six plots comprising an area of 8 ha in Padi, Nellikkatta (Chengala panchayat), Melparamba (Chemnad panchayat) and Kadambar (Manjeswar panchayat). A total of 39 palms were treated @ 13 palms under each technology option. The results showed that treatment with Imidacloprid is highly effective with 92% recovery of treated palms, followed by 77% with Carbaryl and 69% with Spinosad respectively. Farmers were



convinced of the importance of regular observations or systematic scouting of palms in the gardens, early diagnosis, prophylactic measures against rhinoceros beetle damage and optimum palm spacing in the management of red palm weevil, as positive outcome from this trial.

## Organic cultivation of vegetables in Kasaragod district

Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity. Of late, the organic farming practices are gaining importance in the agricultural sector in our country. Actually, farmers may experience some loss in yields in the initial phase on stoppage of synthetic inputs and converting their operation to organic production. Before restoration of full biological activity (growth in beneficial insect population, nitrogen fixation from legumes etc.) pest incidence and fertility problems are common. Sometimes, it may take years to restore ecosystem to the point where organic cultivation is feasible.

There was a time when the people of Kerala relied on home-grown vegetables which were safe to eat. Later, growing population, urbanization and rising wage levels necessitated imports of vegetables from the neighbouring states. The growing awareness on the incidence of pesticide residues above the safer levels and health and wellness consciousness have slowly contributed to changing the mindset of people, which resulted in the present trend of growing vegetables organically in each household for self consumption of safe-to-eat food. The Government of Kerala declared Kasaragod district as 'organic district' during 2010 and this has accelerated the movement of achieving self sufficiency in safe-to-eat vegetables. KVK, Kasaragod also became a part of this movement by conducting trials on organic cultivation of vegetable crops.



**Trials on organic cultivation of bhindi:** These trials were conducted to evaluate the performance of different organic manures on growth, yield as well as pest and disease incidence in the organic cultivation of bhindi. In all the three technology options, farm yard manure and bone meal were given as basal dose of fertilizer whereas poultry manure, vermicompost



and fish meal were applied for top dressing in 2-3 split doses. Neem cake, ground nut oil cake, herbal pesticides, growth promoting organic inputs (different formulations made of cow-dung slurry, urine, butter milk, coconut water, jaggery) and bio control agents were applied as and when required, besides need-based lime application. The trials were conducted in six plots in a total area of one hectare belonging to six farmers spread across three locations - Muliyar, Kambar and Badiadka. The results revealed that bhindi could be cultivated profitably by organic methods as evidenced by good yield and higher benefit cost ratio.

**Organic cultivation of yard long bean:** The trials were conducted in six plots in a total area of

one hectare belonging to six farmers in Paramba, Kambar and Badiadka. The variety assessed was a high yielding variety named Vellayani Jyothika. The results conclusively proved that yard long bean could be cultivated profitably by organic methods. Because of the usage of *Pseudomonas fluorescens* by way of seed treatment, soil application and spray to plants, no disease incidence was recorded. It is noteworthy that pest incidence was less when vermicompost is applied for top dressing in both yard long bean and bhindi cultivation.



**Soil acidity management:** The first step to be followed by farmers prior to organic cultivation is to ensure proper soil health management practices and hence, KVK conducted trials to find out suitable liming materials for the management of soil acidity.



Soil acidity management to improve soil health, better uptake of soil nutrients as well as to enhance crop productivity in bitter melon (var. Preethi) was tested through application of liming materials in 8 plots belonging to 8 farmers covering an area of 3.5 ha at West Eleri and Madhur panchayats. The technology options were T1: Farmers' Practice (no application of liming materials), T2: Application of fine lime in two split doses, T3: Application of dolomite in two split doses and T4: Application of lime as first dose and dolomite as second dose based on soil test results. Results clearly indicated that lime + dolomite application (T4) performed better with increased yield and better growth parameters followed by dolomite application (T3) and lime application (T2) with 11.68t/ha, 11.26 t/ha and 11.10 t/ha yield, respectively, as against 9.58 t/ha in farmers' practice.

Another soil acidity management study with the same technology options on Bhindi (var. Salkeerthi) also proved that lime and dolomite application in two split doses corrected soil acidity and resulted in better growth and yield of bhindi (10.86 t/ha) as compared with farmers' practice (7.64 t/ha).

### Management of quick wilt disease in black pepper

Black pepper (*Piper nigrum*) is a flowering vine in the family Piperaceae, cultivated for its fruit which is usually dried and used as a spice and seasoning. India comes third in the production of pepper in the world (11%) after Vietnam (34%) and Indonesia (19%). However, in the last few years, it is fast losing its status

as a leading producer and exporter of pepper. Grown mostly in the slopes of Western Ghats in Kerala, Karnataka, and Tamil Nadu, the production of pepper in India has been around 55,000 tonnes in 2015-16.

Pepper production in Kerala, which accounts for 75 percent of the total production in the country, in recent years, has been affected by incidence of various diseases and low productivity. Black pepper is affected by a number of diseases, some of which are lethal while others gradually reduce the vigour of the pepper vine causing severe loss in yield. Quick wilt/Phytophthora foot rot, fungal pollu (Anthracnose), leaf rotting and leaf falling, phyllody/stunted-viral disease, nematode infestation & slow wilt and pollu beetle attack are the main diseases and pests. Quick wilt/Phytophthora foot rot is a severe disease problem faced by the farmers throughout Kerala, especially in the arecanut and coconut based pepper gardens of Kasaragod district, with an average disease intensity of 15% leading to a yield loss of 25 to 30%.





As it is a major problem faced by farmers, an OFT on Phytophthora foot rot disease management of pepper was conducted in 5 farmers' fields of 0.2ha each at Bela, Neerchal, Munjiakana and Badiadka during 2008-10 and subsequently in 2012-14 at Ullody and Kallar panchayats of Kasaragod district. With the active participation of farmers, three technological interventions were carried out in fields and farmer's practice was taken as control. Of these treatments, the intervention with pre- and post monsoon spray with 1% Bordeaux mixture and application of *Trichoderma harzianum* enriched neem cake gave good results with checking the further spread of disease incidence, increasing the vigour/ health of pepper vines and yield increase. This technology was further promoted among the farming community through



the programmes undertaken by the Kerala state department of agricultural development and farmers' welfare.

### Bioagents for phytophthora diseases pay rich dividends for pepper farmers

K.M. George, a sixty five year old progressive farmer, had been cultivating coconut, arecanut, pepper, banana, tuber crops and rubber in his two and a half acres at Odayamchal near Rajapuram. He has been practicing bio fertilizer management in his fields for a long time and getting an average yield from all crops. When suddenly faced with foot rot/quick wilt disease incidence in his pepper gardens during 2012, he approached Kallar Krishibhavan. In the ensuing field survey, it turned out that many other farmers in the panchayat were also facing the same problem

after the heavy monsoon showers. Based on the information gathered from the Krishibhavan, KVK conducted a group meeting of farmers and selected five farmers from various villages, for conducting an OFT on "Phytophthora foot rot disease management of pepper" for testing the efficacy of bio agents and chemicals along with the general recommended practice for checking the spread of the disease, with emphasis on the use of bio agents as Kasaragod is declared as an organic district.

Shri George was one of the farmers selected for this programme. The different interventions carried out in the field were spray with 1% Bordeaux Mixture + drench with 0.2% Copper Oxy Chloride, spray with



0.3% potassium phosphonate + soil application of *Pseudomonas fluorescens* and spray with 1% Bordeaux mixture + *Trichoderma harzianum* during pre- and post-monsoon periods, with supplement of organic manures available from his own farm. Out of these treatments tried, the intervention with pre- and post-monsoon spray with 1% BM + *Trichoderma harzianum* gave good results with checking the further spread of disease incidence, increasing the vigour/ health of pepper vines and increase in yield with an average yield of 4.5q from 700 pepper vines.

Since then, he is practicing this technology and there is no foot rot disease incidence in his pepper garden and the yield has increased to 5q now. He

also passes on the message of his own experience to his fellow farmers, encouraging them to do so. He has also started a pepper nursery, Haritha Pepper Nursery, with financial assistance from SHM-Kerala. He is using the bio agents, *Trichoderma harzianum* and *Pseudomonas fluorescens*, along with the potting mixture since 2014. He sold 80,000 disease free rooted pepper cuttings to farmers and developmental agencies and earned Rs. 6,00,000/- during 2016-2017. Shri George was conferred with many awards like the “Best Farmer of Kallar Panchayat” during 2014, “Kathir Karshaka Sree” award during 2015 and “Akshaya” award of Sarojini Damodaran Foundation, Alappuzha for the Best organic farmer of Kasaragod district in 2017.



## Varietal evaluation

Performance evaluation of fodder grass varieties as inter crop in coconut garden:

This OFT was conducted in an area of two ha in three farmers' plots at Kinanoor Karindalam panchayat. Three fodder grass varieties - Thumburmuzhy-1, Australian Napier, and Hybrid Bajra Napier (CO-5) - were introduced in coconut gardens as intercrops. All the varieties performed well and an average fodder yield of 148.3 t/ha, 117.4 t/ha and 95.5 t/ha obtained from Hybrid Bajra Napier CO-5, Thumburmuzhy-1 and Australian Napier, respectively. Fodder grass variety, CO-5, performed well in terms of yield and average management practices



### With the integration of fodder cultivation, dairy enterprise is no longer a loss-making proposition for Moidu Haji

Sri. Moidu Haji is an integrated farmer belonging to Uppilikkai village of Nileswar panchayath. He owns three acres of land where he follows integrated farming system in two acres with coconut as main crop and banana & pine apple as subsidiary crops. In one acre, he cultivates arecanut as main crop and banana as intercrop. He also owns two milking cows, but he was not cultivating fodder grass as intercrop. As feed is the major input component in dairy farming, accounting for 55-60 per cent of the total cost of milk production, judicious feeding comprising

green fodder along with concentrate feed is the most important pillar of remunerative dairying. Other than concentrate feed, he was purchasing paddy straw from outside at high cost and hence, dairy enterprise was not profitable in his opinion.

During an agricultural seminar conducted at Kanhangad, he came to know about the different varieties of fodder grass and he contacted KVK to know about the cultivation technology and availability of these varieties. At KVK, he was familiarized with the planting methods of different varieties of fodder grass and was provided with stem cuttings, 50 each, of five fodder grass varieties (Co3, Co 4, Co 5, Australian Napier and Thumburmuzhi). This was enough for taking up planting in 2.5 cents of land.



After one year, he could expand fodder grass in 25 cents of land. Now he is able to cut fodder grass on a daily basis since he had given sufficient interval between planting time in each plot.

Through this intervention of KVK, he could restrict the use of paddy straw to 25% and save around Rs.25,000/- towards the purchase of the same. Further, the milk yield was also improved with better quality and he fetches better price for milk after the introduction of enough green fodder in feed.



**Evaluation of upland rice varieties:** An on farm trial on upland rice varieties was laid out in 5 farmers' plots of one acre area in Pallikere panchayat for testing suitability of two promising upland rice varieties released by KAU, Samyuktha and Vaisakh, along with the local variety, Vellathovan, as control. The results showed that the variety Vaisakh performed better by yielding 3.2 t/ha followed by Samyuktha @ 2.8 t/ha and Vellathovan @ 2.1 t/ha. Based on these results, Vaisakh is recommended for cultivation under upland conditions.

**Vyttila 6 - A high yielding salt tolerant rice variety:** To find out a suitable a high yielding salt tolerant rice variety, an on farm trial was conducted at Cheruvathur panchayath. Two salt tolerant rice varieties released by KAU - Vyttila 6 and Ezhome 2 - were tested against the local type, Orkayama. The results showed that the tested variety Vyttila 6 performed better with a recorded yield of 4.8 t/ha whereas, Ezhome 2 yielded 3.8 t/ha as against 2.3 t/ha from Orkayama.

**Evaluation of high yielding varieties of sweet potato as mono crop:** Sweet potato is widely grown in Kanhangad area of the district. Generally, the local variety, Kanhangad Local, is widely cultivated. The yield of sweet potato was generally found low in rice fallows and hence the high yielding varieties were tried. The sweet potato slips of three varieties - Sree Arun, Sree Varun and Sree Bhadra - were procured from ICAR-CTCRI, Thiruvananthapuram and evaluated in 10 farmers' fields at Ajanur village in an area of 0.4ha.

Results showed that the production per unit area of Sree Arun was 15.6 t/ha, Sree Varun 17.2 t/ha and Sree Bhadra yielded 18.3 t/ha as against control (Kanhangad Local) (18.0t/ha). The size of the tubers of Sree Bhadra variety was big and preferable for marketing, whereas Sree Arun and Sree Varun were tapering type. Amongst the high yielding varieties, Sree Bhadra was preferable, but the farmers opined that the local variety is good for higher yield and market price.



## Evaluation of high yielding varieties of tapioca as crop rotation in rice fallows:

Tapioca is the main staple tuber crop of Kerala. As no second crop is raised by majority of the farmers after paddy and left fallow, this trial was introduced



to study the economic viability of raising high yielding varieties of tapioca procured from ICAR-CTCRI. Three high yielding varieties - Sree Prabha, Sree Jaya and Sree Vijaya – were evaluated in six farmers' fields (60 cents) in Chemnad area.

The results showed that among the three varieties, Sree Jaya performed better with 36.2 t/ha followed by Sree Vijaya (31.3 t/ha) and Sree Prabha (23.8 t/ha). The feedback from the farmers was that these short duration tapioca varieties can be profitably taken up in rice fallows as a second crop for getting additional income from rice fields.

## A brief summary of other OFT programmes undertaken by the KVK

This Kendra also conducted various other on-farm trials to solve the location- specific issues faced by the farmers with regard to various farming situations and other issues related to crops. The results of these OFTs conducted are enumerated here.

### Other crop production technologies assessed through OFTs

- Contour bunds and filter strips with pineapple and vetiver found to be effective in controlling soil erosion as well as increasing water table.
- Husk burial and planting fodder grass found to be effective for moisture conservation as well as increasing fodder and main crop yield in coconut intercropping.
- Application of recommended fertilizer dose + root feeding of coconut tonic (200ml) diluted with water @ 1:4 proportions (TNAU technology) found to be effective for maintaining health of coconut palms, resulting in an increase in yield (7nuts/palm/year).
- Scented rice variety, Pusa Sugandh-1, is found to be suitable for growing in Kasaragod district and recorded a yield of 5.5 t/ha.



- In the OFT on assessment of PGPR mix-2 in amaranthus cultivation carried out in 5 farmers' fields (2 ha) at Thaikadappuram, Ozhinjalappu and Nileswaram, a considerable increase in vegetative growth of amaranthus was observed (BCR 2.15), while no incidence of *Cercospora* leaf spot was seen.



### Other crop protection technologies validated through OFTs

- Leaf axil filling of naphthalene balls @ 10.5 g per palm was effective for the control of rhinoceros beetle in coconut with a reduction in pest incidence from 66.21% to 16.7% and at the same time eco-friendly.
- Pheromone traps were found to be suitable/effective as one of the component technology under IPM in coconut for the management of rhinoceros beetle. On an average, 113 beetles were trapped per trap in a year, resulting in a reduction of infestation from 72% to 26%.
- Bordeaux Mixture spray @ 1% followed by polythene covering of bunches was more effective in the control of mahali disease in arecanut, but labour intensive. However, 1% Bordeaux mixture spray (three times at an interval of 40-50 days) was also effective against the disease with 90% control.
- Spraying of Zineb (Dithane Z 78) @ 4g/l twice at 25 days interval found to be effective with 80.2% fruit set for the control of inflorescence die back disease in arecanut.
- An integrated approach with prompt disposal of affected fruits, trapping of adult flies using banana and tulasi traps and need-based sprays of malathion @ 2ml/l was found to be effective against fruit flies in bitter gourd with only 8% pest incidence, as against 12% in farmers' practice.
- An OFT on management of Sigatoka leaf spot disease in banana indicated that disease incidence can be brought down considerably (0-10) by spraying with the bioagent, *Pseudomonas fluorescens* (2%) with a BCR of 1.91.
- The banana variety Grant-Naine was found to be tolerant to pseudostem weevil attack with no incidence whereas the incidence recorded in Nendran variety was 26% and hence suitable for growing in areas with high incidence of pseudo-stem weevil attack.



- Spraying the foliage and drenching the basins with Potassium phosphonate (Akomin) @ 4 ml in one litre of water twice at an interval of 45 days starting from the onset of monsoon as well as basal application of bio-control inoculum *Trichoderma harzianum* @ 50g/plant mixed with 1 kg neem cake twice in an interval of 45 days was found to be effective for the management of quick wilt disease of pepper.



- Spraying of vermiwash @ 1:5 or 1:10 or drenching of vermiwash @ 1:5 or 1:10 or spraying of mancozeb (Dithane M-45) @ 3g/lit are found to be effective for preventing the occurrence of leaf spot disease in amaranthus.
- Results of the OFT on management of Fusarium wilt disease of cowpea showed that disease incidence in cowpea treated with *Trichoderma* (seed treatment) + soil application of *Trichoderma*

enriched neem cake + spray and drench with 2% *Pseudomonas fluorescens* was much effective with a BCR of 2.84.

- Under the OFT on management of shoot and fruit borer in brinjal, the efficacy of two bio control agents, *Bacillus thuringiensis* and the parasitoid, *Trichogramma chelonis*, were assessed. The variety tested was Haritha. The technology options



were application of Bt as soon as the moths are observed or two weeks after transplanting on need basis and release of the parasitoid at fortnightly intervals @ 4cc tricocards per acre. The use of tricocards was found to be the best option with pest incidence reduced from 23% to 8% whereas in Bt application, it was 26% to 14%. In farmers' practice, the pest incidence was 40%.

- An on farm trial on Phytophthora foot rot disease management of black pepper conducted in arecanut based pepper gardens indicated that the treatment - *Trichoderma harzianum* basal application + *Pseudomonas fluorescens* spray



and *Trichoderma harzianum* basal application + 1% Bordeaux mixture spray - completely controlled foot rot disease incidence. Pepper vines treated twice with Potassium phosphonate (spraying and drenching) showed 10% disease incidence, when compared to 30% disease incidence in farmers' practice.

- The role of biocontrol agents on the growth and performance of ginger was tested in farmers' fields of W. Eleri and Bedakam panchayats in an area of 3 ha with three technology options - soil application of *Trichoderma* alone as FP (T1), seed treatment + soil drenching with 'Seedpro'



developed by IHR twice at monthly intervals (T2) and Basal application of *Trichoderma* + soil drenching with *Pseudomonas fluorescens* twice at monthly intervals (T3). The results showed that 'Seedpro' performed well with better growth characters, less disease, pest incidence and high yield (12.16 t/ha).

- An on farm trial on micronutrient management in black pepper conducted in arecanut based pepper gardens indicated that spraying IISR Micronutrient mixture @ of 5g/L along with other management practices recorded highest yield, ie., 875.420 kg/ha. Farmers were of the opinion that



the health and vigour of pepper vines improved along with a slight increase in the berry weight when treated with IISR micronutrient.

In brief, a total of 324 on farm trials were conducted during 1997 to 2017 to address severe problems faced by majority of farmers in the district in the field of agriculture and allied activities by converting suitable technologies into production accomplishment in a given situation. These trials were conducted in an area of 209 ha covering 38 villages of the district. The above trials helped the farming community to adapt their crop production and marketing strategies to the rapidly changing social and economic conditions, so that they can in the long run shape their lives according to their farming requirements.





## FRONT LINE DEMONSTRATIONS: SEEING IS BELIEVING

The Indian Council of Agricultural Research (ICAR) evolved a new concept of field demonstrations called Front Line Demonstrations (FLD) during mid-eighties to show the performance of new varieties including recommended production technologies on farmers' fields under real farm conditions for increasing productivity and higher farm returns. Having seen the convincing results of these demonstrations in the country, the ICAR introduced FLD programme as one of the mandated activities of Krishi Vigyan Kendras (KVKs) in the country since 1998.

The field demonstrations conducted under the close supervision of the scientists are called front line demonstrations because the technologies are demonstrated for the first time by the scientists themselves before being fed into the main extension system of the State Department of Agriculture. A minimum of 2 hectares of land at a stretch is the pre-requisite for conducting these demonstrations to show the impact of the demonstrated technologies.

**Objective:** The main objective of an FLD is to demonstrate newly released varieties, crop production and protection technologies in the farmers' fields under different agro-climatic regions and farming situations.

**Special features:** The FLDs are different from the normal demonstrations being conducted by the extension functionaries. The special features of FLDs are:

- FLDs are conducted by the scientists of the National Agricultural Research System comprising of ICAR Institutes, National Research Centres, Project Directorates, Krishi Vigyan Kendras and State Agricultural Universities and its Regional stations.
- Newly released technologies or those likely to be released in the near future are selected for the FLDs.
- FLDs are organized in a block involving all those farmers whose plots fall in that block.
- Only critical inputs and training are provided from the scheme budget and the remaining inputs are contributed by the farmers themselves.
- Training of the farmers who associate with the FLDs is a pre-requisite.
- The largest audience of FLDs is both farmers and the extension personnel as the purpose is to convince them about the potentials of new technologies and disseminate them in a wider scale.
- FLDs are used as a source of generating data/factors contributing towards higher crop yields and constraints in production under various farming situations.



**Target farmers:** The target farmers were selected by the KVK faculty in consultation with Agricultural Officers, Agricultural Assistants, Panchayat Presidents, Panchayat members and local leaders for successful conduct of the demonstrations. The farmers who volunteer and enjoy the confidence of their neighbours are selected as target farmers. Due care is also taken to select the farmers representing all categories like large, medium, small and marginal including the underprivileged sections.

### **Technologies demonstrated in Kasaragod district**

FLDs are being carried out by KVK systematically enunciating the cardinal precept of 'seeing is believing'. For conducting these demonstrations, KVK has to adopt certain steps such as situation analysis through a combination of data collection tools and techniques, selection of proven technologies superior to the practices being already in use by the farmers, selection of suitable demonstration sites and farmers of all categories, planning and timely arrangement of critical inputs, guiding the farmers for laying out the demonstrations, recording of observations, follow-up during and after demonstrations, writing of technical report and popularization of demonstrated technologies.

Based on the felt needs and problems of the farmers of the selected villages as well as prevailing farming situations, high yielding varieties of crops were selected and suitable technologies were integrated. Some selected interventions are showcased in the

following pages for a better understanding of this most important mandate.

### **Varieties and technologies demonstrated under paddy**

Paddy is a major crop cultivated in the district in an area of 2665 ha, covering all the three crop seasons and across all categories of farmers comprising large, medium, small and marginal. Before the commencement of the FLD, farmers were cultivating traditional varieties like Khayame, Kunhu-Kunhu and Vellathoovan and improved varieties such as Jaya and Jyothi. The area under paddy was declining drastically due to high cost of production and lesser returns and small and marginal farmers were finding it difficult to continue cultivation. Hence, it was felt that introducing high yielding paddy varieties with improved package of practices was the need of the hour.

As a prelude to implementing the programme, a preliminary survey was made in the selected villages to collect the primary and secondary data about these villages. Then, a series of activities like group discussions, direct observations, informal interviews with key informants etc., were organized which facilitated actual involvement of farmers in the programme. Participatory Rural Appraisal (PRA) techniques were employed in each selected village to understand the constraints faced by farmers. With this exercise, the general information about the village, socio-economic status, problems and prospects regarding cultivation were identified.



## New paddy varieties introduced

Based on the felt needs and problems of the farmers of selected villages, high yielding varieties of paddy such as Kanchana, Aathira, Aiswarya, Karuna, Harsha, Pratyasa and Vaishak were selected based on their suitability to the selected villages especially during Rabi season. Altogether 230 demonstrations were

conducted during 1998-1999 to 2016-2017 in nine selected villages (Cheralu-Bayar, Pathur, Perumbala, Shen, Pullur, Kayyur, Perumbala, Kunjathur and Chengala) to show the field performance of high yielding varieties of paddy as compared with the farmers' grown varieties. While conducting demonstrations, production potential of high yielding paddy varieties was given major thrust.

## Characteristic features of the rice varieties

### Kanchana (PTB 50)

- Cross between IR36 and Pavizhom
- Long bold grain with red colour
- Short duration (105-110 days)
- Resistant to blast, blight, stem borer and gall midge
- Suitable for all seasons
- Potential yield up to 5.5t/ha. Grain and 4.0 t/ha. straw



### Aathira (PTB 51)

- Cross between BR 51 and Culture 23332-2
- Short, bold grain with red colour
- Medium duration (120-130 days), semi tall, non lodging photo
- Moderately resistant to diseases like blast and sheath blight
- Suitable for first and second crop seasons and hilly tracts
- Potential yield up to 5.5 t/ha and 6.0 t/ha straw



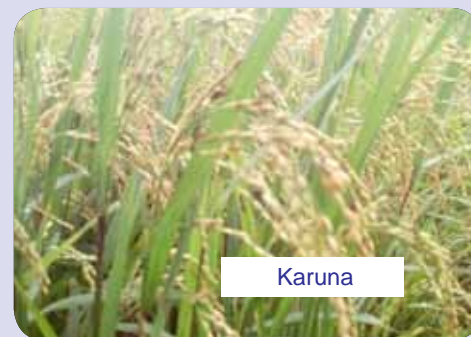
### Aiswarya (PTB 52)

- Cross between BR 51 and Jyothi photo
- Long, bold grain with red colour
- Medium duration (120-125 days)
- Resistant to diseases like blast, blight and BPH
- Suitable for first and second crop seasons
- Yield ranges between 5.5 – 6.0 t/ha and 6.0 – 6.5 t/ha straw



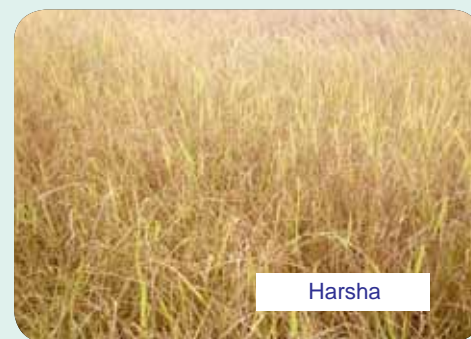
### Karuna (PTB 54)

- Cross between Co 25 and H4
- Long bold grain with red colour
- Long duration (140-145 days)
- Tall, multiple resistant, tolerant to iron toxicity
- Susceptible to brown spot
- Specific to second crop season
- Yield ranges between 4.5 – 5.0 t/ha and 7.0 – 8.0 t/ha straw'



### Harsha (PTB-55)

- Cross between M 210 and PTB 28
- Long, bold grain with red colour
- Short duration (105-110 days)
- Suitable for direct seeding in rainfed low lands
- Moderate resistance to blast and moisture stress
- Yield ranges between 4.5-5.0t/ha grain and 4.5 t/ha straw



### Pratyasa (MO 21)

- Red, long and bold grain
- Duration of 100-110 days
- Non-lodging, Photo-insensitive
- Semi tall variety
- Moderately resistant to gall midge, BPH, sheath blight and sheath rot.



