IMPRINTS

A Decade in Service to Farmers (2004 - 2013)

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KRISHI VIGYAN KENDRA – ALAPPUZHA

Central Plantation Crops Research Institute (Regional Station)
(Indian Council of Agricultural Research)
KRISHNAPURAM - P.O., KAYAMKULAM, KERALA - 690 533

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THE PRELUDE

Introduction

Alappuzha, historically acclaimed as the Venice of the East, is blessed with the scenic beauty of its back waters, sea shores and vast green expanses of paddy fields boarded by swaying coconut palms. A typical coastal district of Kerala, it has been a famous tourist destination with many religious, historical and cultural land marks like Krishnapuram Palace, Edathua St. George Church, Ambalappuzha Sree Krishna Temple and snake boat race which emphasizes the natural, social and cultural harmony. The region, with its diverse soil and agro-ecological characteristics, is covered under five distinct agro-ecological units (AEU) of Kerala and supports wide range of crops from rice to rubber. Major part of Kuttanad, the renowned Rice Bowl of Kerala with the unique below mean sea level ecosystem, has been accorded the status of the Globally Important Agricultural Heritage System (GIAHS) by FAO. The district also assumes significance for a wide range of agro based enterprises like agri-eco-tourism, coir, and marine, brackish, and fresh water fisheries. Thus, the area offers wide scope for agricultural development and technology transfer interventions that support scientific sustained production. The location map of the district is given as Fig.1.

Krishi Vigyan Kendra, Alappuzha hosted by Central Plantation Crops Research Institute (Regional Station), Kayamkulam has achieved the status of one of the leading Frontline Extension providers in the district during the last decade. Started functioning from June 2000 under the National Agricultural Technology Project (NATP) of ICAR, it was remandated to the regular KVK status from April 2004. Located along the NH-47 at Krishnapuram, it can be easily accessed by the farmers from different parts of the district.

Functioning on an average annual budget of around one crore, it has a multidisciplinary staff pattern with a Programme Coordinator of Senior Scientist cadre and six Subject Matter Specialists in the disciplines of Agronomy, Entomology, Home Science, Plant Pathology, Animal Science, and Soil Science. Three Programme Assistants (Agrl. Extension, Horticulture and Computer Applications), two administrative staff, one driver and two skilled supporting staff also help in fulfilling the set mandates and work in convergence with the other line departments in the district for the benefit of the farmers.

Mandates

The overall mandate of the KVK is to develop and disseminate location specific technological modules at district level through Technology Assessment, Refinement and Demonstration and to act as Knowledge and Resource Centre for agriculture and allied activities.

The specific activities envisaged to carry out this mandate are:

- conduct on-farm testing to identify the location specificity of agricultural technologies under various farming systems
- organize frontline demonstrations to establish production potential of various crops and enterprises on the farmers' fields

- organize need based training of farmers to update their knowledge and skills in modern agricultural technologies related to technology assessment, refinement and demonstration, and training of extension personnel to orient them in the frontier areas of technology development
- create awareness about improved technologies to larger masses through appropriate extension programmes
- production and supply of good quality seeds and planting materials, livestock, poultry and fisheries breeds and products and various bio-products to the farming community, and
- work as resource and knowledge centre of agricultural technology for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district.

MAJOR ACTIVITIES

A. On Farm Testing (OFTs) :

The objective of On Farm Testing is to test and evaluate the findings of Research Stations at the farmer's field and to refine and modify the technologies, if required, for better adoption by farmers. It is confirmation of already proven research results under real farming situation. Based on the finding that the farmers do not adopt about 70% of the available technologies, farmer participatory testing of research findings in their own farms becomes imperative. It promotes conviction among farmers and also provides opportunity to refine or modify the recommendations to suit the requirements of the farmers in a given farming situation. Participatory Rural Appraisal (PRA) was conducted to identify the problems faced by the farmers and based on the priority of the problems, OFT was implemented. Economically viable, and operationally feasible technologies matching with farmers needs are identified to solve the problem faced by them. The OFT's conducted in major crops and allied sectors during the last decade are given below.

Rice

1. **Performance of different rice hybrids under scientific management** (Location: Chennithala): Rice hybrids CORH-3 and KRH-2 performed well under scientific management with KRH-2 recording the highest yield of 6.4 t/ha with a B:C ratio of 2.89. This was followed by CORH-3 and Jyothi with yields of 4.85 t/ha and 3.61 t/ha and B:C ratios of 2.34 and 2.03, respectively.
2. **Assessing the performance of high yielding paddy variety Prathyasa in Onattukara tracts** (Location: Chennithala): Prathyasa performed well in Onattukara regionwith anaverage yield of 5.3 t/ha compared to Uma (4.9 t/ha) and Jyothy (4.3 t/ha) with a B: C ratio of 2.96, 2.56, and 2.39, respectively and had good cooking quality.

3. **Performance of rice varieties in upland coconut gardens under scientific management** (Location: Karuvatta): Vaishak variety performed well with an average yield of 1.2 t/ha compared to Jyothy (1.05 t/ha) with a B: C ratio of 1.22 and 1.09, respectively.
4. **Assessment of effect of PGPR with nutritional inputs in rice** (Location: Karuvatta): PGPR mix I, with soil test based nutrient application showed better performance with an average yield of 4.81 t/ha and a B:C ratio 1.31 compared to farmers' practice and soil test based nutrient application alone.
5. **Management of rice stem borer** (Location: Chettikulangara): Cartap hydrochloride 4G @ 5kg/acre was applied in the nursery one week before transplanting showed nopest infestation up to 65 DAT in the field and the only pest recorded was rice bug at the later stage of the crop, which was well under the ETL as against chemical spra ing and use of Tricho cards.

Coconut

6. **Assessment of bio-priming in coconut seedlings** (Location: Muthukulam, Krishnapuram &Kayam kulam): Application of Trichoderma @ 50g /pit at the time of seed nut sowing and transplanting or application of consortium of Pseudomonas and Bacillus 50 g each in coconut pits at the time of seed nut sowing and transplanting recorded 100% of establishment of seedlings in the field compared to planting without any treatment (69%).

7. **Effect of Trichoderma against stem blee ing of coconut** (Location: Devikulangara): Swabbing of Trichoderma paste in the bleeding region of trunk was rated better in terms of easiness of application and labour savings compared to 5% Calixin application on wou nded region and root feeding with the same.
8. **Assessing methods to improve the shelf life and clarity of coconut water vinegar** (Location: Chunakkara and Karuvatta): Of the two types of technologies tested to assess the clarity and shelf life of coconut water vinegar, filtering the vinegar through ordinary filter paper and pasteurization over boiling water bath was found to be to be better in terms of appearance and keeping quality.
9. **Improved screw press for drudgery reduction in small scale coconut processing units** (Location: Different units): The improved version of screw press for coconut milk extraction could reduce the time for VCO production and increase recovery. The screw press is easy to operate, reduces drudgery and fatigue, and hygienic.

Vegetables

10. **Assessment of effect of vegetable special in Cowpea** (Location: Chunakkara): The micronutrient formulation developed by IIHR, along with soil test based nutrient application

recorded higher average yield of 24.5 kg/ ha with a B:C ratio of 2.09. Farmers felt that micronutrient formulations were useful to increase the productivity.

11. **Assessing the effectiveness of IIHR neem soap in cowpea** (Location: Chunakkara): Initial spray @10g/l neem soap preparation from IIHR, Bengaluru was done at four leaf stage followed by need based spraying at 12-15 days interval. Incidence of borer pests and mites were less. Farmer perception on effectiveness and environmental impact by the pesticide was very positive.

12. **Assessment of effect of vegetable special in bitter gourd** (Location: Venmony): The micronutrient formulation developed by IIHR, along with soil test based application of major nutrients recorded higher average yield of 25.3 kg/ ha with a B: C ratio of 1.51.

13. **Management of fruit fly of bitter gourd** (Location: Chunakkara and Bharanikkavu): Use of cue lure trap alone gave 85% control of white fly whilecovering with plastic + trap gave 96% control. The number of flies caught ranged from 130 to 680 in cue lure compared to 18 to 25 in ordinary trap with a B: C ratio of 1.91 and 1.80, respectively.

14. **Assessment of high yielding bacterial wilt resistant tomato variety** (Location: Devikulangara): Tomato varieties, Anagha released by KAU and Arka Abha released by IIHR, Bangalore were resistant to bacterial wilt disease. Arka Abha produced fruits of higher size (75g) having good appearance and cooking quality and hence preferred by farmers compared to Anagha (40 g).

15. **Performance of Hybrid brinjal CoBH-2** (Location: Vallikunnam and Chingoli): The hybrid brinjal CoBH-2 when compared with KAU Hybrid Neelima and KAU HYV Haritha showed that the CoBH-2 was susceptible to bacterial wilt disease while the others were resistant. The cooking qualities of all the three were found to be good with Neelima recording the highest yield of 14.5 t/ha and B: C ratio 1.47.

16. **Evaluation of management practices for bacterial wilt of solanaceous vegetables** (Location: Chettikulangara and Cheriyanad): The technologies compared were applications of bleaching powder, copper oxy chloride and Pseudomonas fluorescens in chilli and brinjal. Use of P. fluorescens gave 83% and 79% disease reduction in brinjal and chilly, respectively with B: C ratios of 1.26 and 2.5.

Banana

17. **Effect of potassium sulphate spray on bunch for yield improvement in banana** (Location: Karuvatta): Soil test based nutrient application+ potassium sulphate spray gave better average yield of 13.1 kg/plant and a B:C ratio of 2.58 . But the need of extra labour for spraying was considered an impediment in adoption.

18. **Assessment of effect of banana special and major nutrients in banana** (Location: Nooranad): Four treatments viz., farmers'practice (T1), soil test based nutrient application (T2), soil test based nutrient application+banana special (T3) and soil test based nutrient application + banana shakthi (T4) were evaluated. T3 gave an average yield of 12.1 kg/plant and a B:C ratio of 2.68. Non-availability of material locally and extra labour for spraying were problems in large scale adoption.

19. **Assessment of pseudostem weevil management in banana using bio agents** (Location: Krishnapuram): Metarhizium fungal spore suspension was assessed along with the recommended chemical and conventionally using granular insecticides. The performance of thefungal pathogen was not promising leading to the recommendation that judicious application of recommended chemicals can be adopted in areas where infestation is severe but as a component in IPM, Metarhizium can be used along with other pest management practices where pest infestation is not severe.

20. **Evaluation of drudgery reduction sprayers for farm women engaged in banana cultivation** (Location: Chettikulangara): Three types of technologies viz., a) granular application of systemic pesticides, b) Chlorpyriphos spraying using knapsack sprayer, and c) light weight plastic sprayers with long adjustable sprayers were tested. More number of plants could be covered using light weight plastic sprayers with long adjustable sprayers (155/hr) compared to metal sprayer (133/hr). No fatigue and shoulder pain were reported while using this sprayer unlike other sprayers

Spices

21. Assessment of organic production technology of turmeric in Onattukara region (Location: Muthukulam and Pathiyur): The three technology options tested were: farmers'practice (T1), soil test based nutrient application (T2), and organic inputs such as neemcake, vermicompost, bonemeal, ash (T3). Organic production treatment (T3) gave better average yield of 2.1 kg/plant and a B: C ratio of 1.35. Production and processing of organic turmeric is to be popularized for premium price marketing.

22. **Assessment of different media for seed ginger storage** (Location: Thamarakulam and Chunakkara): The storage methods assessed were heaping ginger rhizomes and covering with sand (T1), storing in alternate layers sandwiched by dry saw dust (T2), and storing in alternate layers sandwiched by dry saw dust and covering with panal leaves (Glyosmis pentaphyllus) at the top (T3). The recovery percentage of seed ginger by weight was 76.5, 65 and 68, respectively for T 1, T 2, and T 3. The higher recovery percentage in T1 was due to the higher moisture content. Germination percentage was considerably higher (88 and 93.7, respectively) in T2 and T3 in comparison with 61.6 in the case of the farmer's practice.

Animal husbandry

23. **Management of ecto parasite in dairy cattle** (Location: Keerikad): Twenty two animals were selected and divided into two groups. In group 1 Flumethrin 1% solution was tried @ 1 ml/10 kg body weight. In group 2, Ivermectin injection was tried @ 1ml/ 50 kg body weight. After 90 days, it was observed that 2% reinfestation and 250 ml increase in milk yield in group 1 and no reinfestation and an increase of 450 ml in milk yield in group 2. The body weight was improved in both the groups.

24. **Prophylactic measures for preventing mammary infection in dairy cattle** (Location: Kanda lloor): The technology option was Teat dipping in Kohrsolin solution 0.5 ml/150 ml water (Glutarldehyde, 1,6 Dihydroxy 2,5 – Dioxahexane, Polymethylol urea derivative) after each milking and spraying the cow shed with kohrsolin 1% solution once in a month. There was no disease incidence in the treated animals.

25. **Assessment of milking device for Mini Dairy Unit**: Even though the performance of Milking machine with vacuum gauge was slightly better than the MM without vacuum gauge, the BC ratio was favourable towards the milking machine without vacuum gauge. Farmers observed that both the machines were not completely emptying the udder in cows and buffaloes, continuous milking process was not possible and it takes 2-3 intervals during the milking process, and all the cows in a herd do not cooperate with this machine.

