AICRP (Palms)

आज़ादी का अमृत महोत्सव

Contributions of ICAR-AICRP on Palms to farming community

Success stories

भा.कृ.अनु.प -अखिल भारतीय समन्वित ताड़ अनुसंधान परियोजना

ICAR- ALL INDIA COORDINATED RESEARCH PROJECT ON PALMS

भाकृअनुप-केन्द्रीय रोपण फसल अनुसंधान संस्थान

कासरगोड़ - 671 124, केरल, भारत

ICAR - Central Plantation Crops Research Institute

Kasaragod - 671 124, Kerala, India

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केरफअसं CPCRI

Technical Bulletin No. 2

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Success stories

Ravi Bhat
S. Sumitha
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ICAR-CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
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1. COCONUT+COCOA+NUTMEG CROPPING SYSTEM

Name of the farmer	:	**Thiru. K. Aruchamy**
Address	:	Kaliyapuram village Anaimalai, Pollachi-642129.
Contact Number	:	6381305195
GPSCo-ordinates	:	$10^0 54' 09"$ N;$76^0 92' 08"$ E
Coconut Based Cropping System	:	Coconut+Cocoa+Nutmeg

Thiru. Aruchamy owns 8.5 acres of garden land in which his ancestors have raised Tiptur Tall variety of coconut fifty years back. He started intercropping of cocoa in coconut ten years back after visiting Aliyarnagar Centre of ICAR – AICRP (Palms). He maintained a total of 1400 cocoa plants across seven acres. Six years ago, one of his relatives gave him 400 budded plants of nutmeg (round leaf type) to plant in coconut garden. He replaced 400 poor yielding cocoa plants with nutmeg. To his great surprise, his plants came to bearing in the fourth year itself. He is practicing organic farming wherein he applies vermicompost procured from Coconut Research Station, Aliyarnagar @ one kg per plant per year. He applies biocontrol agents *viz.*, *Pseudomonas fluroscens and Trichoderma viride* @ 50 g per plant per year.

Yield and Economics

On an average he is harvesting 120 nuts per palm from coconut, two kilo grams of dried cocoa beans per plant from cocoa and 100 fruits per plant from nutmeg per year. About 370 fruits are required to reap one kg of mace which is being sold at the rate of Rs. 2200 per kg. Nutmeg fetches a premium price of Rs. 500 per kg which peaks during the month of January. Dried beans of cocoa is sold @ Rs. 170 per kg. He has assured returns of Rs. 1000 per nutmeg plant and Rs.340 per cocoa plant per annum.

Perception of the farmer

The farmer is much convinced with coconut + cocoa + nutmeg cropping system because of its better remuneration than the other intercrops. He also appreciates the significant quantum of leaf litter addition from cocoa which is approximated to nearly five tonnes per hectare. The farmer spelt out that only very few technical experts are available for top working in nutmeg, that too in the neighbouring state. Unemployed youth of Tamil Nadu can acquire training in this aspect so that it will be mutually rewarding to the farmers and the unemployed. He thanks Aliyarnagar Centre for keeping him occupied in the farm and to scrap the loneliness as his only son is in USA.

2. COCONUT+JASMINE CROPPING SYSTEM

Name of the farmer	:	**Thiru. Dhandapani**
Address	:	Bangalakadu, Anaimalai Pollachi
Contact Number	:	9578773815
GPSCo-ordinates	:	$10^0 32'$ 55" N;$76^0 02'$ 34" E
Coconut Based Cropping System	:	Coconut+Jasmine

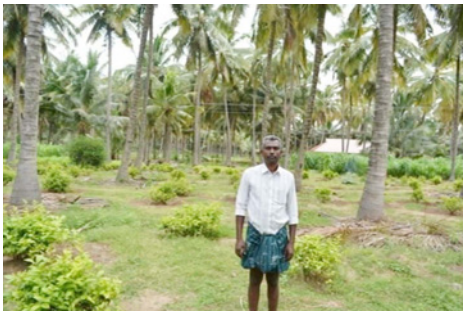
Thiru. Dhandapani owns 2 acres of 30 years old coconut plantation, planted at a spacing of 7.5 m x 7.5 m. The farmer after visiting Aliyarnagar Centre, ICAR- AICRP (Palms), Tamil Nadu Agricultural University, Coimbatore acquired inspiration for intercropping of flower crops. Jasmine has been raised over one acre. Totally the farmer has 120 coconut palms in his field of two acres. Jasmine has been planted at a spacing 1.5 m x 1.5 m. The yield of coconut is 150 nuts per palm per year and Jasmine yields 3 – 3.5 tonnes of flowers per acre per year. The peak flowering season of Jasmine is February – May. The farmer only applies FYM @3 kg per plant per year. Micronutrient mixture is sprayed @ 1 % during peak flowering season. Neem oil is sprayed @ 2 % to control sucking pests.

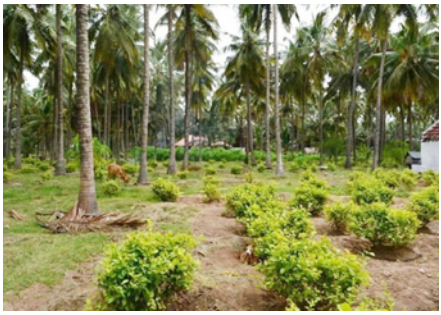
Yield and Economics

The farmer is enjoying a net income of Rs. 1,50,000 per acre per year by adopting Jasmine integrated cropping system. During festivals and marriage seasons, price of jasmine may shoot up to even Rs. 2000 – 3000 perkg.

Perception of the farmer

In the view of the farmer, two acres of coconut farming alone do not offer great potential for family labourers. But intercropping with jasmine renders greater employment opportunities to the family members and to the female labourers in the nearby settlement. Jasmine cultivation helps in constant money flow in the hands of the farmer thus instilling self confidence in him. Jasmine cultivation increases the economic value of his coconut garden. Land is kept weed free and as it warrants daily movement of labourers, it offers in direct security to his garden from the trespassers.





COCONUT + JASMINE

3. GOAT BASED INTEGRATED FARMING SYSTEM

Name of the farmer	:	**Thiru. K. Krishnasamy**
Address	:	Kottur, Malayandipattanam, Pollachi-642114.
Contact Number	:	9965488025
GPSCo-ordinates	:	$10^0 30'$ 36" N;$76^0 58'$ 34" E
Coconut Based Cropping System	:	Coconut+Banana+Foddergrass + Telicherry Breed of Goats

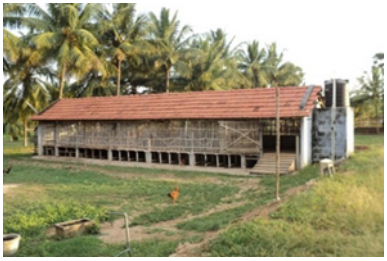
Thiru. Krishnasamy owns two acres of land in which ALR(CN)1 [Arasampatti Tall] coconut variety has been planted during 1998. Owing to the fluctuating price of copra, debilitating pests and dreadful diseases surmounting coconut cultivation, he resorted to Integrated Farming System with goats after acquiring inspiration from the IFS Unit of Aliyarnagar Centre of ICAR-AICRP (Palms). Telicherry breed of goats (12+4) was integrated in the system. Cumbu napier hybrid (COBN5) was raised across 5 cents. Groundnut haulms, soybean husk and groundnut oil cake are being fed to the goats.

Yield and Economics

Yield from coconut is 130 – 140 nuts per palm per year. Gross returns from 2 acres of coconut together with banana is Rs. 513749, cost of cultivation is Rs. 84,000 and net returns is Rs. 429749/- Gross returns from the animal component is Rs. 235080 per annum and net returns is Rs. 140080. Thus an additional income of Rs. 1.40 lakhs per annum is possible because of integration of goat in coconut system.

Perception of the farmer

In the view of the farmer, monocropping of coconut presents potential risks and insecurity to the farmers. But Integrated Farming System with goats presents many advantages in terms of employment opportunities, additional net returns and improved standard of living. Maintenance of goats is very easy compared to dairy and does not warrant huge medical expenses. Unlike coconut, goats can be easily disposed off at any point of time to meet unforeseen expenses in the family front. Soil fertility of the garden is also improved to a great extent because of the droppings of the goats and the field is kept weed free without intervention of chemicals or machinery



Goat Shed

Cumbu Napier Fodder

Goats grazing

GOAT BASED INTEGRATED FARMING SYSTEM

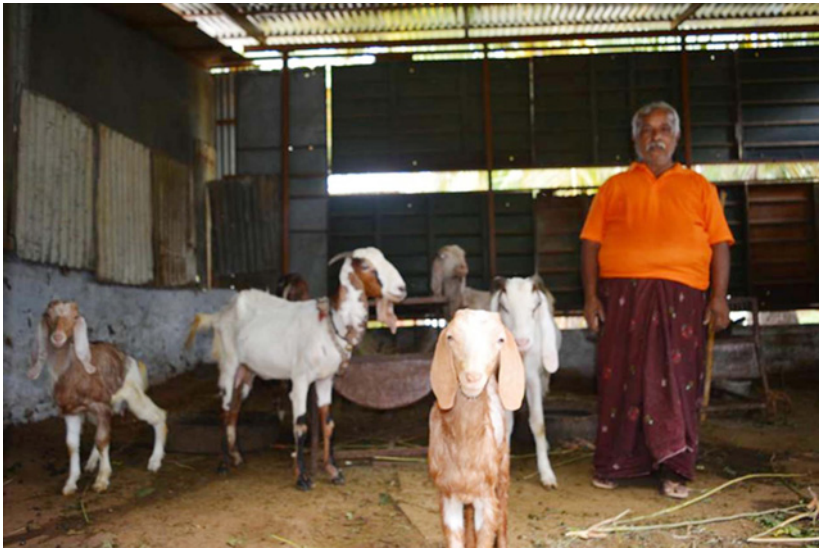
4. UNEMPLOYED TRANSFORMED AS ENTREPRENEUR

Mr. Subramanian of Aliyarnagar, Coimbatore district, Tamil Nadu is overwhelmed to narrate the transformation made by goats in his life and the tangible and intangible benefits accrued through goat rearing. He had been leading a drifting life without permanent employment. Having derived hint from the Integrated Farming System model of AICRP (Palms) scheme of Coconut Research Station, Aliyarnagar, he purchased a pair (1+1) of Jamunapari breed of goats a year back and started rearing in the one acre coconut garden owned by him. Within six months, the goat gave birth to two kids which provoked confidence in him to expand goat rearing to a business venture. He celebrates the kids as new additions to his family. He spells with all hope that goat rearing will scrap his worries and negativities and reframe his life towards prosperity.

Mr. Subramanian, Aliyarnagar rearing goats in his garden

5. GOAT BASED INTEGRATED FARMING SYSTEM

Mr. Aruchamy, a coconut grower of a village in Pollachi taluk of Coimbatore District owns (7+2) flock of Boer goats. He tells that goats give consistent income to him through kids and manure and he is not worried about the fluctuating price of copra now. Soil fertility of his one acre farm is enriched with the droppings and urine of goat. He has planted trees of cotton candy berry, *Thespesia populnea* and Manila Tamarind in his farm which supplies abundant leaves for the goats. In his perspective, rearing goats renders eustress to him. He obtained a net profit of Rs. 1.42 lakhs during 2019 through the sale of goats. Besides economic benefits, he says goat rearing is a therapeutic activity which stimulates his body and soul.



Mr. Aruchamy with Goats in the Shed

6. COCONUT+GINGER CROPPING SYSTEM

Name of the farmer	:	**Thiru. P. Deivaraj**
Address	:	Ramana, Mudalipudur, Anaimalai
Contact Number	:	6382419580
GPSCo-ordinates	:	$10^0$56’ 06" N;$76^0$97’34" E
Coconut Based Cropping System	:	Coconut+Ginger

Thiru. P. Deivaraj has planted ALR (CN)1 variety of coconut two years ago over three acres and he has to wait for four more years to harvest nut from his palms. To utilize his land effectively, he has resorted to ginger as intercrop after attending training on ‘Technological Interventions for Improving the Livelihood Security of Farmers’ organized under SCSP at Aliyarnagar Centre of ICAR – AICRP (Palms). Himachal variety of ginger has been planted adopting a rhizome rate of 700 kg per acre. Rhizomes have been soaked in 0.3 % solution of mancozeb to avoid fungal diseases and planted in raised beds at a spacing of 1 ft. X 1 ft. Beds have been mulched with coir pith for moisture retention. Sprinkler irrigation system is being practiced by providing appropriate engineering structures. Complex fertilizers (20-20-20) are applied @ 70 kgs per acre once every two months. Manual weeding and need based plant protection measures are followed.

Yield and Economics

At the end of nine months from sowing, an average yield of 10 – 12 tonnes per acre is realised. Ginger is being marketed @ Rs. 40 – 50 per kg. When his crop is not hitby a major pest or disease, the farmer enjoys a net income of Rs.1,50,000 – 2,00,000 per acre of ginger cultivation. The farmer targets Karnataka market for selling ginger.

Perception of the farmer

Although ginger is highly remunerative, initial capital investments vested with formation of raised beds, trenches and fixing sprinkler systems are heavy. More so ever, it can be intercropped in coconut garden, when the age of the palm is less than 3 years and the canopy is not rendering shade effect. Ginger thrives well when it receives two to five hours of direct sunlight. Timely plant protection measures will bring great returns by ginger which is a highly remunerative intercrop of coconut at the early age of the palm of less than four years.

7. COCONUT+NUTMEG+PEPPER CROPPING SYSTEM

Name of the farmer	:	**Thiru. Thirumalaisamy**
Address	:	Kaliyapuram, Anaimalai, Pollachi - 642126
Contact Number	:	9486243449
GPSCo-ordinates	:	$10^0$30' 60" N;$76^0$55'14" E
Coconut Based Cropping System	:	Coconut+Nutmeg+Pepper

Thiru. Thirumalaisamy owns 6.6 acres of 20 years old coconut palms. He has planted East Coast Tall variety over three acres and West Coast Tall variety across 3.6 acres. After visiting Aliyarnagar Centre, he derived interest on Multi tier cropping in coconut. Nutmeg (Round leaf, Viswasree varieties) has been planted during 2013 and has come to bearing from third to fifth year. Seeds of nutmeg were sown in polybags packed with vermicompost, FYM, sand and planted in the field after two years of sowing (as seedlings attained a height of three feet)in a pit of dimensions 1.5 ft. x 1.5 ft. He maintains a total of 50 plants per acre, intercropped over three acres. Panniyur 1 variety of pepper (Twenty plants per acre) procured from Pechiparai is allowed to trail over coconut and the plants are in their sixth year now.