Pratyasa

### Vaisakh (PTB 60)

- Duration of 117-125 days
- Red, short and bold grain
- Suitable for direct seeding during Khariff season in uplands
- Tolerant to moisture stress
- Resistant to blue beetle
- Moderately resistant to stem borer and whorl maggot.



Vaisakh

The results indicated that in Cheralu-Bayar village, Aathira yielded 5.2 t/ha as compared to Kanchana (5.1 t/ha) and Aiswarya (4.6 t/ha) significantly higher than the local variety, Khayama (3.0 t/ha.). In Pathur village, Aiswarya performed well in respect of both grain (4.8 t/ha) and straw yield (4.6 t/ha) as compared to the local variety (1.7 t/ha grain and 4.2 t/ha straw). The results clearly indicated that the introduction of Aiswarya helped in enhancement of paddy production

in this village. In Perumbala, Karuna variety performed well with the grain and straw yield of 4.8 t/ha and 5.4 t/ha. In fact, this village is having more water logged paddy fields, and Karuna performed better and hence this variety was widely accepted in the village.

In Shenry village, the results indicated that Aathira gave higher grain yield (5.5 t/ha). In Pullur village, where around 80% of the paddy cultivation is in low



lands, Karuna performed well with an yield of 5.3 t/ha grain and 5.8 t/ha straw. In Kayyur village, the results indicated that Harsha performed better by yielding 5.2 t/ha grain and 4.5 t/ha straw as compared to Aathira (4.2 t/ha. grain and 4.0 t/ha. straw). In Kunjathur and Chengala villages, the high yielding variety, Pratyasa, was introduced very successfully with a grain yield of 4.7 t/ha and 6.6 t/ha, respectively. In Panayal village, the high yielding variety, Vaisakh, was found suitable for upland cultivation with a grain yield of 3.2 t/ha and straw yield of 2.9 t/ha.

Overall, all the high yielding paddy varieties introduced in the villages performed better with the grain yield ranging between 4.6 – 6.6 t/ha and 3.8- 5.4 t/ha straw as compared to farmers' practice (1.7 – 4.4 t/ha grain and 3.2 – 5.0 t/ha straw yield). In fact, all partner farmers managed the demonstrations properly, which was evident from the yield difference between high yielding varieties and farmers' practice. This clearly indicated that besides varieties, crop management practices also played an important role in obtaining higher yield. Hence, it is proved that the adoption of high yielding varieties along with the recommended package of practices is very much essential to get optimum yield.

## Technologies demonstrated under paddy cultivation

### Leaf Colour Charts (LCC) for optimizing nitrogen nutrition in paddy

This technology developed by TNAU, Coimbatore, facilitating need-based nitrogen application based on

leaf colour chart values, was introduced in Kasaragod district for the first time during 2005-2006. The demonstrations were conducted in two hectare area of paddy belonging to 17 farmers of Perumbala village in Chemnad panchayat with recommended fertilizer application in one hectare (one third dose of nitrogen as basal application, one third during tillering stage and the rest during panicle initiation stage) and one third basal application of nitrogen and thereafter LCC value based top dressing in another hectare area. The demonstrations were conducted in paddy fields where a high yielding variety, Uma (MO16), was cultivated.

LCC values were observed from 20 days after planting (DAP) till heading stage at an interval of 15 days. If the average plot value was less than the set critical value fixed (value 4), top dressing @ 20 kg Nitrogen per hectare was applied in the demonstration plots. Observations recorded showed that LCC values were either at par with block 4 or between block 4 and block 5 and hence there was no requirement of Nitrogen top



dressings other than basal application. The number of productive tillers was found to be 9-19 in plots where fertilizers were applied as per recommendation where as the number of tillers was 8-18 in LCC based fertilizer applied plots.

In plots where fertilizers were applied as per recommendation, incidence of case worm, leaf roller, stem borer as well as blast disease were at economic injury level demanding proper control measures. In LCC based plots, case worms and leaf rollers were controlled by suitable insecticidal application, but stem borer attack was below economic threshold level and blast disease was not recorded. The grain yield was 5.8 t/ha in LCC plots where as it was 5.1 t/ha in normally fertilized plots and the straw yield was 6.6 and 5.4 t/ha, respectively.

Based on the better performance of the technology, State Department of Agriculture included this technology in the demonstrations on crop health management conducted by them in the ensuing years.

### Management of major lepidopteran pests of paddy using biocontrol agents

The major pests of paddy reported during all crop seasons are two lepidopteran pests – leaf folder (*Cnaphalocrocis medinalis* Guenee) and stem borer (*Scirpophaga incertulus* Walker) - inflicting a loss in yield to the tune of 25-30%. Farmers were resorting to injudicious method of insecticidal application to manage these pests without any concerns on the environmental hazards or residual toxicity of the

harvested product. As a matter of fact, these farmers was unaware of the alternative and highly effective bio-control measures available for the management of these pests. Stemming from this realization, this technology was introduced in an area of 4 hectares of paddy at Kozhunthil padasekharam belonging to Nileswar panchayath during 2005-2006. In the demonstration plots, a high yielding variety, Karuna and a local variety, Aricklai, were cultivated in two hectare area each.

A total of 19 demonstrations were conducted by introducing trichocards. Trichocards bearing *Corcyra* eggs parasitized with *Trichogramma chelonis* and *T. japonicum* were procured from State Bio-control Laboratory (SBCL), Thrissur for release at fixed intervals. Trichocards @ 20 cc were used for each release for a total area of 4 hectares, of which 10cc were *T. chelonis* and 10 cc were *T. japonicum* and the cards were installed six times at weekly intervals.



After three weeks (after third release), the leaf damage in the local variety had come down to 12% from 22 % and in Karuna, it was below 8% and below economic threshold level thereafter. The incidence of stem borer at vegetative phase was negligible and it was less than 3% during earhead stage. The grain and straw yields of Karuna variety of paddy in demonstration plots were 5.6 and 6.2 t/ha, where as in control plots it was 4.7 and 5.8 t/ha, respectively. The grain and straw yield of local variety in demonstration plot were 3.2 and 4.9 t/ha, where as in check plots it was 2.4 and 4.3 t/ha, respectively.

Release of bio control agents, *T. chelonis* and *T. japonicum*, against paddy leaf folder and stem borers was found to be highly effective and at the same time cost-effective in the rice ecosystem of Kasaragod district. The farmers as well as Agriculture Department officials were convinced of the merits of this technology in terms of high yield, safe produce and environmental benefits. The effectiveness of the technology was popularized among the farming community through news paper coverage and television programmes, which helped in wide dissemination of this technology among farmers throughout the district.

### **Mechanization: The journey from country plough to combine harvester**

The area under paddy cultivation in the district showed a significant declining trend from 1980s to 2010. This reduction in cultivated area was attributed to low profitability as the main reason on account of increased

cost of production, shortage of labour and ergonomic issues. Acute shortage of workforce is attributed to a variety of reasons, especially migration of the rural youth to other attractive occupations due to drudgery and social issues. It is in this context that the KVK introduced various machineries reducing drudgery, cost and time of cultivation as well as manpower requirement resulting in increased profitability. The introduction of mechanization was highly appreciated by the farming community and department officials, making a rapid stride towards fully mechanized rice cultivation.

Mechanization in paddy cultivation is being implemented in Kasaragod district by introducing tractor operated disc plough for land preparation, drum seeder for seeding of pre germinated paddy seeds, harvesting by vertical conveyor reapers and thresher cum winnower for removal of paddy from straw since 2011-12. Four training programmes on farm mechanization were conducted with the participation of 95 farmers, besides five seminars and demonstration of equipments with the participation of 285 farmers. The fact that about 90 drum seeders for paddy were sold by various agencies during the last five years (up to 2017) itself is a reflection of its popularity and the good impact it has created.

Demonstration of mechanized paddy transplanting was successfully carried out in the district during 2014-15 in 6 farmers' fields for preparation of mat nursery, use of transplanters etc. Two training programmes on operation and maintenance of farm machinery







like drum seeder, conoweeder, paddy transplanter, vertical conveyor reaper, thresher cum winnower was conducted in which 33 farmers participated. The mechanized paddy transplanting in the district got a fillip during this period due to the field demonstrations and the formation of a paddy task force by KVK by providing skill development training to farmers and rural youth who later on took the mantle of carrying

forward this revolution in mechanized transplanting.

Subsequently, the combine harvester for paddy was introduced in the district by KVK during 2016-17. With the introduction of combine harvester, a complete package for mechanization is now available from land preparation by tractor operated machinery, direct seeding by pre germinated paddy seeder, transplanting



by riding type and walk behind type transplanters to harvesting by combine harvester which saves considerable time and reduces cost of cultivation. Also the issue of non availability of manpower for critical operations in paddy cultivation is now completely solved by the introduction of various machineries. The cost of cultivation of paddy was also reduced by 25 percent by the introduction of mechanized cultivation.

Now, more than 300 farmers are using various machineries like tillage implements, drum seeders, transplanters, cono weeders, thresher cum winnowers and combine harvesters for paddy cultivation in the district. KVK pioneered the mechanization initiatives in the district and a considerable extent of awareness



could be created by the combined efforts of KVK, ATMA and Dept of Agriculture Development and Farmers Welfare. At present, more than 20 ha of paddy fallows

were brought under cultivation directly by KVK using the machinery and around 300 ha in the district has come under fully mechanized rice cultivation.

### Rejuvenating paddy fallows for sustainable livelihoods for rural youth: A KVK initiative

The Government of Kerala is striving to increase the cultivated area under rice from the present 1.97 lakh ha to 3 lakh ha as a vital step in achieving food security in Kerala. The KVK has made a very innovative intervention as part of its demonstration programme and was able to rejuvenate 40 acres of paddy fields which was kept fallow for 20 years by Kotachery Pattare Devasthanam in Ajanur panchayat. The paddy fields kept as fallows for many years pose severe



problems like hardening of soil, heavy weed growth, stumps and bushy growth which make it difficult to cultivate without proper implements. KVK introduced



the disc plough to cut the soil deep and turn it upside down so that the weeds are totally covered under the soil leading to its decay and adding sufficient organic matter to soil. Then the soil was puddled using a helical blade puddler (developed by KAU and manufactured by Steel Industries Ltd) which thoroughly ploughs the soil and further pushes the weeds deep up to 30 cm, arresting any further weed growth. This also helps to destroy or reduce many pest as well as disease incidence in the subsequent crops.

### A mechanization strategy developed to increase the number of crops per year

The land preparation is presently carried out using cage wheels attached to tractor which can only be done after the required water table is developed. Hence, a new mechanization strategy had to be developed to effectively reduce the time requirements for land preparation which otherwise extends up to July end. The new policy was to promote primary tillage during

the period from March to May by using disc plough. Disc plough is capable of penetrating into very hard soils even with stones or stumps. Through this operation, tractor which is unutilized during these months could be used to plough all the paddy fields to be prepared for cultivation immediately on the onset of monsoon. Since the primary tillage makes a lot of ridges and furrows as well as loosens soil, all the rain water gets infiltrated which in turn raises the ground water table very fast. The subsequent puddling is to be carried out by using helical blade puddler which requires very less time only (usually 1/3rd) since the primary tillage is already completed during the summer months itself. Hence, the sowing or transplanting generally done during July can be advanced to June, saving 15 to 30 days for land preparation. By adopting this strategy, two crops could be taken up in those areas where only one crop is taken at present and employment could be generated round the year and rural youth can be attracted and retained in the mechanization sector for a sustainable livelihood.

### Customizing mechanization for upland paddy comes to the help of Shri Gangadhara Bhat

Shri. Gangadhara Bhat, Mallam, Muliyar panchayath cultivates rice in 5 acres of land. His field, being in upland platforms, it is difficult to take heavy planting machinery there and the crop is taken up only during rainy season. After attending a training programme on use of agro-machinery for paddy mechanization

by KVK, he was impressed by the cost savings in using various machineries and contacted the KVK for the same. His farm being made into terraces and small holdings, it was recommended to use small machinery for paddy mechanization which comprise of power tiller for land preparation, pre germinated paddy seeder for sowing, conoweeder for weed control, vertical conveyor reaper for harvesting and thresher cum winnower for threshing and winnowing. He hires the pre-germinated paddy seeder from





KVK for sowing and found the machine to be highly effective and reducing the cost of cultivation on account of labour saving. Earlier, he used to do

manual transplanting for which lot of expenditure was involved. Once he used the seeder machine, he observed that the seed rate required was only less than half of that in the routine broadcasting. The seeding was done in a line and this facilitated the use of conoweeder which reduced the labour requirement for weeding. Tilling was also found to be more and the lodging was also observed to be very less, thereby increasing the yield. The management was also easy for manuring and pesticide applications. He is now an enthusiastic proponent of the small scale paddy mechanization with pre-germinated paddy seeder and conoweeder especially for use in small holding paddy lands for reducing the labour, timely sowing, easy management and better profits.

### Shri K.N. Sunil is now the 'Captain' of the 'Paddy Task Force'

Shri K.N. Sunil aged 34, Kemmangay House, Edaneer was an unemployed rural youth till 2011. When he came to know about a training programme organised by KVK through a newspaper advertisement, he registered with the KVK for the programme and participated in the training. The KVK provided extensive training on use of machinery for the paddy mechanization and its maintenance. He was further sent to KVK-Palakkad to undergo advanced training in rice transplanting machinery. Meanwhile, an agro service centre was started in Kanhangad block

and he was selected as machinery operator there, based on his expertise that he gained through KVK training programme. Since then, he never had to look back and is now earning handsome perks as a part of the paddy task force. Moreover, his sincerity and hard working nature made him very popular among the farmers as they could finish the mat nursery preparation and transplanting operation in a time-bound manner. Now, he could effectively handle machineries like power tiller, transplanter, conoweeder, vertical conveyor reaper and thresher cum winnower, by which he could get almost round the year employment. He has further trained the other labourers associated with the unit and helped in setting up a good paddy task





force under Kanhangad block. At present, he is heading the team and is covering approximately 200 acres every year which has given a fillip to mechanized paddy cultivation in the district. He is a role model for the rural youth with his service attitude, polite dealings with the farmers, timely completion of work, sincerity and dedication. His sincere efforts were covered in a lot of press and media reports also. He has become a torch-bearer of KVK efforts in changing the agricultural scenario of the district.

## Integrating apiculture and meliponiculture in coconut homesteads for enhanced pollination and better yields

Coconut, *Cocos nucifera*, is a major crop of Kerala, occupying each and every homesteads in the state. In India, coconut is grown in an area of 1.90 million hectares with Kerala accounting for 7.81 lakh hectares, covering 38 per cent of the net cropped area of the state, whereas the average productivity of the crop in the state do not compare favourably with the neighbouring states. Poor management of coconut gardens is the main reason for this low productivity. Proper management practices like scientific nutrient

and water management, timely adoption of safe plant protection measures and establishment of bee colonies could help to enhance the production and productivity of coconut to expected levels.

In Kasaragod district, coconut is cultivated in an area of 61,836 hectares. At the minimum requirement of 5 colonies per hectare, there is a need for 3.10 lakhs colonies which is much higher than the existing colonies (0.6 lakh). Hence, creating awareness supported by technical know-how for wide-spread dissemination of bee keeping enterprise will not only add to the production of honey and other hive products, but also contribute immensely to the productivity of coconut. Hence, KVK conducted FLDs on "Integration



of Apiculture and Meliponiculture in Coconut based Homesteads” during 2012-2017 to convince farmers of the importance of integrating these allied enterprises ensuring enhanced pollination and resultant yield enhancement in coconut and cucurbits. Further, KVK plays a significant role in promoting bee keeping as an allied enterprise in coconut homesteads and orchards by organizing training programmes, National and state level workshops, honey fests, seminars etc.

### Coconut inflorescence and pollination biology

The coconut palm, being monoecious, produces both the female and male flowers on the same inflorescence (spadix). Generally, male flowers are the first to open and the duration of the male phase is about 18 to 22 days. Female phase lasts for about 5 to 7 days. In tall coconut palms, generally male and female phases do not coincide, that means there is a distinct gap between the shedding of last male flower and the female flowers becoming receptive leading to cross pollination and fruit set. In dwarf palms, the time interval between the two phases is nil or negligible promoting self pollination.

The major factors responsible for pollination in coconut are insects such as different species of honey bees, ants, wasps etc., though wind pollination is also an important factor in coconut. Studies revealed that 30 different species of insects visit the inflorescence and out of these, honey bees dominate. When compared to other insects, honey bees have high floral constancy making them the most efficient pollinators. They visit the inflorescence repeatedly and maximum bee visit

was recorded during 8.00 – 10.00 hours. It was also observed that among the different species of honey bees, Indian bee, *Apis cerana indica* and stingless bees (*Trigona iridipennis*) are the prime visitors ensuring pollination. The hard working nature of honey bees and abundance of pollen in coconut ensures high rate of pollination in coconut palm.



### Establishing bee colonies in coconut gardens

Honey bee colonies undergo three different phases within a year namely brood rearing season (August – December), honey flow season (January – May) and lean/dearth season (June – November). Coconut palm is a good source of pollen and nectar throughout the year. Maintaining colonies in coconut plantations during brood rearing season will ensure continuous supply of pollen to bees. When colonies are kept in coconut gardens and fed with artificial feed (sugar syrup), the colonies become very strong and enabled division in short periods. Six Indian bee colonies



kept at the coconut garden of KVK during July could be multiplied to 12 colonies during September and 24 in December. The colonies were fed with sugar syrup @ 250 ml per hive per week. Multiplying bee colonies in coconut plantations enhances the number of bees visiting the inflorescence, thereby improving the pollination rate and fruit set in coconut gardens. Maintaining 5 – 10 Indian bee colonies per hectare of coconut gardens is advisable to enhance pollination rate and yield in coconut palms. Bee keepers can keep bee colonies in coconut garden during brood rearing and lean seasons, get it multiplied and can migrate excess colonies to nearby rubber plantations to ensure pollination in coconut palms as well as to obtain more honey yields during honey flow season. In coconut monocropping system, honey yield would be very less compared with coconut based cropping systems.

### Sweet are the rewards: honey and money

The studies conducted at KVK campus and in farmers' gardens conclusively proved that establishment of bee colonies @ 5 colonies per hectare resulted in enhanced pollination and increased yield from coconut gardens. A total of 10 demonstrations were conducted during 2012-2015 by integrating 20 bee colonies in an area of 4 ha coconut garden belonging to ten farm families of Kodavalam village (Pullur-Periye), Baradka (Badiadka) and Puluvinchi (Kuttikkol) in Kasaragod district. The average yield of coconut increased from 52 to 64 nuts per palm and number of colonies in the demonstration plots had been increased from 20 to 79 and honey yield was on an average 7.1 kg per hive.



Farmers and extension officials were convinced about the role of honey bees in enhanced pollination and better yield from coconut.

A well pollinated coconut crop can be identified by uniform shaped nuts, well filled kernel and also by tight alignment of nuts in the bunch as observed in coconut palms near the apiary. In coconut homesteads



with vegetable cropping, establishment of stingless bee colonies resulted in more and bigger fruits in cucurbitaceous crops. During 2015-2017, stingless bee colonies (two each) were introduced to an area of one ha belonging to three homesteads of Mangalpadi

and Chemnad panchayats where cucurbitaceous vegetable crops such as cucumber and bitter gourd were being cultivated. An increase in yield to the tune of 22% and 19.5% was recorded in cucumber and bitter gourd, respectively, due to enhanced pollination.

The benefits of bee keeping extend beyond honey production and other products from beehive. It is a well known fact that about one third of the human diet is derived from insect pollinated plants and honey bees are responsible for 80% of this pollination. Honey bees are the important components of the agro-ecosystem as they provide free ecosystem services in the form of pollination which not only enhances the productivity of agricultural crops, but also helps in conservation of biological diversity through propagation of wild flora. Bee keeping as a non-land based income and employment generating activity is fast becoming a prime

component of present day strategies for integrated rural development as well as one of the remunerative components in integrated farming system. Since time immemorial, bee keeping is practiced traditionally in India. Mahatma Gandhi realized the importance of bee keeping industry and advocated development of the same towards uplifting the financial status of people living in rural areas. *“If bees disappeared off the surface of the globe, then man would have no more than four years of life left. No more bees, no more pollination, no more plants, no more animals, no more men”*, said Albert Einstein.

### Apiculture and meliponiculture ensured sustainable livelihood for Sri.Udayan

Sri.Udayan from Karadka village in Kasaragod was working as a temporary driver with the Kerala State Road Transport Corporation (KSRTC) and was finding it difficult to make both the ends meet with his monthly income. He contacted the KVK to explore the possibility of starting meliponiculture as a microenterprise as it can be initiated without additional land and for him non-availability of land was the major handicap in taking up any agri-

enterprise. He owns just 60 cents of land which is densely packed with diversified crops such as coconut palms, pepper, banana, betel leaf and different types of vegetables. So the only option for him was bee keeping that can be done with this limited land resources, without disturbing the existing farming system and at the same time it can ensure more returns from the existing cropping system through enhanced pollination.

He attended that training programme of three days duration on meliponiculture being organized by the







KVK during the ensuing period (in collaboration with National Bee Board and KAU) and surprisingly, his life took a new turn on getting exposed to this training programme. He came out from the training programme with the confidence that he can practice back home what he learnt through theoretical orientation and practical demonstrations.

Back home, he started his venture and as the first step he arranged five bee boxes of standard specifications and started hiving of natural colonies from bamboo nodes of nearby areas. At present, he is able to collect 5-7 natural colonies per week. Now there are around 300 stingless bee colonies in this

unit. He had sold around 600 colonies @ Rs.1200 per colony and around 100 kg of honey @ Rs.1500 per kg thereby earning Rs.8,70,000/- in the last three years. He also maintains around 70 Indian bee colonies in his farm. Both types of honey (honey from Indian bees and stingless bees) are marketed in the brand name 'Unique Honey' and definitely stingless bee honey is unique in terms of nutraceutical value, aroma and taste.

The most important benefit, in his opinion, is that the number and weight of coconuts in his garden has increased considerably and on an average the yield from one palm is 93 nuts per year as compared against the previous yield of 66 nuts. Further, establishment of bee colonies also resulted in more and bigger fruits in cucurbitaceous crops such as cucumber and bitter gourd cultivated in his homestead. During the year 2016-1017, the total income from agriculture and allied enterprises was Rs. 4,15,000/- (Rs.50,000 from coconut; Rs. 75,000/- from 50 kg stingless bee honey; Rs.1,80,000/- from 150 stingless bee colonies; Rs.1,20,000 /- from four quintals of Indian bee honey) where as during 2013-2014, his total income was only around Rs. 40,000/-. The economic impact is so spectacular that his success has motivated a large number of youth towards this enterprise and also serve as a demonstration unit for those who are interested in starting meliponiculture.



## Management of pseudo-stem weevil of banana using cassava bio-formulations

Banana and plantain are widely grown in India with great socio-economic significance interwoven in the cultural heritage of the country. Banana is the 4th important food crop in terms of gross value (exceeded only by paddy, wheat and milk products) and it contributes 31.72% of the total fruit production in India.

In Kerala, banana has emerged as the most important fruit crop occupying an important place both in low land and upland. Banana is cultivated in around 2879 ha area in Kasaragod district with a production of 16165 tonnes, of which the variety, Nendran, contributes 3,189 tonnes from 509 ha area.

### Banana farmers in dire straights

One of the major reasons for low productivity in banana cultivation is the occurrence of pests and among them, pseudo-stem weevil is the main concern causing considerable yield loss, to the extent of 30%. If it is not checked in time it may be up to 50 or 60%. It is the grub of the weevil that feeds on the core of the stem and causes damage to the plant. Symptoms such as exudation of gummy substance from the holes on the pseudo-stem, decaying of pseudo-stem, yellowing and withering of leaves etc. are noticed in infested plants. In severe infestation, the inner core degenerates and the plant succumbs at a much early stage than harvest.

### An institution rises to the occasion

Banana farmers were relying on highly toxic chemical pesticides for managing the major problem of pseudo-stem weevil damage. With the declaration of Kasaragod district as an organic district since 2010, the need for an eco-friendly alternative was strongly felt. As luck would have it, researchers from ICAR-CTCRI could come out with timely findings of cassava based formulations (Nanma and Menma) effective for a wide range of pest problems. Now, realizing the potential of this exciting new development, the KVK-Kasaragod undertook field trials in the area for testing/ demonstrating the efficacy of these cassava-based bio-pesticides in management, under an RKVY funded project in 2014. This technology was well received by the farming community of the district as they experienced better control of the pest using an eco-friendly, non toxic and cheap organic input derived from cassava plants.