Poultry

26. **Assessing productive performance of Gramasree and Kaveri**: Based on the egg weight and HDP, Gramasree breeds performed

well. Gramasree laid 193eggs/bird/year whereas, Kaveri gave 186 eggs/bird/year. Egg size and egg production are comparatively more in Gramasree breed.

27. **Oral pellet vaccine against Raniket disease in backyard poultry**: Sub cutaneous jection of Mesogenic strain (K) with high ICPI and Oral pellet vaccine using lentogenic strain (D58 strain) with low ICPI from TANUVAS were assessed. Blood sample of birds with Oral pellet vaccine recorded high immunity of more than 3. Farmers opined that the oral pellet is very easy to use and recorded a B: C ratio of 2.

Apiculture

28. **Use of division boards to overcome wax moth attack**: Trial on the use of division board in the hive to optimize the colony space was conducted. Division boards helped the apiarist to manage colony space and strength and thereby reduce the wax moth attack. Results showed 96 % colony retention by using division board.

Mushroom

29. **Assessing the performance of soft wood saw dust as substrate for oyster mushroom cultivation**: Match wood saw dust was used as a substrate to assess its per formance in mushroom production. This substrate recorded a yield of 1.07 kg/bed and B:C ratio of 2.4 as against 1.02 kg/bed and 2.3 in rubber saw dust and 0.7 and 1.7 in paddy straw.

Technology Refinements

1. **Effect of Trichoderma against stem bleeding of coconut**: This OFT for refinement was conducted at Devikulangara and Thekkekara panchayaths. The technology options tried were swabbing of Trichoderma paste (100 g in 50ml water) in wounded region (T1), T1 + application of Trichoderma multiplied on neem cake in coconut basins (5 kg/ palm) (T2) and TI + T2 + application of lime 1kg / palm/year (T3). Farmers rated T3 as the most effective technology because of increase in yield and reduction in spread of the disease compared to other treatments after observing for four years. Application of Trichoderma in the wounded region,

which was the refinement over the original recommendation, reduced the spread of the pathogen upwards in the trunk and application of neem cake in the soil along with manures increased the number of bio control agents in soil which reduced the horizontal spread of the disease to new palms.

2. **Modified low cost power operated milking machine for mini dairy unit**: Refinement of the milking machine with vacuum gauge was done by introducing a compressor of 1.2 amp and 2850 rpm in place of the hand pump thus converting to a low cost power operated device for mini dairy unit. This was tested by five farmers in Muttar village by comparing with a low cost power operated milking machine. It was observed that, in power operated milking, 10.5 l of milk was obtained in a 7 minutes cycle which saved time and labour. Partner farmers were convinced of its suitability for a mini dairy unit of 2-5 cows.

B. Front Line Demonstrations (FLD)

Front-line demonstrations are to demonstrate newly released crop production and protection technologies and its management practices in the farmers' field under different agro-climatic regions and farming situation. While demonstrating the technologies in the farmers' fields, the scientists are required to study the factors contributing to higher crop production, field constraints of production and thereby generate production data and feedback information. Front line demonstrations are conducted in larger fields in order to have better impact on the farmers and field level extension functionaries.FLDs carried out at different locations in the district motivated farmers to accept new technologies in solving field problems. Crops/technologies in which FLDs were conducted include paddy varieties, vegetable varieties, vermi composting, spice crops, azolla, apiculture, organic pest management practices, mushroom cultivation, local fruit processing, soil and nutrient management etc. The major technologies demonstrated for adoption after testing through OFT's in important crops and allied sectors in the district are enlisted below:

1. **Micro nutrient management in paddy** (Location: Thakazhi): Application of ZnSO4 @ 20 kg/ha, in two splits at 35 days and 55 days after sowing was demonstrated. The yield obtained was 4.26 t/ha against 3.91 t/ha in control giving a B:C ratio of 1.32. The number of productive tillers/hill and grains/ panicle were higher than that in control plot.

2. **Application of magnesium sulphate in paddy** (Location: Ambalappuzha): Application of MgSO4 @ 20 kg/ha, in two splits at 35 days and 55 days after sowing was demonstrated. The yield obtained was 4.13 t/ha against 3.37 t/ha in control giving 1a B: C ratio of 1.17. The number of productive tillers/hill and grains/panicle were higher than that in control plot.
3. **Management of sheath blight in paddy using Pseudomonas flurescense** (Location: Chennithala): The technology included application of P. flurescense as seed treatment and foliar spray. The B: C ratio was 2.4 with an average yield of 6.2 t/ha. The disease intensity was 11.2 % against 28.1 % in control.
4. **Eco friendly pest management in paddy** (Location: Chettikulangara and Clappana): Use of tricho cards against rice stem borer and leaf folder, pheromone traps to monitor and manage stem borer, light traps against rice bugs, and need based spraying with neem formulations were demonstrated. Regular pest surveillance was carried out in the field to register pest incidence. Rice stem borer infestation was well under control but rice leaf folder incidence was high. Rice bug could be easily managed by using fire torches kept on the field bunds in the evening (6-8 pm) on alternate days. An average B:C ratio of 1.35 was recorded.
5. **Management of blast disease in paddy** (Location: Thakazhi): FLD on rice blast management using Isoprothiolane @ 1.5ml/l recorded a B: C ratio of 2.9 and disease intensity of 17.6% as against 1.9 and 48%, respectively in control.
6. **Black gram variety Co-6 in rice fallows of Onattukara** (Location: Thekkekara and Cheppad): The technology demonstrated was cultivation of high yielding black gram variety Co-6 in rice fallow. It recorded an average yield of 9.25 q/ha with a B:C ratio of 3.24.

7. **Pest management in coconut seedlings** (Location: Krishnapuram): Different pest management techniques in coconut seedlings like leaf axil filling with naphtha lene balls (2-3/plant), or neem cake + sand to ward off rhinoceros beetle, application of dimethoate against mealy bugs, and rat control were demonstrated. Rhinoceros beetle infestation was reduced from 30 % to 3.5%.
8. **Coconut leaf rot management** (Location: Devikulangara): The technology demonstrated was the application of Hexaconazole @2 ml or Mancozeb @3 g in 300 ml water at axil of spindle leaf and leaf axil filling with neem/marotti cake@ 250 g + sand twice a year. Percentage of diseased palms in selected plots could be reduced from 11-13 to 3.85.
9. **Drought Management in coconut** (Location: Thekkekkara): Husk burial and application of coir pith compost in coconut basin resulted in increase in the number of leaves, bunches and nuts compared to control plants. In the case of husk burial, the average number of leaves,

bunches and nuts increased from 23.1, 7.7, and 24.5, to 25.4, 9.1, and 36.7, respectively.

10. **Introduction of high yielding chilly variety Samrudhi as intercrop in coconut gardens** (Location: Cherthala, Muthukulam and Chettikulangara): High yielding chilly variety Samrudhi released by KAU was introduced as an intercrop in coconut gardens which performed well and recorded a yield of 7.5 t/ha with a B:C ratio of 2.44.

11. **High yielding ginger variety Varada as intercrop in coconut gardens** (Location: Karuvatta): High yielding ginger variety Varada released by IISR, Kozhikode raised as intercrop in coconut gardens yielded 7.5 t/ha in the demonstration plots against 3.75 t/ha of local varieties with a B:C ratio of 1.64.
12. **Demonstration on use of shell fired copra drier** (Location: Krishnapuram and Kumarapuram): Skill up gradation trainings were given to the farmers for quality copra production and by-product (coconut water) utilization. The results showed that a value addition of Rs. 0.65 per nut was possible by using copra dryer in addition to convenience of use. The coconut oil from copra dryer was also of superior quality.
13. **Cultivation of tomato in rain shelter** (Location: Harippad): The technology demonstrated was cultivation of tomato in low cost rain shelter of 25 m2 made of casurina poles and UV stabilized polythene sheets (150 guage). Growth of plants in rain shelter was good and the average weight of tomato fruits/plant was 75 g. The B:C ratio of rain shelter cultivation was 1.52 compared to that of farmers practice (1.10).
14. **Wilt management in cowpea** (Location: Chunakkara): The use of Pseudomonas fluorescens for seed treatment and foliar spray (20g/l) and application of Tricho derma multiplied in cowdung- neem cake mixture recorded a B:C ratio of 2.0 and disease incidence of 9.4 % as against 0.8 and 40 %, respectively in control.
15. **Sesamum variety - Thilarani for improved productivity in Onattukara** (Location: Chettikulangara): HYV Thilarani (Released by ORARS, 77 days duration, semi tall, yield 580 kg/ha, oil recovery 50.2 %) recorded a yield of 515 kg/ha with a B: C ratio of 1.44 compared to the local variety (337.5 kg/ha and 1.05,respectively).

16. **Soil test based nutrient management in sesamum in Onattukara region** (Location: Chettikulangara): Application of fertilizers based on soil test data could reduce the quantity of phosphatic fertilizer by 75% and recorded yield of 512 kg/ha against 337 kg/ ha in control with a B:C ratio of 1.40.

17. **Introduction of high yielding variety Sobha and improved processing methods in turmeric** (Location: Karuvatta): HYV Sobha recorded a yield of 125 kg/10 cents. The time required for boiling 100 kg fingers using turmeric boiler was 45 min. against 3.5 hours in manual method. When the fire wood consumption under manual method was 30 kg, turmeric boiler could be run on agricultural waste like arecanut leaf sheath, coconut leaf, tender coconut shell collected from tender nut parlour, teak leaves etc. Drying time was 5 days and 8 days, respectively for turmeric boiled in turmeric boiler and conventional method.

18. **Use of bio agents against rhizome rot of ginger** (Location: Haripad): Application of Trichoderma 50g/bed mixed with 1 kg neem cake and seed treatment, soil drenching and foliar spray with 2% P. fluorescens recorded a B:C ratio of 2.02 and disease incidence of 23.3 % as against 1.26 and 52.74 %, respectively in control.
19. **Foliar application of IIHR Banana Special to improve productivity** (Location: Mavelikkara and Muttar): Application of banana special, a micronutrient formulation developed by IIHR, Bangaluru, as foliar spray @ 5g/l from 5 months after planting at monthly intervals along with major nutrients inbanana yielded 11.8 kg/plant with a B: C ratio of 2.58 against 6.1 kg/ plant in control.
20. **Management of Sigatoka leaf spot disease in banana** (Location: Ala): Removal and destruction of affected leaf parts and alternate sprays of tridemorph 0.05%, propeconazole 0.2% and carbendazim 0.1% recorded a B:C ratio of 2.3 and disease intensity of 28.5% as against 1.3 and 41.4 %, respectively in control, without any application.
21. **Demonstration of ME traps for managing mango fruit flies** (Location: Chettikulangara): One ME trap per homestead with 3-4 mango trees recorded an improvement in yield of mango compared to non adopted area by 56.8 % with B: C ratio of 1.38. The reduction in pest incidence was 35% after use of ME traps with an average fly catch of 122/trap/week.

22. **Demonstration of Sreejaya variety of tapioca** (Location: Thekkekara and Krishnapuram): The average yield of Sreejaya was 22.5t/ha compared to 14.3t/ha of local variety with B: C ratio of 2.86. It had excellent cooking quality and 7 months duration.
23. **Cassava harvester for drudgery reduction of farm women** (Location: Devikulangara, Thekkekara and Kayangulam): Use of lever type Cassava harvester reduced the time for harvest to 2 min/plant compared to 4 min/plant by conventional method. The harvester was easy to operate and the number of broken tubers was less. But in harvesting heavy tubers (>5 kg / plant) breakage of the lever was reported which needs to be rectified.
24. **Improving the income of homestead dairy through promoting crossbred male calves** (Location: Krishnapuram): Ten cross bred male calves fed and managed as per the Package of Practices recommendations recorded an average body weight of 106 kg (a gain of up to 87 kg over the local) at six months and earned an income of Rs. 7,800 per calf.
25. **Controlled internal drug release (CIDR) in anoestrus dairy animals** (Location: Devikulangara and Muttar): The CIDR device that contains 1.38 g of Progesterone hormone per dose kept in the vaginal passage of non cycling cows for 7 days brought the animals to heat on the 2nd day of its removal. Success rate was 80% of which 7 out of 8 animals conceived in artificial insemination. The BC ratio was 2.2 against 1.9 in the normal practice where the inter calving period is longer.
26. **Introduction of Gramapriya layer breeds for backyard poultry rearing** (Location: Chingoli): The egg production in Gramapriya breed was 178 eggs/year and the age of sexual maturity was recorded at 165 days which were far superior to local breeds.
27. **Introduction of rumen by-pass fat as energy supplement in dairy cows** (Location : Ambalappuzha and Krishnapuram): The milk yield increased up to 1.5 lit/day and fat and lactometer reading was up to 4.5 and 29 against 4 and 27, respectively in control.
28. **Feeding of enriched straw in ruminants under scarcity conditions** (Location : Ambalappuzha and Krishnapuram): By this technology, saving in the feed was up to 10% and lactometer reading and fat percentage were 29 and 4.2 against a maximum of 27 and 3.9, respectively in the control.
29. **Demonstration on portable incubator** (Location: Vallikunnam and Devikulangara): The hatchability of 83% was recorded with the B:C ratio of 1.2 in the technology against 3.2% and 1.1, respectively in the control. The power consumption recorded was 40 units/ month.