Yield and Economics

On an average 150 nuts per palm from coconut, 150 – 200 fruits per plant of nutmeg and 1.5 – 2.0 kg pepper per plant are harvested per year. About 1 kg mace is obtained from 200 fruits of nutmeg. Each nutmeg plant gives a remuneration of Rs.2000–4000 per year. Pepper is sold @ Rs. 450 –500 per kg.

Perception of the farmer

The farmer had been initially practicing organic farming but as there was a sharp fall in the out turn of copra, for the past two years he had been applying muriate of potash and micronutrient mixture @ 2.5 kgs and 1.0 kg per palm per year. Because of intercropping, favourable microclimate is maintained in his farm and evaporation loss of water is greatly minimized thus reducing the water requirements. Every waste (fronds, husks) generated in his farm is effectively recycled which effectively helps in reducing the use of external inputs.

COCONUT BASED MULTI TIER CROPPING SYSTEM

8. COCONUT + NUTMEG CROPPING SYSTEM

Name of the farmer	**:**	**Thiru. P. Vijayakumar**
Address	**:**	Kottur Village Malayandipattinam, Pollachi, Coimbatore Dt. - 642 114
Contact Number	**:**	9840422599
GPS Co-ordinates	**:**	10^0 30' 22" N; 76^0 57' 11" E
CBCS	**:**	Coconut + Nutmeg

Thiru. P.Vijayakumar has 16 acres of 28 years old coconut plantations of West Coast Tall variety, planted at a spacing of 7.5 m. x 7.5 m. Nutmeg finds a place at the centre of four coconut palms in six acres. Nutmeg has been planted in between two rows of coconut so as to accommodate 150 plants per hectare. The farmer narrated that as nutmeg is unisexual, budding is imperative at the third year of its planting to induce bisexuality and to make them productive. The farmer adopts fertigation system with water soluble fertilizers *viz.*, Urea, MAP and MOP, fed at monthly intervals. For nutmeg, during the initial years 40 – 50 – 80 g of Urea, MAP and MOP respectively was applied and from the fifth year, 1000 – 500 – 1000 g of the same fertilizers are being supplied to the plants.

Yield and Economics

Average nut yield of 130 nuts per palm and 750 fruits from single plant of nutmeg is realised per year. Nutmeg fetches an average Rs.700 a kg in the domestic market and mace commands between Rs.1,400 and Rs.1,500 a kg. He is confident that each of his nutmeg plant offers a currency of Rs. 2000 per annum.

Perception of the farmer

The farmer elucidated that whenever his coconut plantations are victimized by pests especially Rugose Spiraling Whitefly in the recent past, it is only the intercrop nutmeg which made him smile. Remuneration from nutmeg has provoked confidence in him to extend its acreage to rest of the ten acres he owns.

COCONUT + NUTMEG

9. COCONUT + NUTMEG + ARECANUT CROPPING SYSTEM

Name of the farmer	**:**	**Thiru. M. Muruganandam**
Address	**:**	Devanurpudur, Udumalpet Road, Pollachi - 642207
Contact Number	**:**	9578970007
GPS Co-ordinates	**:**	10^0 30' 33" N; 76^0 57' 16" E
CBCS	**:**	Coconut + Nutmeg + Arecanut

Thiru. M. Muruganandam owns 10 acres of coconut garden of 30 years age, planted at a wider spacing of 8 m. x 8 m. Of the total area, six acres is under coconut monocrop and remaining 4 acres is intercropped with nutmeg and arecanut. Arecanut has been planted in intra row space of coconut adopting a spacing 8 m. x 8 m. whilst inter row spacing is utilized for planting nutmeg. The varieties in his farm are Arasampatti tall (Coconut), Local Kallar cultivar (Nutmeg) and Mohitnagar (Arecanut). Each plantation crop is adequately manured to prevent interspecies competition for nutrients. A total of 150 coconut palms, 150 arecanut palms and 100 nutmeg plants is maintained per hectare.

Yield and Economics

By adopting High Density Multispecies Cropping system, he obtained 120 nuts per palm per year and 500 to 600 fruits per tree from nutmeg and 1.2 kg chali per tree per year from arecanut. The farmer earned a net income of Rs.2,45,500 from coconut based cropping system across four acres compared to Rs.95,000/- only from coconut monocrop from the same acreage previously without intercropping.

Perception of the farmer

His experience speaks that multiple cropping with spices in coconut is highly profitable and remunerative over a period of time in Western Ghats of Tamil Nadu. He felt that cropping system approach is highly remunerative as sustainable and regular income is accrued from the component crops also rather than monocrop of coconut.

COCONUT + NUTMEG + ARECANUT

10. COCONUT + NUTMEG CROPPING SYSTEM

Name of the farmer	**:**	**Thiru. A. K. Chinnadurai**
Address	**:**	Angalakkurichi, Pollachi - 642 007.
Contact Number	**:**	9942844458
GPS Co-ordinates	**:**	10^0 29' 50" N; 76^0 57' 57" E
CBCS	**:**	Coconut + Nutmeg

Thiru. A. K. Chinnadurai owns 10 acres of 26 year old coconut plantation, of which he has ventured into nutmeg intercropping across 8 acres. West Coast Tall variety of coconut has been planted at a spacing of 7.5 m x 7.5 m and the inter and intra row spacing in 8 acres is utilized by Vishwashree variety of nutmeg planted at a spacing of 3.75 m. x 3.75 m. One nutmeg row is planted at 3 m interval at the center of two coconut rows and one nutmeg planted at the center of two coconut plants along the coconut row. The population maintained per hectare is 175 coconut palms with 150 plants of nutmeg.

Yield and Economics

Affluent irrigation facility and rich soil fertility status facilitates the farmer in realizing an yield of 150 nuts per palm per year from coconut and 500 fruits per plant per year from nutmeg. He has realized net returns of Rs.1,50,000 per hectare per year from coconut based nutmeg intercropping system.

Perception of the farmer

Cultivation of nutmeg adds aesthetic value to the coconut garden. Before intercropping of nutmeg, he had been keenly watching the price chart of copra with great apprehension. But nutmeg has helped the farmer to shred all his worries about the dwindling prices of copra and helps him to compensate the economic depressions suffered by the main crop. The only problem with nutmeg cultivation as cited by the farmer is its unisexuality fostering budding / grafting at the third or fourth year to induce bisexual nature and make it better productive.

COCONUT + NUTMEG

11. COCONUT + COCOA CROPPING SYSTEM

Name of the farmer	:	**Thirumathi M. Muthulakshmi**
Address	:	Malayandipattanam Village - 642 114.
Contact Number	:	9698188206
GPS Co-ordinates	:	10^0 31' 00" N; 76^0 56' 35" E
CBCS	:	Coconut + Cocoa

Thirumathi M. Muthulakshmi owns 6 acres of 30 years old coconut plantation. With the convenient coconut (West Coast Tall variety) spacing of 7.5 m x 7.5 m, 400 plants of cocoa (variety CCRP clone) were planted at the sixteenth year of coconut cropping. A spacing of 3.75 x 3.75 m is adopted for cocoa plants; regular pruning is done by the end of July for rejuvenation. Cocoa pods are harvested, beans extracted by standard protocol and sold to the private marketers.

Yield and Economics

An average yield of 70-80 pods per plant per year is being realized from cocoa. The total cost of cultivation of cocoa in coconut + cocoa cropping system per acre is Rs. 54,000/- and the farmer enjoys a net income of Rs.1,25,000 from the component crop cocoa.

Perception of the farmer

The farmer opined that her coconut plantation is totally weed free because of intercropping with cocoa. Also cocoa contributes huge amount of leaf litter to the soil which favours the multiplication of earthworm. Cocoa intercropping contributes salubrious weather to coconut garden. Cocoa does not warrant special care, and returns whatever we feed to it in multiples. She can see more of pollinators conserved in the ecosystem because of the favourable microclimate. She is also happy that the cocoa plantations regularly provide employment opportunities to the rural women folk in the vicinity of the garden. The she- farmer remains a forerunner in eliciting confidence to her counterparts to endeavor coconut based intercropping because of its tangible and intangible benefits.

COCONUT + COCOA

12. COCONUT + NUTMEG CROPPING SYSTEM

Name of the farmer	:	**Thiru. Selvaraj**
Address	:	Malayandipattanam Village, Anaimalai, Pollachi - 642 114.
Contact Number	:	9865984748
GPS Co-ordinates	:	10^0 30' 17" N; 76^0 55' 22" E
CBCS	:	Coconut + Nutmeg

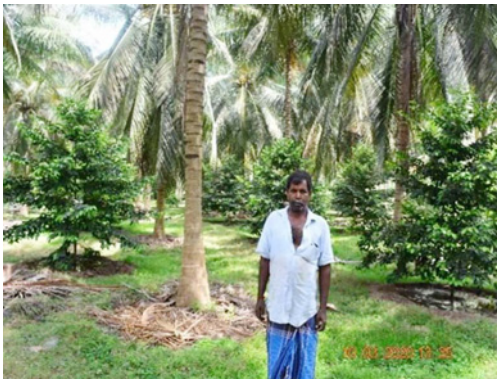
Thiru. Selvaraj owns a coconut plantation of West Coast Tall variety across 20 acres with a spacing of 7.5 x 7.5 m. Nutmeg (Vishwashree variety) is intercropped in coconut garden, with the plant placed at the centre of four coconut trees. Nutmeg plantation is seven years old and is planted in 10 acres of coconut garden. Farmer regularly applies well decomposed farmyard manure for nutmeg @ two kgs per plant per year. He also applies vermicompost @ one kg per plant per year.

Yield and Economics

The farmer obtains average nut yield of 120 nuts per palm and 180- 220 fruits of nutmeg per plant per year. The farmer is getting net income of Rs.1,55,000 per hectare from the component crop in his garden whereas it hardly touched one lakh during the period of monocropping.

Perception of the farmer

Nutmeg is equally sensitive to water stress and water logging and the farmer has lost few plants during intense rain. Hence due care to be bestowed to nutmeg during rainy season and summer months. Like many other nutmeg growers, this farmer also stressed that segregation is a major problem in nutmeg and top working is imperative to induce productivity. Nevertheless, he opines that nutmeg is highly compatible in coconut cropping and is the best rewarding intercrop. Both mace and nutmeg have equal market opportunities and many a times, cost of the mace is decided by its thickness.



COCONUT + NUTMEG

13. COCONUT + COCOA + ARECANUT + MANGOSTENE CROPPING

Name of the farmer	:	**Thiru. V. S. Rajaram**
Address	:	Ponnalammanthurai, Pollachi
Contact Number	:	9443349745
GPS Co-ordinates	:	10^0 29' 23" N; 76^0 53' 56" E
CBCS	:	Coconut + Cocoa + Arecanut +Mangostene

Thiru.VSR. Rajaram is a progressive farmer with 50 acres of coconut garden planted with West Coast Tall variety of coconut. His palms are 45 years old and his garden has arecanut, cocoa and mangostene as intercrops in 30 acres and coconut + cocoa + arecanut in 20 acres. The age of the cocoa, arecanut and mangostene plantations are 7, 8 and 7, planted at a spacing of 2 m x 2 m, 2.7 m x 2.7 m and 4 m x 4 m respectively. He has procured mangostene from the State Horticultural Farm, Kallar. In addition to the recommended dose of fertilizers prescribed by TNAU Crop Production Guide, organic inputs *viz*, Azotobacter, Phosphobacteria, VAM, *Trichoderma viride* and *Pseudomonas fluorescens* are being regularly applied to the crops. He is adopting ring irrigation drip system to coconut. Due to incidence of root (wilt) in coconut, he plans to intensify arecanut plantation in his garden and to extend the acreage under intercropping.

Yield and Economics

The coconut palms yield 6500 nuts per acre, 1.5 kg dried beans from cocoa and 1.0 kg chali per palm from arecanut per annum. The farmer obtains a net return of Rs.1,50,000 from one acre of coconut based cropping system while monocropping yields a net return of Rs.30,000 per acre per year.

Perception of the farmer

Intercrops are a lure of attraction to his coconut garden. Very salubrious microclimate exists in his garden as evidenced by the wandering pollinators, dragon flies and damsel flies. As coconut palms always keep the farmer under threat, it is only the intercrops which makes him comfortable. The farmer is happy that intercrops provide constant employment opportunities to nearly five illiterate unemployed families.

COCONUT + ARECANUT + MANGOSTENE

14. COCONUT + NUTMEG + TEAK CROPPING SYSTEM

Name of the farmer	:	**Dr. Jayaraj**
Address	:	Vettaikaranpudur, Pollachi
Contact Number	:	882580154
GPS Co-ordinates	:	10^0 29' 49" N; 76^0 53' 47" E
CBCS	:	Coconut + Nutmeg + Teak

Dr. Jayaraj, Leading Dentist and a Progressive farmer owns 65 acres of coconut garden planted with West Coast Tall variety of coconut. Cocoa has been intercropped across 40 acres and teak in 20 acres. He is the pioneer to undertake cocoa intercropping in coconut in Pollachi taluk. He has resorted to CCRP cocoa clone. Age of coconut, cocoa and teakwood are 60, 20 and 30 years respectively. The main crop coconut and the intercrops cocoa and teakwood are planted at a spacing of 7.5 m x 7.5 m, 2.5 m x 2.5 m and 7 m x 7 m respectively. Both inorganic and organic fertilizer and bio inputs are being applied as per the standard recommendations.

Yield and Economics

The average nut yield is 125 nuts per palm per year and 2.0 kg dry beans of cocoa per year. The farmer obtained a net profit of Rs. 75,000 per acre in coconut + cocoa intercropping. Cocoa beans are sold at the rate of Rs.180 per kg.

Perception of the farmer

Besides additional remuneration from cocoa intercropping, his garden also receives a good amount of leaf litter from cocoa and contributes to soil fertility. Earthworms can be seen crawling under cocoa plants, which is an indicator of enhanced soil health. His farm is enjoying a weed free atmosphere as the interspaces are occupied by the intercrops. Teak plantations reserve their income for the future. When coconut plantations are hit by debilitating pests and diseases, intercrops can uplift the economy of the farmer from drowning. His farm also offers ground to unravel the unexplored arena in cocoa plantations, as many research scholars of Tamil Nadu Agricultural University pursue their Master's and Doctoral Research in the farm.