Based on the success of the RKVY-supported project, KVK-Kasaragod undertook Front Line Demonstrations on the management of pseudo-stem weevil in banana using cassava bioformulations on a much wider scale during 2014-2017. The main aim of this FLD was to demonstrate the effectiveness of these bioformulations in managing pseudo-stem weevil in banana to the



farmers and extension functionaries with a view to reduce the time lag between technology generation and its adoption. The demonstrations were carried out in an area of 15 hectares comprising 45000 plants in West Eleri, Ajanur, Udma and Balal panchayats. The technology was further refined to tailor to the needs of an organic farming situation prevailing in the district. The technology capsule comprised of lime/dolomite application based on soil test results at the time of land preparation, application of neem cake in planting pits at the time of planting, phyto-sanitary measures, application of 'Nanma' twice at monthly interval at fourth and fifth month after planting, earthing up of soil

on the cut surface while desuckering and injection of 'Menma' only if pest incidence is observed.

### Economic and environmental impact

On adoption of the management practices, the pest incidence was negligible (out of 45,000 plants treated, pest incidence was noticed in only 171 plants). The yield obtained from demonstration plots was 33.0 t/ha as compared to 29.75 t/ha from check plot and the incidence of pest observed was just 0.38% as against 16.9% in check. The results of the demonstrations conclusively proved that this technology is feasible, viable, eco-friendly and cost-effective. The success of this programme has created good impact among the banana cultivators which is evident from the high demand of these bio-formulations not only from the district, but also from neighbouring districts as well.

Being cassava based in nature, these pesticides fit well into the scenario of organic agriculture being endorsed in the Kasaragod district. In the scenario of sudden shift from the prevalent conventional farming practices to purely organic farming, the farmers were exposed to several inadequacies in crop management, in the absence of safer and yet effective alternatives to hazardous but effective chemical pesticides. Nanma and Menma filled this vacuum to a very large extent as far as banana farmers are concerned. The overwhelming response shown by banana farmers proved its efficacy in controlling pseudostem weevil of banana – an all time menace to banana farmers.



### Facets of up-scaling technology: A case study

- During 2009-2010, an OFT was conducted on the management of Banana Pseudo-stem Weevil and found that cassava based biopesticide was effective.
- During 2012-2014, demonstrations were conducted as a part of RKVY project in Kasaragod district (along with Thiruvananthapuram and Malappuram districts) and the efficacy of cassava bio-pesticides, Nanma and Menma, was proved.
- During 2014-2017, Front Line Demonstrations (FLDs) were conducted on a larger scale and it once again confirmed the efficacy
- Farmers as well as agricultural extension officials of Kasaragod and even neighboring districts are convinced of the effectiveness of technology through Field Days and the coverage of the same in print and visual media.
- Once the technology was well accepted and appreciated by the farming community in the district, the State Department of Agriculture Development and Farmers' Welfare started up-scaling of the technology through ATMA demonstrations and all blocks in Kasaragod district conduct projects on management of BPSW using Nanma and Menma.
- KVK received the technology licence for preparation of Nanma from ICAR-CTCRI and started preparation of the same.
- As of now, more than 2000 kg of the product was prepared and sold to the farmer partners belonging to four northern districts of Kerala.
- Several success stories of farmers endorsing the efficacy of Nanma in controlling BPSW through national, local dailies, AIR and TV channels emerged leading to greater popularity and consequent demand/adoption.

### Nanma and Menma: 'A new cassava story'

The Maharaja of Travancore, Sri.Visakhom Thirunal Rama Varma, introduced tapioca (cassava) from Brazil during 19th century and popularized its cultivation in Kerala. It became so popular and commonly available that it came to be known as the poor man's meal in Travancore. Later, during World War II, Japan occupied Myanmar (Burma), from where rice was imported to Travancore and other regions, and as a result import ceased leading to severe food shortage. In

this context, the Maharaja took all steps to promote tapioca as a substitute for rice and tapioca emerged as the saviour crop when state experienced such a famine-like situation. This was when the rest of British India was reeling under severe famine. It can be safely presumed that the erstwhile Maharaja may have never dreamt that tapioca would have a different role to play in future other than its edible purpose. Two centuries later, the bio-formulations developed from cassava by ICAR-CTCRI have become credible alternatives to synthetic pesticides to manage a wide spectrum of insect pests of banana and vegetable crops.



## Demonstrations on management of fruit flies in mango and cucurbits

Mango, acclaimed as the 'King of fruits' and the 'fruit of Kings', is the leading fruit crop in India. Besides its delicious taste, excellent flavour and attractive fragrance, it is rich in vitamin A and C. India is the largest mango producing country accounting for about 65% of world production and 40% of the total fruit exports from the country. Kerala is one of the states bestowed with rich genetic diversity in mango.

Oriental fruit fly, *Bactrocera dorsalis* (Hendel) is the most destructive pest of mango occurring in homesteads of Kerala causing 25-50 per cent fruit loss when harvested at the mature ripe stage. The extent of damage may go up to 80% when the pest incidence occurs in an epidemic form. Due to this menace, fruits in most of the homesteads in Kerala are being harvested at the immature stage for pickling purpose with an intention to avoid fruit damage which manifests at maturity. Commercial growers often resort to irrational pesticide use resulting in insecticide residue in fruits and it has been reported that more than 30% of fruit samples from Kerala markets were contaminated with pesticides.

In view of the high export potential of mango for which insecticide free fruit is essential, alternative methods for the control of fruit flies were felt highly desirable and hence, an FLD on "Management of fruit flies of mango" was conducted by demonstrating integrated management of fruit flies comprising phytosanitation, trapping of fruit flies using methyl euginol traps and

application of *Beauveria bassiana* in the basins. Kerala, being unique for its homestead farming system, a safe and eco-friendly approach would only be appreciated and well accepted by farming community.

### Technology interventions from KVK

This technology was introduced in the district for the first time during 2009-2010. The demonstrations were conducted from flowering season of mango in Kerala (December-January) to the period of fruit maturity (April-May). A total of 100 demonstrations were conducted by introducing Methyl Eugenol traps to 45, 35 and 20 homesteads covering an area of 25 ha in Madhur, Mogral Puthur and Muliya panchayats at the onset of flowering along with other components.

### Tangible benefits

On an average, 120 fruit flies were trapped per trap per week, reflecting in the drastic reduction in pest population. The reduction in pest incidence was observed as 9% in demonstration plots as compared against 50% in check plots. On an average, 69 kg safe and marketable fruits was obtained from trees in demonstration plots where as the yield was only 38 kg from check plots. Popularity of any plant protection measure depends not only on the control obtained but also on the benefit derived from its use which determines the economic viability of plant protection techniques. The cost of adopting the introduced method was Rs. 600/- in one hectare of homestead, as labour cost is not involved. But in homesteads wherein spraying was adopted, it was Rs. 2500/-.





Farmers and agricultural extension officials were convinced of the suitability of this technology for the management of fruit flies being safe and cost-effective. This technology is well received by farmers, as evidenced from the great demand for methyl eugenol traps and its wide adoption throughout the district as a safe and eco-friendly pest management practice.

### Taste of success breeds more success

Following successful demonstrations on the management of fruit flies in mangoes, the same technology was introduced for the management of fruit flies of bitter gourd and snake gourd by integrating cue-lure traps as one of the components in IPM package during 2010-2012. Melon fruit fly, *Bactrocera cucurbitae* (Coquillet) is a serious pest of cucurbitaceous vegetables in Kerala. Bitter gourd (*Momordica charantia*) and snake gourd (*Trichosanthes cucurmerina*) are highly preferred hosts of the pest.

Around 26-40 % yield loss is recorded due to the attack of this most damaging pest in bitter gourd and snake gourd. A total of 30 demonstrations were conducted on the management of fruit flies in bitter gourd in an area of 7.5 ha belonging to 30 farmers of Udyavar, Kanwatheertha, Udma, Melbare and Ambalathinkara. The cue-lure traps were hung under the pandal at a height of 1.3 m from ground level @ one trap for 25 cents. On an average, 139 fruit flies were trapped per trap per week with a reduction in pest incidence from 35% to 8.6%. The yield recorded was 18.28 t/ha in demonstration plot as compared to 16.0 t/ha in check plot.



Demonstrations were also conducted on the management of fruit flies in Snake gourd in an area of 7.5 ha belonging to 30 farmers of Kootappunna, Kallyot, Mogral, Mogral Puthur and Nellikkunnu. On an average, 127 fruit flies were trapped per trap per week with a reduction in pest incidence from 40% to 7.9%. The yield recorded was 31.90 t/ha in demonstration plot as compared to 26.0 t/ha in check plot.

Farmers opined that the great advantage of this technology is that no pesticide is applied on the vegetables directly and this method ensures improved crop productivity and pesticide-free vegetables. This technology has created great impact among the homestead vegetable cultivators and commercial cultivators alike. This is one of the successful technologies introduced and promoted by KVK, and being adopted by a large number of farmers in the district.

### Management of root grubs in arecanut using an EPN aqua formulation

Arecanut is a major commercial crop grown in an area of around 19,000 ha in Kasaragod district. Among the various pests causing damage to arecanut palms, root grubs (also known as white grubs) are the major pests causing around 30% loss in yield. Among the root grubs, the genus *Leucopholis sp.* is a serious pest on arecanut and other intercrops grown under plantation system. These grubs cause extensive damage to arecanut palms by feeding on newly emerging roots and mostly prevalent in sandy loam tracts of coastal

and hilly tracts of Kasaragod district. Severely infested juvenile areca palms could be easily pulled out as most of the roots are eaten away by the grubs.

#### Siezing the opportunity

Entomo Pathogenic Nematodes (EPNs) are soil-inhabiting and lethal insect parasites proved to be the most effective bioagents of cryptic and soil insect pests like root grub (*Leucopholis sp.*). EPNs belonging to *Steinernema* and *Heterorhabditis* genus are found to be an excellent biocontrol agent for managing root grubs as it also occupies the same niche of root grubs.



Chemical control measures are not advisable in the district as the district is declared as organic and hence a management package that fits to the agricultural scenario of the district was demonstrated against the management of root grubs in arecanut. An aqua



formulation developed by CPCRI from the indigenous EPN, *Steinernema carpocapsae* (CPCRI – SC1) packed in sealed polypropylene bags (150 – 200 ml) was found to be potentially efficacious in root grub affected arecanut gardens.

### Targeted interventions imperative

The effectiveness of EPN technology for the management of root grubs in arecanut was demonstrated in four farmer's gardens of one acre each at Melbare village of Uduma panchayat. An IPM strategy comprising soil application of aqua formulation of native EPN isolate *Steinernema carpocapsae* on the root zone @ 1.5 billion infective juveniles (IJs) ha<sup>-1</sup> during June - July and September - October, periodical digging and destruction of grubs, mechanical collection of beetles in synergy with application of neem cake @ 2kg/palm was adopted continuously for three years to subdue the root grub population. Tremendous reduction (91%) in root grubs population around the root zone of the palm in treated gardens could be observed. Palm mortality was reduced to nearly 0.3%



from 6.4% with yield enhancement by 30 to 62% over a period of three years.

Further, the EPNs were re-isolated from 42% of the soil samples collected from all treated plots which shows its establishment consequent to treatment. The perennial nature of the crop and close canopy levels sustains microclimatic conditions ensuring a favorable niche for the establishment of EPN in arecanut based ecosystem. Farmers and agricultural extension officials were convinced about the successful performance of this technology through a Field Day organized in the panchayat and the efficiency of native EPN isolates as a bio-control agent against arecanut root grub was proved. Farmers are of the opinion that they can avoid the application of highly toxic insecticides to the soils in the arecanut growing regions.

### EPNs: Breaking new grounds

EPNs are used successfully to control several agriculturally important insect pests. They have been applied against soil inhabiting insects as soil application and above ground insects as foliar spray in cryptic habitats. The first nematode used successfully in the control of an insect pest was *Steinernema carpocapsae*. They possess many attributes such as wide host spectrum, active host seeking nature, easy mass production, long term efficacy, easy application, compatibility with many chemicals and are environmentally safe. The Environmental Protection Agency (EPA) in India has exempted EPNs from registration.





## Results of other successful demonstrations

The successful and timely interventions undertaken by KVK through frontline demonstrations are listed crop-wise giving a glimpse of the extensive farmer friendly activities carried out over the last 20 years.

### FLDs on management of diseases and pests in coconut

A front line demonstration entitled “Prophylactic method for control of bud rot disease in coconut” using biocontrol agent was conducted in coconut gardens of 7 farmers with 5 ha area at Manjeswar and West Eleri panchayaths of Kasaragod district. Technology demonstrated includes phytosanitary measures and placement of *Trichoderma harzianum* enriched coir pith cakes around the spindle leaves of coconut during monsoon periods at bio monthly intervals. Technology was adopted in 500 coconut palms including coconut seedlings. No disease incidence was observed in 245 coconut palms and 105 coconut seedlings at Manjeswar. In West Eleri, out of 65 coconut palms and 85 coconut seedlings, 14 exhibited bud rot symptoms. By using curative methods 10 palms were cured while 14 succumbed to the disease.

Another technology for the management of bud rot disease in coconut - placing two perforated sachets (containing Mancozeb (5g each) to the top leaf axil of coconut, twice during pre monsoon and after one month, and thrice if monsoon proceeds, was taken up in a programme entitled as Participatory management of



bud rot disease in coconut. A total of 15 demonstrations covering an area of 5 ha were taken up at Bela village of Badiadka panchayath. Results indicated that the incidence of bud rot disease was below 10% when compared with 25% disease incidence in farmers’ practice of using BM once. Though, this technology is found to be highly suitable for controlling bud rot disease, it is not economical due to high wages of skilled labour.

The technology developed by CPCRI viz:- smearing with Tridemorph (5%), root feeding with Tridemorph (5%), coal tar application, soil drenching with Tridemorph (0.1%) and neem cake application (5kg/palm/year) for controlling the coconut stem bleeding disease in different disease intensities were carried out in farmer’s fields. Training on disease management practices, method demonstrations on *Trichoderma* multiplication in neem cake etc. were conducted in farmers’ fields with the active participation of farmers.



Results indicated that the disease incidence has come down in mild and in some moderately diseased palms with slight increase in yield (4-5 nuts /palm/year).

Another FLD on management of basal stem rot disease of coconut was taken up in six farmers fields with a total area of 2 ha at Kodakkad, Pilicode and Kanhangad. Technologies demonstrated include phytosanitary measures, basal application of 5 kg neem cake enriched with *Trichoderma harzianum* along with balanced doze of fertilizer application and proper irrigation to all coconut palms. For disease affected palms basal drenching of 40 L of 1% Bordeaux mixture at bio monthly intervals were also given. Out of 400 palms treated, the vigour of the palms was improved in 384 palms and spread of the disease was checked.

### FLDS on crop management in coconut

Conducted 10 demonstrations on drought management practices in coconut in Kunnumkai of Kasaragod district wherein the technology of coconut husk burial was demonstrated for moisture conservation which was adopted by many farmers of nearby areas.

Conducted 10 demonstrations on in-situ green manuring technology using cowpea in coconut basins in Neerchal of Kasaragod district wherein recorded 3.6 q/ha green matter availability for incorporation.

Demonstrations on coconut based mixed farming system were conducted in 4 ha area of 10 farmers of Chemnad panchayat. Inter crops like fodder grass and banana were provided as critical inputs in this

demonstration. An average yield of 14000 nuts/ha, 21 qtls of fodder grass/ha and 8.0 qtls of banana/ ha were recorded.

The technology on coastal sandy soil management for higher coconut productivity, developed by CPCRI,



was demonstrated in an area of 3 ha belonging to ten farmers of Padanna and Kumbla panchayats. Appropriate soil moisture conservation measures were demonstrated while planting component crops such as banana, vegetables and fodder grass. From the demonstration plots, farmers could harvest on an average 120 ton/ha fodder grass and also the coconut yield was found to be increased from 32 to 48 nuts/palm.

### FLDs in arecanut

- Inflorescence die back disease is a serious problem in arecanut gardens of Kasaragod



district. This disease is caused by *Colletotrichum gleosporioides* and *Helminthosporium sp.* and is prevalent during summer season from January to May, resulting in an yield loss of 25 to 30%. Hence a



FLD programme on Management of Inflorescence die back disease in arecanut was taken up in 10 farmers' fields belonging to Miyapadavu Village of Meenja panchayath covering an area of 3.5 ha. Training on management practices, and method demonstration of spraying chemical using telescopic sprayer developed by CPCRI were conducted with the active participation of farmers. Results indicated that 80-85% control of the disease was observed in the arecanut gardens sprayed with Zineb.

- A total of 10 demonstrations on arecanut based

cropping system were laid out in an area of 2 ha belonging to 10 farmers of Badiadka panchayat. Black pepper, cocoa and banana were included as component crops in this demonstration. The average yield of arecanut was 27.40 qtls/ha and banana yielded 23.6 qtls/ha.

### Interventions in cocoa

- Front line demonstration on management of Black pod disease in cocoa by organic methods was conducted in 10 farmers fields in an area of 5 ha at Baindanadka and Adoor villages of Delampady panchayat. Results indicated that disease incidence has come down to 15-25% in cocoa trees treated with *Trichoderma* and 2% *Pseudomonas fluorescens* as against 60-80% disease incidence in control.
- Canopy management in cocoa was demonstrated in arecanut-cocoa mixed cropping system in an area of 2ha belonging to 10 farmers of Delampady



panchayat. On adoption of appropriate canopy management techniques, an average yield of 2460 kg wet beans/ha was recorded as against 1024kg from check plot.

## Pulses

The pulses contribute an important part in the daily dietary requirement and to meet this demand India had to import pulses. Under these circumstances, the National Food Security Mission was launched by the Government of India and KVK has also participated



in this programme by introducing green gram and black gram in paddy fallows. The area under pulses cultivation in the district is expanded to 40 hectares during 2016 to 2018. Latest varieties like CoGG-8 and BGS-9 (green gram) and Vamban-6 and Vamban-8 (black gram) were demonstrated in Kasaragod district.

## Oilseed crops

High yielding varieties of Sesame, Thilarani and Thilak, were introduced in Kasaragod district after

a gap of 18-20 years. The demonstrations were conducted in an area of one ha each of three clusters (Thrikkaripur, Neeleshwar and Udma panchayats). The average yield of the variety Thilak was 238.3 kg/ha and Thilarani was 220.3 kg/ha in spite of long spell



of drought experienced during the crop season. The farmers were convinced that an oil seed crop of short duration could be integrated in paddy fallows, utilizing the residual soil moisture for more returns.

## Vegetable crops

- Conducted a total of 223 demonstrations on high yielding varieties of vegetables and successfully introduced the varieties viz., Arun (Amaranthus), Vyjayanthi and Lola (Yard long bean), Arunima (Cucumber), Arka Anamika (Bhendi) in four villages namely Perumbala, Shenya, Pullur and Kayuur of Kasaragod district with the yield of 12 t/ha, 9.3 t/ha, 16.8 t/ha and 11 t/ha, respectively during 1998 - 2005.



- Conducted a total of 31 demonstrations on annual moringa variety- PKM-2 in farmers' fields of three villages Meeyapadav, Muliyar and Kayyur in Kasaragod district wherein plants recorded an average harvest of 111pods per plant as against 54 in control.
- Successfully demonstrated the management of pod borers of vegetable cowpea using organic pesticides (neem-soap) and biocontrol agents (*Beuvaria bassiana*) in three farmers' plots of area two hectares belonging to Mangalpady and Mogral Puthur Panchayats. The pest incidence and average yield from demonstration plot was recorded as 7.4 % and 16.64 t/ha, respectively, as against 14.6% and 15.19 t/ha from the control plots.
- Conducted 20 demonstrations on micronutrient management in vegetables by applying the micro nutrient mixture, IIHR Vegetable Special in an area of 10 ha covering Manjeswar, Udma, Periye, Madikkai and Kumbla. Micro nutrient mixture was



sprayed in crops like cabbage, chilly, bhindi, brinjal and yard long bean with the first spray on 30th day of planting followed by two sprays at 15 days interval. The increase in yield in demonstration plots were 29.4%, 12.33%, 8.8%, 14.4% and 39.4% respectively as compared with check plot. Further, it was observed that pest and disease incidence were comparatively less in demonstration plots.

- Foliar application of boron was demonstrated in bitter gourd to enhance plant growth, number of fruits, fruit size and yield. This technology developed by IIHR was introduced in an area of 2



ha, covering 10 farmers of Chengala panchayat. The results showed that on an average, 26.7 tonnes/ha of bitter gourd was harvested from the demonstration plots where as 12.8 tonnes/ha was the yield from control plot. From the demonstration plots, 90% of bitter gourd harvested was



marketable with attractive size and shape.

- Conducted five demonstrations on the use of vermiwash as GAP in organic cultivation of vegetables at Kundampara village of Bedakam panchayat in an area of 2 ha, belonging to five farmers. Farmers were equipped to establish vermicomposting units and extract vermiwash which was applied at weekly intervals to amaranthus @ one litre of vermiwash in 10 litres of water. The average yield from vermiwash applied plots was 13.25 t/ha as compared against 12.0 t/ha in control plot. Further, it was observed that vermiwash applied plants showed profuse rooting pattern, performed better with more plant height as well as with more taste. There was no incidence of pests and diseases in demonstration plots where as in control plots, leaf spot incidence (4%) was recorded.

### Fruit crops

- Micronutrient deficiency disorders are widely reported from the district with respect to banana cultivation and hence, demonstrations on Micronutrient management in banana using Banana Shakthi, a micronutrient mixture developed by TNAU, were conducted in an area of 4 ha in Uduma, Bedakam, Mogral Puthur and Badiadka panchayats. 'Banana Shakthi' comprising a mixture of zinc, iron, copper and boron is sprayed to the plants at 3rd, 4th and 5th month after planting. This mixture @2% concentration along with suitable adjuvant (sticking agent) is given



as foliar spray. Lime/Dolomite was applied at the time of land preparation. Results showed that micronutrient application resulted in better yields (28 t/ha) as compared to 23.25 t/ha in control (20.43% increase in yield). Further, deficiency disorders were not observed in the demonstration plots as against 28.7% in the check plots.

- A total of 20 demonstrations were conducted on micro nutrient management in banana using IHR Banana special in 2 ha area of 20 farmers of Madikai panchayat. Results of demonstration showed an increase of 20% more yield, improved quality of banana fingers like size, shape etc which helped in gaining more price in the market.

### Tuber crops

- High yielding variety of greater yam, Sree Keerthi was introduced in four coconut homesteads belonging to West Eleri panchayat in an area of 2ha. The average yield from demonstration plots was 23.75 t/ha as against 20.16 t/ha from check



plot. The duration of demonstrated variety was 250 days and that of check was 270 days.

- Further, high yielding variety of lesser yam Sree Latha was introduced in four coconut homesteads belonging to W. Eleri panchayat in an area of 2ha. The average yield from demonstration plots was 8.82 t/ha as against 7.37 t/ha from check plot. The duration of demonstrated variety was 240 days and that of check was 270 days.

### Spice crops

- Front line demonstrations on Management of foot rot disease in pepper using biocontrol agents were conducted in 10 arecanut based pepper gardens of 2 ha area at Iriyanni of Muliyar panchayath. Results indicated that no further foot rot disease incidence was observed in pepper vines treated twice with 1% BM spray along with basal application of *Trichoderma* enriched neem cake during monsoon period. Farmers were convinced about the effectiveness of this technology and many farmers from the district adopted this technology for foot rot disease management in pepper.
- The high yielding variety of Ginger (Varada) was introduced in homesteads by conducting 8 demonstrations in Muliyar panchayt of Kasaragod district. Observations of the performance of this variety showed a rhizome yield of 16 t/ha as compared to 10 tonnes per hectare from the local variety.

- Demonstrations on bush pepper cultivation was conducted by introducing potted bush pepper plants in 10 households belonging to an urban area, Vidya Nagar. Ten plants each were provided to each household. An average yield of 5.25 kg/unit was recorded with a net return of Rs. 1087/unit. This helped in the popularization of bush pepper and production of pepper for household consumption.

### Fodder crops

- Introduced high yielding fodder grass variety – Co 3 by conducting 35 demonstrations in farmers fields of Kayyur village under Kayyur-Cheemeni gram panchayat wherein the average yield recorded was 100 t/ha.
- Successfully introduced high yielding fodder grass variety, CO (GG) 3 to five farm families of Puthige, Manjeswar and Badiadka panchayats in 5 ha area. The average yield of this variety when grown as intercrop was 95t/ha as against 70 t/ha for local guinea grass variety. Average yield when grown as monocrop was 150t/ha as against 110t/ha for local variety.

### Crop production and protection interventions in rice

Organic cultivation of paddy was successfully demonstrated in an area of 3 ha at three locations of Mangalpadi panchayat. The varieties suitable for organic cultivation such as Ezhome I, Ezhome II and Ezhome III were introduced. Proper usage of liming



materials, organic manures in sufficient quantities, biofertilizers and organic growth stimulants were applied as and when required as per soil test results. Bio agents such as *Pseudomonas* and neem based bio formulations were used against disease and pest incidence. Around 20% reduction in cost of cultivation was brought out by the usage of machineries like drum seeder, conoweeder, vertical conveyor reaper and thresher cum winnower. The results showed that Ezhome II gave the highest yield (4.17t/ha) followed by Ezhome I (3.41t/ha) and Ezhome III (3.17t/ha), as compared to check plot (2.78t/ha).

Another front line demonstration on effect of seed treatment and soil application of *Pseudomonas fluorescens* against ear head disease of paddy was carried out in 6 farmers' fields with 2 ha area at Thannot in Ajanur panchayat. Technologies adopted were *Pseudomonas fluorescens* (IsolateNo:P1) based paddy seed treatment + root dipping + cow dung mixed soil application + foliar spray. Incidences of paddy blast, sheath blight, sheath rot, ear head disease and neck blast were not observed in any fields where this technology was adopted. Yield data showed that on an average 3.5 tonnes of paddy per hectare was harvested from the technology adopted paddy fields where as in farmers' practice the yield was 2.8 tonnes/ha.