30. **Management of white eye disease** (Vitamin A deficiency) in indigenous ducks (Location: Ambalapuzha and Muttar): The incidence of white eye disease reduced from 16% to 5% by the demonstrated technology with the B:C ratio of 1.5.

31. **Prophylactic measures against infectious diseases in ducks using Automatic vaccinator** (Location: Kuttanad): Automatic vaccinator demonstrated for use by the farmers without expert aid against bacterial and viral diseases could reduce the mortality rates from 50% to 10% and labour requirement to one fifth compared to normal syringe.
32. **Stingless bee keeping practices in homesteads** (Location: Mavelikkara and Muthukulam): Stingless bee keeping with top open wooden boxes gave an average yield of 260g honey/hive with B:C ratio of 1.33. Though the practice was easy compared to conventional methods, there was difficulty in dividing the colonies.
33. **White elm mushroom** (Hypsizygus ulmarius) cultivation using paddy straw (Location: Budhanoor and Chunakkara): The technology recorded advantages of better shelf life and less damage during packing. The recorded average yield was 700g fresh mushroom/bed with a B: C ratio of 1.6.
34. **Pest management in mushroom production** (Location: Krishnapuram, Budhanoor, Thamarakkulamand Chunak- kara): Blue light traps along with X-ray sheets coated with castor oil and 5% neem oil spray in and around mushroom shed was demonstrated and could prevent the yield loss due to pests other than beetle pests.

35. **Udyanamitra for transplanting vegetable seedlings** (Location: Chettikulangara and Chunakkara): Vegetable seedlings of snake gourd, bitter gourd, bush cowpea (gap filling), cabbage, cauliflower, brinjal and tomato (in main field) were transplanted in the demonstration. Apart from reduction in drudgery, it could reduce the time for preparation of pits and transplanting from 3.56 min. in manual transplanting to an average 1.25 min. Rate of transplanting was 48plants/hr and recorded 100 % establishment within two days against 80% in manual transplanting that need 5-7 days for establishment.
36 **Cage culture of pearl spot fish** (Etroplus suratensis) (Location: Arattuppuzha): Etroplus fishes were reared in five cages made of HDPE wire mesh and PVC pipes measuring 2m x1m x 1m size. These cages were floated in the backwaters and fed with balanced feed up to six months. The average weight of fish on harvest was 250 g and the total yield was 156 kg with a B:C ratio of 1.9. In free range system, the average weight of fish was 154 g and a total weight was 96 kg from eight cents with B:C ratio of 1.6.

C. Training Programmes

Capacity building of farmers, rural youth, women and men self help groups and extension officials in agricultural and allied sector has been one of the avowed objectives of KVKs. Vocational, On and Off campus and sponsored trainings in various agricultural and related topics have been organized regularly by the KVK. This helped to facilitate adoption of viable and feasible location specific technologies in farming and allied enterprises among farming community. A category wise list of training programmes organized during the period has been included as Table 1.

Table 1. Category wise list of training programmes from 2004-2013

Year	Training programme	No. of programmes	Number of participants	
			Male	Female
2004-05	On Campus	38	271	575
	Off Campus	40	231	687
	Total	**78**	**502**	**1262**
2005-06	On Campus	69	691	1208
	Off Campus	82	1021	1338
	Total	**151**	**1712**	**2546**
2006-07	On Campus	79	542	1089
	Off Campus	51	468	885
	Total	**130**	**1010**	**1974**
2007-08	On Campus	89	670	1069
	Off Campus	51	589	717
	Sponsored	4	4	92
	Vocational	13	120	163
	Total	**157**	**1383**	**2041**
2008-09	On Campus	57	450	836
	Off Campus	91	994	1634
	Sponsored	25	213	532
	Vocational	25	239	524
	Total	**198**	**1896**	**3526**
2009-10	On Campus	46	333	554
	Off Campus	51	618	853
	Sponsored	52	588	955
	Vocational	10	44	91
	Total	**159**	**1583**	**2453**
2010-11	On Campus	67	554	879
	Off Campus	63	609	932
	Sponsored	43	506	935
	Vocational	4	22	70
	Total	**177**	**1691**	**2816**
2011-12	On Campus	37	378	408
	Off Campus	71	763	1201
	Sponsored	22	318	328
	Vocational	5	39	33
	Total	**135**	**1498**	**1970**
2012-13	On Campus	46	645	556
	Off Campus	57	682	899
	Sponsored	7	96	88
	Vocational	3	23	32
	Total	**113**	**1446**	**1575**
	Grand total	**1147**	**11009**	**17617**

D. Extension programmes

During the period, the Krishi Vigyan Kendra has organized various other extension activities aimed at solving the field problems of farmers and creating awareness among various stakeholders on the emerging trends in farming. The dedicated Help Line services that answers farmer query through phones and mails and direct diagnostic and advisory services through agri-clinics are of great help to the farmers. Diagnosis is being carried out by the multidisciplinary team and necessary suggestions are made to solve the problem. In plant protection aspects, non-chemical methods of pest management are given maximum emphasis. Field visits were conducted and on site recommendations were given in urgent situations. So far 6224 agro-clinical/advisory services were undertaken at an average of 52 per month. There was a steady increase in the queries on after training technical support, registrations for training, agricultural field problems, availability of farm inputs such as seeds, earthworms, seedlings, compost etc. There has been an increase of over 50% in the number of visitors to KVK over the years. The participants of KVK trainings who were interested in adopting the technology as micro enterprises have been helped in the project formulation for availing credit. Awareness programmes like seminars and exhibitions organized and participated by the KVK in the district also attracted large number of farmers and field extension staff.

Mass media support has been overwhelming for the activities of KVK from its early days. Articles on relevant topics have been published in farm journals and agricultural columns of popular dailies by KVK staff for the benefit of the farming community. Radio and TV programmes

on the major activities and relevant topics of expertise of KVK have been aired from time to time. KVK also supports experiential learning programmes of students like RAWE and exposure visits of farmers under various programmes. Publications both in print and digital format brought out by the KVK have been very popular among the farmers of the district. A summary of major extension activities of the KVK is given as Table 2 and the list of important publications is given in Table 3.

Table 2. Major extension activities of KVK

Programme	No.	No. of participants	
		Farmers	Extension officials
Field day	33	1285	92
Kisan mela	3	655	90
Kisan ghosthi	1	60	3
Exhibition	26	2741	456
Film show	156	3188	177
Method demonstrations	96	1347	86
Farmers seminar	72	5170	188
Group meetings	27	488	28
Lectures delivered as resource persons	38	1407	121
Extension literature /training materials produced	3440	4302	669
Technical advisory services	7939	1959	80
Scientific visit to farmers field	552	605	8
Farmers visit to KVK	8858	8311	426
Diagnostic visits	618	528	14
Exposure visits	21	585	59
Ex-trainees sammelan	14	417	0
Soil health camp	11	377	4
Animal health camp	5	192	0
Soil test campaigns	28	1374	31
Farm science Club conveners meet	4	128	0
Advisory services/Agri-clinics	6224	4980	429
Celebration of important days	16	1146	84
Video lessons displayed	23	478	51
Newspaper coverage	498	-	-
Radio talks / coverage	59	-	-

Table 3. Number of important publications of KVK during 2004-13

Sl.No	Publication	Number
1.	International publication	7
2.	National journal/Papers in Seminars	16
3.	Booklets	8
4.	Popular articles	31
5.	Compact disc	10
6.	Extension folder/leaf lets	29
7.	Technical publications	8
8.	Posters	4
9.	News letters	32
10.	Video Documentary	2

Technology Week Celebrations-Kalpakam-2010

Technology Week and World Coconut Day celebrations were jointly organized by KVK and CPCRI, Regional Station, Kayamkulam as a four days programme (1st to 4th September 2010). Agricultural exhibition, farmer's quiz competition on coconut and coconut products, contest on best coconut bunch and seminars on Agricultural Entrepreneurship-Prospects and possibilities, Animal husbandry, Poultry, Fisheries and Integrated farming systems were organized. There were also forums for scientist-farmer interface in which farmers' queries were discussed and practical solutions were delivered by experts. The programme was inaugurated by Sri.Mullakkara Ratnakaran, Minister of Agriculture, Government of Kerala and during the four days programme Sri.K.C.Venugopal, Member of Parliament, Alappuzha, Sri.B.Babuprasad, MLA, Haripad and many members of Panchayat Raj Institutions of the district and agricultural experts participated. About 1,250 farmers actively participated in the various programmes and about 2,000 students from 25 schools visited various exhibition stalls.

Input Sales and Services

Availability of quality seeds and planting materials form a major impediment in realising higher yields in agricultural production. Revolving fund scheme of KVK has been instrumental in making available the critical inputs like seeds of released high yielding varieties of crops, planting materials of pepper/banana/spices, mushroom spawn, bio agents, fodder slips, poultry chicks,

eggs, earthworms, tissue culture plants, processed products, and publications to the farming community at reasonable price. This helped in enhancing the adoption of technologies for improving the productivity as well as the income of farmers. The details of inputs made available to the farmers during the period are given as Table 4.

Table 4. Details of inputs supplied to farmers under Revolving Fund Scheme

Category	Quantity	Amount (Rs.)	Number of farmers benefited
Seed materials -Varieties (kg)	700.85	2,41,724	38,380
Planting Materials - Varieties (No.)	67,960	3,56,495	11,384
Livestock materials (No.)	3,239	1,92,526	837
Fish fingerlings (No.)	160	320	9
Mushroom spawn (packets of 200g)	4,161	75,944	1,190
Earthworm (No.)	46,020	23,040	313
Azolla (kg)	110	3,604	289
ME trap (No.)	2,782	1,87,210	2,092

A revolving fund scheme is being operated in KVK since 2005 with seed money of Rs. 1 lakh provided by ICAR. Various activities like vegetable seed production, planting material production, bio products preparation, livestock and poultry rearing were undertaken in the scheme. The seeds of vegetable crops like amaranthus, bitter gourd, bhindi, brinjal, chilly, tomato, vegetable cowpea, and snake gourd were produced. Planting materials of mango, jack, sapota, pomegranate, jamba, lovilovi, neem, mahagony, agathy etc. were procured from Kerala Agricultural University and made available to farmers. Poultry breeds of Gramapriya, Grama lakshmi, Kadakknath etc. were hatched in the incubator available in the KVK. Bio products such as Methyl Euginol traps, Cue lure traps, mushroom spawn, fresh mushroom etc. were produced. Micro nutrient formulations for banana and vegetables were procured from IIHR, Bangalore. Value added products from coconut and fruits were prepared and made available at KVK. The status of revolving fund is presented in Table 5.

Table 5. Status of Revolving Fund Scheme (Rs) over the years

Year	Opening balance as on 1st April	Receipts	Expenditure	Closing balance on 31st March
2005 - 2006	1,00,000	39,737	27,288	1,12,449
2006 - 2007	1,12,449	75,085	24,985	1,62,549
2007 - 2008	1,62,549	1,25,209	23,795	2,63,963
2008 - 2009	2,63,963	2,67,641	59,577	4,72,027
2009 - 2010	4,72,027	2,00,961	93,794	5,79,194
2010 - 2011	5,79,194	3,07,463	2,95,781	5,90,876
2011 – 2012	5,90,876	2,12,811	1,26,748	6,76,939
2012 - 2013	6,76,939	2,99,639	1,69,351	8,07,227

E. Resource and Knowledge Centre Activities

KVK serves as the Agriculture Resource and Knowledge Centre for the district. It is committed to providing expert technical information and excellence in client service delivered by friendly and experienced staff. Demonstration units established at the KVK and the soil, water and plant testing laboratory (SWPTL) are the major components under this.

Demonstration units established at KVK

Various demonstration units established at KVK serve as model low cost units enabling farmers visiting KVK to adopt them. They are also used for practical sessions in training programmes and serve for seed/seedlings production. Major units and the theme areas are enlisted below.

i. Crop production and propagation: Plant propagation unit- Orchard for grafting/layering, Rapid multiplication of Pepper, Medicinal plants- more than 100 medicinal species, Rain shelter, Poly house, Fodder grass unit, Vegetable seed production units- Snake gourd, bitter gourd, amaranthus, chilli, brinjal, cowpea, and bhindi.

ii. Production of organics: Low cost vermi wash and vermi compost unit- earth worms multiplication, Azolla unit, Trap production unit – ME traps and Cue lure traps, Biopesticide unit.

iii. Mushroom production: Low cost mushroom shed-100 bed capacity for oyster/milky mushrooms, Mushroom spawn production unit

iv. Processing and value addition: Coconut value addition unit, Copra dryer unit – 2 types of 400 and 1000 nut capacity, Snow ball tender nut production

v. Apiculture: Beekeeping demonstration unit- Indian and stingless bee colonies

vi. Poultry: Gramasree /Gramalakshmi/ Gramapriya/Kadakknath/Aseel layer chick bird unit, Poultry Hatchery, Goose and Turkey units, Model broiler chick demonstration unit

vii. Animal husbandry: Rabbitary unit

viii. Pisciculture: Homestead fish culture units- 4 units, Ornamental fish culture unit

ix. Farm machinery: Paddy transplanter, garden tiller, power tiller, power sprayer, brush cutter, lawn mower, coconut climbing device, chaff cutter

Soil, water and plant testing laboratory (SWPTL)

The SWPTL with state of art facilities for analysing all major nutrients, pH and EC was established in 2006 at the KVK. A paid service with a token amount of Rs.30/soil sample and Rs.10/ water sample has been largely utilized by the farmers (Table 6). Eight hundred and twenty two farmers utilized this facility and this could reduce the use of chemical fertilizers by about 20-25% and thus reducing the cost of cultivation. The water testing facility is being utilized by the fish farmers especially backyard pond fisheries and fresh water fish farmers which has great significance for this coastal district with great scope for inland aquaculture.

