

Collaborative Network on Coconut R & D under ICAR-AICRP on Palms

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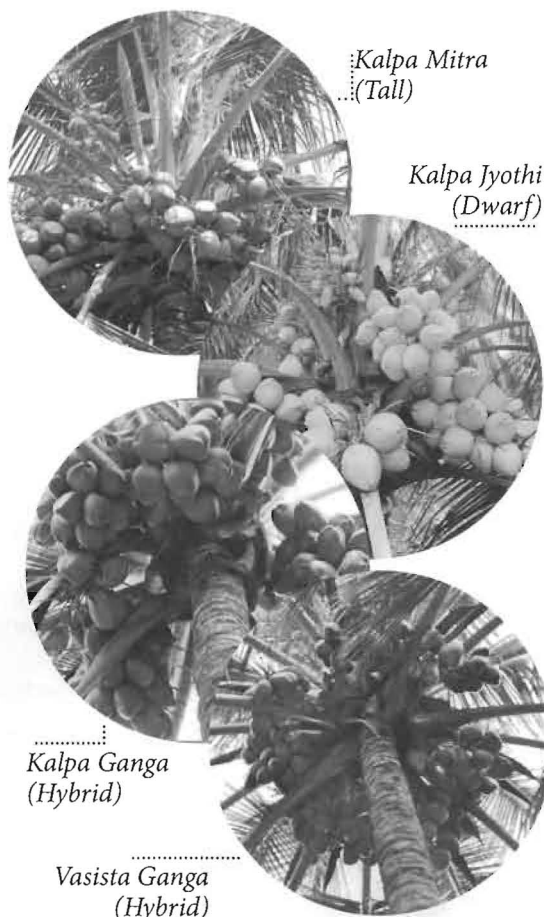
ICAR-AICRP on Palms, ICAR-CPCRI, Kasaragod, 671 124

Introduction

The All India Coordinated Research Project (ICAR-AICRP) on Palms with its headquarter at ICAR-CPCRI, Kasaragod coordinates research on development of location specific technologies to improve the productivity of coconut, arecanut, oil palm, palmyrah and sulphur palm in different agro climatic regions. Fifteen centres are conducting research on coconut regarding genetic resource management, crop improvement, crop production and crop protection.

History of AICRP on Palms

All India Coordinated Coconut and Arecanut Improvement Project was sanctioned by the ICAR in 1970 and the project started functioning with 12 centers across eight states in 1972. Oil palm and Palmyrah palm were included as mandate crops and the project was renamed as All India Coordinated Research Project on Palms in 1986. During the course of time different centers were added in different agro-climatic regions of the country to address location specific problems related to mandate crops. Currently the project is implemented in 29 centres including fifteen centres on coconut, eight on oil palm, four on arecanut and two on palmyrah palm.



*Kalpa Mitra
(Tall)*

*Kalpa Jyothi
(Dwarf)*

*Kalpa Ganga
(Hybrid)*

*Vasista Ganga
(Hybrid)*

List of AICRP on Palms Centres conducting research on coconut in India
Research on coconut is being carried out in its 15 centers located in 12 states and one union territory covering 12 SAUs/SHUs and 3 ICAR institutes.