Light traps as a component in pest management package under organic cultivation of paddy introduced for pest monitoring as well as pest management. The traps were established in two plots covering an area of

2 ha in Nellikkatta village of Chengala panchayat. The catches comprised major insect pests of paddy such as moths of stem borer, leaf roller, blue beetles, brown and green hoppers, besides insect pest sp. belonging to 18 major insect pest families. The pest incidence was below economic threshold levels in demonstrated fields as compared against check plots wherein three pesticidal sprays were given during the crop season. The pest incidence was 3.66% in light trap installed fields as against 11.33% in check plots.

Management of blast disease in paddy was taken up in 5 ha paddy fields of 10 farmers at Koyenkara padashekhar, Thrikarippur panchayat.





*Pseudomonas fluorescens* was applied as seed dressing, root dipping or sprayed and drenched in nurseries @ of 20g/l, fortnightly. Though initial symptoms of blast were observed in two paddy fields, the spread of the blast disease was checked by repeated spraying of *Pseudomonas fluorescens*.

## Value addition initiatives

### Demonstration of osmotic dehydration technology

Osmotic dehydration of pineapple developed by IIHR, Bengaluru was demonstrated to SHGs and farm women of Bela and Neerchal villages in Badiadka panchayat of Kasaragod district during 2011-12. Ten demonstrations were conducted in which 56 trainees participated. During 2012-13, twelve demonstrations were conducted for 185 KVK beneficiaries. Five units have adopted the technology and started making it in small scale.

Sensory evaluation of various products was carried out and it was found to be high for pineapple and papaya. Dehydrated jackfruit and cashew apple was more acceptable in terms of B:C ratio. The entrepreneurs were able to fetch a net profit of Rs. 6000/- for which the input cost was Rs 9500/- and the gross return was Rs 13500 with a B:C ratio of 1.8. The evaluation of the osmo dehydrated fruit products revealed that the yield percentage was 40 with a shelf life of six months.

### Demonstration of VCO byproduct-incorporated biscuits and extruded products

The byproducts of virgin coconut oil (VCO) production

include residues like kulkum (coagulated protein) and coconut milk residue, which has not been utilized efficiently by the VCO production units. In fact, enhanced utilization of byproducts can greatly add to the profitability and viability of VCO units. During 2013-14, KVK demonstrated the use of these



as an ingredient in biscuits and extruded products to enhance taste, bulk and nutritive values. Thirty percent coconut residue and five percent coagulant protein incorporated in biscuits and cookies were highly acceptable. Sensory evaluation was high (75%) for biscuits incorporated with VCO residues. Eight demonstrations were conducted to 140 KVK beneficiaries, from which three units have adopted the technology and started making it in small scale.

### Value addition with branding and marketing of products

During 2014-15, four units were selected for demonstrations on value addition, branding and marketing of value added products as an activity to



promote small scale units to produce various value added products in scientific way, pack the product in attractive containers and market the product under a brand name, so that they can compete with other companies in the market. These units were Meenus Food Products, Vidyanagar, Adithi Home Products, Kunjar, Tasty food Products, Neerchal, and SP Product, Palakunnu. They were provided training for the preparation of value added products like jam, squash, syrup, pappad, vinegar, biscuits, halwa etc. Further, they were trained on the packaging using the latest technologies, providing attractive labels with eye-catching brand names and assisted in obtaining FSSAI registration.

### Entrepreneurship development programmes on preparation of value-added products

Entrepreneurship development programme was carried out during 2015-16 on production of value-added products using seasonal fruits like jackfruit, gooseberry, banana and honey. Five groups were selected and trained on preparation of products like jam, squash, pickles, candies, pappad, chips and nutraceutical products. All the five groups have started manufacturing and marketing of these products on small scale to the nearby stores and in exhibitions.

### Allied enterprises

- A field tool developed by IVRI to detect the time of standing heat and ultimately right time for artificial insemination and high conception rate in cows, cryscope, was introduced for the first time in the state and district. A total of 15 cryscopes

were procured and distributed to farmers having more than five milching cows covering Mogral Puthur, Chemnad, Enmakaje, Badiadka, Udma and Pilicode panchayats. Two units were given to two milk producing societies also thereby benefitting 17 men and 14 women dairy farmers. Dairy farmers were able to identify the right time for AI with an accuracy of around 75%.

- A Front Line Demonstration programme titled “Backyard Poultry rearing as an income generating enterprise for farm women” was carried out with 6 demonstration units located in Mogral Puthur, Madhur, Chemnad and Bedadka panchayats. Ten vaccinated layer birds of Gramasree breed – 45 days old- along with a scientifically prepared cage, designed by KAU, was provided to the households. The demonstrations showed good results with a BC ratio of 2.2.

In brief a total of 1329 demonstrations were conducted under FLDs since 1998, by introducing new and high yielding crop varieties and technologies covering an area of 332 ha. Through these demonstrations, KVK was able to show the maximum production potentiality of the latest and innovative agricultural technologies to the farmers and extension functionaries, by which the time lag between technology generation and its adoption could be reduced to a great extent. Out of these, many technologies created great impact among the farming community as evidenced by the wide dissemination and scaling up of such technologies by line departments and resultant adoption among the farmers of the district.



## CAPACITY BUILDING PROGRAMMES: KNOWLEDGE AND SKILL EMPOWER YOU

The basic concept of Krishi Vigyan Kendra (Farm Science Centre) is that it is extension education directed towards production of desirable changes among farmers with respect to their knowledge (things known), skills (things done) and attitude (things felt), either in all, or one or more of them based on the existing need and situation. Generally, in any education, emphasis is usually placed on changes in knowledge and skills, more or less neglecting the aspect of changing attitude. But attitudes (emotions or feeling) are important, because they tend to express themselves in action which may be favourable (+ve) or unfavourable (-ve) to progress. Considering this precept, this Kendra has formulated various activities, as per the mandate, for educating all rural people with a view to help them live better by learning the ways of improving their farms as well as allied enterprises. In fact, training has become a critical part of modernization in agricultural technology on one hand and its know-how and do-how on the other. Training is regarded as one of the integral components of developmental programmes. Training requires special skills and positive attitudes on the part of the facilitator himself in order to ensure successful programmes for the training. The training design must reflect the

goals and objectives of a training programme in order to objectively measure the success of the training. In this direction, KVK of CPCRI Kas aragod has been organizing training programmes in agriculture and allied enterprises for the benefit of various clients, since its inception in 1993.

This Kendra has developed a systematic training methodology with special features, based on the guidelines provided by the ICAR as well as ATARI Bengaluru. Accordingly, the need-based training programmes are developed, planned and organized either in 'on campus' or as 'off campus' mode. It is always ensured that the target group covers all the 39 gram panchayats of Kasaragod district. Kendra has trained a total of 63,105 (30,691 male 32,414 female) personnel comprising of practicing farmers, rural youth, farm women, women self help groups, extension functionaries and students through organizing 2542 training courses during the period from 1993-1994 to 2016-2017. Out of these courses, 1525 were on-campus and 1017 off campus ones, conducted in different disciplines such as Agronomy, Crop Protection, Horticulture, Home Science, Agricultural Extension, Agricultural Engineering, Animal Husbandry and Fisheries.





**ENVIRONMENTAL PRODUCTS**  
- Environmental safety, no water and energy use, clean  
- Environmentally friendly, healthy and safe

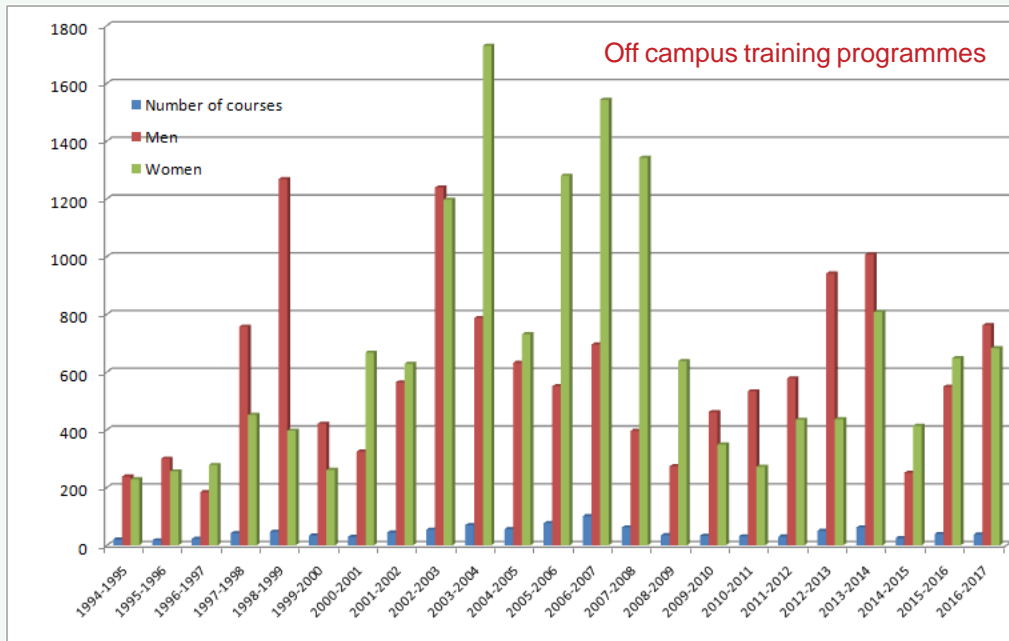
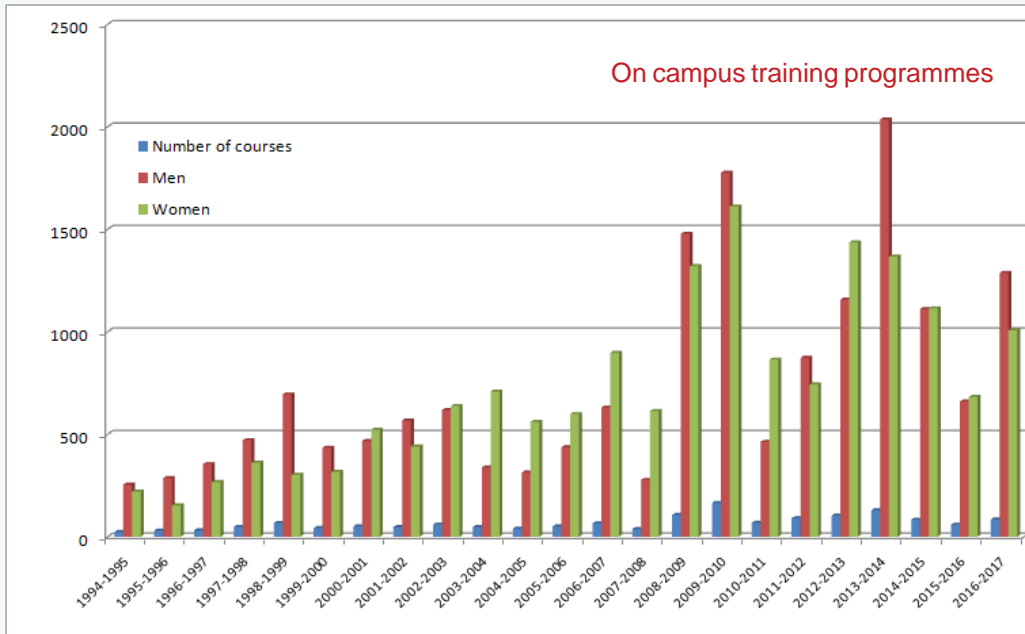
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## Women empowerment through technology literacy

A Womens' Cell was constituted at KVK, CPCRI, Kasaragod as per the instructions of Department of Agriculture & Co-operation, ICAR, during 1998 with emphasis on training of women farmers to enhance self employment opportunities in agriculture and allied sectors leading to women empowerment. Since its inception, farm women empowerment is being given much emphasis by the Womens' Cell of KVK towards imparting technology literacy among farm women, mahila mandals, women self help groups, Kudumbasree units etc.

Though Kerala retains a commanding position in the field of literacy (91.5), the total literacy rate in Kasaragod district is less than the state average. In both agriculture and non-agriculture sectors other than construction, women workers dominate. Keeping this in view, the SWOT analysis for Kasaragod district with special reference to women empowerment is carried out to implement Womens' Cell programmes effectively. Based on the SWOT analysis, the following thrust areas are identified for strengthening farm women empowerment activities in the operational area of KVK:

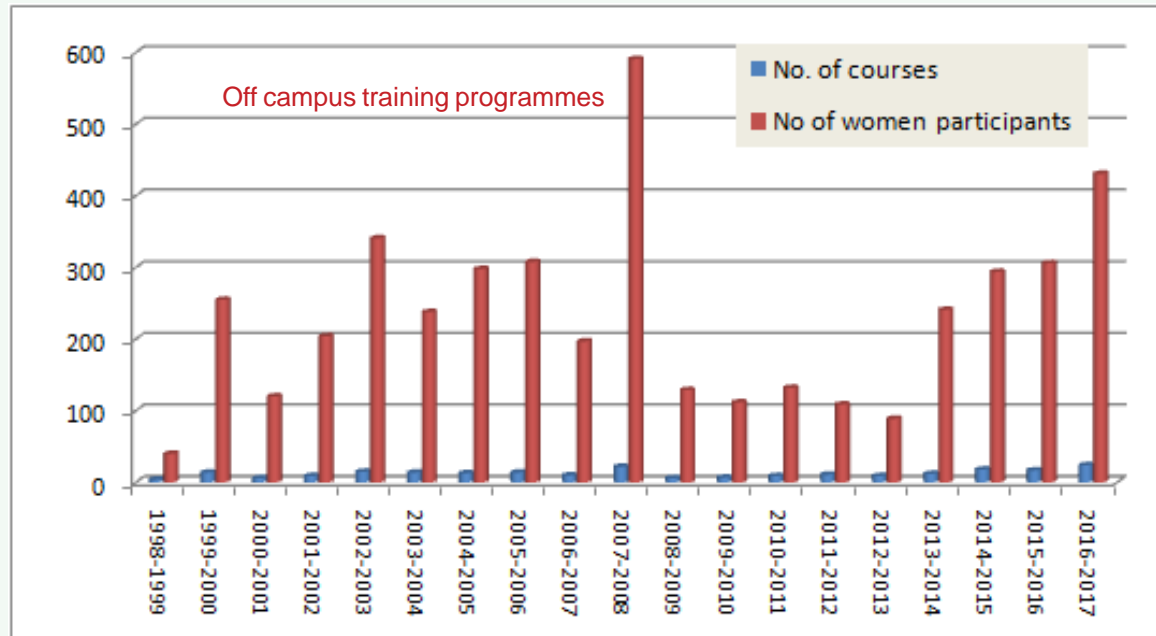
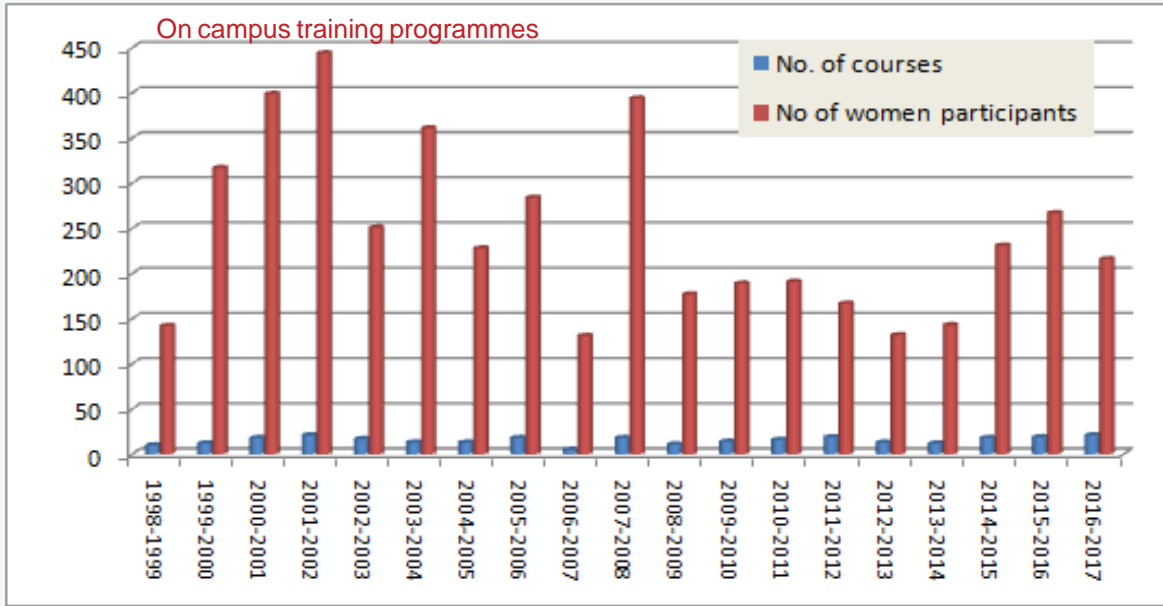
- ▶ Training women farmers in farm related and allied activities to enhance self employment opportunities.

- ▶ Mobilizing and monitoring the activities of women self help groups.
- ▶ Documentation and revival of traditional knowledge/practices for better utilization.
- ▶ Expose women regarding the existing programmes, schemes and facilities extended to women by the government and non governmental agencies.
- ▶ Recognize women as equal partners in all spheres of developmental activities.
- ▶ Create awareness on their strength, rights, opportunities and services.
- ▶ Disseminate latest technologies in the fields of agriculture, nutrition and health care, education etc.

Womens' Cell gives much emphasis on formation of self help groups (SHG) and motivating them to promote group activities leading to technological literacy and women empowerment. This Cell is being associated with the local bodies, developmental agencies and voluntary organizations working in the district for identifying the dire needs of the farm women and their groups, selecting the appropriate technologies fitting to their homesteads, formulating and conducting of various training programmes.

Among the training programmes conducted, 422 programmes were exclusively for WSHGs and farm women benefitting 9079 women trainees







## **‘Friends of Coconut Tree’: a revolutionary move to attract youth to agriculture**

Major coconut growing states of Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra and Goa were facing an acute shortage of climbers, a vital link in the production chain, with very few people taking on this traditional profession. Plagued by the declining number of coconut palm climbers, the Coconut Development Board is trying to woo youth by providing training to unemployed men, besides by offering them a comprehensive insurance scheme.

A training programme under the banner of “Friends of Coconut Tree” was taken up jointly by KVK, CPCRI, Kasaragod and Coconut Development Board (CDB), Kochi with an objective of developing a professional group of youth for carrying out harvesting, management and crop protection activities in coconut sector after acquiring professional skills on mechanical coconut climbing. Unemployed youth from Kasaragod district were selected for this residential training of six days duration and they were trained on technical skills, entrepreneurship development as well as leadership qualities and communication skills with a view to address the problem of labour scarcity in coconut harvesting and plant protection operations. Exposure visits were also arranged to coconut gardens where the participants were trained to diagnose the field level problems.



Through this initiative, KVK could develop a corpus of 550 trained professionals (including 53 women) on mechanized coconut harvesting and plant protection during 2011-2015. All trainees were brought under the coverage of Kera Suraksha Insurance Scheme for one year on the commencement of training and each participant trainee was provided with a climbing device by CDB on completion of the training programme. Around 75% of the trainees have taken this as their profession with earnings from Rs.300 to Rs.900 per day, certainly enhancing the self employment opportunities of rural youth from farm families. They are also planning to form groups so as to extend and diversify their activities towards hybrid seed nut production, snowball tender nut units, tender nut parlours etc., other than harvesting, management and plant protection operations in coconut sector. Their services are duly recognized and well appreciated by the coconut farmers of the district within this short spell of time.



## They came, they learnt and they conquered'; in fact, conquered their own lives

It was in August 2012 that four housewives from a remote village of Kasaragod decided to opt for a job quite unique and a bit adventurous. They had attended a preliminary training in coconut climbing using a coconut climbing device organized by the agricultural officer of their panchayat, Kinanur Karindalam. It was just the spark. Soon, they set off to Krishi Vigyan Kendra, Kasaragod for enquiring about the same and decided to be a part of the "Friends of Coconut Tree" programme – the joint venture by Coconut Development Board, Kochi and Krishi Vigyan Kendra, Kasaragod. Now the names, Seema, Bhargavi, Omana and Usha Balan, have found a place in the phone directory of every household in Kinanur Karindalam panchayat.

As soon as they were back to Kinanur Karinthalam after the 6 days' residential training course at KVK, they reported back to the agricultural officer who gave wide publicity through mass media. The determined ladies were not at all hesitant to give their mobile phone numbers too in the public domain. The efforts found the desired results very soon, because so much was the felt need among farmers. And, Periyanganam Seema, Kollampara V.V. Bhargavi, Karinthalam Omana and Periyanganam Usha Balan, did not fail the expectations and responded punctually to all of the orders placed.

Now after an appreciable service of more than a year, they have gained good expertise in the field. They use safety belts only in risky situations. They go to the sites in groups on their assignments and harvest coconuts with amazing speed and skill. They get job for almost 25 days a month and they collect a very reasonable amount of Rs. 20/ palm from the farmers. The working time is flexible usually from 9am to 3pm. One person climbs 60 palms a day. In peak periods, they earn above Rs.1000 per day. They were also trained in plant protection aspects, pollination, etc. and such services were also offered to the farmers based on the requirements.

Though much satisfied in their job and earnings, the four friends have a common issue of high transport cost for taking the machines to remote fields. Since the climbing device is quite heavy, they are forced to go to the plots in hired auto rickshaw which eat away a lion's share of their hard-earned money. They were also given an opportunity to interact with the then Hon Chief Minister of Kerala, Shri Oommen Chandi, during a face-to-face interaction programme organised by CPCRI, Kasaragod for soliciting support from the state government.





## Women scaling new heights: Transcending gender barriers for pollinating coconut

Among the women FoCTs trained by KVK, four women serve as 'skilled coconut pollinators' for coconut hybrid production at CPCRI under the revolving fund scheme on Seed Production. Coconut climbing and pollination was Men's territory so far, since the practice involved considerable drudgery and the risk involved. Owing to this, number of palm climbers has been on the decline and coconut communities were experiencing severe shortage of skilled climbers-cum-pollinators. The drudgery in climbing was largely reduced with the introduction of climbing machines and safety consciousness is addressed by the addition of safety device to the climbing machine.

Artificial pollination is the most important and crucial activity in the production of quality hybrids in coconut. It demands fine-tuned scientific procedures along with skilled labour force for climbing the tree and pollinating the female flowers at the right stage. The pollinator is required to climb over the crown manoeuvring through the coconut leaves with power, courage and skill. Artificial pollination for hybrid production includes emasculation, bagging, processing of male flowers to collect pollen, dusting pollen on female flowers for 3 to 7 days, bag removal and labelling of bunches. On an average

eight to ten times of climbing is required to complete the pollination of an inflorescence within a period of one month. Thanks to the climbing machines and the 'Friends of Coconut Tree' programme sponsored by the Coconut Development Board (CDB) and implemented in the district through KVK to overcome the situation.

Women have learnt the steps in coconut pollination with ease and carried out the work with confidence. Time taken for completion of pollination work by women pollinators was same as that of male workers. They are able to manage 60 tall palms for pollination work, just like their male counterparts.

Success of women pollinators in coconut hybrid production will hopefully encourage more women to take up this profession as it is much remunerative and improves their social and economic status. Moreover, the Institute is planning to utilize them as women master trainers to train other women in coconut hybrid seed production for increased production of quality planting materials. This venture could be one of the best options as a trend setter for augmenting hybrid seed production, overcoming acute labour shortage, women empowerment, gender equality, agricultural and rural development in the coconut communities of Kerala, which will be a model for other coconut growing states.



## Bee Keeping

Vocational training programmes on bee keeping are being organized in collaboration with HORTICORP under State Horticulture Mission (SHM) and a voluntary organisation, Kasaragod Rural Development Society (KRDS) since 10 years. The training programme is being organized in such a manner that time bound activities in bee keeping such as rainy season management of bee colonies, providing artificial feed for the colonies, strengthening of colonies, division of colonies, migration of colonies, pest and disease



management, extraction of honey, processing of honey, bottling and labelling etc., are arranged at the right time. The trainees are exposed to handling and management of bee colonies in both on campus and off campus mode. The programme is of 10 days duration, out of which they were familiarized with management and division of colonies through practical demonstrations for six days in well established bee keeping units of the district. A total of 1961 trainees, comprising 1749 men and 212 women, attended this

training programme during last 10 years. Utilizing the financial assistance of SHM, 4512 bee colonies were made available to the trainees @ 5 colonies per trainee with 50% subsidy.

### Impact of training programmes on bee keeping: A case study

Vocational training programmes on bee keeping are being regularly conducted at KVK, Kasaragod for the last 10 years. An apiary comprising 20 Indian bee colonies, established at KV K serve as the resource unit for practical demonstrations during the on campus training programmes. A study was conducted among 60 participant trainees who attended the training programmes on bee keeping at KVK with pre- and post evaluation tests and questionnaires as tools to assess the impact of these training programmes.

**Profile of trainees:** Majority of the trainees (55%) were between the age group of 36 to 50 years. Youth were comparatively less in number (26.67%) and a minority (18.33%) belonged to age group of 50 and above. The educational status was predominantly high school level (43.33%) and secondary school (36.67%). Graduates and post graduates comprised only 6.67% and 5% respectively. Majority (56.67) had agriculture as their occupation. Government employees (retired) comprised 18.33%. Business men, private sector employees and agricultural labourers comprised 5%, 8% and 11.67%, respectively.