Table 6. Details of samples analyzed from 2006-07 to 2012-13

Sample	No. of Samples analyzed	No. of farmers benefited	Amount realized (Rs.)
Soil	1228+3645*	784	36,840
Water	42	37	420
Plant	3	1	300
Total	**1273**	**822**	**37,560**

*As part of the external funded project on "Soil Based Plant Nutrient Management Plan for Agro-ecosystems of Kerala"

EXTERNAL AIDED PROJECTS

I. National Initiative on Climate Resilient Agriculture (NICRA) (2011- till date)

Indian Council of Agricultural Research (ICAR) has launched the National Initiative on Climate Resilient Agriculture to enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climate variability and climate change through development and application of improved production and risk management technologies and to demonstrate site specific and integrated technology packages on farmers' fields in one village of each district. The technology demonstration component is initiated through 100 Krishi Vigyan Kendras in the country, coordinated by CRIDA and Zonal Project Directorates.

In Kerala, Allappuzha is the only district covered in the project where Muttar village of Veliyand block in Kuttanad region was selected for implementation (Fig.2). The village is prone to high vulnerability to climate changes with below mean sea level geographical setting, and frequent monsoon floods (June to September). Salinity and acidity problems are also faced by the farmers. Agriculture, livestock, poultry and duck rearing forms the major vocations practised. Rice is the main crop followed by coconut, banana and vegetables. Due to flood and unseasonal rains, only one crop of paddy is possible in the village.

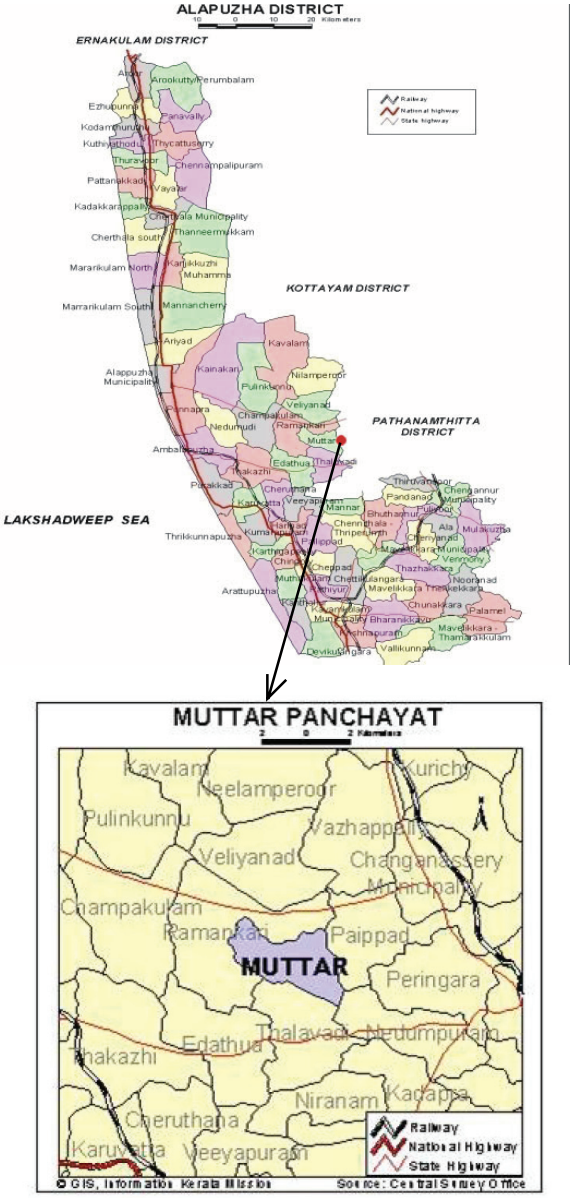
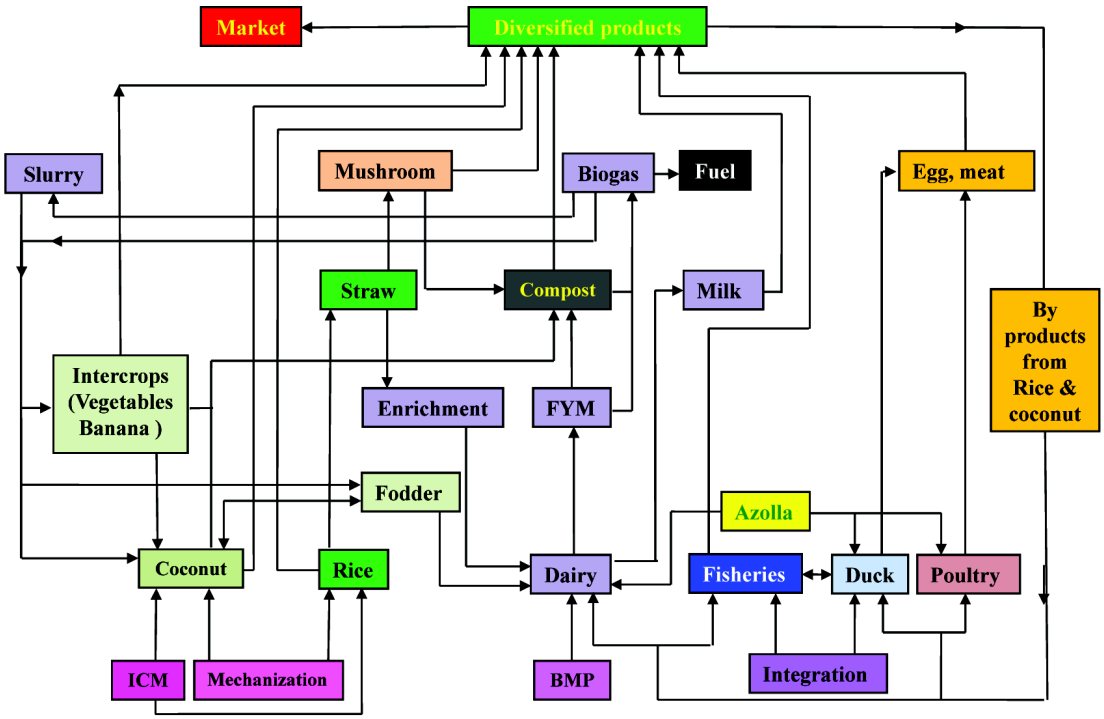


Fig. 2 Location of the project area

Technology demonstrations

KVK - Alappuzha implements the technology demonstration component of NICRA focussing on integrated farming system as a climate adaptation and mitigation strategy. An integrated farming system model incorporating the prevalent and potential production systems of the region viz., paddy, coconut, banana, vegetables, dairy, poultry, duck rearing, fisheries and mushroom was conceptualised with appropriate interventions (Fig.3). The component activities were

Fig. 3 CLIMATE RESILIENT AGRICULTURE: DIVERSIFICATION AND INTEGRATION OF FOOD PRODUCT ION ACTIVITIES IN KUTTANAD REGION



ICM: Integrated crop management; BMP: Better management practices

envisaged as technology demonstrations and formulated under four modules viz., natural resource management, crop production, livestock and fisheries, and institutional interventions. A systematic and programmatic approach was followed for introducing and implementing the technology demonstrations. Awareness creation followed by capacity building activities was taken up and in certain cases the demonstration partners were given the freedom of taking up trials before actually taking up the demonstrations. The different technology modules and technology demonstrations are detailed below.

I. Natural resource management

1. **Site specific nutrient management for better production and resource conservation:** In order to have awareness on the site specific and economic nutrient management, a campaign was conducted for soil testing based nutrient management and 96 soil samples from wet land paddy fields and 145 soil samples from garden lands were collected, processed and analyzed for pH, EC, major and micro nutrients. Soil health cards were prepared based on the analysis and distributed to farmers along with fertilizer recommendations for the major crops of the village.

2. **Recycling of organic residues for energy generation and crop production using portable biogas units** : Dairy farming is one of the major allied enterprises practiced in the project village by marginal farmers with land holdings less than 0.1 ha and economic utilization of organic wastes like cow dung and left over feed materials is not possible. Hence a demonstration was conducted on the use of portable biogas units. Portable biogas plants of 1000 liter capacity were demonstrated to 26 farmer partners during 2011-13. The major benefits of the demonstration were saving in LPG use and enhanced production of banana, vegetable and/or fodder grass and reduction in the emission of green house gases. The results shows that each biogas unit generated cooking gas for an average 2 hr/day which lead to saving in the use of LPG cylinder to the extent of 2-3 cylinders/year.

3. **Moisture conservation in coconut basins through incorporation of biomass** : Even though water logged area, coconut in uplands suffers from moisture stress during the summer months (Dec- April). Hence, a technology demonstration was conducted on in situ moisture conservation by growing cowpea in coconut basins and incorporating the biomass at 45 DAS i.e. flowering stage. Cowpea seeds of C152 were sown in the coconut basins @ 50 g / basin during the recession of NE monsoon. The average biomass produced per basin was 10 kg/palm. In addition to moisture conservation, organic matter incorporation results in the overall health improvement of coconut palms. By spending an amount of Rs. 3 per palm a yield improvement to the tune of Rs. 40 per palm can be realised.

II. Crop production

1. **Integrated Crop Management in Paddy:** Paddy is the most important cereal crop of the village cultivated under the wetland conditions and only one crop is possible annually due to the flood during the monsoon. Lack of mechanization, use of very high quantity of seeds, fertilizers and PP chemicals leading to environmental pollutions are the major problems with respect to the cultivation of paddy. To address these problems, technology demonstrations were

conducted on the following concepts.

- **Site specific integrated nutrient management**: Ninety six soil samples were collected from the paddy fields at the time of land preparation and based on the soil analysis, application of lime was recommended @600 kg/ha in two splits, first as basal and second as top dressing at 30th day after sowing. Recommendations for N, P and K were given for individual fields based on soil test. Seed treatment with biofertilizers viz., Azospirillum and Phosphobacterium were taken up @ 2.5kg/ha for reducing the application of chemical fertilizer. Leaf Colour Chart (LCC) was used for scheduling nitrogenous fertilizer application.
- **Sowing seeds using drum seeder**: Eight row drum seeder was used for sowing paddy seeds. The drum seeder requires less quantity of seeds (50 kg/ha) compared to direct sowing (150 kg/ha). Seeds can be sown in lines at a spacing of 20 cm x 10 cm so that the weeding and other operations were easy.

- **Integrated pest and disease management**: Eco friendly pest and disease management practices were followed in the demonstration plots. The bio control agent Pseudomonas was used for seed treatment (@ 20g/l), broadcasting along with cow dung at 30 days and foliar spray at 45 days after sowing and disease incidence was negligible in demonstrated fields. Tricho cards were used for the management of stem borer and leaf folder at 15 days interval from 25th day of sowing. Light traps were used for the monitoring of pest incidence. As such all these prophylactic measures were very effective in demonstrated fields and no chemicals were applied in these plots throughout the crop season.During 2011-12, the demonstrations were conducted during the puncha season (Nov-March) in an area of 18 ha with 41 partner farmers located in 10 padasekharams. During 2012-13, it was at Kalayamkari padasekharam, in an area of 13.4 ha involving 22 partner farmers. The demonstration plots recorded an average yield of 5.76 t/ha against 4.5 t/ha in control plots. The net returns and B: C ratio also were high in demonstration plots (Rs. 52,909/ha and 2.17, respectively)

2. **Introduction of high yielding short duration paddy variety :** In order to introduce a short duration high yielding variety which can escape the summer showers during harvest (March-April), the variety Prathyasa (105-110 days duration) released from RRS, Moncompu of KAU was demonstrated in an area of 18 ha involving 41 farmers during the puncha season of 2011-12 adopting integrated crop management practices. The Prathyasa variety recorded an average grain yield of 5.39 t/ha with a net income of Rs. 39,818/ha and B: C ratio of 1.93. The

crop could be harvested in 110-115 days and the cooking qualities are better compared to the reigning high yielding variety Uma with duration of 120-125 days.

3. **Mechanization of paddy cultivation :** In order to highlight the use of machineries in paddy cultivation, the use of drum seeder and transplanter was demonstrated for seeding/ transplanting paddy along with broadcasting method followed by farmers. Eight row wet land paddy seeder (Drum seeder) was used for sowing seeds. Paddy transplanter was also demonstrated in an area of two acres. Mat nurseries were prepared using seeds @ 8 kg/ acre. The 13 days old seedlings were transplanted using eight row paddy transplanter. The transplanter used plots recorded the highest yield of 7.14 t/ha with a B: C ratio of 2.35 followed by drum seeder used plots (5.39 t/ha yield and 2.35 B: C of ratio).
4. **Integrated pest and disease management in coconut :** Technology demonstration on the integrated management of leaf rot disease and red palm weevil was undertaken in 1078 infected coconut palms (178 palms duri7ng first year and 900 palms in second year) by involving coconut producers' society in the village. Farmers were trained to identify the affected palms based on symptoms and thereby adopting timely management measures. Coconut climbers in the village were trained and engaged for crown cleaning and treating the palms against leaf rot disease and applying prophylactic measures against rhinoceros beetle and red palm weevil and the results show that among the treated, the disease incidence was reduced considerably from 14.24 % to 4.4 %.
5. **Intercropping short duration cassava in coconut gardens to overcome water logging** : Water logging during monsoon (June to September) is the major problem and upland cultivation is also not possible. Introduction of the short duration cassava Vellayani Hraswa (5-5.5 months) was done in 38 farmer's plots in an area of 1.3 ha. The yield of the demonstration plots (21.9 t/ha) were higher compared to the local check (12 t/ha in 8 months) and the farmers were satisfied with the short duration variety.