COCONUT + COCOA + TEAK

15. MULTIPLE INTERCROPPING SYSTEM

Name of the farmer	:	**Thiru A. Logamoorthy**
Address	:	Vettaikaranpudur, Pollachi
Contact Number	:	9788551919
GPS Co-ordinates	:	10^0 29' 37" N; 76^0 53' 25" E
CBCS	:	Coconut + Arecanut + Egg Fruit + Banana

Thiru. A. Logamoorthy owns 50 acres of coconut garden of which 45 acres are occupied by West Coast Tall variety planted 60 years back and the remaining five acres by D x T and T x D hybrids of age 25 years. The farmer is growing multiple intercrops *viz*., cocoa across 20 acres, egg fruit, arecanut and pepper in 20 acres and banana in 2 acres. The age of cocoa, egg fruit and arecanut are 7 years, 6 years and 15 years, respectively. Spacing adopted for cocoa is 2 m x 2 m and egg fruit and arecanut are planted at 4 m x 4 m and 1.8 m x 1.8 m respectively. Pepper (Karimunda) is allowed to trail on the coconut trunk. Poovan variety of banana is planted at a spacing of 1.8 m x 1.8 m.

Yield and Economics

Coconut palms realised a yield of 125 nuts/ palm/year. The intercrop yields were 1.2 kg dry bean/ tree from cocoa, 1.5 kg chali/palm from arecanut and 50-60 fruits/egg fruit tree per annum. Multiple cropping system resulted in an additional income of Rs. Rs.40,000/ acre in Coconut + Cocoa intercropping and Rs. 50,000/ acre in coconut + Egg fruit + arecanut + pepper intercropping and Rs.15,000/acre in Coconut + banana intercropping.

Perception of the farmer

Egg fruit fetches heavy market price because of its health benefits. Crop diversification in coconut plantation with multiple intercrops is a prudent way of overcoming the shortfall in productivity due to biotic and abiotic stress. Growth of noxious weeds like parthenium is greatly suppressed because of the smothering effect of intercrops. The farmer appreciates the tangible and intangible benefits realized from multiple intercropping in coconut ecosystem. Pepper plants provide berries which help to meet the household consumption.

MULTIPLE INTERCROPPING SYSTEM

16. COCONUT + CHILLI + BUTTER BEANS CROPPING SYSTEM

Name of the farmer	:	**Thiru. Kanagaraj**
Address	:	Manjanaickanoor, Jallipatti, Udumalpet
Contact Number	:	7395811016
GPS Co-ordinates	:	10^0 32' 33" N; 77^0 00' 49" E
CBCS	:	Coconut + Chilli + Butter Beans

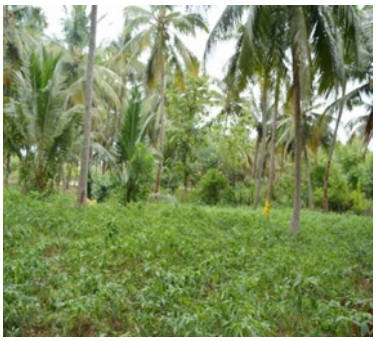
Thiru. Kanagaraj has cultivated coconut across three acres adopting a spacing of 7.5 m x 7.5 m. Coconut is 25 years old and chilli is intercropped in coconut garden over one hectare adopting a spacing 60 cm x 45 cm. The varieties cultivated are West Coast Tall (Coconut) and Chilli (Local cultivar). Butter bean is raised over half an acre. The farmer applies urea, SSP and MOP @ 100, 150,200 kg/ ha respectively. He owns five milch animals and all the cowdung is recycled back to his farm. He has significantly reduced the quantum of inorganic fertilizers and is proportionately increasing organic inputs in the system. Neem oil was sprayed @ 3 % to control thrips in chillies.

Yield and Economics

The farmer is obtaining an average nut yield of 140 nuts per palm/year and 700 - 800 kgs of green chillies from one hectare over a year. The farmer realizes a net income of Rs. 1,00,000 from coconut - chilli intercropping system. Butter bean plant yields 250– 300 g of seeds per plant. Butter beans are dried and reserved by the farmer for domestic consumption as it is not readily available in the market.

Perception of the farmer

The farmer mentions the great advantages of intercropping with chillies and other creepers in coconut garden in terms of weed control efficiency, better income and employment potential. Chillies bring weekly money flow to the farmer to meet his household expenses. Coconut palms also derive benefit from the manures applied to the intercrops. The farmer advocates all the small and marginal coconut growers of his region to adopt intercropping and to sufficiently fertilize the main crop and the intercrop so as to accrue maximum benefit from the system.



COCONUT + CHILLI + BUTTER BEAN

17. COCONUT + COTTON CROPPING SYSTEM

Name of the farmer	:	**Thirumathi. Jayarani**
Address	:	Jileepinakampalayam village, Udumalpet, Tiruppur Dt.
Contact Number	:	8883335630
GPS Co-ordinates	:	10^0 32' 24" N; 77^0 08' 16" E
CBCS	:	Coconut + Cotton

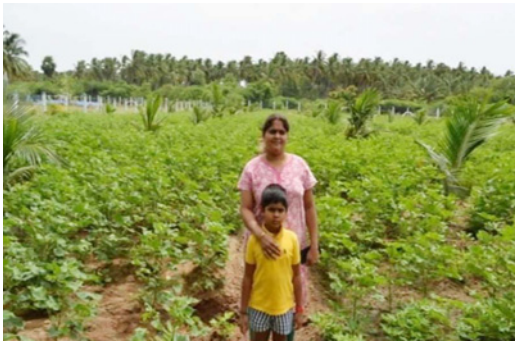
Thirumathi Jayarani owns 4 acres of 2 years old coconut (West Coast Tall) plantations in which cotton hybrid (procured from private dealer) is grown as an intercrop. A spacing of 120 cm x 90 cm is adopted for cotton. Seed rate adopted was 3.0 kgs per hectare for cotton. Coconut seedlings are two years old and only organic manures are applied to the coconut seedlings. For cotton, N-P-K schedule of 150 – 75 – 75 kg per hectare is being followed. Field duration of the crop is 180 days and need based plant protection measures are being adopted.

Yield and Economics

The population maintained for coconut is 75 per acre. They are in the juvenile phase and are yet to give off spathe. The yield of cotton is 2- 4 tonnes/ha. One kilogram of lint is being sold at the rate of Rs. 45 – 50 per kg. Cost of production of cotton is Rs.20,000 per hectare. She has obtained net returns of Rs.70,000/- from cotton intercropping in coconut.

Perception of the farmer

The farmer has chosen cotton as his soil is black cotton type and highly suits cotton cultivation. During juvenile stage, when no profit can be expected from coconut, she is much convinced with cotton intercropping because of its better remuneration. Also coconut seedlings take advantage of the nutrients applied to cotton and the seedlings establish with great vigour, free of pests and diseases.



COCONUT + COTTON

18. COCONUT + LEMON CROPPING SYSTEM

Name of the farmer	:	**Thiru. Thambu**
Address	:	Deepalapatti village, Udumalpet, Tiruppur Dt - 642 126
Contact Number	:	9655968710
GPS Co-ordinates	:	10^0 58' 55" N; 77^0 02' 34" E
CBCS	:	Coconut + Lemon

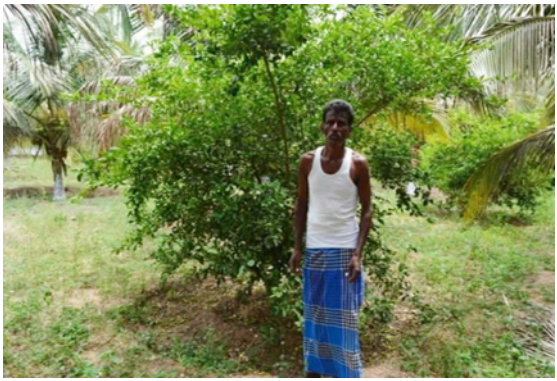
Thiru. Thambu owns four acres of 9 years old coconut plantation, planted at a spacing of 7.5 m x 7.5 m. Across two acres, lemon (PKM variety) has been raised as an intercrop six years ago. The total number of coconut palms is 60 trees per acre. He has totally 40 lemon plants per acre planted in between four coconut palms excavating pit of dimensions 60 cm x 60 cm x 60 cm. No chemical fertilizers are applied to the lemon plants and they are fed only with organic manures.

Yield and Economics

Lemon plants yielded 50 fruits during fifth year and the yield steadily increased to 200-300 fruits per plant per year during sixth year. The farmer is realizing a net income of Rs.1,25,000 per acre per year from coconut based system intercropped with lemon.

Perception of the farmer

Lemon plants contracts only few diseases like leaf spot and can be managed well with copper oxy chloride sprays. Removal of off-shoots at 45- 50 cm from the ground periodically allowed the main stem to grow strong and to induce flowering. The plants undergo a stress period during summer after which, they start flowering. Lemon generates revenue every week which helps to manage money easily. Peak fruiting season is May to July and the yield dwindles during other months. One issue with lemon cultivation is lesions due to citrus canker which decides the marketability of the fruits and due care to be taken to protect the crop from the disease.



COCONUT + LEMON

19. COCONUT + BRINJAL CROPPING SYSTEM

Name of the farmer	:	**Thiru. Kathirvel**
Address	:	C. Gopalapuram Pollachi (North) - 642 002.
Contact Number	:	9942895959
GPS Co-ordinates	:	10^0 74' 13" N; 76^0 98' 79" E
CBCS	:	Coconut + Brinjal

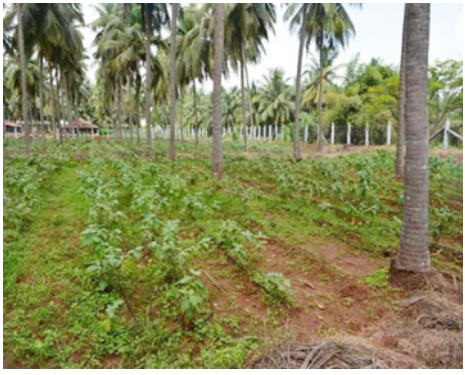
Thiru. Kathirvel owns 7.45 acres of coconut in which West Coast Tall variety is planted adopting a spacing of 7.5 m x 7. 5 m. Brinjal (Local variety) has been intercropped across 1.5 acres. Seed rate of 500 g /ha was adopted. Seedlings were transplanted at a spacing of 60 cm x 60 cm. Urea, SSP and MOP @ 200 - 200 – 100 kgs were applied per hectare. Drip irrigation is adopted for both coconut and the intercrop. Neem oil @ 1 % is sprayed over brinjal to control sucking pests.

Yield and Economics

Coconut yields 120 – 130 nuts per palm per year and the farmer obtained 10 tonnes per acre of brinjal . During peak seasons, brinjal is sold @ Rs. 40 – 50 per kg. Net income of Rs.1,50,000 per acre is obtained per year by intercropping brinjal in coconut garden.

Perception of the farmer

Intangible benefit accrued due to brinjal intercropping is that the farm is kept weed free because of intercropping. It provides great opportunities for family labour. There is weekly money flow because of intercropping with vegetables. Nutrients added to the intercrops benefit the main crop and the yield of coconut in intercropped garden is higher compared to monocropped garden. Brinjal is sensitive to water logging and during the rains there is a need to provide drainage to save the crop.



COCONUT + BRINJAL

20. COCONUT + TOMATO CROPPING SYSTEM

Name of the farmer	:	**Thirumathi Leelavathi**
Address	:	C. Gopalapuram Pollachi (North) - 642 002.
Contact Number	:	9942895959
GPS Co-ordinates	:	10^0 74' 13" N; 76^0 98' 79" E
CBCS	:	Coconut + Tomato

Thirumathi Leelavathi owns one acre of ten years old coconut garden in which West Coast Tall variety of coconut is cultivated adopting a spacing of 7.5 m x 7.5 m. She has resorted to intercropping with tomato over half an acre. Hybrid Shivam has been planted at a spacing of 60 cm x 60 cm. Liberal doses of farmyard manure and well decomposed poultry manure were applied at last ploughing. Because of the heavy bearing nature of the hybrids staking is done to prevent lodging and to ease the intercultural operations. One kg of Asafoetida is mixed in 50 litres of water and sprayed during flowering for retention. Neem oil is sprayed @ 0.3 % for evasion of insect pests.

Yield and Economics

Coconut yields 120 – 130 nuts per palm per year. Total duration of tomato is 140 days and from the date of first picking, harvest can be done at 10 days interval. Six to seven harvests are possible until the end of the crop. An average yield of 20 tonnes can be realized per acre. What about economics?

Perception of the farmer

Tomato is highly sensitive to market fluctuations. Even within the same season, there is sharp variation in price from Rs. 5 per kg to Rs. 50 per kg. Despite these problems, tomato cultivation keeps the farm weed free. Application of nutrients to tomato also benefits coconut in enhancing the productivity. Coconut shade does not cause a setback in the establishment or the yield of tomato. Tomato is highly sensitive to water application. Copious irrigation after a long spell of drought causes cracking of the fruits. Tomato responds more to the application of calcium nitrate and fruit cracking is greatly reduced.

COCONUT + TOMATO

21. COCONUT + BHENDI CROPPING SYSTEM

Name of the farmer	:	**Thirumathi Karuppathal**
Address	:	Ramapattinam
Contact Number	:	8300901484
GPS Co-ordinates	:	100 70' 29" N; 760 94'43" E
CBCS	:	Coconut + Bhendi

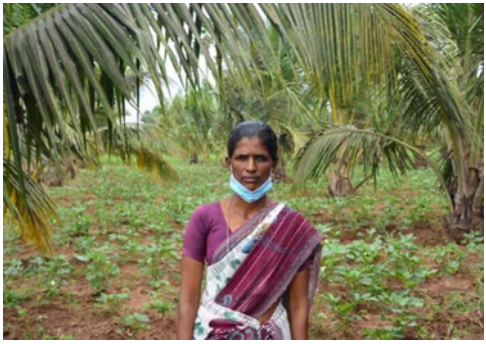
Thirumathi Karuppathal owns two acres of four years old coconut garden in which ALR (CN)1 variety of coconut has been cultivated adopting a spacing of 7.5 m x 7.5 m. Spathe emergence has just initiated in coconut. Local variety of bhendi with a seed rate of 2.5 kg per acre has been raised as an intercrop at a spacing of 45 cm x 30 cm in ridges and furrows. Farmyard manure @ 7 – 8 tonnes per acre was applied during last ploughing and Urea – SSP – MOP was applied @ 50-75 – 25 kg per acre.

Yield and Economics

The crop reaches maturity in 55- 60 days. Picking of tender pods can be done once every three days. A yield of 5- 6 tonnes can be realized per acre. A net income of Rs. 35,000 - 40,000 can be realized per acre.