**Impact on knowledge level of trainees:** The pre- and post-training knowledge levels in bee keeping



showed remarkable difference as follows:

Sl. No.	Knowledge category	Respondent trainees (%)	
		Pre-training	Post-training
1	Low	60.00	06.67
2	Medium	40.00	60.00
3	High	00.00	33.33



**Impact on adoption of technology:** All the trainees (100%) fully acquired the new skill of apiary. Before training, only 31.67% of the trainees were confident in handling bee colonies, whereas after training it rose to 95%. It created an employment opportunity and increase in income for 68.33% beneficiaries and 16.67% of the trainees took the enterprise to a commercial level. To start off with the enterprise soon after completion of the training, 300 colonies were supplied. Out of this, around 58.33% of trainees took 5 each, 18.33% started with 3 each, 13.33% took 10 each and 10% took 2 each. At present, the number of

colonies has risen to 872. In this, 3.33% entrepreneurs have more than 50 colonies whereas 13.33% have no colonies at all. In the midway, 13.33%, 26.67% and 43.33% of ex trainees have 21-50, 11-20 and 1-10 colonies respectively.

Majority (88.33%) of the trainees kept bee colonies in their crop lands for both honey production and pollination, whereas 16.67% for honey production alone and 11.67% for pollination purpose alone. Around 16.67% uses the honey produced for household purpose only.

**Impact on yield of cultivated crops:** More than 20% increase in crop yield has been observed by 11.67% of entrepreneurs, whereas 43.33% and 35% of them have noticed an increased crop production ranging from 11-20% and 5-10% respectively.

**Quantity of honey produced:** Around 11.67% entrepreneurs could harvest more than 100 kg of honey. The other ranges were more than 50 kg (53.33%), 10-50kg (31.67%) and less than 10 kg (3.33%).

**Impact on income level:** It was a great achievement that 1.67% of the ex trainees could earn more than Rs. 1,50,000 additional income annually through sale of honey and divided colonies. Around 5% could earn in a range of Rs. 50,000 to 1,00,000. Others also could make a commendable additional income of Rs. 15,001 to 50,000 (38.33%), Rs. 3,000 to 15,000 (48.33%) and up to Rs. 3000 (11.67%) respectively

The results of the study show that there has been a significant impact among the respondent trainees in



terms of knowledge gain, skill, self confidence and overall income via bee keeping enterprise. There was increase in the production of cultivated crops, especially coconut, cashew and vegetables through

enhanced pollination. In fact, bee keeping can be seen as a social commitment from the point of view of ensuring sustainable yields from plant species and enhanced agricultural production.

### **If honey bees can ensure livelihood for Sri. Ramachandra, it can do for you also!**

Sri. P. Ramachandra, aged 28 years, Badiadka village, Kasaragod, Kerala belong to a resource-poor farm family with only 50 cents of land, which is highly lateritic in nature. But he generates income for sustaining livelihood by rearing Indian honey bees and stingless bees in a professional manner. His life took a new turn for the better on getting exposed to the training programme on bee keeping of 15 days duration organized by KVK. Though he had some familiarity in handling honey bees, he was not well-versed with the scientific management of bee colonies during lean season and growth period and also bee breeding.

With the technical and logistical support from KVK, he decided to set up a bee keeping unit, which he later expanded and developed as a bee breeding unit at his household premises. He started with 10 colonies for which 50% subsidy was made available to him through HortiCorp, Thiruvananthapuram. Further, by utilizing the technology interventions extended to him by KVK through Front Line Demonstrations (FLD), he was able to establish four more colonies and 10 colonies through

domestication of natural colonies. Later, by dividing each of these colonies twice or thrice in a year, he could establish a bee breeding unit. Meantime, he was also trained on stingless bee keeping and he started meliponiculture as it requires only limited resources. Now, he could earn a handsome profit out of this, which ensures livelihood security to his family.

At present, he keeps 250 Indian bee colonies and 200 stingless bee colonies. On an average, he sells 150 Indian bee colonies, 50 stingless bee colonies, 6 quintals of Apis honey and 25 kg of stingless bee honey in a year for the last five years, earning around Rs.4,40,000/- per year. The fact that he could sell more than 1000 bee colonies itself shows that this technology has spread from him to neighbouring



farmers and also to neighbouring villages. Further, he could make the fellow farmers aware of the importance of establishing bee colonies in their homesteads/farms for ensuring better pollination of crops and resultant increased yields from crops.

He is the recipient of state level best beekeeper award sponsored by the Federation of Indian Apiarists (FIA), best bee keeper award from his

panchayath and Krishi Bhavan. He gives radio talks and interviews in AIR, Mangalore and Kannur. Sri. Ramachandra is also an active member of the KVK Honey Group, a group formed by KVK ex-trainees for production and marketing of organic honey under the brand name, 'Keramadhu Kasaragod Honey'. His bee keeping unit serves as a model bee farm for the prospective young bee keepers of Kerala and Karnataka.

### **Large scale adoption of vermicomposting technology using coconut leaf biomass**

Coconut and arecanut are the two major crops grown in the district with an area of 63,791 ha and 18,733 ha. respectively. The importance of nutrient management to realize profitable returns in respect of these crops has been well recognized by the cultivators. They are also aware of the adverse effects of continuous use of chemical fertilizers on soil physical and biological properties as well as its effects on the performance of crops and quality of products. Due to non-availability of organic manures in sufficient quantities, its higher cost and transportation related expenses, the use of organic manures is also less in spite of its importance in maintaining and improving soil fertility and sustainable production.

Research studies conducted at CPCRI indicates the feasibility of recycling the waste biomass available in coconut and arecanut plantations to meet the nutrient requirement of the same. The availability of waste

biomass from 1 ha of coconut/arecanut garden is around 12-14 t including husk of nuts where as it will be around 6-8 t from leaf waste alone. Recycling these residues in the plantation itself will help to meet major nutrient demand of the crops. The husk material can be used as a mulch since husk burial is a common soil moisture conservation practice widely adopted by the farmers of the district to mitigate the ill effects of drought. The natural decomposition of these available waste biomass and nutrient release are very slow due to the high lignin content and nature of lignocelluloses component.

A low cost technique for large scale vermicomposting of coconut waste was standardized at CPCRI using a local species of epigeic earth worm or compost worm belonging to Eudrilus species. Utilizing the waste biomass from one hectare of coconut garden, around 4000 kg of vermicompost can prepared from leaf waste alone which can supply 48-72 kg N, 4-8 kg P and 4-16 kg K. The process of composting of organic matter using earth worm is vermicomposting and the





end product which is brown, non odorous and granular is vermicompost. This vermicompost technology is being promoted and popularized through the Krishi Vigyan Kendra by way of training programmes and other transfer of technology activities.

Vermicomposting is one of the most popular technologies being well accepted and adopted by the farmers of Kasaragod District. By seeing the success of vermicomposting technology on many farmers fields, the Kasaragod District panchayat, state department of agriculture and coconut development board launched subsidized programmes for scaling up of this technology which resulted in large scale adoption.

### **Training programmes on mushroom cultivation Technology**

KVK has been regularly organizing training programmes on scientific cultivation of mushroom as



a profitable enterprise for the last several years. With the knowledge and skill gathered from the training programmes of KVK, 10 trainees and 2 SHG groups (from Kuttikol and Kumbadaje panchayats) started mushroom cultivation units in 2016-17 alone. Most of the beneficiaries started cultivation of mushrooms for their own consumption, ensuring nutritional security of the family.

#### **For Renjith, it is 'mushrooming' business**

Renjith, a young enthusiastic youth from Madhur panchayat of Kasaragod district approached KVK for getting training on mushroom cultivation. He got trained at KVK on mushroom and spawn production in March 2003 and since then was practicing oyster mushroom cultivation in his house for household use as and when mushroom spawns were obtained. When demand for mushroom came from neighboring houses, he started a small mushroom production unit at Parakatta, Kasaragod

in February 2004. However, unavailability of spawn was a main problem for him at that time. But, he managed this situation by purchasing spawn from KVK and other sources whenever it is available. In between, he contacted KVK for clearing doubts and also got training in milky mushroom production. When temperature goes up during February – March period, he started milky mushroom production at his house by procuring the available spawn of the same from KVK. He slowly started marketing mushrooms in vegetable shops at Kasaragod town. When faced





with difficulty in getting milky mushroom spawn during the time of good demand, he approached the KVK for setting a cheap lab for spawn production with low-cost equipments.

Things really turned around for him when, as per the suggestions from KVK, he strengthened his mushroom unit facility with a low-cost inoculation hood chamber, a cheap autoclave and low-cost chaff cutter. Thereafter, he started preparing 4 - 6 mushroom beds once in two days with daily production of 3 kg mushroom per day and earned an average income of Rs.5000/- per month when the cost of mushroom was Rs.80/kg during 2005-06. Exploiting high demand of mushrooms in Kasaragod and Mangalore markets, he further strengthened the mushroom production unit by constructing

under-ground mushroom sheds at Mannipady, Kasaragod for milky mushroom production in 2009-10. With the help of his relative, he prepared 10-15 mushroom beds per day and got a mushroom production of 8-10 kg/day and earned an average income of Rs.30,000/- per month when the cost of mushroom was Rs.150/kg. Now, he is selling 20 kg milky mushroom at Mangalore market in alternate days under the brand 'Coastal Milky Mushroom' and earning an income of Rs.75,000/- per month at the present rate of Rs.250/kg. A project report for construction of a high-tech mushroom shed at Mukkarikandam in Kasaragod has been submitted to DIC office, Kasaragod and is awaiting financial assistance of Rs.10 lakhs as loan for expansion of his enterprise.



## Milky mushroom turned life around for Unnikrishnan

Unnikrishnan, a middle-aged man, a mechanic by profession, was finding it hard to make a livelihood by running his electrical repair shop at Mavunkal, Kanhangad. So, he was looking for a supplementary income generating activity, operating from his premises and utilizing family labour. He came to know from his friends that mushroom production is one such activity. From a nearby resource centre, he gained the knowledge of oyster mushroom cultivation and started producing mushrooms from his house. Once he received demand for mushroom from neighbouring households, he constructed a small mushroom shed and started mushroom cultivation by preparing 3-5 mushroom beds once in two days. He was getting 2 kg mushroom per day and started selling in the market @ of Rs.200/kg at Nileshwaram and Kanhangad markets, earning an average income of Rs.3000/- month. In between, he met with so many risk factors such as contamination of mushroom beds and low yield due to other fungal attacks, pest attack, spawn unavailability etc. Later, he approached KVK for addressing a range of constraints that he is facing in mushroom cultivation.

The real turning point in his life was when he attended the training programme on oyster and milky mushroom and a vocational training programme on spawn production during 2013. Confident with the expertise, he strengthened his mushroom shed by getting some funds from Nileshwaram Krishibhavan

under SHM programme and concentrated on milky mushroom production with spawn purchased from KVK, Kasaragod. However, the spawn availability was inadequate for him to scale up the mushroom production as the market demand was very high. With the advice of KVK, he built a low-cost spawn production lab for in-house spawn production of milky mushroom. With the help of family members, he prepares 8-10 beds per day and gets a production of 5 kg mushroom per day and earning an average income of Rs. 25000/- per month, selling @ of Rs. 250/kg. As the demand of mushroom is going up day by day in the market, he has decided to construct a full-fledged mushroom unit with all high-tech facilities. He submitted a project proposal to ATMA through Dept. of Agriculture in 2016 and the construction of his high-tech spawn production lab and mushroom sheds are underway at Nileshwaram with the funding of Rs. 15.0 lakhs from the agency.



## Farmer Participatory Awareness Programmes and Seminars

### Seminar on management of wild life intrusion in agriculture

Of late, human-wildlife conflict has become a burning issue and wild life intrusion in crop lands is a nightmare for the farmers. Overpopulation of wild animals, scarcity of food and water especially in the dry months, easy availability of alternative food in the forest fringes with the expansion of cultivation and destruction of forest habitats are some of the reasons often attributed to this menace. There is a big hue and cry on this issue since most of the indigenous practices tried out by the farmers fail to ward off the crop-raiders from the wild. Electrical fencing is often touted as the only solution; but, unscientific methods of electrical fencing are dangerous and not advisable.

In this backdrop, a seminar on management of wild life intrusion in agriculture was organized by KVK on 13.11.2014. This seminar proved extremely useful to the farmers and gave them an idea of various alternative technologies like 'Boarep', a wild boar olfactory repellent powder and reflective ribbons (technology from KAU) and solar/electric fencing which can be used to ward off wild animals from cropped areas. Considering the huge demand from the farmers, the products have been made available for sale at KVK.

### State level workshop on fresh water pearl culture

Kerala is blessed with abundant natural water bodies with 44 rain-fed rivers with copious tributaries and distributaries flowing through the land, 27 backwaters, 7 lagoons and 18681 ponds. Fresh water pearl culture using *Lamellidens marginalis*, a fresh water mussel is an underexploited field of enterprise which has a very high potential as an income source. This technology was developed and being popularized by the ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA), Bhubaneswar. Keeping in mind the prospects in the state, a state level workshop on fresh water pearl culture was organized at CPCRI on 18.2.2014, in which many interested farmers from all over Kerala participated. Method demonstrations were conducted by experts using coin pearl nuclei used for gem pearl culture.



The workshop could bring out a success story from Wayanad where a group of trainees who attended the workshop successfully produced designer pearls within the stipulated time period of 18 months.

### National awareness cum technology transfer conference on meliponiculture

This mega event was conducted by the All India Co-ordinated Research Project on Honey bees and Pollinators (Vellayani Centre of KAU) in collaboration



with National Bee Board, KVK, CPCRI, SHM-Kerala and Kasaragod Rural Development Society, Kasaragod, from 11-12 March, 2014 at CPCRI Kasaragod in which more than 450 participants attended. Major topics like introduction to meliponiculture, pollination services and health management of stingless bees, seasonal management of stingless bee, colony division and honey extraction, nutritive and medicinal value and value added products from honey were handled by experts. An interactive session of beekeepers and researchers was also arranged in which the participants cleared their doubts on meliponiculture.

### Harvest Festivals

KVK organizes Harvest Festivals to mark the success of FLDs or result demonstrations in farmers' fields. Mass participation of farmers brings with it a real festive mood to these harvest festivals.

One such event, a paddy harvest festival was organized by KVK at Mangalpadi in 2015 in collaboration with Nithyananda Yogashrama, Kondevur. The programme received overwhelming response from farming community and attended by over 200 farmers. KVK has organized another harvest festival at Kinanoor-



Karindalam in connection with the successful front line demonstration of mini sett techniques for rapid multiplication of tuber planting materials on 19/01/2016. High yielding varieties like Varada, Pratibha and Gajendra were used as mother seeds in ginger, turmeric and amorphophallus respectively.

Yet another Harvest Festival on tubers was organized



at Paramba, West Eleri panchayat on 10.01.2017 in connection with FLDs on “Introducing greater yam and lesser yam varieties in coconut homesteads”. Greater yam (*Dioscorea alata*) variety, Sree Keerthi and lesser yam (*Dioscorea esculenta*) variety, Sree Latha, released by ICAR-CTCRI were introduced



to homesteads during May, 2015. In coconut homesteads, both varieties performed well with good returns. It is also observed that greater yam variety could overcome the challenge of climate change with very good yield in spite of less rainfall and prolonged spell of drought.

A banana harvest festival and celebration of successful validation of efficacy of cassava based bioformulations against pseudo-stem weevil of banana, was organized at Periya Community hall on 27.07.2013 in connection with the RKVY Project on “Popularisation of cassava bioformulations against Pseudostem weevil in Banana in three districts of Kerala”. Around 10,000 banana plants were treated with the cassava biopesticides,



Nanma and Menma, developed by CTCRI. Yet another banana harvest festival was conducted at Bheemanadi in connection with the FLD on Management of Banana Pseudostem Weevil using Cassava Bioformulations. The demonstrations were conducted at West Eleri and Ballal panchayaths in an area of 4 ha.

### **KVK ‘grooms’ Kasaragod to go organic**

Krishi Vigyan Kendra, Kasaragod in collaboration with different grama panchayats in the district launched a whole range of farmer-participatory agricultural extension activities with the mass participation of farmers sensitizing the farming community on the need to adopt timely and eco-friendly plant protection measures. This includes plant health clinics, lectures on plant protection measures and method demonstrations of the measures.

A total of 14 Plant Health Diagnostic Camps were organized in collaboration with the host institute, Department of Agriculture and Grama panchayats benefitting over 1000 farmers. The camps were conducted at Madhur, Muliya, Chengala, Madikai, Ajanur, Badiadka, Kuttikkol, Bedakam, Karadka,



Puthige, Uduma, Enmakaje and Kumbbla with the active participation of panchayat authorities and officials from the agriculture department. Farmers bring specimens of disease affected or pest infested plant parts to the clinics and get advised on suitable remedies from the expert panel of KVK. A brochure documenting the common problems and their control measures was also made available. This outreach initiative has helped in creating awareness among the farming community on the plant health diagnostic facilities available at this KVK.

Besides, KVK and Mangalpady panchayat collectively launched a plant protection campaign on farmer participatory management of Rhinoceros beetle. Around 100 packets of the bio control agent, green muscardine fungi (*Metarhizium anisopliae*) was distributed to the participant farmers for taking up timely treatment of the breeding sites of the pest on a community basis.

## Exhibitions and Kisan Melas

Exhibitions on agricultural technologies are being organized by KVK at many parts of the district in connection with many events of public importance. During these exhibitions, various technologies useful to the farmers are showcased. One at Kinanoor-Karindalam on 28-29 September 2015 during the pre-rabi sammelan was inaugurated by Shri P Karunakaran, Hon. M P of Kasaragod and was attended by over 1000 farmers. It depicted the various organic technologies and products developed by CPCRI and KAU. Another exhibition pavilion was organised by KVK during the Technology meet by

ATMA on 26-1-2016 at Periya in which around 2000 farmers participated. Kasaragod Mela organised by Malayala Manorama, Agri Fiesta exhibition organized by State Department of Agriculture and KAU, Mannuthy, Seminar on Coconut Cultivation aspects by State Agrl. Department, Seminar on Researchable Issues in agriculture at Manjeswar Block, exhibition at Mavunkal, Kanchangad organized by MILMA dairy northern zone etc. are few others to mention.

Further, exhibitions were organised by KVK at CPCRI in connection with the centenary celebrations of CPCRI during 2016. Around one lakh farmers visited the exhibition stalls.

## KVK initiatives on Student READY programmes

Student READY (Rural Entrepreneurship Awareness Development Yojana) programme is a new initiative of Indian Council of Agricultural Research to reorient graduates of Agriculture and allied subjects for ensuring and assuring employability and develop entrepreneurs for emerging knowledge intensive agriculture. This programme aims to provide rural entrepreneurship awareness, practical experience in real-life situation in rural agriculture and creating awareness to undergraduate students about practical agriculture and allied sciences. Further, this programme will help in building confidence, skill and acquire Indigenous Technical Knowledge (ITK) of the locality and thereby, preparing the pass-outs for self-employment. It also aims to provide opportunities to acquire hands-on-experience and entrepreneurial skills.

Rural Awareness Works Experience (RAWEX) is one



of the major components of this programme. RAWE helps the students primarily to understand the rural situations, status of agricultural technologies adopted by farmers, prioritize the farmer's problems and to develop skills and attitude of working with farm families for overall development in rural area.

KVK, Kasaragod is a partner of Kerala Agricultural University in conducting RAWE programmes for their students every year. Through this programme, KVK equip the students to gain rural experience, give them confidence and enhance on-farm problem solving abilities in real life situations, especially in contact with farmers, growers, etc. Further, KVK organized RAWE programmes for students from Agricultural Universities of Tamil Nadu, Maharashtra and Uttarakhand in previous years and exposed them to rural agricultural situations and experiences.

Further, On Job Training was imparted to students of Government Vocational Higher Secondary Schools

functioning in the district having Agriculture as the main vocational subject (GVHSS Karadka, Thrikkarippur and Bellikkoth) since the last 15 years. The students were well equipped with crop protection technologies as well as nursery management techniques. This programme helps the student to develop competence, capability, capacity building, acquiring skills, expertise and confidence to start their own enterprise on completion of their course. Several students who got exposed to agricultural and allied activities at KVK through on job training is now working as Agricultural Assistants at the Krishi Bhavans at Kasaragod and other districts of the state.

KVK-Kasaragod has been striving for the cause of overall development of farm families in the district through the functional relationship with various institutions and judicious utilization of resources at its command - information, technology, human and material resources - as per their permissible rules and regulations.





## EMPOWERING WOMEN: THE TECHNOLOGY EDGE

In India, women constitute almost half the adult population. The prosperity and growth of a nation depend on the status and development of its women. In the present socio-economic scenario, technological empowerment and education are the key issues before the society, especially for women in agriculture and allied sectors. In this changing scenario, the Krishi Vigyan Kendra-Kasaragod, since its inception in 1993, has made pioneering contributions in improving the technical competence of women of Kasaragod district in the field of agriculture and allied fields for higher production, generating self-employment, diversification of food sources in the region, value addition and other areas of nutritional and environmental concerns. The main focus was on drudgery reduction in farm and farm related activities and social empowerment through better access to resources, technology and information. In the implementation of these initiatives, KVK could enlist the wholehearted co-operation of all the district level developmental departments such as Agriculture/ Fisheries/ Animal Husbandry/ Sericulture/ Social Justice/ Tribal Development, Khadi and Village Industries Board, Kudumbashree Mission, Agricultural Universities and other Non-Government Organizations (NGOs) like Dharmasthala Gramabhivridhi Prathishtana and Vijaya Rural Foundation.

Entrepreneurial Development Programmes (EDP) can play an important role in influencing potential candidates to take advantage of new business opportunities and establish new business ventures.

Programmes are designed to help potential candidates to start new ventures, or to help existing entrepreneurs to improve their skills, or to solve particular business problems.

In the initial years of its functioning, KVK-Kasaragod was addressing the requirements of the farming community in terms of technological empowerment through various activities, both on and off field, which included training programmes, front line demonstrations, on farm testing, farm field schools, advisory services, field visits, awareness programmes and focused group meetings etc. The success of these outreach programmes created a demand which necessitated the incorporation of capacity building and entrepreneur development programmes for individuals as well as groups especially women collectives to promote enterprises related to agriculture and allied activities.

As a positive outcome of these programmes, a “Model Agriculture Project” was sanctioned by the Kasaragod district panchayat (through the Department of Agriculture) with a total financial outlay of Rs.15.0 lakhs in 2004. The objective of the project was to provide training to the beneficiaries as well as to function as a small scale production unit for the benefit of the farming community. Under this initiative, more than 400 skill development and entrepreneur development programmes were conducted related to food processing and eco-friendly technologies.



An impact of these programmes was the rejuvenation of women groups with improved participation, co-ordination and willingness to carry out group activities. To address nutrition related problems of the community and to reach a wider population more effectively, the priority was for programmes targeting village extension functionaries (Anganwadi teachers, ASHA workers), CDS members of Kudumbashree and NGOs. Majority of the training programmes conducted emphasized on capacity development and entrepreneur development to motivate groups to initiate small-scale enterprises. As a positive outcome of these initiatives, several small-scale production units for seasonal fruit products such as squashes and syrups from amla, kokum, pineapple, grapes and mixed fruit jams; dehydrated fruit products from jackfruit, kokum, tapioca and banana; nutraceutical mixes such as Omega 3 enriched wheat flour, ragi malt, amylase rich ragi flour; coconut based chutney mixes from horsegram, sesame, curry leaf and flax seed; coconut based medicated oils, spice mixes etc. sprung up in the district.

Success stories of several entrepreneurs bear testimony to the positive role of KVK in the district. An account of the select interventions over the last 25 years and its impact in empowering women in Kasaragod district is presented in the following pages.

## **Community Health and Nutrition Oriented Programmes**

### **‘Amrutham Nutrimix’ food supplement: Women earn from children’s nutrition**

Towards eliminating hunger and malnutrition in the

rural infants and ensuring income generation and social uplifting of rural women at the same time, the Krishi Vigyan Kendra-Kasaragod ventured on the ‘Amritham’ nutri-mix programme. Amrutham nutri-mix is a cereal-based powder mix developed by the KVK after several years of research and a number of Kudumbashree enterprise groups are involved in its production and distribution in the state since 2007.

### **Interventions of KVK**

The traditional diet provided for children in Anganwadis is rice gruel and green gram as a supplementary food. It consumes time for cooking and also does not provide the desired variety of food palatable to children. Ideally, a nutritious food should satisfy the following parameters: it should be nutritious and easily digestible; it must be pre-cooked and be ready-to-eat; and most importantly it should be within reasonable price. This product developed by the KVK satisfies all these conditions and proved to be very successful in the pilot survey when it was supplied to the underweight children in Anganwadis of Bedadka Panchayat, and the children were able to gain normal weight within four weeks of the course.

This novel enterprise not only provide balanced nutrition to the children of the Anganwadis but also generate income for women self help groups as well. Realizing the high demand owing to the improved health conditions of the children, the product was taken up by the Govt. of Kerala through a project of ICDS. The real turning point in this business proposition was when it was taken up for upscaling on the Kudumbashree platform, the state-wide WSHG chain,



through trainings across the state, elevating it from the realms of a micro-enterprise. As part of this upscaling process, the nutrimix unit at Bedadka in Kasaragod was chosen as a Master Training Centre from where training was imparted to over 900 trainees across the state. Presently, the nutrimix powder is being supplied through Anganwadis free of cost and the entrepreneur is paid by the respective panchayats through ICDS.

### Timeline of entrepreneurship development

It all began with the On Farm Trial undertaken by KVK-Kasaragod on “Comparative study of supplementary foods among anganwadi children” during 2003-04. Under this initiative, training was imparted to about 80 women groups at KVK to start with and over 200 demonstrations were conducted at different panchayats of Kasaragod district. The product gained good acceptance and came to be known as “Nutrimix powder”. Organoleptic tests and consumer preference tests were conducted among anganwadi children, teachers, public health centres and SHGs. Field days were conducted regularly to create awareness among the public about the nutritional aspects of the product. More than 1000 samples of the Nutrimix powder were distributed through anganwadis and Health Centres and group meetings were conducted with the participation of panchayat members, ICDS supervisor, PHC staff, anganwadi teachers and WSHGs for facilitating possible refinements.