III. Livestock and fisheries

1. **Feeding management and disease control programme in livestock**

a. **Enerfat to reduce the incidence of ketosis and to increase the milk production**: The higher feed cost forced the farmers to reduce the quantity of balanced feed during early lactation stage resulting in nutritional deficiency diseases like ketosis which affect the milk production and quality. To overcome this, Rumen By pass fat @ 100 g/day was supplemented to lactating cow to ensure the availability of energy and quantity and quality of milk was improved after

this intervention. There was an increase of 400-500 ml of milk per day per animal and the LR and fat increased from 27 to 30 and 3 to 3.5%, respectively.

b. **Paddy straw enriched and made in to solid block to reduce the feeding cost**: The digestible crude protein content of paddy straw is zero and its feeding has no benefit in feeding value. By increasing the nutritive value of paddy straw, the feeding cost could be saved. For this, paddy straw was enriched with 4% urea and kept in an air tight container for 21 days. After this period, the treated paddy straw was mixed with 2% of formaldehyde treated Ground Nut Oil Cake, 5% binding material (Maida), 2% mineral mixture, 1% salt and made into block of 30 mm x10 mm x10 mm size. By feeding this sun dried blocks, the feeding cost could be saved by 12%, in addition to the improvement in quality and quantity of milk.

c. **Disinfectant solution to prevent disease outbreak during flood**: Every year during the flooding season outbreak of infectious and contagious diseases like Foot and Mouth disease and Mastitis occur which leads to heavy economic loss to the dairy farmers. To overcome this problem, KOHRSOLIN disinfectant solution @15 ml/ 5 l water was sprayed inside and in the surroundings of the cow shed. Incidence of FMD and mastitis was not reported from these cow sheds after using this disinfectant solution.

d. **Introduction of fodder grass cultivation in homesteads**: A major problem faced by the dairy farmers is the unavailability of quality green fodder especially during monsoon flooding period. Most of the dairy farmers have marginal land holdings and fodder grass cultivation was not practiced in the area. Hence the fodder grass variety CO-3 was introduced to 27 farmers for ensuring the green fodder availability. The first harvest was made 90 days after planting and further harvestings were done at 45 days interval. An average yield of 70 t/ha was obtained per year through 7 harvests. With an average cost of Rs.48,500/ha, a net return of Rs.21,500 is obtained with a B:C ratio of 1.44 at the present cost of fodder prevalent.

2. Housing of poultry on slatted floor to overcome the flooded conditions

Poultry farming during monsoon seasons in the village is affected with flooding and most of the people lose their poultry in the flood. Outbreak of diseases is another major problem

due to flood. The traditional method of housing of poultry in small cages could not protect them from these situations. Therefore, a new technology was demonstrated to house the poultry in cages on raised platforms which could protect them from the flood and also from the outbreak of diseases. Trainings were conducted to farmers on poultry rearing and the selected farmers were given slatted floor poultry cages built on strong GI pipes and covered with iron nets. 30 units of poultry cages were established in the village and each unit contains more than 15 poultry birds. With the help of this intervention, the mortality percentage was reduced from 60 to 10 and the egg production was increased from 1,750 to 3,000 eggs/ unit/year.

3. Introduction of automatic vaccinator and empowerment of poultry farmers

Commercial duck farming is practiced by about thirty farmers utilizing the waterlogged fields in addition to two egger nurseries in the village. Each flock has a size of 5,000-10,000 birds mostly of indigenous breeds, Chara and Chemballi. Occurrences of disease like Duck Plague, Pasteurelosis and Ranikhet are common causing complete mortality. Vaccinating the entire folk at a time without expert service is a difficult task. Hence, a technology demonstration was conducted to introduce an automatic vaccinator, which was very simple in operation and can be used by the farmers themselves. Method demonstrations were conducted to popularise this device among the commercial and homestead farmers for taking up the vaccination. As a result of the demonstrations, the mortality rate of ducks was reduced to 7.5 % from 20-50 % in normal cases with a net return and B: C ratio of Rs. 91,000 and 2.82, respectively compared to Rs.70,000 and 2.40 per flock of 5,000 ducks in the traditional practice.

4. Introduction of improved breeds of poultry for higher egg production

In order to introduce an improved breed of poultry for the village, the Gramapriya breed was introduced in 25 households with 10 birds per unit. The birds started laying eggs on 164 days from the date of hatching.

5. Integrated duck and fish farming

Most of the houses in the village have a small homestead pond of average size of 5 cents. Duck farming is a common practice of the area, but in large flocks only and fish farming is practiced by a very few farmers. A technology demonstration by incorporating duck and fisheries was introduced so that an average farmer could earn his livelihood and run a

complimentary and sustainable production system. Trainings were conducted on integrated duck and fish farming and an exposure visit was conducted. Twenty five integrated duck and fish farming units were established in homestead ponds. Low cost duck shades were erected over the ponds at the edges with PVC pipes and locally available materials. A unit accommodated 20 ducks and fingerlings @ 75 no./cent.

IV. Institutional interventions

1. **Value addition of rice and coconut** : A value addition unit was established to prepare high value products from both coconut and paddy crop. Value added rice products like ready to cook fried rice powder and coconut products like virgin coconut oil, chutney powder and rice based traditional food products were prepared utilizing the rice and coconut procured from the project area. For facilitating this activity, machineries and devices like pulveriser, roaster, sealing machine, utensils, motorized scraper, screw press and packing materials labels were procured from the project side. The products prepared were properly packed, labelled and marketed in the brand name "Keerthi ". In the value added unit there was approximate production of 600 kg of chutney powder, 350 kg of rice powder, 105 l of virgin coconut oil with an employment generation of 960 man days. Nearly 5,000 coconuts and 700 kg of rice were utilized for value addition.
2. **Mushroom production and marketing for income generatio**n: Technology demonstration was conducted for the utilization of available paddy straw for the production of Oyster mushroom. Following trainings and exposure visits, six commercial mushroom production units were established. Among the farmers undertaking mushroom production, one entrepreneur was selected and provided intensive training on low cost spawn production followed by setting up a low cost spawn production unit with support from the project. The mushroom produced by the partners were branded and marketed in the name-"Muttar fresh". The spent substrate is being used for vermicompost production and in turn used for crop production.

3. **Facilitation of milk marketing**: In order to overcome the problem of lack of milk marketing facilities faced by the dairy farmers, KVK organised the dairy farmers and initiated the revival of the milk marketing society (Muttar East-APCOS-208D which was not functional for the last 12 years) in convergence with the Dairy

Development Department and MILMA (the milk procurement and marketing agency of the state). The procurement of milk started on 1st July 2012 with 91 l per day from 15 farmers which has increased to more than 200 l per day from 25 farmers within a year. A committee of three farmers managed the activities of the society initially and later an elected Director Board took over the management as per rules of the society.

4. **Small Weather Station**: For making the farmers and students aware about climate change and its impact in crop production, a small weather station was established at St. Georges' Higher Secondary School, Muttar. Self recording rain gauge, Maximum, Minimum, Wet bulb, Dry bulb thermometers and Single Stevenson Screen were established in the weather station. The students of social science club were trained in taking daily weather data and tabulating it. The weather data was displayed in the school notice board for the benefit of farmers and students.
5. **Custom hiring centre**: For making the farmers more familiar with mechanisation and to ensure the timely availability of implements a custom hiring centre was initiated in the village. A management committee was constituted for the operation of custom hiring centre. The rates for hiring the machines/implements were decided by the custom hiring centre management committee, and every farmer in the village can hire these implements by paying a nominal rent. During the two years of operation, the custom hiring centre could realize a total amount of Rs.24,450/ with a net saving of Rs.5,900/.

II. **Other External Funded Projects**

1. **Knowledge and skill up gradation training for gardeners for employability in the horticulture units/farm (2007)**: Funded by the Kerala State Horticulture Mission (Rs. 13.53 lakhs) selected 50 rural youths for the training programme of six months duration. Basic infrastructures such as poly house (14 m x 5 m), rain shelter (8 m x 3 m), shade house (15 m x 9 m) and store cum potting shed were constructed for facilitating practical sessions in the KVK for field training.
2. **Integrated management for increasing yield and profitability in rice (2007)**: Funded by the Kerala State Planning Board with a budget of Rs. 2.42 lakhs through Kerala Agricultural

University, the demonstration was implemented at Chennithala panchayath in a contiguous area of 50 ha. The project covered all the 113 farmers in 9th block padasekharam of the panchayath. In this programme, integrated pest and disease management in rice, value addition of rice and straw were demonstrated. The awareness, knowledge and skill of farmers in the identification of natural enemies and bio control agents were improved through Farmer Field School.

3. **Training and demonstration on fresh water fish culture, fresh water prawn culture and brackish water prawn/fin fish culture (2008)**: Funded by the National Fisheries Development Board, Hyderabad with a budget of Rs.1.94 lakhs, four training programmes were conducted for 10 days each on 'fresh water fish culture', 'fresh water prawn culture' and 'brackish water prawn/fin fish culture' in which 105 farmers from different parts of the district participated. All the participants are actively involved in fresh water fish and prawn culture and named their village as "Mathsya (fish) village". Eight farmers trained in the project are producing seed fish of Pearl spot and Tilapia.

4. **Training programmes on Rural Craft, Screw pine product preparation (2008-10)**: Funded by DRDA, Kollam through Oachira block panchayath with a budget of Rs. 1.77 lakhs. A total 142 women were trained in 5 batches of one week duration for self employment.
5. **Reviving rice fallows with crop sequencing of sesamum /pulses in Onattukara region of Alleppey district (2009)**: Funded by the Kerala State Planning Board with a budget of Rs. 2.88 lakhs, Front Line Demonstrations at Thekkekara and Devikulangara panchayaths of Onattukara region were conducted in an area of 55 ha consisting of 123 farmers. This programme revived paddy cultivation in cultivable rice fallows of Onattukara region, demonstrated cost reduction technologies like soil test based fertilizer application, use of biofertilizers like Azospirillum and Phosphobacteria, application of Pseudomonas fluorescens and trichocards, use of leaf colour chart through group approach involving rural youths/women, and improved the income through productivity increase of rice – pulse/ sesamum crop sequence. Rice (variety Uma), Cow pea (variety C 152, Pusa Komal), Black gram and Green gram were used. An average yield of 4.2 t/ha of paddy and 0.55 t/ha of pulses were obtained with B: C ratios of 1.8 and 1.31, respectively.
6. **Entrepreneurship Development Programme in Agriculture (2009-2012)**: Eight batches of training were conducted for the beneficiaries sponsored by the Kerala State Development Corporation for SC/ST, Thrissur in which 294 participants from Alappuzha, Kollam,

Pathanamthitta and Kottayam districts attended. Trainings on various topics related to entrepreneurship development in crop production and protection, animal husbandry, mushroom cultivation and value addition of produce were imparted to the trainees.

7. **Rationalizing chemical fertilizer and plant protection chemicals through soil testing methods and eco-friendly plant protection measures (2010)**: Funded by the Kerala State Planning Board with a budget of Rs. 1.65 lakhs, the demonstration was taken up with objectives to motivate the farming community to ensure soil testing and adopt technologies for improving nutrient use efficiency, eco-friendly plant protection measures, and maintaining crop health cards. It was implemented in 258.5 acres covering 6 padasekharams (153 farmers) at Thakazhi panchayath in Kuttanad region. A total of 500 soil samples were collected and fertilizer recommendations were suggested based on results. By following the soil test based nutrient recommendation, an amount of Rs.470/ha could be saved. Application of fertilizers could be reduced by 13% based on soil testing and Leaf Colour Chart usage. Use of plant protection chemicals could be reduced because of bio agent applications.
8. **Soil Based Plant Nutrient Management for Agro-ecosystems of Kerala (2010-13)**: Funded by the Dept. of Agriculture, Kerala and coordinated by Kerala State Planning Board with a budget provision of Rs.10.67 lakhs, KVK soil testing lab was a partner in the network project involving 13 organisations and 27 labs in the state for the preparation of soil based plant nutrient management plans for different agro-ecosystems of Kerala. Detailed analysis of 3,645 samples for the major and micro nutrients from 24 panchayaths and one municipality of Alappuzha district was taken up. The results were uploaded in the dedicated website for the project and interpreted for the preparation of soil based plant nutrient management plans.
9. **Block level training programmes (2011)**: Conducted training programme on coconut product diversification and scientific vegetable farming for two batches sponsored by Muthukulam Block panchayath.
10. **Friends of Coconut training programme (2011-13)**: Sponsored by the Coconut Development Board, Kochi, 160 persons were trained in ten batches of one week duration. The six day training included coverage of topics like mother palm and seed nut selection, pest and disease management, nutrient management, intercropping, integrated farming and value addition of coconut in addition to rigorous training on climbing for harvesting and plant protection in coconut. The trainees were also exposed to personality development and financial management aspects.