Perception of the farmer

Moisture stress should be avoided at flowering which reduces fruit quality and yield. Fruit borer is a major problem which reduces the marketability of the produce. Spraying of neem oil @ 1 % is done at flowering to avoid the pest. The farmer does not use chemical pesticides for the control of the pest to safeguard the interest of the consumers. In the view of the farmer, intercropping with bhendi provides conducive ambience for coconut seedlings and their performance is highly satisfactory. Also as the farmer enjoys better money flow from the intercrop, she need not always keep a watch on the spathe emergence of coconut for her household expenses. She advocates the farmers in her vicinity not to waste the valuable resources of their farm when coconut palms are in their early years.



COCONUT + BHENDI

22. COCONUT + TURMERIC CROPPING SYSTEM

Name of the farmer	:	**Thirumathi Ranganayaki**
Address	:	Nedumparai Pollachi (North) - 604407.
Contact Number	:	9965876191
GPS Co-ordinates	:	10^0 67' 93" N; 76^0 86' 88" E
CBCS	:	Coconut + Turmeric

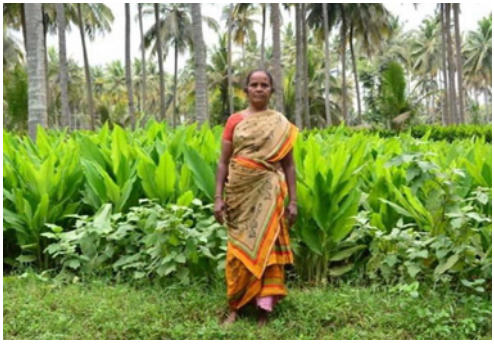
Thirumathi Ranganayaki owns seven acres of 30 years old coconut garden in which Tall variety of coconut has been accommodated at a spacing of 8 m x 8 m. Local variety of turmeric has been intercropped across five acres. Finger rhizome rate of two tonnes per hectare has been adopted. Rhizomes were treated with mancozeb @ 0.1 % before planting. Rhizomes were dibbled at a depth of 4 cm at a spacing of 45 cm x 15 cm. For one hectare of the crop, 60 – 60- 30 kgs of Urea – SSP – MOP are being applied at 30 days interval from planting. Dimethoate @ 2 ml per litre is applied to protect the crop from sucking pests.

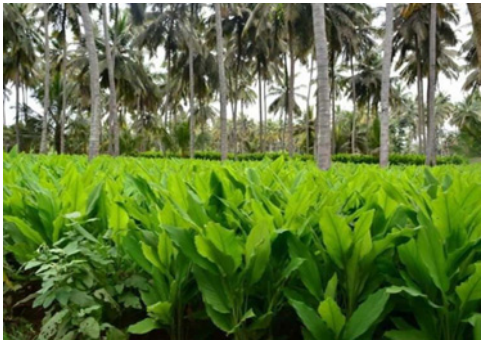
Yield and Economics

A yield of 130 – 140 nuts per palm per year is obtained from coconut. From turmeric yield of 25 – 30 tonnes of fresh rhizome is obtained per hectare. Field duration of the crop is 8 – 9 months and an additional income of Rs. 50,000 – 60,000 per acre is obtained. Fresh rhizomes are marketed to local merchants @ Rs. 2000 – 3000 per tonne.

Perception of the farmer

The major benefit the farmer cites is that turmeric intercropping enhances the aesthetic view of his farm and maintains it in a weed free condition. Coconut derives benefit from the fertilizers and plant protection chemicals applied to turmeric and the palms look healthy and yield more. The farmer is happy with the employment opportunities generated to the people of nearby settlement area from turmeric cropping.





COCONUT + TURMERIC

23. COCONUT + RIDGE GOURD CROPPING SYSTEM

Name of the farmer	:	**Thiru. V. Vasantham**
Address	:	Pethanaickanoor, Anaimalai (T.K) - 642 134.
Contact Number	:	6381304676
GPS Co-ordinates	:	10^0 34' 18" N; 76^0 57' 59" E
CBCS	:	Coconut + Ridge gourd

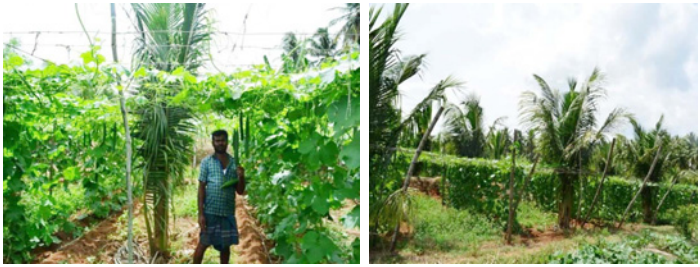
Thiru. V. Vasantham owns three acres of coconut garden in which ALR (CN)1 variety of coconut was planted three years ago at a spacing of 7.5 m. x 7.5 m. Ridge gourd is intercropped in coconut garden with NS4, a hybrid from a private company. Four to five cart loads of well decomposed FYM is applied at last ploughing. Seeds of ridge gourd @ 5-6 kg/ha were treated with *Trichoderma viride* @ 4 g per kg of seeds and dibbled in ridges and furrows adopting a spacing of 10 ft. x 2 ft. the seedlings were trailed over Trellis specially formed for this purpose. On 15th day, DAP is given @ 50 g per plant and from 30th day complex fertilizers and calcium nitrate are being applied through fertigation. The crop comes to harvest in 40 – 50 days. Picking is done daily or once in three days depending upon the market demand.

Yield and Economics

On an average 300 kgs of fresh vegetable can be harvested per day from one acre of land. In the total duration of 100 – 110 days, a yield of 10- 15 tonnes can be realized per hectare. The produce is sold at the rate of Rs.17 – 18 per kg and a net profit of Rs. 1,20,000 can be obtained per hectare.

Perception of the farmer

The farmer need not wait for five years to derive income from his land. He is very much convinced and complacent with intercropping of creeper vegetables, which brings good earning from 60 days of its planting. Care must be taken to ensure that the young fruits are hanging down because as the vines grow long and thick, the fruits entangles in the vines resulting in undesired shape thus affecting the marketability. The farmer is equally afraid of viral diseases, which makes the plant yellow and pulls down the productivity. Also leaf miner is a major havoc in creeper vegetables. Ridge gourd is highly prone to mechanical injury. Except for the pest and diseases, he considers ridge gourd as a highly amenable intercrop in coconut garden in its early age.



COCONUT + RIDGE GOURD

24. COCONUT + ARECANUT + COCOA CROPPING SYSTEM

Name of the farmer	**:**	**Thiru. Senthil**
Address	**:**	Subbegoundanpudur, Anaimalai (T.K.)
Contact Number	**:**	9715011446, 9750006655
GPS Co-ordinates	**:**	10^0 62' 24" N; 76^0 93' 68" E
CBCS	**:**	Coconut + Arecanut + Cocoa + Pepper

Thiru. Senthil owns forty acres of coconut garden in which West Coast Tall variety of coconut aged 60 years is being maintained. Intercropping has been done with cocoa and Panniyur 1 variety of pepper across 15 acres and with Arecanut over 10 acres. Pepper is 5 years old, arecanut 15 years and cocoa nine years old. About 200 plants of cocoa and 500 plants of arecanut are maintained per hectare. Pepper is allowed to trail on coconut and arecanut, a total of 70 plants of pepper is maintained over one acre and has started yielding.

Yield and Economics

Cocoa yields 40 pods per plant per year from which 1.5 kgs of dry beans are extracted. From arecanut, 1.0 kg chali per plant per year is obtained. Pepper gives an average yield of 1.5 kg berries per plant per year. Every kg of dry bean of cocoa is sold @ Rs. 180. Arecanut palms are leased out at the rate of Rs. 300 per palm per year. Pepper is sold @ Rs. 400 per kilogram of dried berry. The farmer enjoys an additional benefit of Rs. 2,50,00 per hectare from the multiple cropping system.

Perception of the farmer

His garden enjoys a very salubrious microclimate because of intercropping with an array of crops. The farmer is completely contented that every inch of his land is utilized in an effective way. Due to smothering effect of the crops, better is the weed control efficiency in his garden. Cocoa adds appreciable amount of litter thus enriching the soil fertility. Culinary needs are met by pepper cultivation and the surplus spins money. As the evaporation losses of water are greatly reduced due to intercropping, water requirement of coconut palms is also very less compared to monocropping system.

COCONUT + ARECANUT + COCOA + PEPPER

25. COCONUT + BASIL CROPPING SYSTEM

Name of the farmer	**:**	**Thiru. Murali**
Address	**:**	Thovalai, Kanyakumari (Dt.) - 629 302
Contact Number	**:**	6381518245
GPS Co-ordinates	**:**	08^0 23' 12" N; 77^0 50' 60" E
CBCS	**:**	Coconut + Basil

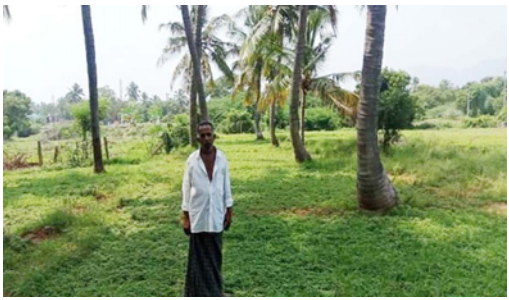
Thiru. Murali owns four acres of coconut palms of East Coast Tall variety planted at 8 m. x 8 m. He has resorted to intercropping with Basil (*Ocimum basilicum*) over one acre. The farmer has applied well decomposed farmyard manure at last ploughing. Nursery is being raised collecting seeds of the previous crop. Seed rate adopted is 2 kgs per acre. Seedlings are raised in nursery and transplanted in flat beds at a spacing of 60 cm x 30 cm. Complex fertilizers are applied @ 150 kg per acre.

Yield and Economics

Coconut gives an average yield of 120 nuts per palm per year. From one month of transplanting, herbage is harvested, tied in bundles and sold @ Rs. 5 – 10 per kg. An average yield of 5 tonnes of herbage can be obtained from one acre throughout its life time. An additional net income of Rs. 60,000 per acre can be obtained because of basil cultivation.

Perception of the farmer

Basil is very hardy compared to Thulasi. Coconut shade sometimes causes a setback in herbage yield in Thulasi which is not the case in this crop. Basil cultivation has a positive impact on local economy. There is constant money flow due to the cultivation of this crop. Coconut garden is maintained weed free because of the cultivation of this medicinal plant. As plucking is done daily, cold storage facilities are not required unlike other crops. The crop can be maintained for three to four years in field under good management practices. Cost effective cultivation strategies and employment opportunities offered to the rural folk by sweet basil cultivation has added fragrance in coconut farming.



COCONUT + BASIL

26. COCONUT + BASIL CROPPING SYSTEM

Name of the farmer	:	**Thiru. Manoharan**
Address	:	Thovalai, Nagercoil Kanyakumari (Dt.) - 629 302
Contact Number	:	8675876103
GPS Co-ordinates	:	08^0 23' 57" N; 77^0 50' 46" E
CBCS	:	Coconut + Basil

Thiru. Manoharan owns five acres of coconut palms in which East Coast Tall variety of coconut has been planted thirty years ago at a spacing of 8.0 m. x 8.0 m. Basil has been intercropped in coconut garden over two acres. Seedlings were raised in nursery and transplanted in the main field at a spacing of 60 cm x 30 cm. Farmyard manure is applied to the garden scrupulously. Need based application of pesticides and fungicides are resorted to.

Yield and Economics

Coconut gives an average yield of 130 nuts per palm per year. Basil can be harvested from two months of transplanting. Each bundle of basil is sold @ Rs. 10. Harvesting is done once every 30 days. During the time of religious festivals, the market price shoots up. An average yield of 5- 6 tonnes of herbage can be obtained from one acre throughout its life time. An additional net income o Rs. 65,000 per acre can be obtained because of basil cultivation.

Perception of the farmer

Basil has abundant health benefits and is preferred by the Ayurveda firms. Soil texture and the physical properties get improved because of basil intercropping in coconut garden. The fields are maintained free of weeds as it covers the entire land. There is very pleasant aroma in the surroundings because of the cultivation of this medicinal plant. This crop is not affected by the shade rendered by coconut. No storage facilities are required as the herbage is harvested as and when required. Maintenance of the crop is also very easy and does not require tedious care. The farmer feels that in a very easy way, basil helps in minting money to his family.

COCONUT + BASIL

27. COCONUT + TULSI CROPPING SYSTEM

Name of the farmer	:	**Thiru. Nagalingam**
Address	:	Thovalai, Nagercoil, Kanyakumari (Dt.) - 629 302
Contact Number	:	8675876103
GPS Co-ordinates	:	08^0 22' 82" N; 77^0 50' 88" E
CBCS	:	Coconut + Tulsi

Thiru. Nagalingam owns ten acres of coconut palms planted with T x D variety spaced at 8.0 m. x 8.0 m. Palms are seventeen years old in which intercropping with Tulsi has been done across two and a half acres. Duration of the crop is one to one and a half years. Seeds were raised in nursery and transplanted in the main field adopting a spacing of 40 cm x 40 cm 7 weeks after sowing. Urea and MOP are applied @ 100 kgs each per acre. Pesticides and herbicides are applied at monthly intervals to ward off insect pests. Manual hand weeding is done one month after transplanting.

Yield and Economics

Coconut gives an average yield of 140 nuts per palm per year. Tulsi Leaves are harvested from 40 days of transplanting, leaving a height of one feet from the ground. Harvest cycle is repeated once every forty days. 300 kgs of herbage is harvested at forty days interval from one acre. Totally all through its life time, 3- 3.5 tonnes of green matter can be harvested per acre of the crop. An additional net income of Rs. 60,000 can be realized per acre from Tulsi cropping alone.

Perception of the farmer

Tulsi cultivation helps in additional remuneration in the coconut garden. It also helps to prevent weed menace in the coconut garden. The farmer enjoys money flow at constant intervals due to intercropping. His family members also acquire gainful employment. He also feels that the crop helps to ward off soil borne pathogens. Tulsi cultivation does not require heavy investments or care and performs well with minimal care. The farmer is very much convinced with Tulsi intercropping in coconut gardens.