In 2004, 20 beneficiaries of the training started a unit, “Kandamkuttichal” at Madikai and another group of 11 beneficiaries also started a unit, “Keerthi” at Bedadka for producing the nutrimix powder. Subsequently,



another women SHG started the ‘Gramasree’ food product unit at Bedadka and supplied food supplements for adolescence girls under the brand “Kumari Plus”.

Further, during 2012-13, an On Farm trial on “Enhancement of Palatability of Nutrimix” was carried out on a request from Kerala State Kudumbasree Mission (an organization devoted to poverty alleviation through empowerment of women) with the addition of different flavours like vanilla, strawberry, chocolates, badam in nutrimix. Considering the overall acceptability, availability of materials and cost of production, vanilla was mostly preferred. The recent OFT on “Refinement of nutrimix powder with coconut sugar” (carried out during 2015-16) reveal that 10 per cent replacement of white sugar with coconut sugar enhances the flavour and consumer acceptance with a mean organoleptic scoring of 4.5/5.0. The nutritional analysis reveals that the micronutrients like iron, calcium, potassium and magnesium increases with the addition of 10 to 15 percent of coconut sugar in the Amrutham nutrimix.





### Economic viability of the enterprise

Wheat grain from FCI is being supplied by Kudumbasree to all the nutrimix units @ of Rs 5/-. Members of the WSHG group constitute the manpower. The produce is marketed to Anganwadis through ICDS section of panchayats. In Kasaragod district, there are around 25 to 40 Anganwadis in each panchayat, with 25-30 children in each Anganwadi. At the start of the programme, it was supplied to only low birth weight babies, but later it was extended to all the children. Currently, every child is provided with 3.5 kg of Amrutham Nutrimix a month (at the rate of 135 grams per day, for 25 days).

Amrutham Nutrimix has been a runaway success in Kerala in terms of providing nutrition to infants from poor families and financial/social empowerment of rural women. At present, there are 16 Nutrimix units functioning in Kasaragod alone, producing 35 tonnes a month. About 398 women groups are presently supplying this food supplement to 32,922 Anganwadis

and the total production of Amruthasm Nutrimix in the state of Kerala has touched 1,267 tonnes/ month in 2011.

### Social impact



Most of these women were engaged in Beedi industry or working as daily wage labourers before starting the enterprise. Now, each one of them earns a regular monthly income of Rs. 4500 per month @ Rs.150/ day through Nutrimix production for which only about 6 hours a day is spent, without sacrificing on their household duties. They pool the surplus money as a micro-finance corpus fund and use them for providing loan to their members without interest. Now, the educational expenses of their children and other routine financial needs are met by the women themselves. In their perception, this has a positive influence in setting up gender equality in their homes.

Amrutham Nutrimix stands out from other micro-enterprise ventures as it addresses two issues of pivotal importance at the same time: women empowerment



and malnutrition. It has created a positive impact, changing society's mindset to a large extent. It has given women of Kerala an opportunity to earn an assured monthly income, which will not only be of financial help but also make them confident and help them to take part in the decision making process. This effort has been one of the most decisive movement in battling malnutrition and child mortality, the bane of Indian society over the years.

### Adolescent health and nutrition

Various programmes have been conducted in empowering adolescent girls in the area of health, nutrition and safe food production with the co-ordination of ICDS under the "Kishori Shakthi Yojana" a Central Government sponsored scheme under the Department of Social Justice. Various capacity building programmes like "Optimizing nutritional needs of teenagers through effective use of locally available natural food sources", "Significance of healthy food practices in relation to health and nutrition", "Incorporating micronutrient rich food sources for combating nutrition related problems in adolescents", "Adolescent nutrition and health", "Promotion of vitamin A rich foods through papaya", "Combating anaemia through indigenous medicinal plant sources and addressing nutrition related deficiencies using low cost supplements and seasonal fruits" were organized as part of this initiative.

### Processing and Preservation of Seasonal and Under Exploited Fruits

KVK has conducted various training programmes

for farm women/home makers in the areas of nutrition, preservation of fruits and vegetables and entrepreneurship development. Since the Kasaragod district has substantial area under horticultural crops, this KVK concentrated on imparting training on seasonal fruit and vegetable preservation. There is immense scope to generate additional/supplementary income for women which can be facilitated through skill training.

The technique of preservation of seasonal fruits such as jackfruit, cashew apple, kokum, pineapple, orange, lemon, mango, black grapes in the form of squash, syrup, jam, jelly, ready-to-serve beverages, chutney, pickles, osmo-dehydrated products using standardized techniques (developed by CFTRI, UAS and KAU) has been effectively demonstrated and popularized. A considerable extent of awareness is created on the utilization of locally available natural fruit sources and its benefits over commercially available synthetic drinks. Around 90% of the trained beneficiaries are producing the same at the household level, thereby ensuring intake of fresh source of vitamins, minerals and antioxidants in the family.

### Jackfruit, nature's bounty in plenty

Jackfruit, which is indigenous to India and available in abundance in the region, is presently used only to a limited extent as fresh fruit and its seeds for culinary purpose. Of late, jackfruit is on the revival path with farmers showing interest in exploring its potential, visible with the number of jackfruit fairs being held in the villages and towns of Kerala and Karnataka. Ripe jackfruit bulbs with good packaging have entered the



supermarket chains. Its seed, being a rich source of protein and antioxidants, is incorporated into various flours and enriched to make various value-added products. Many small processing units have come up making a series of jackfruit products and there is a huge untapped potential that can generate a lot of rural employment and augment the rural economy. Jackfruit pappad, jackfruit chips and halwa is few products of the region which is marketed and in great demand in the Middle East. In fact, jackfruit chips are healthier than potato chips.

In this context, the farming community under the purview of KVK activities is constantly encouraged to initiate small scale production units of value added products from jackfruit to revive its effective utilization. Various value-added products from jackfruit using standardized procedures of CFTRI and UAS (Bangalore) are familiarized through method and Front Line Demonstrations and EDP activities. These include jackfruit squash, jackfruit jam and jelly. Jackfruit waste is very high in pectin, whereas most of the commercial pectin used in preparation of jam and jellies has strong acids. A healthy sign is that there is an increasing trend of consumers looking for products obtained in a more environmental friendly way. In this scenario, the suitability of Jackfruit waste containing high amount of pectin and with lowest chemical residue generation in the preparation of jelly in integrated utilization of jackfruit was effectively popularized. As harvesting of jackfruit is a labour intensive process, a user friendly jackfruit harvester was introduced through FLD for facilitating effective utilization of the fruit.

### Refined indigenous technology for brining of jackfruit

Considering the availability of jackfruit in glut in the region and its under utilization due to labour intensive processing techniques, a group initiative for revival and promotion of a indigenous technique of brining of raw jackfruit was initiated. Through traditional brining procedures raw jackfruit could be stored for more than a year and used for culinary use. However, brining was done using hand measure and the technique was familiar only to few elderly members in a few traditional households. Brined jackfruit is used in the form of curry and is a special delicacy in the region of Kasaragod and Dakshin Kannada districts. The labour oriented task of processing of jackfruit which was earlier easily handled with labourers or joint family households is not feasible in the present context with nuclear families and labour constraints. There was a need to familiarize the younger generation regarding the indigenous technique and promote it as a low cost technology, safe and organic source of food, assure its availability and for income generation. In this pretext, the traditional technology of brining was standardized at KVK by determining the ideal brining percentage to be 15-20%. Hygienic handling and packaging using food grade plastics (standing pouches) or containers was also demonstrated. This technique was then disseminated for a wider adoption through group initiative of farm clubs, SHGs, schools and entrepreneur groups.





### Impact of popularizing indigenous household technologies: A case study

The technology, which was restricted to household use earlier, is now processed for marketing as well as in school lunch programmes. It is promoted through attractive packing and labelling in small standing

pouches and sold @ Rs 100-200/kg through vegetable vendors. Farmer/ women's group of other districts of Kerala have also been exposed to this technology through paid training programmes and have adopted it successfully. Through group initiatives, large bulk of the fruit ranging from 500 - 1500 kg can be processed

in a day through community approach, addressing wastage of the fruit and concerns of food security.

The brined jackfruit, which is extensively used for culinary purposes, can be effectively adopted in large scale in school mid day meal programmes and promoted as an ethnic delicacy of the region through local canteens, heritage hotels and restaurant chains. The large scale processing at schools involving local community and promoting it as an organic food and its use in school lunch programme has been the major highlight of this activity. The technology is widespread and adopted through Dharmasthala SHGs in Kasaragod and adjoining South Kanara district.

The brined jackfruit is served in the form of curry in school lunch programme in different forms at least twice a week. Children are familiarized with the indigenous brining technique and are made aware of how to

use the nature's best. Traditional snacks from brined jackfruit such as Undalakalu and Nippattu have been refined through enriching it with amylase rich sprouted ragi flour to promote healthy food habits among children. A master trainer and women entrepreneur of KVK, Mrs Lakshmi Bhat, has been promoting these under the name, M/s Abhirama Food Products.

### Revival of jackfruit pappad production through introduction of drudgery-free, user- friendly fibre frames

Jackfruit pappad prepared out of raw and ripe jackfruits is popular in the region of Kasaragod district of Kerala and also in the neighbouring districts of South Karnataka, with high market potential. However, the production of jackfruit pappad does not meet the market demand due to labour intensive procedures involved. In recent times, this traditional technology

Impact of the activity related to promotion of raw jackfruit brining.					
Organizations/ farm women	No. of participants	Qty of raw jackfruit processed (kg)			
		2014	2015	2016	2017
Sri Bharathi Vidyapeeta, Mujangavu	25	500	500	750	750
Sri Bharathi Vidyapeeta, Badiadka	30	1000	500	500	500
Sri Durga Parameshwari High School, Dharmathadka	23	-	-	750	1000
Holy Family Convent, Kumbla	58	-	500	500	500
Sadguru Sri Nithyananda Vidyapeeta, Kondevoor	140	-	-	1500	1500
Badiadka & Ednad Mahilodaya Members	20	150	250	250	250





is fading away due to high cost of labour and disintegration of traditional farm families to nuclear families and migration. The traditional method of pappad making involves drudgery and time-intensive, wherein the steam-cooked pulp is pressed manually between oil smeared plastic sheets. Keeping this in view, a light weight fibre frame developed by a farm innovator, G.K Hegde from Sirsi was procured and demonstrated. The oil-free technique popularized was feasible in terms of time, labour and production. This user-friendly frame was hence popularized through various skill-oriented training programmes. The oil free technique was adopted by more than 50 SHG groups in a single year and the production of jackfruit pappad has been revived.

Further, the technique has been refined by enriching it with Omega 3 rich flax seeds and spice mixes and introduced with variations for better marketability. The refined product with proper labelling and branding is promoted through various SHGs and women entrepreneurs, focusing on the nutraceutical contents and its significance. The pappad is sold in various exhibitions and Kisan melas organized by State Department of Agriculture, NGOs @ Rs 3-5 per pappad. Hence jackfruit pappad making is a potential enterprise which can be initiated with minimum cost and most feasible and replicable avenue for the traditional farming community.

### Cashew apple and other underutilized fruits

Other underutilized fruits of the region like cashew apple and kokum with nutritional significance as an excellent source of vitamin C and antioxidants have

been promoted through various activities under EDP and skill oriented trainings. The use of cashew apple in the region which was earlier limited to its utilization for preparing indigenous liquor and fermented juice for stomach ailments is now promoted as a refreshing health drink. The skill oriented training in extraction of juice using cashewapple juice extractor and separation of tannin from the fruit with rice gruel, a low cost technology, has promoted the utilization of this fruit and effective adoption of its technology for household use. The use of the fruit is further maximized through demonstration of other standardized products of CFTRI in the form of jam, hot and sour chutneys.

Kokum (*Garcinia indica*) an under utilized fruit grown in some homesteads in the region is a highly nutraceutical fruit with commercial importance. The indigenous processing, with crude method of extraction of juice which involved excess heating and unhygienic dehydration methods, was refined and promoted emphasizing on proper packaging, labelling and branding. Its medicinal use as a detoxifying agent, cardio tonic, weight reduction, anti-allergic and anti inflammatory properties was highlighted through various capacity building programmes for product promotion. Further, the indigenous use of brined kokum fruit with more than one year shelf life was documented and its use modified for wider use and marketability as a food adjunct.

The feasibility of value addition of Figs (*Ficus racemosa*), locally available in few homesteads in the region, considered a coolant and rich iron source with nutraceutical properties, is promoted through value



addition of green figs in the form of pickle. Brined figs are used in preparation of fig pickle with variations in the spices and condiments palatable to the regional taste. A woman entrepreneur, M/s Abhirama Food products, have been successfully processing the fruit as per seasonal availability and selling it @ Rs 160/ kg with a net profit of Rs 80/kg.

### **Revival and promotion of indigenous knowledge systems for health security and income generation**

Life style disorders have been on the rise in recent times. There is a visible concern among the public and an increasing trend in purchase of foods ascribed with medicinal/therapeutic value. India has a rich heritage of indigenous knowledge systems. Several indigenous techniques for utilizing the natural resources available within the region have been documented and its therapeutic properties promoted through value added products to address the health and nutritional security of the community at large. Further, the technical know-how of the practicing farm women/ home makers on the potential use of these sources is modified based on sound scientific principles and promoted as health-foods with proper branding and labeling. Indigenous sprouted horse gram chutney powder, curry leaf chutney powder, chutney mixes with incorporation of dehydrated tender sprouts of edible plants have been promoted to address health and nutritional security.

The traditional processing techniques with nutritional significance have been identified and revived through refinement. Feasible preservation techniques are demonstrated to promote it as an income generating

enterprise and also address health issues through its use in household remedies. Women are empowered and encouraged to utilize effectively the medicinal plant sources around to address commonly encountered health issues and its use with the focus on 'food as medicine'. Some of these products include indigenous use of carambola juice for therapeutic use as a coolant in measles and as an anti-inflammatory pain oil; use of banana seed (Kallu bale) for flushing out kidney stones; use of mature coconut water cream (gadi maddu/kula) as an anticoagulant in wounds; coconut based medicated oils for pain, burns and varicose veins and herbal hair oil from regionally available medicinal plant sources; medicinal preparations from fruits, herbs and spices such as amla, kokum, hippali, *Aloe vera*, turmeric, centella, arrowroot, ginger etc in the form of cough powder, syrup, churna, arishta and leha.

Under the EDP programme on labelling, branding and marketing of value-added products, more than 70 food products have been promoted through registered enterprises. This includes value added products from spices and condiments like various types of masala powders, enriched flours (chakkuli mix, poshak flour, omega 3 enriched wheat flour ), nutraceutical foods (sprouted ragi malt, sprouted ragi flour, omega 3 enriched flax seed chutney powder, sesame chutney, sprouted horsegram chutney, curry leaf powder); indigenous foods/products (sweet potato pappad, tapioca pappad, jackfruit pappad, banana vermicelli (refined indigenous technology), dehydrated amla, amla chew, indigenous chutney mix, banana flower





thokku (chutney paste), kokum chutney paste, passion fruit syrup, red rice products (minimally polished red rice, rice flour, flaked rice).

Innovative product preparations based on coconut was introduced through the activities of SHG groups. Coconut based chutney mixes which was earlier a part of the ethnic food system of the region has been revived and promoted as nutraceutical chutney mixes supplementing with nutrient-rich locally available pulses such as horsegram and sesame, jackfruit seed, curry leaf and kokum. Kokum leaf with nutraceutical properties is used as an alternative to tamarind in these chutney mixes.

### Promotion of nutraceutical mixes

Flax seed, being a rich source of omega 3 fatty acids, is important for cardiac health, brain development in infants and in regulating hormonal imbalances especially among adolescent girls and women. Flax seed is fortified in regional foods like chutney powder, wheat flour, salads and snack preparations. Village-level extension functionaries like ASHA workers, community extension workers, anganwadi teachers have been trained in production of these products for wider dissemination. Practical applicability and awareness regarding household nutrition security and production and promotion of organic foods is thereby emphasized.

A multi-grain supplement, “Poshak powder” containing a composite of cereals, pulses, oilseed, garden cress seed and “Ragi Malt”, which is used as a ready-to-use infant food, was popularized among vulnerable

groups through anganwadis as a health drink by imparting awareness among mothers and extension functionaries. A small-scale enterprise was initiated by a group of Asha workers from Badiadka panchayat “Yukti Home Products” for production of ragi malt powder, omega 3 enriched flax seed powder and poshak powder.

### Amylase-rich nutraceutical mixes

Ragi malt is a multi-purpose food item mainly used as weaning food for infants and as a beverage. Sprouted ragi reduces anti nutrients, makes it easily digestible, increases mineral availability and water soluble vitamins and enhance the activity of enzymes required for digestion. This nutrient and calorie dense food/ low bulk food is promoted to reach the vulnerable groups, especially children through various programmes under ICDS.

A variety of special foods that can be prepared with ragi malt as a base ingredient like ragi malt drink, weaning food, children's food and supplementary food were demonstrated to extension functionaries like anganwadi teachers, supervisors and ASHA workers. Similarly nutrient dense mix containing 3 cereals, 3 pulses and an oilseed were introduced as supplementary foods to upscale the nutritional status of the mother and child.

Two ASHA workers from Badiadka panchyat initiated production and sale of nutrient rich mixes which are sold during their house visits in the area of their work. The women employees are earning an additional income of Rs 2000/ month through the sale of this



hygienically packed enriched powders. Ragi malt is sold @ Rs 40/ 250g and poshak @ Rs 125/ 500g.

### **Production and promotion of indigenous spice mixes**

In view of the growing demand for the use of spice and condiment powders for culinary purposes and consequently the higher incidence of poor quality and adulterated spice mixes surreptitiously entering the consumer market chain. Indigenous spice mixes of the region and standardized mixes from Avinashilingam Institute of Home Science, Coimbatore were popularized through capacity building and entrepreneur development programmes. “Ethnic Kori Roti Masala Mix” and “Enriched chakkuli mix” were introduced and promoted through an enterprise initiated by “Mahalasa Food Products”.

### **Promotion of sustainable agriculture and food and nutrition security among weaker sections of society**

With the declaration of 2014 as the International Year of Family Farming by FAO, a few households at Koraga tribal colony near Bela in Kasaragod were motivated to initiate kitchen gardening with emphasis on securing a balanced diet, safeguard agro-biodiversity and sustainable use of natural resources.

### **Marginalized to mainstream: Extending a helping hand**

Basket making is the main supporting activity for the members of Koraga families. They are also skilled agricultural labourers. However to address improvement in their living conditions, habits and health status and to create interest through involvement in agriculture-related activities, various activities were initiated in the Koraga colonies at Periadka, Madathadka and Badiatka. This include facilitating planting of around 150 coconut seedlings for tender nut purpose, tapioca cuttings, jasmine cultivation, vegetable and fruit crop cultivation.

Several awareness programmes regarding use of low-cost nutritious food for improving their nutritional status were imparted. Through the constant intervention and rapport built with this generally reclusive tribal community, the members were subsequently exposed to various technologies at CPCRI through an exposure visit. Subsequently, few of the youth were trained in coconut climbing for taking it up as a sustainable income generation option. Smt Sumathi and her husband, Sri Amarnath, are two of the active members of the community who established a kitchen garden and a house-hold jasmine plot as a motivation for other members of the group to initiate the same.





## INNOVATIONS IN EXTENSION AND ENTREPRENEURSHIP DEVELOPMENT: FARMERS ON THE CENTRE STAGE

Over the past 25 years, Krishi Vigyan Kendra, Kasaragod has become a household name in the district and literally a second home for the farmers by virtue of its strong social bonds and the rapport that the institution has knit with the farming community. Since inception, various extension activities on agricultural technologies were organized by the KVK at many places across the district to bridge the gap between research institutes and the farming lands. As it is literally impossible to elaborate on all of them, veritably a massive effort, a few select innovative and novel initiatives are recounted here.

### **‘Krishiyidam’ Television documentary - An innovative tool for extension of technologies**

Krishiyidam’, the television documentary serial, launched on 26th of April, 2011 as a joint venture of KVK, Kasaragod and Kasaragod Vision channel could muster high viewership and wide acceptance among the farming community of Kasaragod. This innovative programme was conceived to give a wider exposure to the successful farmers of the district and also the front line demonstration of technologies through television, the most powerful mass media, the ultimate aim being attracting more people, especially the youth, into agriculture and associated enterprises.

Every episode in this well-structured programme had



three segments: Parichayam, wherein the farmer was introduced to the public, Anubhavam, the time for experience sharing by the farmer (through interview as well as demonstration of technologies) and Saanketika Vidya highlighting a particular technology compatible with the topic of that particular episode (elaborated by a SMS from KVK or an external expert). A wide range of technologies relevant to the farmers of the district like scientific cultivation of banana, scientific quail rearing, soil and water conservation structures, bush pepper cultivation, processing techniques of jackfruit, disease management in cattle and poultry, processing of honey, tissue culture banana cultivation, disease management in arecanut, vegetable garden, processing of coconut, pest management in vegetables, scientific management of pigs, different devices for coconut palm climbing, Friends of Coconut Tree training at KVK, mushroom cultivation as a



remunerative enterprise for school children, scientific jasmine cultivation and fodder grass cultivation along with a model practitioner were showcased for better conviction.

It was a great achievement that the KVK could telecast 25 episodes at weekly intervals in a period of six months. The programme had a wide acceptance as per the rating scores of Kasaragod Vision Channel which has more than 90% coverage in Kasaragod district. The feedback from the farmers with over one thousand phone calls/enquiries received soliciting details of the technologies as well as the concerned farmers in each episode indicate that the objective of Front Line Demonstration through mass media was also met effectively. The programme was very successful as it could bring about very good exposure to the success stories of farmers of Kasaragod district. Another dimension to great impact is that the farmers gained high reputation through many ways - social recognition, increased demand for their products etc.

### Farmer-Innovators to the limelight

A KVK-NABARD partnership initiative, Farmers' Monthly Interface Programmes with farmer-scientists under Farmers' Technology Transfer Fund (FTTF) of NABARD was formally launched by Sri. N. Gopalan, AGM, NABARD, Kasaragod with the inaugural function on 26th of April, 2011 at CPCRI, Kasaragod. The major objective of this programme was to attract the attention of farmers to successful venture or innovations by another farmer and thus to get them inspired and motivated to adopt the technology.

Topic for the inaugural edition 26 April, 2011 was 'Improved Dairy management practices –Innovative drinking water system in cattle sheds'. The innovator-



farmer of the month, Sri. V P Divakaran Nambiar from Parappa, demonstrated the working of the system with a model with the scientific explanation on the innovation given by the Veterinary Surgeon, Kasaragod. Characteristic features of the innovation were assured constant availability of sterile drinking water to the cattle, reduced labour charges, cost effectiveness, hygiene, etc. As an Impact of the programme, MILMA has taken up this innovation to be installed in more than 1000 dairy units in Kerala.

The workshop in May was on the topic "Farm Mechanization" led by two farmer-scientists, Sri. Simon George from Kannur and Sri. Prakashan Thattari from Kozhikode. Sri. Simon George presented his innovations like Modified Rocker sprayer, Polybag filling device, trolley to move pots and polybags, while





Sri. Prakashan Thattari detailed his innovation, a remote control operated coconut palm climbing device.

About 300 participants attended the programme. The prototype of the coconut climbing robot received wide media coverage. Enormous phone calls were received at KVK, Kasaragod and by Mr. Prakashan Thattari from fellow farmers, research institutions and financial institutions from within and outside Kerala, all enquiring about the details of the coconut climbing robot. Mr. Prakashan Thattari was offered financial assistance by several banks in response to the press reports. Mr. Prakashan Thattari is now offered technical support by NPOL (National Physical Oceanographic Laboratory), Kochi and the work of fabricating the machine has been started. Mr. Simon George received several booking orders for Simon's High Rocker Sprayer from many of the participants.

The programme for June on "High Yielding Varieties of Spices" was led by two farmer-scientists, Sri. T.T.



Thomas from Idukki for his innovation - a high yielding variety of pepper "Pepper Thekkan" which according to him yields 8.6 tonnes (dry weight) per hectare and Sri. Saji Mathew from Kozhikode for his innovation, "Nova" - a promising variety of nutmeg which, he said, would yield 2000 fruits from an 8 year old tree. The programme received wide media coverage. Nearly 10 participants visited the pepper plots of Sri. T. T. Thomas at Kattappana on their own interest and procured planting materials of Pepper Thekkan.

The July edition was on "Wall Tile manufacture from the shells of Green Mussel (Kallummakkaya)" led by a farmer-scientist, Sri. Kaduthodil K. J. Mathachan from Kasaragod. Being a successful farmer in fresh water pearl culture, Sri. Mathachan has by now gained attention all over Kerala. He has come out with an interesting innovation - manufacturing wall tiles from the shells of green mussels. This innovator was appreciated by the District Collector of Kasaragod in person and he suggested a cluster approach for the manufacture of these tiles. In a district like Kasaragod wherein a lot of people are engaged in green mussel farming, this technology can be taken up as a remunerative enterprise.

The fifth monthly workshop in August was on "Low cost Digital Incubator" devised by the innovator-farmer, Shri. P.A.Chandran from Kasaragod which can be used to hatch eggs of hen, duck, quail, turkey, etc. simultaneously. Made up of GI sheet, with a capacity of hatching 100-200 eggs per batch, this device costs just Rs.10,000, whereas the cost of incubators



currently available in the market is very high and often unaffordable by small scale farmers.