THE IMPACT

The KVK through its decade long activities has emerged as knowledge cum resource centre for agriculture and allied activities in the district. It functions in convergence with other lead agencies and line departments in facilitating agricultural development. Apart from the overall improvement in knowledge/skill/income/entrepreneurship in farm and non farm income sources of farmers in the district, a few cases that leaves the imprints of the KVK interventions among farming community have been enlisted under individual/group success stories and cases of large scale adoption.

I. Successes stories from the field

KVK interventions have been instrumental in promoting many micro enterprises in agriculture and allied sectors along with gains in production and profit through technological interventions. Some of the exemplary achievements in major areas have been detailed under specific categories.

A. Crop Production

1. Samrudhi – an ideal intercrop in coconut garden

Mr. Narayana Pillai, Vembanad, of Chettikulangara Panchayath, is a progressive farmer. In his 3.5 ha coconut garden he cultivates 200 coconut trees along with a wide variety of intercrops like banana, vegetables, tuber crops, spices, fruit crops etc. throughout the year to increase income. He was one among the partners in the Front Line Demonstration (FLD) programme on 'Introduction of high yielding chilly variety "Samrudhi", as an intercrop in coconut gardens'. Mr. Narayana Pillai cultivated the samrudhi variety in 5 cents (150 plants) during 2011. On every harvest the crop yielded around 10 kg fresh chillies and every fourth day he harvests chillies. There was a mild attack of leaf curl and he adopted eco friendly pest management practices. The chillies, priced around Rs. 100/kg, were marketed in the local markets. He was very much satisfied with the performance of the chilly variety as the pungency and quality of the variety is better than that of the local chilly variety. He has been producing seeds and seedlings of the variety and providing to farmers on request through KVK linkage. A popular article on the success story was published in Kerala Karshakan.

B. Processing and value addition

2. Sreedhurga Coconut Processing Unit, Chettikulangara-Marketing the traditions

The KVK provided one week training in coconut product diversification to 12 members of Sreedhurga women SHG of Koippallikarazhma in 2007. The knowledge and skill gained motivated

the group to start a coconut processing unit under the leadership of Ms. Sreekala, Puthussereth. A self reliant unit that used coconut from their own homesteads for processing into value added traditional products like virgin coconut oil, chutney powder, coconut oil, coconut oil based wafers and rice/coconut based bakery products, has wide acceptance among the public. Run on sustainable profits, they have diversified into order based production of coconut and rice products for rituals also. It proves the potential of microenterprises in value addition to provide sustainable income and employment for rural women.

3. **Praan foods Kareelakulangara- a success story in coconut product diversification**

Mr.Radhakrishnan is a gulf returnee who invested his savings and bank credit in a flour mill for powdering chilly, coriander and rice. But the income was low and he had enough spare time in between. He could get only a nominal income from the 1.5 acres of inherited coconut garden also. So he approached the KVK for proper guidance in utilizing the available facilities of the pulverizing unit to start any coconut related enterprise. KVK provided him the technology support to produce diversified coconut products from the nuts harvested from his farm utilizing the machineries available in the flour mill. Utilizing family labour, he ventured into the production of virgin coconut oil, chutney powder, fried coconut gratings (ready to use product), instant theeyal mix, avulose powder etc. All these products are sold under the brand name “Praan” and marketed through his production cum sales outlet near National Highway. He further extended the unit with labour saving devices like screw press, motorized scraper and grinder and on demand, provides the service of grating fresh coconut for hotels and marriage functions. The coconut water, otherwise wasted has been converted to coconut water lemonade and was used in ready to cook Appam mix. These products are in high demand and enables him to earn a steady monthly income of over Rs.15,000/-.

4. **Chithus Coconut Products, West Kallada**

Ms. Geetha Lekshmi started the unit in 2011 as a family venture and was engaged in producing the coconut products like VCO, Chutney powder, Theeyal mix and fish curry mix, coconut based traditional bakery products and are marketed under the brand name “Chithus” through the outlets of Triveni, a State Government Organization, super markets and bakeries throughout Kollam District. KVK provided training, follow up services, unit visit, project proposal for availing credit facility, linked them with machinery suppliers, packing material suppliers and marketing channels. Financial outlay of the unit is Rs.15 lakh including building and machineries. She is

giving regular employment to 8 housewives for production and packing of products and two youths are engaged in marketing. Her unit is equipped with labour saving devices like pulveriser, double scraper, and screw press, bar coder, hot air oven, automatic roasting machine and sealing machine.

5. **Anthiyoor Coconut Producers Society, Balaramapuram**

Mr. Balayyan, started the unit in 2011 as a registered farmer group under Coconut Producers Society, Anthiyoor. It produces coconut products like VCO, left over coconut kernel products, and coconut water soft drink. The KVK provided training and follow up services like unit visit and prepared project proposal for availing credit. It also facilitated by linking them with machinery suppliers, packing material suppliers and marketing channels. The unit is performing well now employing many women.

C. Mushroom production

6. **Ms. Leenarani, Chettikulangara, woman master farmer for Mushroom Training**

Mrs. Leenarani is a Commerce graduate with entrepreneurial qualities and enthusiasm. Her farm of 1.2 ha consists of paddy, sesamum, coconut, vegetables and fruit crops. She happened to attend a training programme on Scientific Oyster mushroom Cultivation offered by the Krishi Vigyan Kendra in 2002 which motivated her to start mushroom production as a micro enterprise in her homestead. Later she attended another training programme on marketing aspects at the KVK that led her to adopt labelling and selling mushroom under the brand name 'Dream valley mushrooms'. She also started production of spawn for her own requirement and later ventured into its sales. Under the guidance of the KVK, she has been moulded into a master trainer for mushroom production. She is actively engaged in conducting training programmes and earning an aggregate income of Rs. 25,000 per month from the enterprise. This has been highlighted as a case of constant handholding support extended by KVK to its trainees in becoming successful entrepreneurs. She has been elected as a member of the Chettikulangara Grama Panchayath, which highlights the gain in empowerment through these activities.

7. **Ms. Sathi Varichirayail, A mushroom entrepreneur from Chunakkara**

Ms.Sathi is an educated housewife belonging to Scheduled caste. She has been cultivating mushroom since 2006 after attending training from the KVK. She initiated mushroom cultivation by constructing a low cost shed which was later expanded to home 150 beds by availing credit. She took up the sales through her own small shop at Chunakkara where students and teachers

are regular customers. She used this to popularise mushroom use to more than 500 students in the locality. She is earning an income of Rs. 2,000-3,000 per month from mushroom cultivation alone. She is a model to small farmers in integrating mushroom cultivation with other crops like vegetables and betel vine for earning additional income. Her homestead has been converted to a sustainable integrated farming system unit through other interventions of KVK.

8. **Mr. Manoharan Pillai, Venmony, a Blooming Mushroom Entrepreneur**

Mr. Manoharan Pillai, Greeshmam, Venmony has set an example of dedication, hard work and technology utilization in mushroom cultivation. After retirement from the army service, he started mushroom cultivation with two packets of spawn in 4 beds. Now he has expanded his unit to a size of 1000 beds capacity and produces 4-5 kg mushroom/day and earns Rs.10,000-15,000 per month. Besides this, he also produces quality mushroom spawn through low cost techniques learned from KVK and perfected through regular follow up visits. He successfully utilizes the locally available soft wood saw dust for mushroom production and is a model to other mushroom growers. In addition to this, he earns a good income from spent waste by recycling it in to vermicompost. He had developed several techniques of his own in cultivation and shares his experience with other farmers also. Now as a master farmer, he disseminates the technology to farmers in nearby districts also. He is maintaining other allied enterprises successfully like egger nursery, Stingless bee keeping etc.

D. Apiculture

9. Ms. Thankamony Amma, Thamarakkulam- The Queen of Apiculture

Ms. Thankamony Amma, a graduate house wife attended bee keeping training at KVK after losing two colonies due to lack of proper management. Gaining knowledge, skill and confidence from the training and the FLD programme conducted in her village, she started a small apiculture unit with five colonies in 2007. Now Ms. Thankamony owns more than 30 live colonies at two locations. She has spread the technology to around 250 people through personal communication,

skill demonstration, training and field visits. Her present annual income from the sale of honey, colonies and honorarium for training is around Rs.75,000/. She has been recognized as the master farmer for trainings by Horticorp, Rubber Board, local bodies and has trained more than 300 persons. She also serves as a technical service provider for small and marginal level apiculturists/ groups. A small honey processing unit has also been initiated using the inputs from the follow up trainings in marketing and honey processing by the KVK.

F. Poultry and Animal Husbandry

10. **Integrated duck and fish farming –story of group success**

Seven members of Pachakkad farmers club of Thamarakulam Panchayath undertakes integrated duck and fish farming in 110 acres of public water body in the village after they came to know about the success story of fish and duck farming published by the Krishi Vigyan Kendra. They approached KVK for technical advice and visited model units set up by the KVK before initiating the venture. As per the standard models developed by KVK, low cost duck shed was erected above the pond and 150 no. of 3 months old indigenous ducks of Chara and Chemballi were introduced. Ducks started laying eggs at 5-6 months of age and the daily egg production was in the range of 100 – 120. Eggs were sold @ Rs. 5/- in the site itself providing a daily income of Rs. 500 – 600/- . Half the money earned through sale of eggs was spent for feeding ducks and the remaining amount was spent towards the labour charges of night watchman. Since the water body was large, it needed a night watchman to prevent the theft of fish by anti social elements. A total income of Rs 1.8 lakhs was obtained through sale of duck eggs during the year 2011 -12 in addition to the bumper profit from the sale of fish to the tune of Rs.6.0 lakhs. The success has been widely covered by news papers and TV channels. An interview on this was aired by AIR, New Delhi by interacting with KVK staff.

11. **Ms. Shylaja, Vallikunnam, Hatching Success in Poultry**

Ms. Shylaja, SS Bhavanam, Vallikunnam attended a training programme on poultry rearing conducted by the KVK in 2007 and since then she has been in constant touch with KVK for technical and follow up support. She produces a day old chicks using natural broody hen continuously for 2-3 batches without any break, which she learnt from the training programme. In normal case broody hen after hatching out one batch would take care of chicks and later start laying eggs after a break. Here she used 2-3 desi fowl exclusively for hatching out the chicks. Once the chicks hatched out, the day old chicks are shifted to artificial brooding house and the next set of eggs are placed for hatching. She was also a partner for demonstration on portable incubator and hatched out various types of chicks. Now she has diversified into ornamental birds also and earns

Rs. 2,000-4,000 per month through the sale of ornamental birds @ Rs.300 per pair and layer type of chicken @ Rs.150 per pair.

12. **Broiler unit, Cherukara, Kavalam**

Mr. Maneesh, M .L. was a 23 year old youth, when he attended a vocational training on broiler farming in KVK during 2008. Though he had no prior experience in poultry farming, the technical back up of the KVK gave him the confidence to start a small broiler farm unit of 100 chicks reared in 'all in all out' system. With steady income he increased the bird size to 300 chicks per batch and earned Rs. 1,000-2,000 per batch. Presently he owns a farm of 1000 chicks capacity reared in multiple batch system with intake capacity of 200 chicks per week. In peak seasons his profit has been Rs. 4,500/- from 300 broilers. KVK also equipped him with broiler dressing technology and marketing strategies to further diversify his ventures into the sale of broiler in ready to cook form through follow up training programmes.

13. **Egger Nursery, Mavelikkara**

Mr. Rajasekharan Nair, Ashirwad, Pallarimangalam was a poultry farmer and based on the advice of the KVK personnel who visited his unit, started an egger nursery by rearing 200 numbers of a day old chicks per batch. He reared the chicks up to 45 days and sold after immunization. Motivated by the initial success, he constructed a poultry shed in a scientific manner with the plinth area of 100 sq.m. having a capacity to rear 1,000-1,200 birds per batch and now earns a profit of Rs. 15,000-20,000 per batch every 45 days.

14. **Caprice Goat Farm, Chettikulangara**

It was a chance visit to the model goat farm of the KVK in 2008 that inspired Ms. Rohini Alexander, Meenathetil of Kanjikal to venture into goat farming. She started the farm with 15 goats under the name Caprice goat farm. Later she diversified into duck and poultry rearing also and now has a variety of indigenous and exotic breeds of ducks and layer birds. She earns a good income of Rs. 1.5 lakh per year through sale of kids and bucks. KVK has been using her farm as a model for visit by other farmers. The shed has been refined by replacing the wooden pillars with concrete structures so that the durability of the shed is increased. About 25 farmers have adopted this design of shed.

F. **Agri-related services**

15. **Anilkumar, clearing heights with coconut climbing device**

Anilkumar was a member of the first batch of Friends of Coconut Tree training programme funded by CDB and organized by KVK during 2011. Frustrated by the non availability of skilled laborers for harvesting the coconut palms in his own homestead, he decided to learn the skill

himself. After acquiring the skill and confidence through the residential training, he started the job in his homestead and nearby areas. Coconut farmers in his village encouraged him by entrusting the work to him. He harvested the coconut palm and adopted the plant protection measures to the satisfaction of the clients and is in high demand in Panavally, Cherthala and Eranakulam. As a hospital technician by profession who attends duty in the afternoon schedule, he utilizes the morning hours (6.30 am to 12 noon) in working days and full time in holidays, as a friend of coconut. He charges for the work on par with the traditional workers remuneration and earns a monthly income that ranges from Rs. 15,000 to 18,000, much more than his regular income from hospital. Following the guidelines provided to the friends of coconut during the training, he keeps the record of the details of work, remuneration etc. in the format. It is helpful to maintain a rapport with the beneficiaries and remind them about the harvesting or any crop management practices. He proves that if there is a will there is a way which can be a model to other unemployed youth.