COCONUT + TULSI

28. COCONUT + COCOA + BANANA

Name of the farmer	:	**Paladugu Venkateswara Rao**
Address	:	Chinthalapudi, Eluru
Contact Number	:	9493038888
Cropping System	:	Coconut + Cooca + Banana

Paladugu Venkateswara Rao, a progressive coconut farmer from Chinthalapudi village of Eluru district, Andhra Pradesh possess six acres of agricultural land. Due to his passion on coconut he has taken quality planting material of Godavari Ganga hybrid and East Coast Tall variety coconut seedlings from Dr YSRHU-Horticultural Research Station, Ambajipeta and planted at a spacing of 7.5 m x 7.5 m and 8 m x 8 m respectively. Later planted intercrops cocoa and banana in coconut for improving his income. Cocoa was planted at a spacing of 3 m x 3 m in a single row system in between coconut plants. Further, he followed the good agricultural practices developed by Horticultural Research Station, Ambajipeta. Biocontrol agents are used by him for the control of Black headed caterpillar and other major pests of coconut. He successfully controlled Ganoderma (Basal stem rot) by use of talc formulation of *Trichoderma* sp @100 g + Neem cake @ 5 kg per palm per year. He adopted *Trichoderma* enriched coir pith cakes for the management of stem bleeding disease in coconut. He successfully installed micro irrigation system in his entire six acres of land for coconut, cocoa & banana crops and also developing vermicompost by recycling farm residues to reduce the cost towards purchasing of inorganic manures.

Yield and Economics

Paladugu Venkateswara Rao is earning on an average, Rs.1,31,900/- per acre from Coconut + Cocoa + Banana based intercropping system.

Perception of the farmer

He states that he has followed the suggestions and recommendations offered by the scientists of HRS, Ambajipeta in implementing Integrated Nutrient Management, intercropping systems and Bio control management of pests and diseases in effective manner. The technologies of Horticultural Research Station, Ambajipeta are very good and cost effective which can boost the income of farmer and reduces the cost of cultivation. Especially the hybrid cultivar Godavari Ganga is giving very high nut yield among other varieties in his farm. So, he is thankful to the scientific community of Dr. YSRHU-Horticultural Research Station, Ambajipeta for the technical advisory rendered.

29. COCONUT BASED INTEGRATED FARMING SYSTEM

Name of the farmer	:	**Kotla Venkata Sree Ramarao**
Address	:	Pallipalem, Nakkavari Peta, Konaseema district
Contact Number	:	8106210555
Cropping System	:	Coconut + Cocoa + Areca nut + Black pepper + Livestock + Aquaculture + Sericulture + Poultry.

Kotla Venkata Sree Ramarao (Bujji) has 22 acres of agricultural land in Pallipalem, Andhra Pradesh. Ventured into Integrated Farming system (IFS) in his land with the guidance of the scientist of Horticultural Research Station, Ambajipeta. He is maintaining coconut varieties ECT, Godavari Ganga and local germplasm Pillalakodi green and also he was trained in coconut hybridization work. Forestero type of cocoa and Mangala, Sumangala and Mohithnagar varieties of arecanut were planted as intercrops in coconut. He has implemented biocontrol management for pests and diseases in coconut. He is generating compost from livestock, aquaculture and poultry in his farm and reducing cost of cultivation by minimizing the application of external sources of fertilizers. He started coconut nursery by producing quality seedlings like ECT, Pillalakodi etc. and generating additional income and planning to extend for production of hybrids in collaboration with HRS, Ambajipeta and planted Ganga Bondam seedlings to serve as mother palm garden. Around his farm land, he has planted remunerative forest trees like Bamboo, Teak, Red sandal etc., to protect garden from cyclones and summer gales and also to get additional income. As a part of biocontrol management, he took the eggs of *Pseudomallada astur* predator for the management of Rugose Spiraling Whitefly and he expressed his satisfaction in controlling of RSW. He used *Trichoderma* enriched coir pith cakes for the management of stem bleeding disease and also followed the biointensive management of *Ganoderma* basal stem rot and *Trichoderma viride* along with neem cake powder in basins of palm.

Yield and Economics

He is earning net returns of Rs.1,50,000/- per year through Coconut + Cocoa + Arecanut + Black pepper system. Apart from this he is also earning from the other resources like live stock, aquaculture, silviculture and poultry.

Perception of the farmer

The farmer thanks the Scientists of Horticultural Research Station, Ambajipeta for encouraging him to start Integrated Farming System for doubling his income.

30. COCONUT + COCOA + BLACK PEPPER + ARECANUT + GINGER

Name of the farmer	:	**Guduru Venkata Siva Rama Prasad**
Address	:	Sagipadu, Chinthalalpudi, Eluru
Contact Number	:	94417 81397
Cropping System	:	Coconut + Cocoa + Black pepper + Arecanut + Ginger.

Guduru Venkata Siva Rama Prasad, a progressive farmer from the village Sagipadu, Andhra Pradesh is growing coconut in 25 acres of land by taking improved elite ECT and Godavari Ganga seedlings from Horticultural Research Station, Ambajipeta. He has initiated HDMCS (High Density Multiple Cropping System) in coconut, with the motivation from demonstration plot of HRS, Ambajipeta. He is maintaining Coconut + Cocoa +Black pepper +Arecanut + Ginger model of HDMCS system in his land. Basically he is from engineering background, so he implemented his skills in development of watershed management practices for effective conservation of irrigation water to avoid moisture stress for coconut and other intercrops. He is very successful in installing micro irrigation system in his farmland. He is also very much successful in use of INM practices especially the use of sugarcane crushing wastage for reducing cost of cultivation and increasing yield of coconut.

Yield and Economics

On an average he is getting an annual income of Rs. 1, 10,000/- per acre from Coconut+ Cocoa + Black pepper + Arecanut + Ginger model of High Density Multiple Cropping System. Apart from this he is also earning an additional income from ECT nursery.

Perception of the farmer

The biocontrol agents developed by Dr. YSRHU-Horticultural Research Station, Ambajipetta helped him a lot in reduction of pests and diseases in coconut garden there by curtailing the cost of cultivation**.** The watershed management practices help him in reduction of moisture stress in field. The use of sugarcane crush waste helps in reducing the use of chemical fertilizers.

31.COCONUT + BLACK PEPPER + COCOA + PINEAPPLE

Name of the farmer	:	**Aalapati Manikyala Rao**
Address	:	Chagallu, East Godavari
Contact Number	:	9490171573
Cropping System	:	Coconut + Black pepper + Cocoa + Pineapple

Aalapati Manikyala Rao is a progressive farmer from Chagallu village, Andhra Pradesh who grows coconut varieties ECT and Godavari Ganga from Dr. YSRHU Horticultural Research Station, Ambajipeta at a recommended spacing of 8 m x 8 m. He adopted high density cropping system in coconut by integrating cocoa (3 m x 3 m), black pepper and pineapple to generate additional income. Pineapple is planted in double row system. He is very successful in implementing micro-irrigation system for effective irrigation management, resulting in water saving in his farm. He developed vermicompost from agricultural wastes and crop residues which helped in reducing cost of cultivation. He is adopting biocontrol strategies for pest and disease management by obtaining biocontrol agents from Horticultural Research Station, Ambajipeta.

Yield and Economics

He is obtaining Rs. 88,300/- per year/acre on an average from coconut + Black pepper + Cocoa + Pineapple intercropping system.

Perception of the farmer

The suggestions and recommendation together with technologies obtained from HRS, Ambajipeta helped him to successfully grow coconut and also to generate additional income through CBCS systems. The vermicomposting technology helps him to reduce the expenditure incurred on chemical fertilizers. Therefore he is grateful to Dr. YSRHU Horticultural Research Station, Ambajipeta scientific community for the service to the farming community.

32. COCONUT + COCOA + NUTMEG SYSTEM

Name of the farmer	:	**B. Srinivasa Rao**
Address	:	Chikkala, Chagallu, East Godavari
Contact Number	:	9849340600
Cropping System	:	Coconut+ Cocoa +Nutmeg

B. Srinivasa Rao owns 16 acres of farmland in Chikkala Village, East Godavari district of Andhra Pradesh wherein he has planted ECT and Godavari Ganga varieties. When invasive whitefly attacked his orchard, he approached Ambajipeta Centre of ICAR – AICRP (Palms) and obtained *Encarsia gudelopi*, *Pseudomallada astur* parasitoids and released in his garden. He also took the recommendations of spraying soapnut powder extract with neem oil and installed yellow tarp sheets lubricated with castor oil to control the pest and succeeded in its management. He was much convinced over the biocontrol strategies in pest management. Apart from whitefly, he is also successful in adopting bio-intensive approaches for the management of Ganoderma and stem bleeding diseases and adopted the application of *Psuedomonas fluorescens* @ 125 g and *Trichoderma asperellum* @ 125 g together with neem cake as basal application in monsoon season. On his farm, he makes his own vermicompost from crop residues which considerably reduces the cost on chemical fertilizers.

Yield and Economics

The farmer is earning a net income of Rs. 95,800/- per acre/year from coconut + cocoa intercropping system and Rs. 1,20,000/- from coconut + nutmeg system.

Perception of the farmer

The farmer feels that the help rendered by Ambajipetta Centre was helping him to successfully control invasive whitefly in his farm. Coconut-based cropping system helps him to earn extra income. Vermicompost fertilizer helped him to reduce the cost of external inputs to a great deal and helped to enhance the soil health.

33. COCONUT BASED INTEGRATED FARMING SYSTEM

Name of the farmer	:	**Dantuluri Surya Narayana Raju**
Address	:	Ravada, Bhogapuram, Vizianagaram
Contact Number	:	9440282799
Cropping System	:	Coconut Based Integrated farming system

Dantuluri Surya Narayana Raju is a progressive coconut farmer from Ravada village in Bhogapuram Mandal, Andhra Pradesh very much committed to Integrated Farming System. He grows coconut variety East Coast Tall (ECT) and Godavari Ganga across 25 acres of land. He has adopted improved irrigation and water management practices such as drip irrigation and mulching with coconut husk to manage water stress scenario. Besides cultural aspects, he is also successful in introducing bio-intensive management strategies for pests and diseases in coconut through the use of bio-control agents like *Trichoderma asperellum*, predators and parasitoids which helped to increase yield and reduce cultivation costs. He has integrated livestock and poultry farming to generate additional income in coconut. In addition, he applies organic manures like farmyard manure (FYM) and poultry manure to coconut plants and thereby curtails the expenditure incurred on chemical fertilizers.

Yield and Economics

On an average a net income of Rs. 45,000/- per acre per year is realised from coconut alone. Apart from coconut he is earning an additional income from poultry and livestock rearing. Besides these he is earning a good amount of income through maintenance of ECT (East Coast Tall) nursery.

Perception of the farmer

The farmer overwhelms to inform that suggestions, recommendations and technologies picked from Ambajipeta Centre of ICAR – AICRP (Palms) helped him in successful implementation of coconut based Integrated Farming System. It helped him in earning additional income compared to monocrop of coconut. So he is very thankful to the scientific staff of Dr YSRHU-Horticultural Research Station, Ambajipeta for the technological support.

34. HIGH DENSITY CROPPING SYSTEM IN COCONUT

Name of the farmer	:	**Vegina Venkata Sai Devakinandan Verma**
Address	:	Avidi, Kothapeta, Konaseema
Contact Number	:	9866067424
Cropping System	:	High density cropping system in coconut

Vegina Venkata Sai Devakinandan Verma is a progressive, active and dynamic farmer from Avidi Village in Kothapeta Mandal. He owns 2.5 hectares of coconut garden. He is so passionate about farming that he has adopted high density cropping system to double his income. He is also successful in using predators, installing yellow sticky traps, using soap nut powder extracts mixed with neem oil spray, etc. for the management of Rugose spiralling White Fly in Coconut. He is adopting bio-intensive disease management and using *Trichoderma* enriched coir pith cakes developed by the Dr. YSRHU Horticultural Research Station, Ambajipetta, for the treatment of stem bleeding disease. He is a very successful person in implementing micro-irrigation system, thereby saving water in his farm. He has implemented natural farming in his coconut garden and observed the downward trend in Rugose Spiralling Whitefly compared to his neighbours. He observed the occurrence of natural predators on Rugose Spiralling Whitefly. He is convinced about High Density Multispecies Cropping System in Coconut.

Yield and Economics

The net income of Rs. 1,10,000/- from Coconut, Cocoa and Banana based cropping system is realized on an average from one acre of land per year.

Perception of the farmer

Agro-technologies developed by Ambajipetta centre helped him to accrue additional income from coconut plantations. He underlines that biological pest and disease management strategies developed by the centre are very simple, cheap and cost effective for the farming community. Therefore, he thanks the scientific community of Dr. YSRHU Horticultural Research Station, Ambajipeta for their unbound support.

35. INTEGRATED DISEASE MANAGEMENT IN COCONUT

Name of the farmer	**:**	**Thiru. D. Sakthivel**
Address	**:**	Puliyankandi Pollachi, Coimbatore
Contact Number	**:**	8220277442
GPS Co-ordinates	**:**	10°56' 06" N;76°97'34" E
Cropping System	**:**	Coconut -15 acres

Thiru. D. Sakthivel hailing from Puliyangandi village in Pollachi block of Coimbatore District, Tamil Nadu has been a prominent Coconut Farmer and is keen to pursue Science based Agriculture in his field and propagating the same to his fellow farmers and relatives. His fifteen acres of Coconut garden has been a learning ground for many farmers. Recently he did face problem in coconut garden and yield got reduced drastically. His sound relationship with formal sources of Information especially Aliyarnagar Centre came for his rescue.

The Intervention

Initially, based on the whatsapp message sent by Mr. D. Sakthivel, the scientists obtained a preliminary idea about the disease and confirmed it through a field visit to his farm. The Scientists of the AICRP on Palms, CRS, Aliyarnagar have visited the farm and had in-depth discussion with the farmer and reported that the garden was infested with Coconut Leaf Blight disease which could be managed through a scientific practice. The scientists have recommended root feeding of propiconazole @ 5 ml in100ml water at three months intervals during January, April, July and October and advised the farmer not to discontinue till the trees completely recover from the disease. In line with the recommendations given, Mr. D. Sakthivel meticulously adopted the technology.