The workshop in June on “Eco-friendly agriculture” was led by two farmer-scientists, Sri. P.V. Divakaran from Kasaragod and Sri. N. Vasan from Kannur. Shri. Divakaran demonstrated the use of climber-friendly devices that can be used by coconut and arecanut palm climbers to avoid knots and warts on their hands and legs. Shri. Vasan has outlined a very simple and highly effective technique of using red ant colonies to control tea mosquito bugs, a major pest problem in cashew growing areas. He adds that farmers get Rs. 5.50 from a rupee invested on this, whereas return from pesticide application was Rs.1.50 for one rupee invested. In the backdrop of the declaration of Kasaragod district as a “Jaiva jilla” (organic district), this innovation has proved useful to the farming community of Kasaragod.

“E M Technology for Sustainable agriculture and Waste management” was the topic for October, presented by Sri. V. Premnath, Director, EM Technology Mission, Kozhikode. ‘Effective Micro-organisms’ is a simple and cost effective method to decompose biowaste, as just 5 litres of diluted EM solution can convert 1 tonne of organic waste into useful compost.

The eighth one in the series (November event) was on “Modified Pepper Thresher”, developed by Shri. Gopalakrishna Sharma of Kasaragod. This machine driven by a 0.5HP motor has a threshing capacity of 250 kg/hour (2 tonnes/day) and is more hygienic as the detached undamaged berries get collected in



a container at the bottom of the machine. KVK has assisted Sri. Gopalakrishna Sharma in filing patent document for his innovation. In due recognition of his innovation, Sri. Sharma was invited by ICAR to the Meeting on Entrepreneurship Development at New Delhi. He is also receiving several booking orders for the machine.



The focus of the ninth monthly interface in December was “Labour-saving Dairy Management Practices”. Sri. D. Subrahmania Bhat from Yethadka, Kasaragod demonstrated the use of Reverse-Forward (R-F) switch as a churning device in slurry tanks for effective mixing of cowdung slurry. The tenth monthly workshop in February 2012 was on “Diversification in shrimp culture”. Sri Purushothaman from Payyannur, a veteran in this field, detailed the possibilities of growing a peculiar species of shrimp which can be used for high density farming.

The eleventh and the concluding interface programme was conducted on 24-04-2012 at CPCRI, Kasaragod on the topic ‘Low cost micro sprinkler irrigation system’. Sri M Avaran from Malappuram shared his experiences and idea behind the innovation of the micro sprinkler irrigation system called ‘Mayilpeeli sprinkler irrigation’.



According to him this system ensuring high water use efficiency is adoptable for all types of crops like plantation crops, fruits and vegetables. Clogging of drip emitters can be avoided by this micro sprinkler and this sprinkler is economically viable. A total of 400 farmers have already adopted this system and laid out in more than 2000 acres of agricultural land.

A most notable feature was that every monthly programme was concluded with highly informative sessions by the AGM, NABARD, the LDM, Syndicate Bank and officials of the State Horticulture Mission who briefed on the farmer-friendly agricultural credit facilities and other services extended by NABARD, banks and the state department of agriculture, ensuring convergence of various extension and developmental agencies working for the welfare of farmers. The Monitoring Committee with experts from KVK and NABARD lauded the implementation of the programme in a systematic manner. The programmes attracted wide media coverage and publicity and were well appreciated by the farming community in Kasaragod district and elsewhere in the state.

### **Other Innovative methods adopted for effective technology transfer**

#### **Trainee-farmers as resource experts for popularizing vermicomposting technology**

The Central Plantation Crops Research Institute has made a tremendous achievement towards building soil health by identifying a local earthworm closely related to the African night crawler, *Eudrilus sp.* and standardized the methodology of vermicomposting of coconut and



arecanut palm wastes using this earth worm species. This vermicomposting technology is being promoted and popularized by KVK by implementing the concept of trainee-farmers as master farmers and resource experts in terms of teaching knowledge, skills and supply of nucleus earth worms.

A total of 20 contact farmers were identified among the trainees who underwent training programmes on vermicomposting technology and were fully supported for establishing vermicomposting units as well as trained them to become master trainers. The primary trainee-farmers further identified and trained fellow farmers. Thus the concept of trainee-farmers as resource experts for popularization of vermicomposting technology was found to be highly successful and the impact created in terms of technology spread, production increase, soil health and environmental benefits are highly worthy.

The benefits derived by the identified farmers through this concept are as follows:

### Production of vermicompost

- On an average, 40 t of vermicompost was produced by the 20 identified trainee-farmers in their own farms within a short span of three years by utilizing 64 t of waste biomass.
- This compost was utilized in their own farms to various crops for supplying 720 kg N, 80 kg P and 160 kg K besides supplying considerable quantities of organic matter and micronutrients to the soil.

- The vermicompost thus produced could save addition of inorganic fertilizers like urea (1565 kg), rock phosphate (400 kg) and muriate of potash (265 kg).
- This process helped farmers to save the expenditure incurred on inorganic fertilizers (around Rs.10,000) and also improved soil health by avoiding chemical fertilizers.

### Production of earth worms

- A total of 1,60,000 earth worms were sold to fellow farmers as a critical input for establishment of vermicompost units.
- Farmers sold earth worms @ 30 paise per worm thus they could earn Rs 48000 out of total sale.
- It is to be noted that the cost of earth worms was lower as compared to research institutions because of neighbourhood relations.

### Socio-economic changes

- Better social status, social service, human relations, public contacts, leadership qualities, good will etc among the identified trainee-farmers were observed.
- On an average, it is found that farmers could save Rs.3,540 on procurement of organic manures.
- In case of inorganic fertilizers, there is 66.66% reduction in procurement of urea, 45.45% reduction in procurement of potash, 61.53% reduction in procurement of factomphos and 66.66% reduction



in the case of 17:17:17 fertilizer. All put together, farmers could save Rs.10,000/- expenditure on inorganic fertilizers.

### Soil health

- Perception of majority of the identified trainee-farmers indicated that application of vermicomposting could result in the improvement of soil fertility, moisture retention capacity of soil, texture of the soil, crop growth, reduction in pests and diseases, farm waste recycling, reduction in use of chemical fertilizers, reduction in transportation cost on fertilizers and interval between two irrigations.
- Some of them perceived that the practice could help in the improvement of yield, keeping quality, colour, size, taste, marketability, reduction in health hazards and reduction in use of their organic manures.

### Technology promotion through trainee-farmers

- Identified trainee-farmers extended services to many neighbouring farmers to establish vermicomposting units.
- Sold 1,60,000 earth worms to the neighbouring farmers enabling the fellow farmers to utilize 160 t of waste biomass.
- This is almost two and half times as compared to the waste biomass converted by the identified trainee-farmers.

- Identified 60 secondary level of contact farmers among the farmers to whom they sold earth worms.
- It was observed that a few farmers started vermicomposting units with the intention to become resource experts in their vicinity.

Thus, this concept of using trainee farmers as resource experts for promoting agricultural technologies may be followed in similar situations for speedy transfer of technology process in the country.

### On the spot diagnosis and remedial measures to a specific problem faced by farmers

Though public extension system made available to the farmers for the necessary information, majority of them still depended on fertilizer/pesticide dealers for advice regarding farm health related problems. Thus, indiscriminate and untimely use of fertilizers and pesticides created serious problems like emergence of new pests/diseases and the phenomenon of minor pests assuming major status, as well as the manifestation of nutritional deficiency/toxicity disorders in crops. Hence, appropriate and timely diagnosis of plant health hazards caused by biotic and abiotic factors is very important. Effective management of these at farm level is to be effected through prompt farm advisory services.

### Concept

On the spot agro-clinic services is meant for providing on the spot diagnosis and appropriate recommendations for the farm related problems by a



multi-disciplinary team of experts being extended to the farmers of Kasaragod district.

### Objectives

- For rendering quick and prompt need based farm advisory services with out time lag.
- To perform on the spot diagnosis of farm level problems pertaining to soil, water, nutrients, pests and diseases and to provide remedial measure options.
- To serve as information source for all types of inputs like seeds, fertilizers, pesticides, farm machinery etc.
- To disseminate appropriate scientific packages.

### Modus operandi

On the spot agro-clinic services are extended to the needy farmers as per their request through the Officials of State Department of Agriculture in Kasaragod district. On the receipt of the request, schedule of the visit is being fixed through the discussions with farmers, concerned Agricultural Officer and team of experts over telephone. Field visits for problems diagnosis and spot recommendations in prescribed format are being arranged in the forenoon followed by an interaction meeting (Scientists-Extension Functionaries-Farmers) in the afternoon to appraise the modern technologies and to answer the farmers' queries.

### Out come

Extended spot diagnosis and recommendations

to 75 farmers belonging to East Eleri, West Eleri, Cheruvathur, Madhur, Mogral Puttur, and Meenja panchayats.

Diagnosed problems are bud rot in coconut, stem bleeding disease in coconut, nut fall in arecanut and coconut, rhinoceros beetle in coconut, stem borer in paddy, fruit and shoot borer in bhendi and leaf spot in amaranthus.

Based on this experience, we have submitted a project proposal for establishing Plant Health Clinic (PHC) at KVK with an estimated budget of Rs.20 lakhs and SHM has sanctioned the budget during 2008-2009. The well equipped PHC was inaugurated at KVK during 2010.

### Farmers - scientists' interaction : A knowledge sharing approach

This comprehensive and holistic approach has the inherent capacity for the flow of knowledge between the scientists and farmers, with mutual benefits.

The methodology involves mainly four principles viz. (i) caring the uncared, (ii) reaching the unreached, (iii) teaching the untaught and (iv) learning the unlearned.

The programme was implemented in 43 target farmers/ entrepreneurs fields belonging to 22 gram panchayats viz. Chengala, East Eleri, Puthige, Kumbala, Manjeswar, Meenja, Kumbadaje, Enmakaje, Madhur, Karadka, Pullur-Periye, Kallar, Karindalam, Badiadka, Chemnad, Bedadka, Pallikkere, Belal, Mangalpady, Madikai, Kodom-belur and Mogral Puttur in Kasaragod district of Kerala.



Sharing of ideas, knowledge and experience between farmers and scientists resulted in formulating situation demand research programmes as per the desires, problems and abilities of the farmers and made route to implement participatory research programmes effectively for technology assessment and refinement in real farm situation.

The data generated during the programme were compiled and brought out as a publication entitled : Farmers-Scientists Interaction - A knowledge sharing approach.

### **Farmer - Producer Company on the auspices of KVK**

The farming community in Kasaragod was not getting remunerative prices for their agricultural produces and was forced to resort to distress-selling of their produces during glut season. The main crops like banana and seasonal fruits were fetching below par prices. The farmers from the district found it very difficult to find markets for their produces like honey since the major market for honey is mainly in cities and there were very few takers for unbranded products. Under these circumstances, it is very much imperative that the farmers unite together to process and add value to their produce, market them under a trusted brand for realizing a reasonable value for their products.

The Government of India through NABARD initiated a scheme to organize farmers under one umbrella called “Farmer Producer Company” by providing a seed funding to form such farmer owned companies.

KVK-Kasaragod provided necessary guidance and hand-holding to farmers of Kasaragod district for the formation of a farmer-producer company.



### **Advantages of producer companies**

- A producer company is a hybrid between a private limited company and a cooperative society, thus enjoying the benefits of both.
- The ownership and membership of a producer company is held by primary producers or producer institutions and it cannot be taken over by others and hence the benefits are accrued to the shareholders.
- The liability of the members is limited to the unpaid amount of the shares held by them only and hence private assets of the members are safe from company losses, if any.



- The area of operation of producer-company is the entire country which gives flexibility to expand.
- The minimum paid up capital for a producer company being Rs. 1.0 lakh and the minimum authorized

capital being Rs. 5.0 lakhs, it is easy to mobilize the funds by farmers. Also, the minimum membership required is 10 and there is no maximum limit and hence any number of farmers can join together to form a company.

### **Saga of 'Tulunadu Ecogreen Farmers Producer Company Limited'**

The ICAR- Krishi Vigyan Kendra, CPCRI, Kasaragod, had been organizing various training programmes on cultivation, value addition of seasonal fruits and bee keeping, creating a vast pool of skilled potential entrepreneurs in the district. The idea of a farmer-producer company sprung up from the realization that farmers, the prime movers of the agricultural economy, are unfortunately the only player in this agricultural commodity value chain not able to leverage his bargaining power to his advantage.

#### **Hand-holding by KVK**

Taking advantage of the new initiative of the NABARD, KVK put forth a proposal for funding of a farmer producer company and the same was approved by the NABARD for the formation of a company for marketing of honey and organic pepper. The KVK convened a meeting of lead farmers of the district in May 2016 to discuss the possibility of forming such a producer company in Kasaragod and the idea was well taken by the

farmers who readily agreed to take the lead role. Lead farmers/ promoters were deputed to attend various meetings to get an overview of the activities and advantages of a producer company. The promoters pooled together Rs. 1.0 lakh as paid up capital for the company. The Registrar of Companies provided the necessary approvals and the company was incorporated under the name 'Tulunadu Ecogreen Farmers Producer Company Limited' on 21st December 2016 under the Companies Act 2013. The first AGM held during March 2017 adopted the articles of association and the memorandum of association, and elected Smt. Annamma Jose as the Managing Director of the company. Further the lead farmers, Mr. Joji P. Daniel, Sh. Vijayan, Sh. Preman, Sh. Muneer and Sh Charly Mathew were elected as the directors of the company.

#### **The company spread wings**

The company pooled in more resources by broad-basing the shareholding for the expansion of operations of the company. A factory was taken on rent at Kalichamaram in Kinanoor Karindalam panchayat and applied for various mandatory clearances like panchayat licence, pollution control







certificate, health certificate, water quality certificate and electricity connection which were obtained for starting commercial production of value added products like squash, jam, jelly, syrup, masala powders, cereal products, jackfruit products, nutrimix powders etc. The company has now obtained FSSAI and GST registration.

The company started agglomeration of honey during June 2017 and the honey was processed

and bottled into small containers for marketing. The company chose a brand name "EcoGold Honey" for its branded product and a tagline "Use Eco Gold Honey for wisdom, beauty, health and long life". The branded honey and the logo were released by Shri A.G.C. Basheer, President, Kasaragod District Panchayat during a ceremony at CPCRI. Presently, the company has increased the total number of shareholding to 70 and a share capital of Rs. 4.0 lakhs collected from shareholder farmers.





## ROLE MODELS FROM KASARAGOD

**A**griculture is the backbone of Indian economy. Around 70 % of India's population lives in rural areas and their prime occupation is farming. Transfer of useful and relevant agricultural technologies are very important for effective farming and production. In the present era of technological advancements, the dissemination of appropriate technologies to the end users suiting to their prevailing agro ecological situations is posing a great challenge to the extension system. Each and every agricultural organizations or agencies in India are generating enough of technically sound, culturally compatible, ecologically sustainable, economically viable and practically feasible technologies from time to time. But the benefits of these technologies will be derived only when they reach farmers in a meaningful way.

Here are some farmers who have excelled in their farming activities through innovative ideas. Their contacts with KVK, ICAR-CPCRI resulted in adoption of

recent agricultural technologies by way of technological interventions through restructuring of existing farming situations, leading to their recognitions as lead farmers with sustainable farming system approach. The mutual sharing of knowledge and experience enriches the agricultural tradition and culture and they emerge as role models for the farming community. The enterprising nature as well as innovative attitude helps them in realizing rich dividends from farming activities in a sustainable manner. The major achievement of these progressive farmers is that they inspire young generation so as to attract and retain them in farming sector. In fact, KVK extends whole hearted support in terms of technological interventions, technological inputs, credit facilities, insurance coverage etc. to them through various mandatory activities for their overall development. Their farm holdings serve as training resources of KVK and it shows how meticulously they integrated eco friendly approaches to a sustainable farming model.

### Farmer Profile

Name: Sri. A. M. Subramanyan Nair

Address: Kalichanadukkam,  
Kodom Belur Panchayath, Kasaragod

Ph. No. 9447708149

Age: 65 yrs

Education: High School

Total land holdings: 15 acres

Main crops: Coconut, arecanut, paddy and vegetables



Sri. A. M. Subramanyan Nair is a progressive farmer following integrated farming practices in letter and spirit. He is the recipient of the prestigious Karshaka Shree Award 2000 for his comprehensive farming practices. This award instituted by Malayala Manorama, a leading national news paper is in fact the biggest award bestowed on an individual farmer in Kerala comprising a prize money of Rs. 2,00,000/, a gold medal and a citation. He has bagged more than





10 awards at Panchayath and district level for his successful farming models. He is a very enterprising farmer who started cultivation by farming in 35

cents initially and grown slowly to own 15 acres at present. He cultivates coconut, arecanut, banana, paddy and vegetables with diary as a subsidiary enterprise. The main technological interventions from KVK comprise crop health management and drought mitigation measures in coconut. He gets water from natural springs, surangams and open wells. He uses pressurized irrigation system for irrigating crops. His farm is a role model for agriculture as a successful enterprise to the farmers of Kasaragod district. One could find in him the personal conviction to innovate and implement new ideas on farming.

### Farmer Profile

Name: Sri. A. Rajan

Address: Kuttianam House,  
Kanhirapoil, Madikkai Panchayath,  
Kasaragod

Ph.No. 8547240645

Age: 45 yrs

Education: Pre-degree

Total land holdings: 10 acres

Main crops: Coconut, arecanut, pepper,  
paddy and vegetables



Sri. A. Rajan, a young progressive farmer and a contact farmer of KVK, is the recipient of Kshonimithra award sponsored by the Government of Kerala during 2014 for his comprehensive farming practices meticulously adopting proper soil and water conservation methods. His farm is well maintained and properly planned with mixed cropping system. The biggest problem he faced during the previous years was the non availability of water for irrigation during the summer months. With proper directions provided by KVK and CPCRI he had remodeled his farm with properly planned bench terraces with stone pitching and made a large number of catch pits for water harvesting. Further many farm ponds were made to conserve the excess runoff water during the rainy months which was used for irrigation. He also uses other in situ water conservation measures





like husk burial and half moon bunds and planting of pineapple and vetivar along the borders of terraces. These measures helped him in conserving and recharging the ground water resources without allowing a drop of rain water to spill out resulting in sufficient water for irrigation during the summer months. His check dam is a model for other farmers in the panchayat. He inspires fellow farmers to adopt proper soil and water conservation measures and drought mitigation measures like husk burial to save each drop of water in their farms.

### Farmer Profile

Name: Smt. Lakshmi V.Bhat

Address: Abhirama House,  
Soorambail Post, Ednad, Kumbla ,  
Kasaragod – 671 321

Ph.No. 9961502446

Age: 53 yrs

Education: SSLC

Enterprise : Seasonal fruit products, nutraceutical foods, Indigenous refined food and medicinal products.

Smt. Lakshmi V. Bhat a trained beneficiary of KVK empowered with technologies related to food processing is now a 'Master Trainer" and a role model motivating women groups and empowering them in various activities related to seasonal fruit preservation, production of nutraceutical foods, revival of traditional foods, Use of eco friendly



technologies like vermicomposting, arecanut leaf sheath plate making, organic vegetable production through use of biopesticides and income generation through production and promotion of quality foods addressing the issues related to food and health security. Through Home Scale production she earns an additional income of Rs 2000- 3000 /month .



### Farmer Profile

Name: Smt. Sumathi Manoharan  
 Address: Udayanagar House,  
 Pullur, Kasaragod  
 Ph.No. 9495880150  
 Age: 42 yrs  
 Education: SSLC  
 Total land holdings: > 50 Cents,  
 Home Stead Cultivation,  
 Enterprize : Mushroom Cultivation



Smt. Omana attended a training programme on Mushroom cultivation at KVK and started a small scale mushroom unit at her house and was producing 6 Kg Oyster mushroom per month initially which was used for household purpose and supplied to neighbours occasionally. When the demand from neighbours for mushrooms increased, she prepared 3 to 4 beds once in two days and slowly increased the production to meet their demands. Later on, with



financial assistance from the state department of agriculture, she expanded and strengthened the unit. She started producing 2-3 Kg mushrooms per day and earned Rs. 5000/- to Rs. 7000/- per month as an additional income. Further, she started cultivating milky mushroom through KVK intervention and at present she produces 3- 4 Kg mushroom per day and earning an income of Rs. 20000/- to 25000/- per month by selling mushrooms @ of Rs 250 – 300/- per Kg.

### Farmer Profile

Name: Sri. Joji P. Daniel  
 Address: Pullanchery, Kattamkavala,  
 Chittarickal, West Eleri Panchayath,  
 Kasaragod  
 Ph.No. 9447880525  
 Age: 43 yrs  
 Education: Pre-degree  
 Total land holdings: 9.5 acres  
 Main Crops: Coconut, arecanut, nutmeg, pepper,  
 cocoa, tuber crops and vegetables



The farm of Mr Joji, a young farmer is an 'open school' itself for enthusiastic young farmers and agricultural students as one gets exposed to a range of intense and diverse farming activities there. He regularly attends farmers' meetings at CPCRI and KVK and gets acquainted with latest technologies for sustainable farming.

He promptly follows good agricultural practices like crop rotation, incorporation of leguminous plants for improving soil fertility, organic recycling





of farm waste, mulching etc. In the coconut based integrated farming system, he has two cows and one heifer, fodder grass, poultry birds, honey bee colonies, vermicompost units, bio gas plants and a l s o freshwater fishes like Tilapia and c a r p varieties in tanks and ponds. The highlight of his farm is that adequate soil and water conservation measures are adopted throughout the farm with around 300 rain pits and inward sloping terraces with stone pitching in 1500 m length. The roof top water harvesting structure and farm ponds can store around 16 lakh liters of water. Coconut husk burial is a common practice adopted

in trenches made between rows of coconut palms for moisture retention. In peak summer time also, there is no shortage of water in his farm whereas the neighboring areas are hit by drought as prolonged dry spells are generally experienced in the district.

He is the recipient of state level Karshaka Mithra award instituted by Kerala Government for the first time in 2014. This award is for individual farmers who are propagating sustainable farming models among fellow farmers. He has also bagged the Karshakasree award for the best farmer by the Kathir Malayora Karshaka Samithi, Block level Best Coconut Farmer award from the Nileswaram block, Best Lead Coconut Farmer award by CPCRI and Regional Agricultural Research Station, Pilicode. Mr Joji was SAC member of KVK, Kasaragod, he is also holding other positions like contact farmer for the NAIP activities of CPCRI, block level governing body member of ATMA, president of Coconut Producers Federation and Co-ordinator of Sauhruda Farmers' club.

#### Farmer Profile

Name: Sri. A. Kunhambu Nair

Address: Vayaravally, Periye,  
Pullur-Periye Panchayath, Kasaragod

Ph.No. 9947634224

Age: 68 yrs

Education: SSLC

Total land holding: 3 acres

Main crops: Coconut, pepper, arecanut, banana and vegetables



Mr. A. Kunhambu Nair is a full time farmer for the last 50 years. He has 3 acres of land in which 2.5 acres of land he is cultivating coconut, arecanut, pepper and banana. Now, he has started to cultivate vegetables in 2 acres of leased land along with fellow farmers. He is cultivating the local variety of coconut palms in 70 cents of land which is intercropped with black pepper. He is adopting a wider spacing of 9m x 9m,





so as to accommodate all intercrops. He uses only bio-pesticides or biological or physical methods for pest and disease management like *Trichoderma*, light traps etc.

He is a progressive farmer willing to adopt new and innovative agricultural technologies in his farm and a partner farmer of KVK. He is in the forefront to showcase recent technologies disseminated by KVK with his fellow farmers. He served as the lead farmer in popularizing and promoting eco-friendly technologies for the management of banana pseudostem weevil very successfully.

He had bagged the prestigious Haritha Keerthi award sponsored by VFPC at district level for his contributions in organic banana cultivation. He was the recipient of Best Pepper Farmer award given by ATMA at block level and panchayath level. He was also bestowed with several awards by the Krishi Bhavan such as best banana farmer, best pepper farmer, best integrated farmer etc.

#### Farmer Profile

Name: Smt. Omana. C.N.

Address: Lakshmi Nivas, MG Colony,  
Vidya Nagar, Kasaragod

Ph.No. 9497602992

Age: 52 yrs

Education: Pre Degree

Products : Jam, Squash, Pickle, Coconut cutney powder and confectionary products

Smt Omana, Vidya nagar, Kasaragod has attended many training programmes at KVK on Post harvest management, harvesting, handling, grading and packaging, storage and value addition



in horticultural crops. Technical skills on processing and value addition were imparted through practical demonstrations, training and exposure visits. She started commercial production of mixed jam, squashes and variety of pickles. After acquiring skills and knowledge related to fruit & vegetable





preservation, she purchased the inputs from local market and prepared variety of pickles. The products were sold in the brand name of “Meenus food products” to departmental stores, public meetings and SHG exhibition. She further submitted a project proposal under PMEGP to avail financial assistance of Rs 1.0 lakh for strengthening of the enterprise and employment generation to other rural youths. Later, she obtained the SSI registration for the unit which

enabled her to avail the benefits provided by the government under various schemes and the product could find a place among the established branded food products which made marketing easier. She is successfully running the unit and earns an average income of Rs. 6000 to 8000 per month to meet the day to day expenditure. She is happy to get succeeded in her venture and is a role model for other women entrepreneurs of the district.

### Farmer Profile

Name: Mr.P. Radhakrishnan

Address: Punjamgode House,  
Mallam, Muliyar Panchayath,  
Kasaragod

Ph.No. 9645626144

Age: 50 yrs

Education: P.D.C

Total land holding: 3.5 acres

Main crops: Coconut, arecanut, paddy, banana and vegetables



Mr. Radhakrishnan, an enthusiastic young farmer belonging to Muliyar panchayath in Kasaragod district has demonstrated that cultivation of vegetable crops alone can fetch regular income round the year. In his vegetable plot of 02 acre area, a range of vegetable crops such as bhindi, cowpea,

bitter gourd, ridge gourd, snake gourd, cucumber, chilly, brinjal, cabbage, cauli flower and amaranthus are being grown on rotation basis in such a way that he can send two or three items of vegetables daily to the local market.