II. **Cases of Large Scale Adoption**

Scaling up of technologies proven under OFTs and popularized through FLDs has been a great challenge taken up by the KVK. Some cases that could produce a large scale impact through adoption are detailed below.

1. **Fodder grass and azolla cultivation in the district**

Green fodder could help to overcome the problem of high cost of cattle feed and provide healthy fresh feed to the cattle population in the district. KVK organized seven training programmes exclusively on scientific fodder production (both on and off campus) and as a session in five training programmes of 'Scientific cattle rearing techniques'. Planting materials of fodder grass varieties like hybrid Napier were multiplied and made available to the farmers for cultivation. About 75,000 cuttings were planted by 125 farmers. KVK further facilitated multiplication of these cuttings and distribution to other farmers also. Thus an area of 30 ha was covered among 125 farmers.

Azolla cultivation was also popularized among cattle and poultry farmers through trainings, frontline demonstrations and production and sale of azolla seed materials. A total of more than 200 azolla units were established in 54 farmer's fields yielding an average of 60-80 kg per annum per unit which serves as a nutritious feed for cattle and poultry farmers.

2. **Methyl Euginol Traps (MET) for fruit fly management in mango**

Alappuzha has 5,346 ha under mango which constitutes about 6 per cent of the total area under mango in the state and production records reveals 5 per cent contribution to the state overall production. The main shortfall in quality mango production is the infestation of fruit fly (Bactrocera dorsalis). Though some farmers do smoking to ward off the pest, it does not yield the intended results. The spraying advocated for the fly control is not feasible under the micro level conditions of the region as most trees are near drinking water sources or living rooms. Practice of using the bait trap technology using Ocimum leaves is also difficult due to the scarcity of leaves in summer coupled with religious festivals. In this context the KVK conducted an OFT, followed by FLD on the efficacy of MET under field conditions. Based on experience gained from these technology assessment and demonstration processes, KVK modified the existing trap model and made it available to farmers at a reasonable price. The KVK now supplies MET for fruit fly management in mango and guava.

In Mararikkulam village, with the help of VVV club under NABARD, KVK supplied more than 75 traps as a pilot programme for large area adoption. About 240 traps were also distributed to different localities within the district and also to Ernakulam, Pathanamthitta, Kollam, Thiruvananthapuram and Kottayam districts. KVK also gave wide awareness on fruit fly management and use of MET through mass media. Three Grama Panchayaths have formulated projects for MET technology adoption by entire village with the technological backup of KVK. Until now the technology has spread to more than 2,000 households, causing a reduction of 60%-70 % in damage by the pest. People have started using the MET for fruit fly control in guava also. During 2009-10, KVK has produced and sold more than 2,000 MET to different agencies and farmers. Realizing the success of the pilot project, Krishibhavan of Mararikulam panchayath has procured more than 1000 METs from the KVK to spread the technology throughout the panchayath. Considering an average reduction of 25% in the pest infestation, the technology has increased the production of mangoes at least by 2,500 t in the district.

3. **Use of Tricho card for managing stem borer in rice**

Stem borer and leaf roller are two major lepidopteran pests in all rice growing tracts of the district. Farmers use chemical pesticides with systemic action against these pests. Use of Tricho cards against these pests was found successful. KVK has given trainings, method demonstrations, seminars and FFS to popularise the use of tricho cards against these pests from 2002 onwards. As a result of the interventions and awareness programmes in association with the State

Department of Agriculture, 75 per cent padasekharams in the district are using tricho cards. A total of 5,000 cc cards were used for 2,500 acres located in 30 villages during 2009-10. Use of tricho cards reduces number of sprayings from three to one or nil and reduction of pest incidence from 70% to 2-5% thereby reducing the cost of cultivation and increasing the net profit in addition to saving the environment.

4. **Intercropping IISR ginger variety Varada in coconut gardens**

KVK conducted OFT on intercropping IIHR ginger varieties as intercrop in coconut gardens in Chingoly panchayath during 2007-08. Varieties such as Varada, Mahima and Rejatha were tested for their suitability in Alappuzha district and it was proved that among the three varieties, Varada was superior in the case of yield and pest and disease resistance. Hence a front line demonstration was conducted during 2011-12 in Karuvatta panchayath involving 30 farmers. The Varada variety recorded the highest yield compared to the local variety. The farmers were very much satisfied with the performance and yield of Varada. The whole production of 1,500 kg of ginger was utilized as seeds and made available to 75 farmers through KVK- farmer linkage. Based on the success of this FLD, the Chavara panchayth of Kollam district procured 60 kg ginger rhizomes from these farmers for demonstrations.

5. **Thilarani – sesamum variety gaining popularity in Onattukara region**

Cultivation of sesamum in rice fallows has been a tradition in Onattukara region. Due to socio economic and other factors, the area under sesamum cultivation has been on the decline over the years. The KVK intervened and conducted two front line demonstrations for reviving the rice fallow sesamum cultivation in 2011. FLD on popularization of high yielding variety Thilarani released by Regional Agricultural Research Station, Kayamkulam was conducted in Chettikulangara panchayath involving 20 famers in an area of 5 ha. The demonstration was very successful and farmers got an average yield of 515 kg/ha. Based on the success of the demonstration, the Agriculture Department procured the entire seeds produced in the demonstration for larger spread of the variety. The Thilarani variety was adopted in four panchayaths in an area of 30 ha in the next year

(2012). The advantage of higher yield and suitability to the regional situation paved way for the wider adoption of the variety.

6. **Drum seeder for seeding in paddy cultivation**

During 2011-12 a technology demonstration on use of drum seeder for sowing paddy was conducted in an area of 1 ha at Muttar panchayath under the NICRA project involving two farmers. The demonstration was extended to an area of 10 ha with 25 farmers in Kalayankari padasekharam of Muttar panchayath during 2012-13. Along with this, method demonstrations were conducted in Karuvatta, Nooranad, Veeyapuram, Muttar and Chavara panchayaths. The technology was also popularized through extension officials' training, mass media like news paper, TV etc. ATMA conducted demonstration of drum seeder in an area of 6 ha in Ambalapuzha, Ramankari, Harippad, Bharanikkavu and Maveliklkara block panchayaths. By adopting this method, the quantity of seed/ ha could be reduced to 40 kg instead of 100 kg in direct sowing, reducing the cost of cultivation. Yield increase to the tune of 20% was recorded due to the optimum plant population achieved by using the drum seeder with a spacing of 20 cm x 10 cm. The number of tillers, plant growth and grain weight were higher in the drum seeder used plots. In addition, reduction in the incidence of pests and diseases was also observed. Convinced of the merits of using drum seeder, Thakazhi Panchayath has procured 50 units for farmers under their plan projects.

7. **Use of Banana special for nutrient management in banana**

During 2009- 12, the KVK conducted OFT and FLD on the application of "Banana special", a micronutrient formulation which was found effective in increasing the yield. The product was made available to farmers through Revolving Fund in KVK. More than 500 farmers have already adopted the technology. Large and small scale farmers adopt the technology and the practice is getting spread to larger areas, leading to about 20% increase in productivity.

8. **Milking Machine**

During 2008-09 an OFT was conducted on "Use of manually operated milking machine". Based on the feedback from the farmers involved, refinement was done by incorporating a compressor to this manually operated machine to be used as a power operated milking machine for mini dairy units. Instead of a hand pump, a compressor (1.2 amps and 2850 rpm speed) of refrigerator is used and can be operated using electricity, so that the machine can be operated by hand as well as power. More than 20 method demonstrations have been conducted to popularise

this machine. Nearly 55 farmers have approached KVK for technical advice to use this machine. Now 141 farmers have started using this low cost manually and power operated milking machines. The users are mainly the small scale dairy unit with 2-5 cows. By using this machine, a dairy farmer can save Rs.600-700/ per month per cow. The cost of this power operated milking machine comes to around Rs. 6,000-7,000/- and a farmer could save Rs.7,200-8,400/- per cow per year.

9. **Bio control of leaf spot disease in betel vine**

The KVK organized farmer participatory OFT and FLD in the management using Pseudomonas fluorescence (2%) - soil drenching and foliar spray at three week intervals. The technology was further spread through the experience sharing of the OFT and the FLD participant farmers to other betel vine farmers and extension officials. As a result 50 betel vine growers started regularly adopting the technology meticulously realizing better growth, large leaves fetching higher price, good keeping quality, and control of the disease. Moreover as the technology was simple and eco – friendly many farmers showed willingness to adopt, as revealed through the helpline and agroclinic services. These interventions have given a new lease of life to the betel vine farmers of the district.

10. **Integrated duck and fish farming**

The KVK conducted a FLD on integrated duck and fish farming during the year 2007-08 with the participation of 15 farmers from different parts of the district. A unique model for integration of duck and fish was designed and established in all the15 units. Low cost duck shelter was fabricated with locally available bamboo and PVC pipes above the fish ponds and ducks of chara and chempally breed were reared in the shelter. Fingerlings of rohu, katla, mrigal and red belly were released to the fish pond. Based on the success of FLD 25 IFS units were established in Muttar village under NICRA project and 17 units were established under FLD program of KVK in different parts of the district. Exposures visits of progressive farmers and students were arranged to the model farms to disseminate the technology. About 150 groups of farmers and students visited the model farm of which 52 groups were from outside the district. Popular articles were published in agricultural magazines and a success story was published in The Hindu 'Agriculture and Technology' column, and news paper in local language. Video documentation was telecasted

in Dooradharsan (Krishidharsan), Kairali, Asianet (Krishi deepam), and Jeevan TV channel. Approximately 150 new units are established in different parts of Alleppey district.

11. **Fish for all – Mathsya gramam**

Sree Krishna radio and arts club, Thiruvizha, Cherthala have 150 members and all the members are between the age group of 20-40. The area had large number of homestead ponds where fishes were grown in unscientific ways. This prompted the KVK to organize a training programme for ten days in inland fish culture involving the youths from the area. They were provided with fingerlings, training manual and pH kit after the training. Now 50 members in the club have formed a group and named the village as mathsya gramam and is successfully involved in fresh and ornamental fish culture in scientific way. Five youth have started business in aquarium and low cost fish tank setting and provides advisory service. They earn an individual monthly income to the tune of Rs. 15000 /- and act as model entrepreneurs.

11. **Eco friendly disease management in paddy – use of bio-agents**

Due to unscientific cultivation practices, disease incidences are common in all paddy tracts of the district. Farmers follow indiscriminate application of fungicide which results in high cost of production and resurgence of diseases. Use of bio- agent, Pseudomonas florescence as a prophylactic measure against the diseases was found successful. The KVK tried to popularise the technology through trainings, method demonstrations, FLDs, advisory services, FFS and through extension literature since 2005. Through the awareness programmes in collaboration with the State Department of Agriculture, more than 4500 farmers adopted the technology in an area of 4075 ha in the district. The technology has also been spread to other farmers through field days conducted after FLDs. Prophylactic application of these bio agents through seed treatment, soil application and foliar spraying resulted in the complete reduction in the use of fungicides. By this eco and farmer friendly technology, farmers could reduce the cost of cultivation and thereby increase the net profit.

III. **Innovative Approaches in Technology Transfer**

Farmer-Farmer Extension through Master Farmers

Dissemination of knowledge from farmer to farmer is one of the efficient methods of transfer of technology. The Krishi Vigyan Kendra has involved in farmer to farmer technology dissemination through production and distribution of quality critical inputs and facilitating master farmers for sharing experiences and skills. This resulted in better and faster dissemination of knowledge/ skills among the farming community, especially among women farmers/micro entrepreneurs. Master farmers (Farmer Promoters) have been groomed in the areas of nursery management,

coconut product diversification, apiculture, compost making and mushroom cultivation through intensive trainings and hands on work experience programmes. KVK has developed master trainers not only in production sector, but in allied enterprises like soap making and screen printing. Evidences suggest that it has been the constant after-training follow-up programmes and the personalized services of the KVK that enabled many farmers to venture agriculture and allied options as a livelihood vocation and serve as field schools for others.

IV. **The Overall Impact**

1. **Capacity Development Programmes**

Trainings being a major capacity development programme of the KVK, an assessment of trainings organized during the last eight years was attempted. A random sample of 200 participants of various training programmes selected from the list of trainees registered at Krishi Vigyan Kendra was used as respondents. This gave an overall indication of the profile of the trainees, knowledge gain among the participants and the utilisation of the skill and knowledge gained through trainings. The duration of training ranged from two days to six months. A total of 1147 training programmes were organized on various topics in which 28626 farmers attended. The profile analysis indicated that around 61.5% of the total participants in training programmes have been women. It also indicated that the majority of the participants had high school level education and had an average annual income below Rs. 60,000 with small and marginal land holdings.