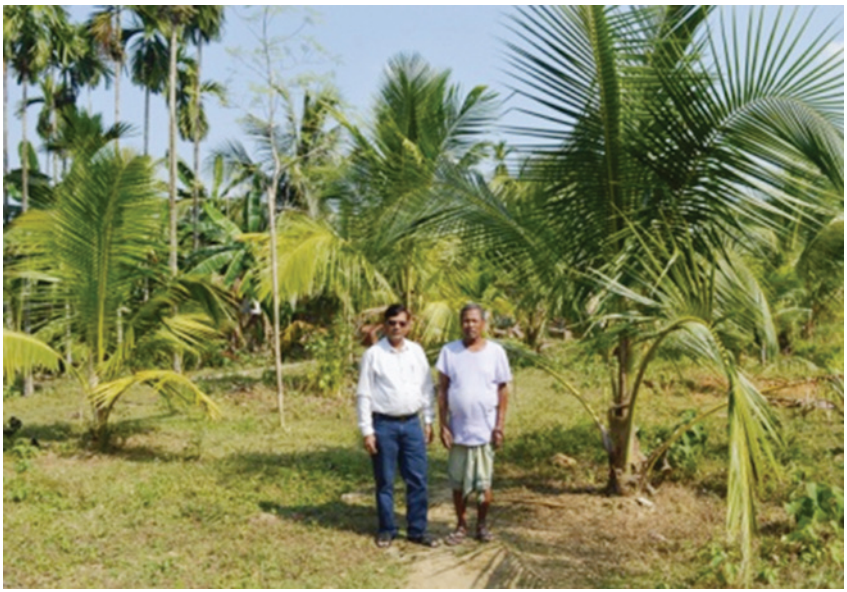
The Impact

The attitude of the farmer in following the recommendation without any deviation has yielded him rich dividends. The garden fully recovered from the Leaf Blight disease and the symptoms disappeared gradually. Nearly hundred trees which were treated have shown significant improvement and the recovery was fast as Mr. D. Sakthivel was told to give the fertilizer in correct quantity in appropriate time besides the treatment. This has quickened the recovery from Leaf Blight disease. Mr. D. Sakthivel was very much vocal about the success and kept telling his contacts about the intervention of CRS, Aliyarnagar. Besides, realising the personal impact, the technology recommended has trickled down to his fellow farmers through word of mouth and diffused in other parts of the block. This social impact has been the technological change brought by the team of scientists on AICRP on Palms of Aliyarnagar Centre.

36. COCONUT BASED CROPPING SYSTEM FOR SUSTAINABILITY

Name of the farmer	**:**	**Sri Dhubin Rabha**
Address	**:**	Singra under Kamrup district
Contact Number	**:**	986606742
Cropping System	**:**	Coconut based cropping system

Sri Dhubin Rabha, was a poor educated middle aged farmer of the village Singra under Kamrup district of Assam state. He started cultivation of vegetables mainly, cabbage, cauliflower and some leafy vegetables only during 2010 in his 1.5 acre of land in the *Rabi* season. During that time he could hardly manage his family with little income from his garden. During the visit of Project Coordinator of ICAR –AICRP (Palms) during 2012, he was advised to grow coconut in his farm and to follow suitable coconut based cropping system developed by AICRP on Palms, Kahikuchi centre. With the intervention of the scientists of AICRP on Palms, Kahikuchi centre, he planted 60 coconut seedlings of var. Kamrupa during 2013 and started to grow banana, turmeric, Assam lemon and vegetables (*Rabi & Kharif*) in a systematic manner under his coconut plantation. At present, he has 50 bearing banana plants (var. Nendran), 30 Assam lemon plants, 125 pumpkins (var. Arjuna) and has been growing turmeric (var. Megha), pineapple and *Rabi and Kharif* vegetables every year under coconut plantation. Now, he earns Rs. 200,000/- (Rupees Two lakhs) annually by selling the produce from his garden and makes his family cheerful. Moreover, his earning will be escalate more in near future when he gets harvest from coconut palms. He had participated in many trainings on improved cultivation practices of coconut organized by the AICRP on Palms, Kahikuchi centre.



37. INTEGRATED NUTRIENT MANAGEMENT IN COCONUT

Name of the farmer	**:**	**Mr. Mihirbhai Jayeshchandra Desai**
Address	**:**	Khara Abhrama, Jalalpore Dist.: Navsari
Contact Number	**:**	08511112400
Cropping System	**:**	Coconut alone

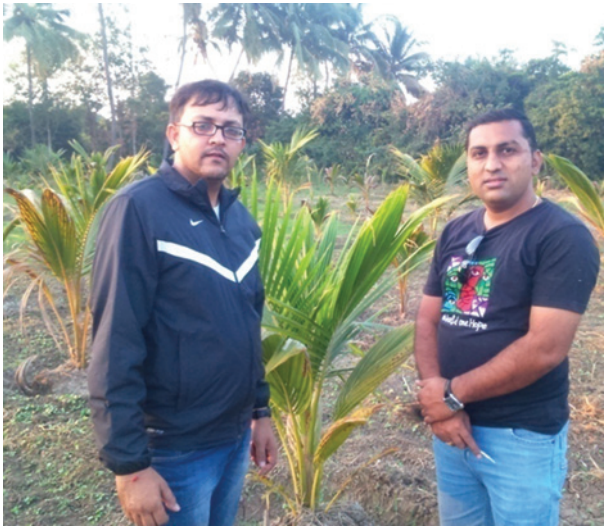
Mr. Mihirbhai Desai is a young enterprising farmer who turned to coconut cultivation in Abhrama Village of Jalalpore Tahsil, Navsari District of Gujarat 20 years ago and introduced Integrated Nutrient Management in his coconut plantations. Mihirbhai used to grow other crops such as mango, sapota, and rice in his fields. Mihirbhai's journey began by planting sapota and mango in his farm. He decided to do something different. He interacted with the scientists of ICAR-AICRP Palms, NAU, Navsari and, on their advice, planted coconut as border crop in mango and sapota fields. In the past, Mr. Mihirbhai used all kinds of nutrients and organic manures to get maximum yield from coconut. Because of this, the cost of cultivation increased tremendously, and both yield and profit decreased significantly. But after contacting and taking advice from the scientists of AICRP Palms, he started adopting integrated nutrient management practice in coconut cultivation to achieve higher yield and reduce cultivation costs. Scientists advised him to make a ring of about 4-5 feet from the trunk and apply 50 kg of pressmud (sugarcane factory by-product) and 1500-750-1500 g of NPK/palm/year along with 5 kg of neem or castor cake per palm during June-July and Sept.-Oct. During the monsoon season, Mr. Desai raised green manures (sun hemp) in the palm basin and applied bio-fertilizers such as *Rhizobium*, *Azotobactor*, PSB and KSB to improve soil structure, absorb nutrients and increase organic carbon in the soil.

Impact of technologies of coconut

Initially the farmer harvested 50-60 nuts per palm per year. But, after the adoption of technologies and with scrupulous management, his yield increased to 80-100 nuts per palm per year (almost double) and received the income of Rs. 12000-14000 per month. Now, he is very happy for minimizing the cost of cultivation and increased profit in his field.

Perception of the farmer

He also grew mango and sapota in his farm, but from his experience and knowledge, coconut cultivation is a hassle-free agriculture that require minimum of labor and also provides a steady and stable income. In future, he is planning to increase the coconut acreage to achieve sustainable yields.



38. PRODUCTION OF QUALITY PLANTING MATERIAL

Name of the farmer	**:**	**Laxmanbhai Polabhai Ram**
Address	**:**	Mahakali Coconut Nursery At. Post: Tantivela, Veraval taluk Gir Somnath
Contact Number	**:**	08511112400

Mr. Laxmanbhai is a very progressive farmer in adopting new technologies in his farm. After contacting the scientists of AICRP (Palms), NAU, Navsari, Gujarat he started the work on hybridization as there is huge demand of D x T coconut hybrids in Gujarat state. He clustered a small group of coconut farmers and sought training on hybridization form CPCRI, ICAR, Kasaragod (Kerala) during 2017-18. After completion of training, he initiated crossing programme in his own coconut farm. He has 150 numbers of CGD (Female parent) plants for crossing programme and procured pollens of male flowers (WCT) from government farm. Now, he is preparing nearly about 10000 hybrid seedlings of D x T coconut in a year and selling @ Rs. 500 per seedling. He adopts fertigation, nutrient and water management, IPDM *etc.* technologies for producing pest-disease free and healthy nuts for planting materials.

Perception of the farmer

Mr. Laxmanbhai says that there had been some problem in the beginning but there was no necessity to look back after initiating the work. Due to his hard work, dedication garnished with the guidance of scientists of Navsari Centre and desire to do something different, he has made a different identity. He advises everyone to experiment and work hard. He had become a source of employment for the workers of his area also. His collaboration with the scientists of AICRP (Palms), NAU, Navsari; signing of MOU with CPCRI, Kasaragod for technology transfer; CDB; Dept. of Hort., GoG; ATMA, KVK and NGO's of district has paid rich dividends.

39. INTERCROPPING OF FRUITS AND VEGETABLES IN COCONUT

Name of the farmer	**:**	**Mr. Harshad R Bhandari**
Address	**:**	Nargol, Umergaon (Valsad)
Contact Number	**:**	9879142770
Cropping System	**:**	Intercropping of fruits and vegetable crops under coconut garden

Mr. Harshad Raghunand Bhandari is a young enterprising farmer, along with his two brothers turned to coconut cultivation 20 years back in Nargol village from Umergaon Tahsil of Valsad district of Gujarat. Now he has coconut cultivation across 17 ha of land with palms of various ages (WCT, COD and MGD), wherein 400 palms are above 40 years, 300 palms above 20 years and 300 juvenile palms of around 5 years. He is also harvesting tendernut from his palms. He has cultivated different vegetables (brinjal, okra, tomato, cucumber and cowpea) and fruit crops (banana) as intercrops in young as well as old coconut garden for getting maximum income. His coconut farm is totally under organic cultivation. For all the crops he is adopting recommended package with regard to nutrient management and water management. For supplying required nutrients, he applies organic manures viz. FYM/ poultry manure/goat manure. The biomass from the crops is being recycled *in situ* in the form of mulching or vermicompost. *In situ* composting by digging pits and adding biomass supplements the external application. Mr. Harshad has seven ponds in his coconut garden for aquaculture providing additional income and for harvesting rain water.

Yield and Economics

On an average he harvests 80-100 nuts/palm/year. He sells tender nuts in local markets at the rate of 12 per unit. He is reaping very good yields from intercrops as well as from harvesting of fish from ponds. The economic benefit (average of 3 yrs) of the system indicates that, the variable cost of production involved in maintaining one ha of the system was around Rs. 1,25,000/- to Rs. 1,50,000/- per year. Average net returns realized from all the crops with fisheries was to the tune of Rs. 4.50 lakhs to 5.25 lakhs/ha per year depending upon the market price of the crop.

Perception of the farmer

Thus from his experience it was realized that, cropping system with fruits and vegetables in coconut is highly profitable and remunerative over a period of time in the South region of Gujarat. He is a graduate and is actively participating in horticulture exhibitions, training programmes etc. and also encourages other farmers for cultivation of coconut by adopting coconut based cropping system. He has built good support and continuous contact with the scientists of ICAR-AICRP (Palms), NAU, Navsari and State Horticulture Department.

40. ORGANIC FARMING IN COCONUT

Name of the farmer	**:**	**Mr. Nareshbhai Save**
Address	**:**	Deheri village of Valsad district
Contact Number	**:**	942747790
System	**:**	Organic farming in coconut

Mr. Nareshbhai Save is a son of late Mr. Bhaskarbhai Hiraji Save from Deheri village of Valsad district, Gujarat who was a visionary and proponent of organic agriculture way back from 1965. Mr. Nareshbhai followed the techniques of his father and continued the tradition of organic cultivation. Today he is a respected farmer and gets invitation from many organizations for delivering lectures on organic agriculture. The *Kalpavruksha* farm established by Mr. Bhaskar H Save is a learning centre for farmers wherein trainings are organized regularly and the farm is open to farmers on all Saturdays. The whole family of Shri Nareshbhai Save consisting of his wife, brother and daughters are involved in teaching the concept of organic cultivation to farmers. The farm has coconut (West Coast Tall) across 2 ha with 305 bearing and 25 juvenile palms. Fruit crops like arecanut, sapota, banana, custard apple and avocado with yams are intercropped in coconut garden. Need based irrigation through channels is followed with croton plants as soil moisture indicator (drooping leaves indicate moisture stress). He adopts zero tillage and no wedding strategy. Weeds are controlled by shade management and growing cover crops. The farm is under fully organic cultivation with no external inputs for the last 50 years. The nutrient supply is only through recycling of biomass. The field is loaded with earthworms and the biomass gets composted within six months. Pest and diseases control is also done by biological methods taking advantage of natural food chain. Value addition of the farm produce is an integral part of Mr. Save's philosophy of organic cultivation. He produces and markets herbal hair oil as 100 per cent chemical free. He has coconut nursery supplying quality seedlings to farmers and other nurseries. He is a well known farmer and trainer for many organizations like CDB, KVKs, State Department of Agriculture and Horticulture and educational institutions. Efforts made for disseminating organic coconut based production technologies among the farmers and awareness creation on organic cultivation are well recognized.

Impact of the technologies

Mr. Save produces more than 10000 good quality coconut seedlings of West Coast Tall and dwarf green varieties throughout the year and selling @ Rs. 50 per seedling to farmers and nursery entrepreneurs. Only from nursery, he received more than Rs. 5.00 lakhs per annum. He also adopts coconut based cropping system organically and achieved production of tender nuts, as well as arecanut, sapota, banana, custard apple and brinjal with net returns (economy) of Rs. 2,04,887.00 per ha. The Save family received Best Coconut Farmer Award by Coconut Development Board in 2006 and also received many awards and certificates of appreciation for doing exemplary work in organic farming especially for coconut cultivation.

41. SCSP / TSP MISSION - TECHNOLOGY PROVIDER

Sri Nabakishor Patra of Odisha had 0.3 ha of unutilized land. Through SCSP programme 50 numbers of coconut seedlings along with banana saplings and vegetable seeds were distributed for intercropping. By adoption of coconut based farming system, Sri Patra is now getting extra income by selling fruits and vegetable after fulfilling his own consumption.

Juvenile Phase of Coconut

Aquaculture + Coconut

Mr Sisir Kandi Subarnapur, Gop ,dist. Puri, has one pond which was left as such. However, with the intervention of the scientists of AICRP (Palms) , had cleaned the pond and started aquaculture. Through SCSP programme he has planted coconut seedlings around the pond along with banana. Now, his financial condition has been improved by IFS technology.

Sri Arjun Mohanty, Pipili, has one acre of coconut plantation. He was very much interested for paddy straw mushroom cultivation. With advice and suggestion from the AICRP scientist, he is successfully growing mushroom in the coconut plantation and getting extra income from the same piece of land.

Mushroom Beds

Intercropping in Coconut

At Konark, **Sri. Kandi** is a hard working farmer. Through SCSP programme he has planted 25 numbers of coconut seedlings in the backyard of his home and growing vegetables as intercrops. After fulfilling his own requirement he could able to sell extra vegetable in the market and getting good income. Tribal people are generally poor and they do not get sufficient food and nutrition.

Through the TSP mission of Keonjhar district of Odisha, **Sri Heanta Tudu** has planted 35 numbers of coconut seedlings and doing intercrop with vegetables. Now, he is nutritionally self sufficient and by selling vegetables, he is getting extra income.