Traditionally, his family is following integrated farming system with crops such as coconut, arecanut, paddy, pepper, banana, vegetables integrated with poultry and dairy. He switched over to organic farming without suffering much loss by replacing all chemical inputs in a phased manner. Besides vermicomposting which was already done by him, he was trained on coir-pith composting methods and multiplication of bio control agent, *Trichoderma harzianum* in cowdung-neem cake mixture. He has bagged several awards at panchayat, block and district level as well.





This model realizing maximum returns from minimum unit area through healthy and safe cultivation practices, is highly appreciable and would attract and motivate more youngsters to take up agriculture as a noble profession.

His farm is considered as a model plot for arranging exposure visits of farmers and agricultural extension officials from the district as well as state.

#### Farmer Profile

Name: Shri E.Radhakrishnan

Address: Prasanna Nivas.

Pollakkada, Haripuram,  
Pullur Periya

Panchayath, Kasaragod

Ph.No. 9946458026

Age: 56 yrs

Education: SSLC

Total land holding: 5 acres

Main crops: Coconut, arecanut, pepper, fodder grass, banana and vegetables



The farm of Shri Radhakrishnan is an excellent model for integrated farming system and is a farm school for students of agriculture. The farm in an area of 5 acres of coconut garden is integrated with intercrops like black pepper, banana, fodder grass, vegetables, fruit plants etc. and is an excellent water harvesting and conservation model with adequate coconut basin

management practices. The water harvesting pits and a farm pond ensure the collection of maximum rain water which is used for irrigation purpose. The plot is made into terraces for conservation of soil and cultivation of intercrops. The intercrops like pepper, banana, vegetables and fruits ensure additional income round the year. The irrigation is done with drip, micro-sprinkler with fertigation facility. A vermi-composting unit ensures recycling of farm waste into valuable organic manure thereby reducing the cost of fertilizers to a great extent. He also maintains 5 cows, 15 goats, 20 poultry and 20 ducks which fetch him daily income, besides 20 bee colonies established for pollination support for increasing crop productivity. Solar electric fencing prevents intrusion of wild animals like wild boars, porcupines and peacocks apart from stray animals thereby protecting the crops.





Thus, this farm is a complete model farm fetching regular income and optimum utilization of resources. The KVK extends necessary advisories and assistance for maintaining this sustainable farming model. He is the recipient of several prestigious awards including Kadaleevanam award for the best farmer and second best coconut farmer award at panchayat level.

### Farmer Profile

Name: Shri Abdul Hameed .M.K.

Address: Dharul Aman.

Thankayam,  
Thrikkarippur Panchayath,  
Kasaragod

Ph.No. 9400912923

Age: 53 yrs

Education: PDC

Total land holding: 10 acres

Main crops: Coconut, arecanut, pepper, banana  
and vegetables

Sri. Hameed, a Gulf returnee, attended the vocational training programmes on Bee keeping and Stingless bee keeping organized by KVK, Kasaragod and as a part of the training programme, he was given seven bee colonies with 50% subsidy from SHM. Once got exposed to all aspects of beekeeping, he managed the colonies as per scientific norms and could able to strengthen



the unit by dividing the colonies to around 28 by the honey flow season of 2015 – 2016 (December - January). During the same season, he was able to extract 6.78 quintal of honey and through this he raised an additional income of Rs.2,03,400. With his experience of working in a multinational company, he started a honey-based marketing company, procuring honey from other bee keepers as well and marketed around four tones of honey in the brand name, 'Mambee Honey'. Through this activity, he has extended a helping hand to his co trainees by giving them Rs. 20 per kg more than the market rates.



### Farmer Profile

Name: Sri. Aboobacker Siddique. K.

Address: Khandige Farms,

Saravu, Perla,

Enmakaje Panchayath,

Kasaragod

Ph.No. 9447025034

Age: 40 yrs

Education: Pre-degree

Total land holdings: 12 acres

Soil type: Lateritic

Type of farming: Irrigated

Main Crops: Coconut, arecanut, fodder grass, pepper, cocoa, banana and vegetables.



Sri. Aboobacker Siddique is a role model for the young generation of the district in terms of sustainable cropping and farming activities. He is the member of 10th ward of Enmakaje panchayath and also an integrated farmer. He cultivates coconut, arecanut, cocoa, fodder grass, pepper, banana and vegetables in around 10 acres of land. He integrates dairy, poultry, fisheries and bee keeping with his farming system. In his dairy unit, a total of 130 cows including 20 heifers are there. The dairy unit is almost mechanized with pressure washer, milking machines, safe automatic drinking water facility and chaff cutter. He initiated his unit availing a loan facility from Perla service cooperative bank and later developed the same with the assistance of Kasaragod district cooperative bank. The fodder grass varieties, Co3, Co4 and Sampoorana varieties are cultivated in around 20 acres of barren land took on lease for which recently he got a state level award for the best fodder garden developed in a barren land from the Dairy development department of Kerala. In 2016-2017, he was awarded the best dairy farmer of Malabar zone of Kerala by the MILMA. Further, he was adjudged as the best dairy farmer at district level also.



### Farmer Profile

Name: Shri C.N.Narayana Hebbar

Address: Choukar House

Bella Village, Badiadka Panchayath

Kasaragod,

Ph.No. 9446222192

Age: 50 yrs

Education: PDC

Total land holding: 5 acres,

Main crops: Coconut, arecanut, pepper, coca, fodder grass, banana and vegetables



Sri.C.N.Narayana Hebbar, an enterprising and dynamic farmer, developed his farm in a sloppy undulating terrain by successfully adopting suitable soil and water conservation methods such as stone pitched bench terracing and rain pits. His traditional farm had crops like coconut, arecanut, banana and pepper along with a well established dairy unit. He restructured this model by integrating high yielding varieties of coconut seedlings, fodder grass varieties (Co-3, Co-4 and Co-GG3) vegetables, cocoa and other components such as bee keeping, vermicomposting, biogas plant etc. The farmer has succeeded in incorporating all these components in such a way that it enhanced the productivity as well as profitability of the system as compared to the farming system model practised by him earlier.

This farming system model is an example for optimum resource utilization providing acceptable profits and sustained production levels in a difficult terrain with the integration of enterprises and scientific technologies.

The concerted efforts put by Sri. Hebbar in developing his farm as a model farming system is highly appreciable and praise worthy which makes him a role model among the farm families of the area. Further, this farm serves as a training resource for KVK trainees and farmers in and out of the district.





## ALIGNING WITH THE NATIONAL GOALS

### Sankalp se Siddhi

Sankalp se Siddhi or 'Determination to Attainment: New India Movement (2017-2022)', a seven-point strategy to double farmers' income by 2022 is the flagship programme being implemented by the Ministry of Agriculture and Farmers' Welfare through the ICAR Institutes/ KVKs. The Prime Minister has launched the 'Sankalp se Siddhi' for realizing an accelerated agricultural growth, through effective and efficacious implementation of these initiatives coupled with generation of resources and good governance.

- i. With the objective of providing water to every field, Pradhan Mantri Krishi Sinchai Yojana has been launched on July 1, 2015 and to provide end-to-end solution in irrigation supply chain, water resources, network distribution as well as farm level application. PMKSY, not only focusses on resource-building for assured irrigation, but also on the water conservation through rain water harvesting for protected irrigation. To ensure 'More Crop Per Drop' through micro irrigation, requisite government support is being provided to encourage the farmers.
- ii. Second point is increasing production through improved seeds, planting materials, organic farming and soil health card. Under the Soil Health Card Scheme, soil health card will be issued to 12 crore agricultural holdings across the country every two years, thereby informing the nutrients status of the soils to enable farmers to use recommended doses of fertilisers as prescribed in the cards. This will help reduce the cost of cultivation and ensure sustained production and productivity.
- iii. Strengthening warehousing and cold chain facilities to curb post-harvest losses: To encourage farmers to store their produce in warehousing, benefit of interest subvention will be extended to small and marginal farmers for a period of up to six months post-harvest on the same rate as available to crop loan against negotiable warehouse receipt for keeping their produce in warehouses.
- iv. Value-addition through food processing: The food processing units can obtain loans at preferential rate under priority sector lending. Ministry of Food Processing Industries has launched SAMPADA, under which the food processing capabilities will be strengthened through establishment of backward and forward linkages of agro-processing clusters.
- v. Overcoming deficiencies in agriculture marketing through e-nam: For creating a nation-wide e-marketing system, e-NAM was launched on April 14, 2016 and mandis have been linked online to this scheme. The aim of the Government is to consolidate the dis-integrated APMCs and create a unified national market for agricultural commodities, thereby reducing information



disparity and intermediation costs, providing transparency and competitiveness to enable farmers to get better price of their produce.

- vi. Institutional loan to reduce risk and growth of agriculture sector: This programme aims to reduce the inherent risk of agriculture sector through Pradhan Mantri Fasal Bima Yojana (PMFBY) and Restructured Weather Based Crop Insurance Scheme (RWBCIS) so that farmers feel secure even during the occurrence of natural calamities. Under PMFBY and RWBCIS, the Government provides extensive crop insurance coverage from pre-sowing to post-harvesting losses from natural calamities on the very low premium rates (2%

for Kharif crops; 1.5% for Rabi crops and 5% for annual commercial/horticulture crops).

- vii. Allied activities of agriculture: Eight other income generation activities for farmers such as Rashtriya Gokul Mission, National Mission on Bovine Productivity, Dairy Development, Blue Revolution, Agro-forestry, Beekeeping, Poultry, and Solar Cell Project for Irrigation were launched for doubling the farmers' income by 2022.

### KVK initiatives

Sankalp se Siddhi or 'Determination to Attainment: New India Movement (2017-2022)' was celebrated in Kasaragod district on 19.8.2017 at St Mary's Church





Hall, Vorkady with the participation of more than 100 farmers. The oath on the New India Manthan was taken by the farmers and the dignitaries during the occasion. As part of the programme, lectures by eminent experts, technology demonstrations and an exhibition were conducted and the film show on ways to increase productivity was also shown. The seven-point agenda outlined by the Government of India for doubling farmers' income was discussed in detail during the event.

### **Soil fertility evaluation and issue of soil health cards**

Soil fertility refers to the capacity of soils to provide nutrients required by plants in adequate quantities in right time and right proportions. Soil testing and plant analysis are the two most important diagnostic tools for scientific management of nutritional requirement of crop plants. Soils vary widely in their physico-chemical as well as mineralogical properties, which result in soil fertility from highly degraded to very fertile soil. There are 16 essential elements required for proper plant growth and development. A deficiency or excess of any of these nutrients causes some abnormal condition and reflects in growth and performance of plants. Hence plants need these essential nutrients in a balanced proportion with none in excess and none in deficient amounts. Generally the deficiency of plant nutrients will be overcome by the addition of nutrients in the form of organic manures and fertilizers. However, sustainable production could be maintained through optimum fertilizer dose based on analysis of

soil, water and plant samples.

Keeping in view the above facts, much emphasis has been given to soil, water and plant testing based recommendations. In this direction, ICAR has extended one time grant to Krishi Vigyan Kendras to establish Soil, Water and Plant Testing Laboratories (SWPTL) during 2004-05. The Soil, Water and Plant Testing Laboratory at KVK, ICAR- CPCRI, Kasaragod was one among 32 SWPTLs established under the then Zone VIII, Bengaluru.

Major soil types of the district are sandy soil (6%), loamy soil (11%), sandy/laterite loam (5%), gravelly laterite (63%) and forest soil (15%). The soils are generally light to fine textured and the depth ranges shallow to deep and the erosion status is predominantly severe. Kasaragod district receives high rain fall during South West monsoon and hence the leaching of elements like, potassium, boron, calcium and magnesium is very high with surface run off along with precious top soil. Intensity of soil erosion is high due to undulating topography prevailing in this region. With all the above reasons, nutrient deficiency and poor crop health is prevailing in almost all the farmers' fields in the district.

The soil fertility evaluation programmes at KVK commenced during July, 2005. Soil samples were drawn from various agricultural lands and diverse cropping systems. A brochure was prepared providing necessary information on the importance of soil, water and plant analysis, sampling techniques along with a registration form to be filled in while giving the soil sample. The registration form comprised information



on the details of the farm, crop details and farmers' profile. Each sample was tagged a pre-defined unique sample number.

Soil samples were collected and analyzed for soil fertility parameters such as soil reaction (pH), electrical conductivity (EC), soil organic carbon (OC) and major plant nutrients (NPK). The facility for analyzing secondary and micronutrients are not available at KVK lab. The data sets generated were used for assessing soil fertility and based on this, plant nutrient input advisories were given to the farmers in the form of soil health cards. A total of 904 soil samples from 16 villages belonging to 532 farmers were analyzed and soil health cards were issued to 1027 farmers of the district. The soil test data was processed and interpreted to arrive at the overall soil fertility. In respect of soil reaction the data was grouped as strong to very strong acidic, neutral and alkaline. For major nutrients (N,P,K) the data was grouped in to low, medium and high groups.



It is observed that, acidification of soils, a serious constraint to crop production has assumed severe proportion in the district. Soil acidity severely impairs plant availability of nutrients and microbial processes responsible for organic matter decomposition and nitrogen fixation. Out of 904 samples, 91% of samples tested for strong to very strong acidic reaction ( $< 5.5$  pH). The cause for development of strong acid reaction in the soils of the district is attributed to extensive weathering, high leaching coupled with heavy input of fertilizers without regular application of lime to neutralize the acidity generated. Application of liming material based on soil test result is recommended to check the acidity problem of soil. In the absence of soil tests, application of lime at the rate of 240 kg/acre is suggested. Many farmers have given feedback that applying liming materials resulted in healthy growth of crops, reduced pest and disease incidence thereby improving the overall quality of farm produces.

Nitrogen is first among the major nutrients essential for plant growth. Estimate of plant available nitrogen in soils is often made by determining the organic carbon content of the soil. High level of organic matter not only provide part of the nitrogen requirement of crop plants, but also enhance nutrient and water retention capacity of soils and create favorable chemical and biological environment. Among the soil samples tested, more than eight percent responded for high available nitrogen (above 560 kg/ha) which may be due to the continuous application of organic manures in the farms. The samples collected from rice fields showed medium level of available nitrogen (280-560



kg/ha). Application of organic manures and nitrogen fertilizers to crops according to soil test information is recommended. It was also recommended to correct soil acidity before applying the manure so as to facilitate mineralization of organic matter.

Phosphorus is required by plants for energy transformation, photosynthesis and many other functions. Phosphorus deficiency imparts dark green color to younger leaves and the plants turn thin, erect and spindly with sparse foliage. In more than ninety percent of the samples tested, plant available phosphorous was deficient. It is recommended to apply phosphorus fertilizer accordingly. It is also recommended to skip phosphorus fertilizer application where excess level of P is reported as high level of P in the soil can impair the uptake of many essential nutrients like zinc and boron. Further, farmers were made aware about the correction of soil acidity through liming which can lead to release of phosphorous fixed in the soil.

Potassium is the primary nutrient required in large quantities. The element plays a regulatory role in plant metabolism and development. Deficiency symptoms of potassium develop first on older leaves, chlorosis along leaf margins followed by scorching and browning of tips of older leaves. In the tested samples, available potassium level was very low (below 120 kg/ha) in soil samples drawn from coconut, arecanut and paddy cropping systems. The test results showed the necessity to apply potassium fertilizers regularly in as many splits as feasible at recommended rates. Farmers

were advised to maintain high levels of organic matter and to manage soil acidity through liming

As per the study conducted by the State Planning board Thiruvananthapuram, the level of available secondary and micro nutrients like calcium, magnesium, sulphur and boron are very low in the soils collected from Kasaragod. The following measures are to be adopted in cases of deficiency disorder of the above mentioned nutrients.

- Application of liming materials to alleviate soil acidity shall ensure the supply of calcium wherever deficient.
- It is necessary to apply Magnesium sulphate regularly in accordance with soil test results or in its absence @ 80 kg/ha.
- Application of Magnesium sulphate can take care of sulphur requirement of crops.
- Boron is found deficient in around 80 % of the samples drawn prior to the conduct of OFTs and FLDs by KVK. It is an essential micronutrient required in very small quantities by plants. Boron can be applied as per soil test results. The general recommendation is to apply 10 kg Borax per hectare or foliar application of 0.2% solution.

Soil fertility management is essential in any agricultural production system to achieve targeted crop yields, sustainable utilization of resources and better economic returns. The economy of Kerala state is largely dependent on plantation crops, horticultural



crops and cash crops which are heavy feeders, exhausting the inherent fertility of soil ultimately resulting in soil starvation and low productivity of crops. Productivity enhancement could be possible through effective soil resource management and corrective measures including micronutrient supplementation and soil amelioration. Through soil fertility evaluation programmes, KVK could convince the farming community of the district that scientific and judicious fertility management practices should essentially be a part of crop productivity to maintain optimum soil health and to sustain the economy. Farmers are well convinced about the benefits of soil test based nutrient management as evidenced by reduction in nut or fruit drop, less incidence of pests and diseases, quality produces, long duration of yielding periods etc.

## Pradhan Mantri Fasal Bima Yojana (PMFBY) Awareness Meeting

It is an accepted fact that many flag-ship schemes of the Central government for the benefit of farmers and other socially vulnerable groups do not reach a large section of the potential beneficiaries, largely due to lack of awareness on the benefits and the timely modalities to be followed for availing the potential benefits. Realizing this ground reality, the KVK has taken the initiative to spread the message of 'Pradhan Mantri Fasal Bima Yojana' (PMFBY) launched by the Govt. of India, among the farming community in the district.

An Awareness Programme on 'Pradhan Mantri Fasal Bima Yojana' (PMFBY) was organized on 28th May,



2016 for the benefit of farming community of Kasaragod district. Shri P. Karunakaran, Member of Parliament, Kasaragod, in his inaugural address, felt that this would be a great support to the farmers in the eventuality of climate change and consequent calamities. He further desired that crop insurance should also cover price fall of the agricultural commodities. Shri N.A. Nellikkunnu, MLA, Kasaragod wished that maximum farmers be benefited by PMFBY and that more and more people in the district take up farming as their main livelihood occupation by virtue of this scheme. Dr. P. Chowdappa, Director, ICAR-CPCRI outlined the overall benefits of PMFBY to the farmers in overcoming crop losses due to natural calamities mainly, drought, flood, pest



and disease epidemics. He specifically highlighted the advantage that the premium payable for availing this crop insurance is very low and affordable for the farmers at just 2.0% for Kharif, 1.5% for Rabi and 5% for commercial and horticulture crops. Shri A.A. Jaleel,

Panchayat President, Mogral Puthur panchayat, Shri Janardanan, Chief Manager, SBI (RBO), Kannur, Smt. Veenarani, ADA, Nileshwar and Shri Jyothis Jagannath, AGM, NABARD, Kasaragod were also present. The inaugural session was followed by technical sessions where Shri Janardanan Chief Manager, SBI (RBO) and representatives from the Insurance Companies delivered talks on implementation of PMFBY.

### **Farmers' Meet (Pre Rabi Kisan Sammelan) and Exhibition on Agricultural Technologies and Products**

Krishi Vigyan Kendra, ICAR-CPCRI, Kasaragod organised Farmers' Meet and Agricultural technology exhibition in collaboration with Kinanur Karindalam panchayath from 28-29 September 2015. The function was inaugurated on 28th September by Shri P Karunakaran, Hon. M P, Kasaragod, Shri Lakshmanan K, President, Kinanur Karindalam panchayath presided over the function and Dr P. Chowdappa, Director, CPCRI delivered the key note address. During the technical sessions Dr. K.M. Sreekumar, Dr.P. Jayaraj, Dr.P. Gigin, Shri Roy Mathew and Shri Mathew delivered lectures on integrated crop management, soil health management, profitable dairy farming, Indian bee and meliponiculture, respectively.

### **Jai Kisan Jai Vigyan Diwas**

KVK celebrated Jai Kisan Jai Vigyan Diwas on 23-12-15 at Kalichamaram Milk Producers Coop Society, Kinanoor Karindalam to commemorate the birthday of former prime ministers, Shri Charan Singh and Shri





Atal Bihari Vajpayee. The programme was inaugurated by Dr. P. Chowdappa, Director, CPCRI, Kasaragod. During this occasion, four progressive farmers who contributed outstandingly in dairy farming - P Shobha, Smt Janaki, Smt Shyamala and A V Rajan – were honoured. A special talk on profitable dairy farming was delivered by Dr Tito Joseph, Veterinary Surgeon followed by an interface programme with KVK officials.

### Technology Week celebrations

The KVK Kasaragod made a grand celebration of a technology week from 14 to 18 of December 2010. The event was inaugurated by Smt. Shyamala Devi, President, District Panchayat and Dr. P.V. Balachandran, the Director of Extension, Kerala Agricultural University and Shri S Prabhukumar, Director, ATARI, Bengaluru delivered key note address and thematic address. The valedictory meeting was attended by the then Minister of Agriculture, Kerala Shri Mullakkara Retnakaran and Dr. George V. Thomas, Director, ICAR-CPCRI delivered special addresses. The event marked the participation of about 5000 farmers who attended the function and the associated exhibition.



Various seminars were conducted on all the days and method demonstration, field visits, farmer scientist interaction, display and sale of various agricultural inputs were also made by various agencies as part of the programme. The KVK celebrated the technology weeks in subsequent years at Pullur-Periye, Kinanoor Karindalam and Neeleswaram in collaboration with the department of soil conservation and ATMA. These events helped in taking the latest technologies to the masses and ensured availability of various agricultural inputs to the farming community.

### Production of technological Inputs

One of the mandates of KVKs is to ensure production and distribution of quality technological products and inputs such as seeds and planting materials of high yielding crop varieties, bio agents, bio pesticides etc. to the farmers of the district. This KVK is fully equipped for the production of technological products and inputs and for this purpose the ICAR has sanctioned Rs.1,00,000/- as seed money under the Revolving Fund (RF) scheme of the council. Initially, KVK has





taken up the production of seedlings of arecanut varieties released by the host institute and later on the activity was expanded towards production of seedlings and grafts of other important crops as well as other technological products like bio agents, bio pesticides, mushroom spawn, organic growth stimulants etc.

So far this Kendra has produced 3,28,080 numbers of planting materials which include seedlings of arecanut, coconut, black pepper, papaya, drum stick,

vegetables, mango, suppota, curry leaf, ornamental plants, medicinal plants, vetiver etc which benefited 78,474 farmers. In addition to this, 3058 kg of bio pesticides, 135 kg of organic growth stimulants and 769 pheromone blocks were produced and sold benefiting 3975 farmers. Around 6000 fish fingerlings, 582 kgs of mushroom spawn, 9250 earth worms, 26 honey bee colonies were also produced and supplied to 1686 farmers of the district.







## LOOKING AHEAD

The significant achievements of KVK-Kasaragod in terms of promoting sustainable agricultural practices and latest technologies by conducting various on-farm testing of technologies for solving the location-specific problems, promotion of latest varieties and technologies through frontline demonstrations, capacity building and skilling of farmers, home makers and rural youth, and a whole spectrum of different extension activities carried out over the last 25 years is the launching pad for its activities in the coming years focussing on improving production, productivity, sustainability and profitability of farming in the district. The glorious service rendered by the KVK-Kasaragod during the past 25 years raises more expectations and brings more responsibilities which call for coordinated efforts to maintain the spirit and work culture followed in this KVK. For addressing the issues of farmers, to increase production and productivity, to double the income, to mitigate the vagaries and ill-effects of climate change and to make farming more profitable and sustainable requires sincerity, dedication and hard work. For achieving this, the KVK also need to be further equipped with the required infrastructure, manpower and other resources apart from proper planning and concrete efforts.

The KVK is presently having very good infrastructure, which needs to be further augmented to achieve the expectations of the farming community. The 50 acres of land area allocated to the KVK needs to be

converted into model farm with demonstration plots of different cropping systems and seed garden for producing and supplying sufficient quantities of seeds and planting material of high yielding and superior varieties for meeting the demand from farmers. KVK need to develop nurseries with sufficient infrastructure like greenhouses, tissue culture units and mother gardens for raising the planting materials in required quantities. The model farms need to be converted to model training units to impart skill development and capacity building programmes to align with the modern farming systems. KVK should truly become a centre of excellence for skilling rural youth in modern agriculture.

The infrastructure development by creating a new farmer facilitation centre, bioagents production unit, tissue culture laboratory, agro service centre with latest farm machinery and training centre, incubation centre for skilling rural youth, green houses for hi-tech farming and nursery production, integrated farming system model, modern irrigation systems for training and demonstration and a new training facility with farmers hostel can help in broadbasing the activities of KVK Kasaragod to reach the hitherto unreached. The KVK soil testing lab upgradation with latest equipments like AAS system can ensure accurate testing for all major as well as minor nutrients and a time bound testing activities to cater to the needs of the farming community.



KVK-Kasaragod can act as the knowledge and resource centre in all aspects of agriculture for continued skill upgradation of all the extension officials of various departments. The collaborative developmental activities with the allied developmental departments of the central and state government can ensure proper funding and expansion of its activities in line with the national mandates. KVK also can function as an agricultural polytechnic for the district and can undertake various skill development courses for rural youth making them employable or capable of getting self employed in various farm activities and enterprises. The activities under postharvest processing and value addition of agricultural commodities and allied enterprises like dairy, poultry, goattery, aquaculture, mushroom, farm mechanisation and bee keeping activities can create a large number of skilled rural

youth who can have a sustainable income and self employment.

A major intervention is required on the policy front to equip KVK Kasaragod with the required manpower to undertake the planned activities in a continued manner. The bottlenecks in administration and finance can be reduced or smoothened by bringing the KVK into a non plan scheme thereby ensuring availability of finance in a time-bound manner to carry out the activities. The multi-centred administrative set up of KVK is to be relooked into a single control authority for administrative, financial and functional efficiency to smoothen its activities. With the proper direction, support and realignment of the administrative setup, the KVK-Kasaragod can function as a centre of excellence in agriculture and allied enterprises to cater to the farming community of Kasaragod district.



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