Knowledge gain measured through pre and post evaluation scores of the teacher made knowledge tests indicated an overall knowledge gain of 27.78%. Based on the training topic the knowledge gain varied from 23–57% over the pre training knowledge scores that indicated the effectiveness of training programmes. The knowledge gain score of women participants was found to be higher than that of men indicating the keen interest of the rural women in acquiring knowledge for skill up gradation and income generation. More than 40% knowledge gain was recorded in the case of beekeeping, mushroom cultivation, and coconut product diversification. It could be noted that these subjects are allied enterprises, which will help in income generation utilizing the available local resources and can be taken up by the trainees with minimum capital investment.

Technology spread through the exchange of knowledge gain by the trainees with other members of the farming community was also estimated to be high. It was recorded that majority (64%) of the trainees exchanged their knowledge with 10-42 persons. The results were indicative of the confidence gained by the participants and the importance of farmer to farmer extension in agricultural development. The relevancy rating score for the majority of training topics was 56

to 83 and was graded as very useful. Three fourth of the respondents opined that the after–training services offered by the KVK was very good and useful for sustained adoption. This has been indicative of the fact that many of the participants have utilized the training input to start vocations that support their livelihoods. However, among the trainees only eight per cent of the participants could utilize the knowledge/skill obtained in starting relevant micro-enterprises in rural areas and was more dependent on the individual entrepreneurial qualities and access to capital/infrastructure.

2. **Entrepreneurship Development**

Apart from the improvement in knowledge and skill in enhancing farm and non farm income from major crops and allied activities, specific gains have been recorded in the areas of apiculture as a women friendly micro enterprise, mushroom cultivation as a homestead based agri-enterprise, coconut processing and value addition as a niche market enterprise, and vermi composting as an eco-enterprise for resource recycling. Detailed case studies on these areas with emphasis on socio-economic impact and scalability has been included for its relevance in the overall agricultural development of the district.

1. **Apiculture –a micro enterprise to increase the income of farm women**

Though apiculture is known as a forest based enterprise, Alappuzha, a district without any forest cover could prove that proper utilization of crop flora can sustain bee keeping as a commercial venture. It has been promoted as a farm enterprise suitable for rubber growing eastern tracts of Alappuzha where rubber provides extra floral nectar during February to May. The western part which lies close to the coastal belt having large area under coconut is also congenial for growth of the bees as it provides pollen essential for bees throughout the year. So there is good scope for migratory apiculture by keeping colonies in western part during lean and vegetative growth season and shifting to honey pasturage area during flow season. During summer, sesamum known as the best bee flora can also be utilized. Apiculture is also suitable for places where crops like cucurbits, mango, tamarind and cashew are grown. These crops are maintained in every homestead of the district and thus increase the scope of including apiculture as a component in integrated farming system in homesteads.

KVK interventions in the area was backed by the results of a survey conducted in 2003-04 which revealed that unscientific management of colonies was the prime reason for discontinuing beekeeping by around 88% of the involved farmers. The KVK adopted an integrated approach to tackle the problem by combining different technology transfer methods. Frontline demonstration on scientific practices of beekeeping was carried out at Thamarakkulam village under the title Apiculture for rural women as an additional income source. In 2005 along with trainings conducted on various topics at relevant timings, hives were made available so that participants could test the skill and knowledge obtained immediately in their hives. The supplied hive was managed to become a full hive for division within a period of one month. The empty boxes purchased were used for dividing colonies and towards the start of honey flow season in the second half of January 2006, every member owned at least two hives. Hands on training on queen cell identification

and management was organized in addition to method demonstration on preparing honey comb foundation. During this period, farmers' visit to the demonstration area was also arranged. All the interventions were routed through the identified group leaders. Simultaneously KVK carried out about fifteen trainings on scientific bee keeping practices to various stake holders such as farmers, women groups, rural youths, students etc. in the locality/ near vicinity/ adjacent areas.

An On Farm Testing on the management of wax moth using division board was initiated in 2009. As the price of sugar escalated, farmers faced difficulty in maintaining the Indian Bee colonies and to overcome the situation, KVK suggested emphasis on an integrated approach of bee keeping with Indian and Stingless bee colonies. Stingless bee honey fetches a fair price ranging from Rs.1000-1500/kg honey. An FLD on the scientific management of sting less bees in homestead was also taken up with ten farmers and twenty bee hives at Mavelikara and Baharanicavu Blocks, the whole area being in a contiguous stretch.

In Chathiyara, Thamarakkulam Village where only 15 hives were present during pre demonstration, it was increased to 54 recording 260 per cent increase in number of hives. Earlier the average productivity was only 2.5kg honey/ hive which increased to a maximum of 16 kg averaging 5.75 kg honey/hive. The production of honey increased from 75 to 275 kg in the demonstration area. It is estimated that incurring an amount of Rs.350/- on a unit of two hives, an income of Rs.1000/- from honey with a BC ratio of 1.86 is realised. Further, family labour is sufficient in regular handling of hives and no labor cost is involved. The produce has good demand and is marketed through the local channels. The increase in average annual family income from apiculture is Rs. 12000/.

The overall impact of the KVK interventions and its experiential learning strategies has been reflected in the overall adoption of scientific bee keeping by farmers in the district. It has been estimated that 25 farmers/farm women groups and more than 150 individual farmers, mostly farm women have adopted the technology. Three registered bee keeping units have also been established.

2. **Mushroom cultivation-a homestead based agri-enterprise for additional income**

Predominance of small and marginal farmers in the district made KVK to promote scientific mushroom cultivation as a viable entrepreneurial venture for the homesteads ever since its inception. More than 120 trainings were conducted during the last ten years with participation of about 2800 trainees predominantly women (76.3 %). A study on the impact of training programmes on scientific mushroom cultivation conducted by the KVK taken up in 2009-10 among 120 randomly selected participants revealed its popularity as a homestead based enterprise for additional income.

The results indicated that majority of the adopters of the technology (55%) belonged to younger age group (31-45 years) especially educated rural women (81%). Eighty eight per cent of

the trainees were having educational qualification of high school (54%) and three per cent were post graduates. Another factor that favoured adoption of the technology by women has been the utilization of home premises for its production. Most of the units are located in converted or constructed mushroom sheds. The average investment was Rs.25, 000 to 75,000 per unit and 68% farmers availed bank credit. From 32 micro enterprises on fresh mushroom production successfully established by farmers with the continuous technical support of the KVK, the average total marketable fresh mushroom production is estimated to be 50-65 quintals with an employment generation of 2000 – 2400 man days per annum and average income realized from mushrooms was Rs. 2000 to 10,000 per month. Further analysis indicated that 15.6 % of the units produce 4 – 5 kg fresh mushroom per day, 21.9% more than 3 kg per day and 62.5% up to 1 kg per day. The B: C ratio rangeed from 1.5 to 2.2. Many of the entrepreneurs have also been trained through KVK in mushroom spawn production, a critical input for the success of the venture. Around 750-1250 packets of quality mushroom spawn has been produced and marketed per annum by the farm entrepreneurs promoted by the KVK.

The produce is marketed either directly to the consumers or to hotels, margin free markets and bakeries. Different units market their produce under brand names of Farm Fresh, Dream valley, Greeshma, and Sneha mushrooms. Four master trainers/farmer promoters have emerged through KVK interventions who serve as agents for farmer to farmer technology dissemination. The technology spread through master trainers in mushroom production and spawn production has been over 3000. The whole set of activities have lead to a network of adopters, information providers and other development / related agencies. A meet of KVK ex-trainees was conducted for sharing of information and experiences in liaison with All India Radio and Dooradarshan. It indicated that the entrepreneurs could extract functional support of state wide agencies like State Horticulture Mission (SHM), STED, NGOs, Department of Agriculture, Financial institutions, and Kerala Agricultural University for their activities, a clear verdict for their entrepreneurial wisdom.

The main motivational factors for adoption of this vocation as perceived by the entrepreneurs were monitory benefits, training and technical support from KVK, market demand and social acceptance. Various sources of knowledge on mushroom cultivation (multiple responses) indicated that they acquired knowledge through KVK trainings (100%), communication with other mushroom growers (21%), technical support from KVK after training (24%), reading magazines/ pamphlets (5%), other media (Radio, TV , News paper) (9%).

3. **Vermicomposting as an eco-enterprise**

The Krishi Vigyan Kendra through its multi faceted transfer of technology programmes

enhanced the knowledge, skill and adoption of vermiculture in the rural areas both as individual and group micro enterprise. The technology dissemination in vermicomposting has been promoted as an eco- enterprise for farm waste recycling through various extension methodologies singly and in combination. The major methods adopted were awareness building and knowledge/ skill enhancement through training programmes and method demonstrations. More than 100 training programmes were conducted for the spread of this technology in which more than 3000 farmers, rural youth and extension officials participated.

KVK also conducted frontline demonstration (FLD) on vermicomposting and the results showed that from one tonne of organic matter, 700 kg of vermicompost worth Rs.5600 could be produced at a benefit cost ratio of 2.37 along with employment generation for 6 women labourers. Further KVK involved in mass multiplication of earth worms and supplied quality worms directly to farmers/ groups (84,000 numbers). KVK also facilitated farmer to farmer exchange either free of cost or sale (34,000 numbers) and income generation of women self help groups through earthworm multiplication and sale (64,000 numbers) @ Rs.0.50/worm. KVK also conducted helpline services, agro clinics, field visits, experience sharing in ex-trainees /group meetings and facilitated the farmers in project preparation, technology support for implementation of projects with assistance from Coconut Development Board, Department of Agriculture etc.

The feedback, direct observations, and ex-trainees meet indicated that out of 22 women groups trained, 18 groups adopted (81.82%) vermicomposting as an income generating activity. They realized an average income of Rs. 10,000-15,000 per year. About 37.7 per cent of the farmers trained adopted vermicomposting for utilizing mainly for vegetables, banana, coconut, cassava, paddy etc. Their perceptions indicated good growth, green/healthy leaves, reduction in pests/ diseases and improved taste/keeping quality in vegetable/paddy. The adoption of the technology is also the highest among women groups compared to other clients, thus reflecting the women friendly nature of this technology.

4. **Coconut processing and value addition as a niche market enterprise**

Coconut being a major crop of Alappuzha district, coconut based micro enterprises hold immense potential to provide opportunities for generating income for the farmers. Indentifying the need, the KVK has taken up many interventions for value addition of coconut. More than 100 skill oriented training programmes on group /individual basis have been conducted covering about 2300 participants on use of small holders' copra dryer, coconut chips making, virgin coconut oil production, bakery products and chutney powder and instant curry mixes using left over coconut kernel, coconut water products and tender coconut products. Besides training programmes, KVK has conducted need based OFT and FLD to improve the quality and shelf life of the coconut products and provided viable project proposals to the stake holders for availing credit facilities for starting units and organized ex-trainees meet to share the experiences of the adopters. A study to assess the impact of the KVK interventions on coconut product diversification as an enterprise to improve the livelihood of rural women group and small and marginal farmers was conducted during 2010-11. The respondents indicated that trainings and other extension programmes of the KVK were the major source of information to them in starting the enterprises.

Majority (93.3 %) of the respondents acquired knowledge and skill from training programmes conducted by the KVK and 6.7 per cent of them gained knowledge from KVK master trainers. About 76.7 per cent of them participated in other extension programmes like seminar, exhibition etc. All the respondents adopted and practiced the skill, knowledge and technologies they acquired through the training programme for product preparation and there by income generation.

It also revealed that majority (46.7 %) of the adopters belonged to the age group of 41–50 years and were women (86.7 %) showing that coconut product diversification is a micro enterprise which can be taken up by women groups, eighty per cent of them being housewives, highlighting the potential of adopting this micro enterprises for additional income generation by utilizing leisure time. More than 50 groups initiated the coconut product diversification as a micro enterprise, and engage 4-9 members for labor generating 55-60 working days per annum. It processes 7500-8000 nuts, producing 10-25 tonnes of product annually, and the average value addition obtained per nut is Rs.10.5. On an average, each member of a group earn an income of Rs.150/- on each working day and realize an income of Rs.9000-10000 annually. Majority of the groups prepare virgin coconut oil products, chutney powder, instant curry mix, coconut water vinegar, soft drink, beverage, coconut based bakery products, traditional bakery products etc. The adopters opine that combination/integration of products maximizes the income of the unit. Six units market their product under brand names Praan, Mari, Muralika, Swadesi, Souhrida and Sreedurga. Vanitha Fed, a State government organization procures Virgin Coconut Oil from more than ten units and market in the brand name "Kerakaanthi" through selected outlets in Trivandrum district on demand.

About 50 per cent of the units are run by individuals and the rest on group basis. Half of these entrepreneurs availed credits from financial institutions like nationalized banks and the rest from Kudumbasree Mission and Self Help Groups of NSS, SNDP etc. Majority of the (73.4 per cent) of the adopters opined that Rs.1-3 lakhs was required to establish a farm level coconut processing unit with minimum facilities. They preferred a low cost shed to operate and small scale machineries like motorized coconut scrapers, roasting machines, screw press, sealing machines etc for effective functioning. Local availability of nuts was a serious problem indicated by 63.3 percent of the adopters. Production cycle analysis revealed that 16.7 per cent of adopters prepare the coconut products on a regular basis where as 43.3 per cent at fixed intervals, and others only based on demand. Sixty per cent of the adopters produced up to three different products, 23.3 per cent produced 7-9 products, and the rest (16.7 %) preferred to produce 4-6 products. The adopters opined that combination/integration of products maximizes the income of the unit. Eighty per cent of the adopters preferred direct marketing for realizing better profits.

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A Decade in Service to Farmers (2004 - 2013)