42 . COCONUT BASED CROPPING SYSTEMS IN CHATTISGARH

			
Shri Eshansh Singh Rathore	**Shri Shailesh Atami**	**Shri Somaru Ram**	**Shri Peelu Ram**

Shri Eshansh Singh Rathore is a resident of Bakawand block in Bastar district of Chhattisgarh. He is one of the progressive farmers who is concerned in raising vegetable and fruit crops in his field. He has around 2500 coconut seedlings intercropped with fruit crops like guava, banana, mango, citrus fruits, dragon fruit, passion fruits and sulphi together with vegetables like peas, tomato, brinjal, okra, leafy vegetables etc. This is the 7th year of coconut plantation in his field and first year of fruiting in coconut. He has earned around Rs. 30000/- from coconut while a sum ofRs. 5 lakhs from intercrops. According to him coconut has just begun to fruit but still he is earning a handsome income in market through selling of tender nuts. Growing of intercrops in coconut orchard is highly remunerative for him.

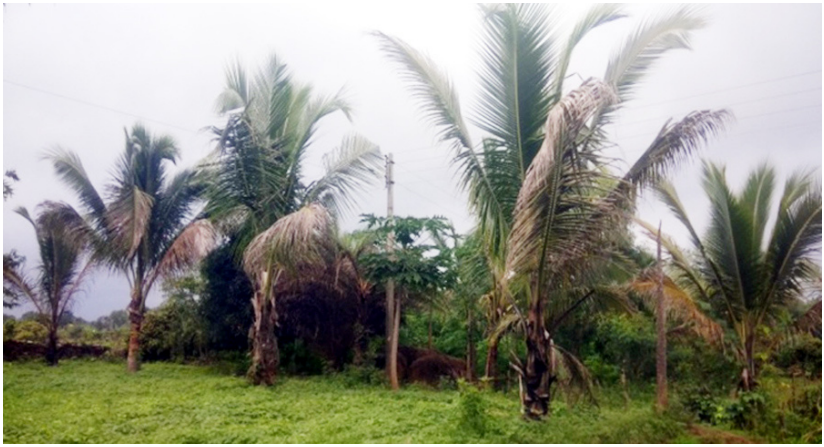
Shri Shailesh Atami is a progressive coconut farmer of Chhattisgarh. He owns his land in Kasoli, Dantewada in which he has grown around 600 coconut seedlings (planted during 2017) intercropped with banana and guava. This is the second year of fruiting in coconut. He is earning a sum of Rs. 2.00 lakhs from coconut and around Rs. 3.00 lakhs from banana and guava per annum. He opined that by growing of intercrops he has earned quite more than monocropping system.


Field view of coconut in Kasoli, Dantewada

Shri Somaru Ram is a progressive coconut farmer from Chokar village, Bastar. He has planted 150 coconut seedlings and is also growing vegetables like tomato, chilli, okra and brinjal as intercrops in coconut orchard. He has earned around Rs. 3.5 lakhs last year from coconut. Apart from coconut he is earning around 2.5 lakh per annum from intercrops. Rather than monocropping of coconut, intercropping is providing good remuneration overcoming the drowning effect of price chart of copra.


Field view of coconut in Chokar, Jagdalpur

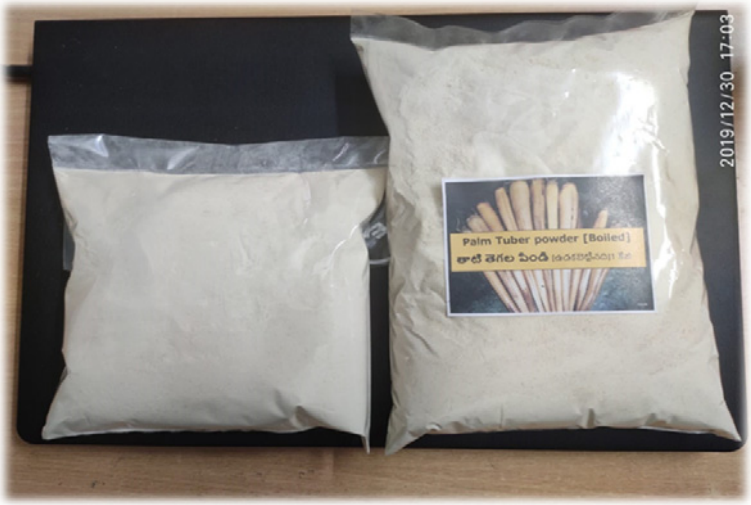
Shri Peelu Ram is a marginal farmer belonging to village Tahakapal in Bastar district of Chhattisgarh. He has planted 50 coconut seedlings during 2015 and has intercropped with marigold and vegetables like peas, radish and leafy vegetables. Fruiting has initiated in some of the palms from 2020 onwards. He is earning Rs.1.5 lakhs annually from coconut along with intercrops. The farmer is highly convinced with intercropping in coconut garden as it enhances the aesthetic outlook of the farm, provides gainful employment and good returns.



Field view of coconut in Tahakapal, Bastar

43. PALMYRAH TUBER FLOUR MAKING

Palmyrah is a hardy crop which can tolerate adversities, biotic and abiotic stresses. Palmyrah yields an average of 300 nuts giving about 300 tubers in which one can make about 30 kg of natural flour for use in bakery and confectionery. There is a lot of scope to generate income from thousands of Palmyrah palms located in East Godavari region of Andhra Pradesh. Tribal farmers who are technologically deprived can earn more by selling naturally available products in the forest and in their fields. After successful training conducted by ICAR-AICRP Palms, HRS Pandirimamidi, East Godavari, Andhra Pradesh on the manufacturing process of Palmyrah Tuber products, Tribal farmers, through the NGO called ASHA, manufactured and sold Palmyrah Tuber Flour at the rate of Rs. 120/- per kg, where previously no economic activity existed. During October to January an average of Rs. 25,000 to Rs. 35,000 per tribal farmer was earned through the sale of tubers and tuber-based flour. Tribal areas of Chinturu, Andhra Pradesh has plenty of palmyrah palms. As there is no consistent earning from palmyrah and only seasonal products are obtained for their own consumption, by adopting the technology developed by ICAR –AICRP Palms, tribal farmers are benefited from palmyrah tuber flour making and even one consignment has been shipped to United Kingdom.



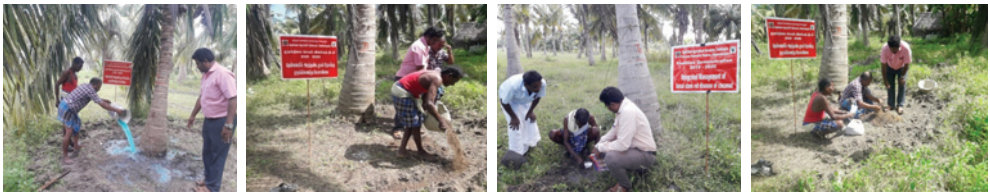
44. QUALITY IMPROVEMENT OF JAGGERY

A fully grown palmyrah tree yields 125-150 litres of sap and from this 20-25 kg of jaggery and 15 kg of palm candy can be produced. Non-edible products such as leaves and fiber can be used to make boxes, baskets, mats, brooms, ropes, fans, winnows and much more for the daily needs of the rural population. Based on rough estimates, an average minimum net income of Rs. 1,500 is gained from one tree (the current market price for palm jaggery is between Rs. 150-600 per kg). Andhra Pradesh Jaggery Cooperative is advocating jaggery making to economically uplift traditional jaggery makers through KVIC and about 45 families are involved in Nidadavolu area of East Godavari in producing jaggery with traditional process and is marketed locally. But due to lack of standards, the shelf life of jiggery is poor. On obtaining training from ICAR AICRP Palms and KVIC, standards were established for the manufacturing process towards lowering the moisture content. With the intervention of the scientists of ICAR AICRP (Palms), the farmers are now able to sell jaggery at a good price and maintain quality and reduce wastes. Now around 35 families are benefited in making jaggery and is being sold @ Rs 300/- per kg. Also recovery improved along with good appeal. The famers are happy about the income and the technology which transformed their product into a hot cake.

45. INTEGRATED MANAGEMENT OF COCONUT BASAL STEM ROT

Coconut is the most desired plantation crop in East Coast region of Tamil Nadu for successful income generation and is mainly cultivated in Thanjavur district, Tamil Nadu. Pattukkottai is one of the taluks of this district and is considered as the coconut centre of this region. The livelihood security of the Scheduled Caste (SC) population of Pattukkottai Taluk depends largely on coconut cultivation and rearing of indigenous cattle and goats on their marginal land holdings. The economic situation of coconut farmers was completely ruined in almost all coconut-growing areas of Thanjavur district after ravaging of the Gaja Cycline. Recently, the heavy attack of the most terrible Ganoderma wilt disease has further reduced the recovery of cyclone hit palms, and the yield loss has been estimated up to 60%. The great ignorance of the severity of the disease and its spread, lack of knowledge on IDM technologies and poor economic situation have been the major setbacks for farmers in controlling the disease in this area. Consequently, disease progression has lead to the death of the palms and major economic losses, ultimately affecting farmers' livelihoods. In this regard, efforts have been made by Veppankulam of ICAR – AICRP (Palms) to demonstrate the IDM package against root rot disease of coconut popularly known as Thanjavur wilt. Implementation of FLDs on Integrated Management of coconut basal stem rot disease was carried out in 2019-20 in a one-hectare coconut garden of farms in Nambivayal, Pattukkottai, Thanjavur district. The target beneficiary Mr. M. Pandian, S/o. Muthusamy has been identified and provided the critical input for the adoption of the IDM package against coconut BSR disease under the ICAR-AICRP on Palms-2019-20 SC Sub Plan project. Before adopting IDM package, he did not follow any phytosanitary measure in his field and hence poor nut yield was obtained with low income. The timely implementation of IDM package against coconut BSR disease was mediated through diagnostic field visits, On-campus and Off-campus trainings and demonstrations, which benefited the farmer by reducing the severity of the disease.

Adoption of IDM package against Basal Stem Rot (BSR) of coconut in his field helped to increase the Benefit Cost Ratio (BCR) significantly as high as 1:3.19 in demonstrated palms than the check-(farmers' practice) which recorded 1:2.43. The per cent disease reduction of coconut basal stem rot disease over check was 10.3 % with 19.23 % increase of nut yield over check. Additional income of Rs.1,04,542/ha has been accrued to the farmer due to the application of IDM package against basal rot disease. M. Pandiyan was well acquainted with the technologies and is able to identify the first symptoms of basal stem rot disease. He learned the technology and acquired skills through method demonstration of root feeding and soil drenching. Now he serves as a master trainer and influences other coconut farmers to adopt the cutting edge research technologies and has been encouraged by the State Dept. of Agriculture to disseminate the adoption of IDM package against coconut BSR disease.



Demonstration of Root Feeding of Fungicides

46. COCONUT + COCOA INTERCROPPING

Dr Anil Vittal Joshi, MBBS, 58 years old, resident of Narvane Taluka-Guhaghar District-Ratnagiri of Maharashtra, an Ayurvedic doctor, after an active medical career, turned to a passionate agricultural entrepreneur. Mango and coconut are the main crops grown by him. He ventured into coconut plantation since 1990. He has more than 500 bearing coconut palms with nutmeg, black pepper, arecanut, sapota and garcinia as intercrops. He recognized the importance of intercropping for securing crop yields and the sustainability of farms. He recently planted bush peppers and has obtained economic yield potential in his orchard. Open well is the source of irrigation. For efficient water use, he has installed drip irrigation throughout the farm area. He applies farmyard manure (50 kg/palm), trace nutrients (Ormichem 1600 g/palm in two splits and chemical fertilizer in two splits).

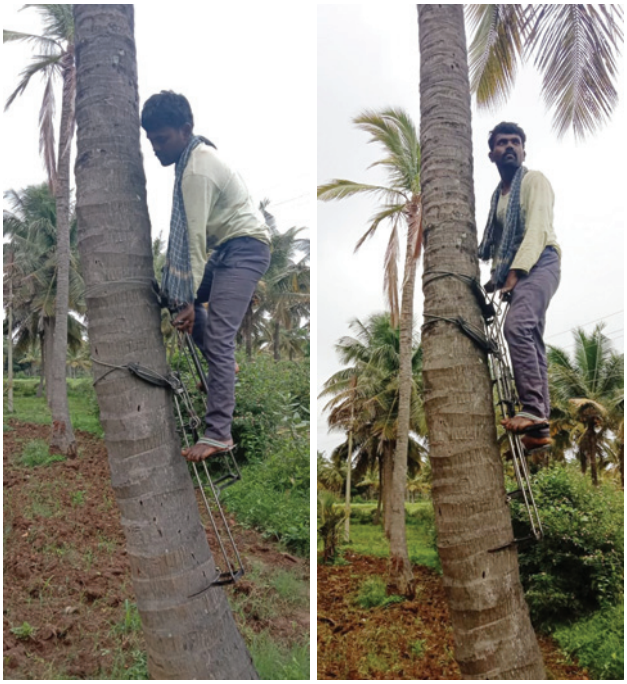
He practices in situ recycling of biomass in the coconut basin. He harvests 40,000 nuts a year and sells them to local traders. Although the main crop is mango, he says that with proper planning and management, coconut will become the most profitable crop in the region. He positively witnessed the importance of University-recommended technology such as timely irrigation and fertigation to improve and maintain coconut yield. Through the use of fertigation and micronutrient application, the coconut yield is increased from 78 nuts per tree to 119 nuts per palm. He sells the nuts for Rs.20. According to him, selling raw coconut will never improve the farmer's position in the value chain, and for higher grading, processing and value-addition is imperative. Considering his contribution and achievements, Dr. Joshi has been awarded with prestigious Jain Irrigation Award and District Best Farmer Award- *'Adarsh Shetinistha Purskar'* forRatnagiri district. He was also feliciated by Shri. Sharadchandraji Pawar, the then Union Agriculture Minister with prestigious 'Padmshree Dr.Appasaheb Pawar High-tech Agriculture Puraskar" at Nashik.

47. TREE CLIMBING MACHINE - A BOON TO COCONUT FARMERS

Mr. Anand S/o Shivayya is a farmer from ChikkaGandasi Village in Arsikere Taluk, Hassan District, Karnataka. Basically he is a small farmer, who owned 2 acres of land and 30 coconut palms. As he was unable to support his family from his farm income he worked as daily wage labor to make his bread and butter. Mr. Anand attended the FOCT Palm Climbing Training Program sponsored by Coconut Development Board in collaboration with AICRP (Palms) and HREC, Arsiker during 2022, which became a turning point in his life. He received training on the use of coconut climbing machine and practically learned how to climb the coconut tree. This is a simple and easy to use device for climbing coconut tree. After completing the training program, he uses this harvester in his own garden to harvest the nuts, which solved labor problem (climbers), especially climbing the tall coconut trees. He took this idea as a business venture and started using coconut climbing machine to harvest coconut in other gardens in his village at a fee of Rs. Rs. 50/palm and he earns Rs. 700-900/day, thus totaling Rs. 10000/month. He also gives training to other people who are genuinely interested in learning how to operate the harvester.

Technological Intervention

Due to migration of youth to urban/semi-urban areas, agricultural community is facing acute labour scarcity. In coconut gardens, harvesting by climbing palm is a herculean task and the intervention of the climbing machine is the solution to these limitations. The prototype of coconut climbing machine is standardized by Coconut Development Board with affordable price and easy operation. During the training program conducted by AICRP (Palms) Centre, 20 farmers were trained, most of them working on their own field and 3 started on commercial scale.



Use of coconut climbing machine for harvesting nuts by Mr. Anand

48. COCONUT BASED INTEGRATED FARMING SYSTEM

Mr. Sudhakar Narhar Marathe, is a progressive farmer, who at the age of 75 has successfully demonstrated the feasibility of intensive integrated farming on his 2.0 hectare land. He is a respected farmer in the community for his extensive experience and success in multiple cropping and related businesses. After retiring from teaching, he actually got involved in farming since 2001 by procuring five acres of land. He planted coconut, mango, turmeric, ginger, sunflower, pineapple and vegetable crops. He has integrated dairy unit with crop management practices e.g. raising azolla and grass for livestock. It has become a model for small and fringe farmers.

He prefers organic way of farming and has his own vermicompost production units. He emphasizes the importance of intercropping in coconut as a provider of continuous income and employment that is sustainable. He uses scientific pest control strategies including preparing Nimboli Ark, Dashpami Ark and even Neem Cake. He has established a beekeeping unit in his farm to improve yield through proper pollination. With his commitment and dedication, he has turned agriculture into a vibrant company and transformed himself as a top farmer worth emulating.

49. COCONUT BASED INTEGRATED FARMING SYSTEM

Mr. Raj BhargavPadhye, although a graduate, automotive engineer, had a passion for farming and is experimenting novel things in his farm and gives business tinch to farm activities. He decided to integrate several crops in coconut and arecanut garden to utilize free space and manage resources effectively. He has participated in many trainings, meetings and conferences related to horticulture. He has also found that coconut and arecanut are good hosts for black pepper. He owns a total of three hectares of land where he grows paddy across one acre, five acres of mango, one acre of arecanut, two acres of cashew and one acre of coconut plantation. He trained pepper (Panniyur-1) cutting in the trunks of coconut and arecanut. The end products such as green pepper and dry are sold to Metropolitan cities *viz.*, Mumbai, Ahmedabad etc for good price.

He produces vermicompost from whatever waste is available in his farm. He raises livestock to meet the need for organic manure and for domestic consumption. He has three buffaloes, two cows, one proven ox. He has a small dairy unit where he produces Pedha, Shrikhand and sells to the needy. He has registered his product with the brand name 'Padhye'. Livestock is an important component in maintaining soil health, he added. He uses cow dung to produce Gobar gas daily, which saves him Rs. 4500/- every year against gas cylinders for domestic consumption. Essentially, he focuses on the production of peppers. He has been producing 1200 kg of black pepper every year and earning a good income. He is well connected to the scientist of Regional Coconut Research Station, Bhatye.

50. COCONUT BASED INTEGRATED FARMING SYSTEM

Mr. Hemant Yadnyeshwar Phatak is a dedicated farmer. This 55-year-old sincerely learned farmer has enormous agricultural experience of about 30 years. It is noteworthy that his entire family is devoted to farming, including his elderly mother. He always promulgates that 'If you love farming and practice it with passion and diligence, you will surely succeed in this endeavor'. He is an active member in all research activities of the Regional Coconut Research Station, Bhatye. He firmly believes that the incorporation of mixed cropping into natural farming leads to increased productivity and profitability of unit area. In his opinion, black pepper, pineapple and banana are ideal cover crops in the coconut garden as they are perennial and fit the coconut ecosystem. These crops are maintained with minimal investment to generate additional income regularly throughout the year. Soil fertility is maintained by effectively recycling the biomass produced on the farm through mulching, composting, vermicomposting, husk burial techniques, etc.

With the technical advisory of the scientist of Ratnagiri Centre of ICAR – AICRP (Palms), he is able to maintain his farm in pest free condition. He produces elite and quality mangoes, cashews and coconuts. The productivity of coconuts obtained from his farm is 125 nuts per palm per year. He has attributed his success in coconut farming to cover crops and involvement of the family members. He produces coconut oil for his family consumption and mango by-products e.g. Aambawadi and pickles. He prepares Jeevamrut, Ghanamrut, Dashparni Ark, compost and has vermicomposting units and dairy farms. He is invited as one of the resource persons for trainings, melas and workshops pertinent to agricultural sector. He thanks Ratnagiri Centre for bringing silver streak in his living.

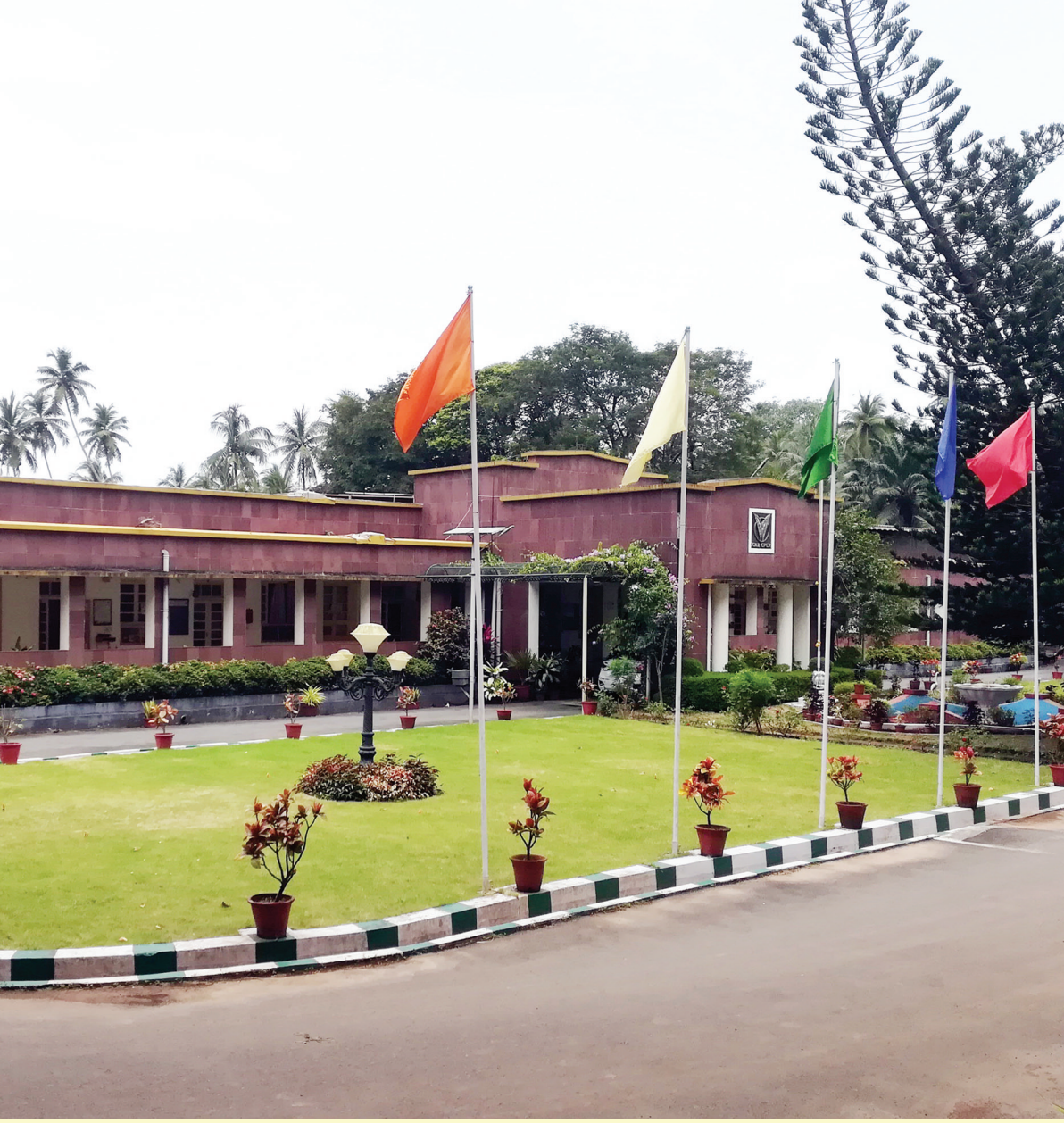
Profile of AICRP on Palms

The project is implemented in 28 centers with its headquarters at ICAR-CPCRI, Kasaragod and at present 15 centres are working on coconut, six on oil palm, four on arecanut, four on palmyrah and seven on cocoa. The coordinating centers are located in 14 states and one union territory covering 13 SAU's/SHU's, one Central Agricultural University and four ICAR institutes.

State	Center/Location	University/ Institution
Andhra Pradesh	Ambajipeta: Horticultural Research Station, Ambajipeta, East Godavari Dt. - 533 214Phone: 08856-244436/243711	Dr. Y.S.R Horticultural University, West Godavari Dt., Andhra Pradesh - 534 101
	Pandirimamidi: Horticultural Research Station, Pandirimamidi, Ramapachodaram, East Godavari Dt. - 533 288, Phone : 08864-246577	
	Vijayarai: Horticulture Research Station, Vijayarai, West Godavari Dt. - 534 475, Phone : 08812-225431	
	Pedavegi: Indian Institute of Oil Palm Research, Near Jawahar Navodaya Vidyalaya, Pedavegi, West Godavari Dt. -534 450, Phone :08812-259409/259532	Indian Council of Agricultural Research
Andaman and Nicobar	Port Blair: Central Island Agricultural Research Institute, Port Blair - 744 101 Phone : 03192-250436	Indian Council of Agricultural Research
Arunachal Pradesh	Pasighat: College of Horticulture & Forestry, Pasighat - 791 102Phone : 0368-2224887	Central Agricultural University, P.O. Box 23, Imphal, Manipur - 795 004
Assam	Kahikuchi: Horticultural Research Station, Kahikuchi, Guwahati Kamrup Dt. - 781 017Phone : 0361-2840232	Assam Agricultural University, Jorhat, Assam - 785 013
Bihar	Sabour: Bihar Agricultural College, Sabour, Bhagalpur Dt. - 813 210 Phone : 0641-2451001	Bihar Agricultural University, Sabour, Bhagalpur, Bihar - 813 210
Chhattisgarh	Jagdalpur: Shaheed Gundadhur College of Agriculture & Research Station, Kumhrawand Farm, Jagdalpur - 494 005 Phone : 07782-229360	Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh - 492 012
Goa	Goa: Central Coastal Agricultural Research Institute, Ela, Old Goa Dt. - 403 402, Phone : 0832-2285448	Indian Council of Agricultural Research

State	Center/Location	University/ Institution
Gujarat	Navsari: ASPEE College of Horticulture & Forestry, Navsari Agricultural University, Navsari - 396 450 Phone : 02637-282144	Navsari Agricultural University, Navsari, Gujarat - 396 450
Karnataka	Arsikere: Horticultural Research and Extension Station, Arsikere, Hassan Dt. - 573 103Phone: 08174-291565/291711	University of Horticultural Sciences, Navanagar, Bagalkot, Karnataka - 587 102
	Sirsi: Horticulture Research and Extension Centre, Sirsi, Uttara Kannada Dt.- 581 401 Phone: 08384-226797/247787	
	Bavikere: Agricultural and Horticultural Research Station, Bavikere, Chikkamagaluru – 577 144 Phone : 08261 255122	University of Agricultural & Horticultural Sciences, Navile, Shivamogga, Karnataka - 577 225
	Shivamogga: Arecanut Research Centre, College of Agriculture, Navile, Shivamogga Dt. – 577 225 Phone : 08181-267011	
Kerala	Kasaragod: Central Plantation Crops Research Institute, Kasaragod - 671 124 Phone : 04994-232733	Indian Council of Agricultural Research
	Pilicode: Regional Agricultural Research Station, Pilicode P.O., Kasaragod - 670 353, Phone:0467-2260450	Kerala Agricultural University, KAU, Vellanikkara, Thrissur, Kerala - 680 656
	Thrissur: Cocoa Research Centre, Kerala Agricultural University, Vellanikkara, Thrissur Dt. – 680 656 Phone: 0487-2438457	
Maharashtra	Mulde: College of Horticulture, Mulde, Kudal Taluk, Sindhudurg Dt. - 416 520 Phone: 02362-244231/244232	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri Dt., Maharashtra - 415 712
	Ratnagiri: Regional Coconut Research Station, Bhatye, Ratnagiri Dt. - 421 612 Phone : 02352-255077	
	Wakawali: Central Experimental Station, Asond block, Wakavali, Daopli Taluk. Phone : 02358-282417	

State	Center/Location	University/ Institution
Odisha	Bhubaneswar: Department of Horticulture, (OUAT), Bhubaneswar - 751 003 Phone : 0674-2397463	Odisha University of Agriculture and Technology, Bhubaneswar, Odisha - 751 003
Tamil Nadu	Aliyarnagar: Coconut Research Station, Aliyarnagar, Coimbatore Dt. - 642 101 Phone: 04253-288722/288662	Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu - 641 003
	Killikulam: Agricultural College & Research Institute, Killikulam, Vallanad, Tuticorin Dt. - 628 252 Phone : 04630-261226	
	Pattukkottai: Agricultural Research Station, Pattukkottai, Thanjvur Dt. - 614 602 Phone : 04373-235832	
	Veppankulam: Coconut Research Station, Veppankulam, Thanjavur Dt. - 614 906 Phone: 04373-260205/202534	
Telangana	Konda Mallepally: Horticultural Research Station, Konda Mallepally Mandal, Nalgonda Dt.- 508 243	Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad, Telangana – 500 030
West Bengal	Mondouri: Directorate of Research, P. O. Kalyani, Nadia Dt. - 741 235 Phone :033-25827574	Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal - 741 252



भा.कृ.अनु.प -अखिल भारतीय समन्वित ताड़ अनुसंधान परियोजना

ICAR- ALL INDIA COORDINATED RESEARCH PROJECT ON PALMS

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