State	Centre/Location	Area of Research	University/ Institutions
Andhra Pradesh	Horticultural Research Station, Ambajipeta, East Godavari District- 533 214 Phone: 08856-244436/243711	Crop Improvement, Production & Protection	Dr.Y.S.R Horticultural University, West Godavari District, Andhra Pradesh- 534 101
Andaman and Nicobar	Central Island Agricultural Research Institute, Port Blair- 744 101 Phone : 03192-250436	Crop Improvement & Production	Indian Council of Agricultural Research
Assam	Horticultural Research Station, Kahikuchi, Kamrup District, Guwahati- 781 017 Phone : 0361-2840232	Crop Improvement & Production	Assam Agricultural University, Jorhat, Assam-785 013
Bihar	Bihar Agricultural College, Sabour, Bhagalpur District, Bihar-813 210 Phone : 0641-2451001	Crop Improvement & Production	Bihar Agricultural University, Sabour, Bhagalpur, Bihar - 813 210
Chhattisgarh	Saheed Gundadhoor College of Agriculture & Research Station, Kumharawand Farm, Jagdalpur, Chhattisgarh- 494 005 Phone : 07782-229360	Crop Improvement & Production	Indira Gandhi Krishi Vishwavidyalaya, Raipur - 492 012
Gujarat	ASPEE College of Horticulture & Forestry, Navsari Agricultural University, Navsari, Gujarat- 396 450 Phone : 02637-282144	Crop Improvement & Production	Navsari Agricultural University, Navsari, Gujarat- 396 450
Goa	Central Coastal Agricultural Research Institute, Ela, Old Goa Dist., Goa - 403 402 Phone : 0832-2285448	Crop Improvement & Production	Indian Council of Agricultural Research
Karnataka	Horticultural Research Station, Arsikere, Hassan District- 573 103 Phone: 08174-291565/291711	Crop Improvement, Production & Protection	University of Horticultural Sciences, Navanagar, Bagalkot, Karnataka - 587 102
Kerala	Central Plantation Crops Research Institute, Kasaragod - 671 124 Phone : 04994-232733	Crop Production	Indian Council of Agricultural Research
	Regional Agricultural Research Station, Pilicode P.O., Kasaragod - 670 353 Phone:0467-2260450	Crop Improvement	Kerala Agricultural University, P.O. KAU, Vellanikkara, Thrissur, Kerala - 680 656
Maharashtra	Regional Coconut Research Station, Bhatye, Ratnagiri District- 421 612 Phone : 02352-255077	Crop Improvement, Production & Protection	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri District- 415 712
Odisha	Department of Horticulture, (OUAT), Bhubaneswar, Odisha - 751 003 Phone : 0674-2397463	Crop Improvement & Production	Orissa University of Agriculture & Technology, Bhubaneswar, Odisha -751 003
Tamil Nadu	Coconut Research Station, Aliyarnagar, Coimbatore District- 642 101 Phone: 04253-288722/288662	Crop Improvement, Production & Protection	Tamil Nadu Agricultural University, Coimbatore - 641 003
	Coconut Research Station, Vepankulam, Thanjavur District- 614 906 Phone: 04373-260205/202534	Crop Improvement, Production & Protection	
West Bengal	Directorate of Research, P.O. Kalyani, Nadia District, West Bengal- 741 235 Phone :033-25827574	Crop Improvement & Production	Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal- 741 252

Varieties/ Hybrids released by ICAR-AICRP on Palms

Sl. No.	Variety/Hybrid	Parents	Recommended for
Varieties (Tall)			
1	Pratap	Banawali	Konkan region of Maharashtra
2	Kamrupa	Assam Green Tall	Assam
3	ALR (CN) 1	Arasampatti local	Tamil Nadu
4	Kalyani Coconut -1	Jamaican Tall	West Bengal
5	Kera Keralam	West Coast Tall	Kerala, Tamil Nadu and West Bengal
6	Kera Bastar	Fiji Tall	Coastal region of Andhra Pradesh, Tamil Nadu and Konkan region of Maharashtra and Bastar region of Chhattisgarh
7	Kalpa Dhenu	IND 006 (AGT)	Kerala, Karnataka, Maharashtra, Tamil Nadu and Andaman & Nicobar Island
8	Kalpa Pratibha	IND 016 (CCT)	Kerala, Karnataka, Maharashtra, Tamil Nadu and Coastal region of Andhra Pradesh
9	Kalpa Mitra	IND 022 (JVT)	Kerala, Karnataka, Maharashtra, Tamil Nadu and West Bengal
10	Kalpatharu	Tiptur Tall	Karnataka, Tamil Nadu and Kerala
11	Kalpa Shatabdi	San Ramon	Tamil Nadu, Karnataka and Kerala
Varieties (Dwarf)			
12	Gauthami Ganga	Gangabondam	Coastal region of Andhra Pradesh
13	Kalpa Jyothi	IND 058(MYD)	Kerala, Karnataka and Assam
14	Kalpa Surya	IND 048(MOD)	Kerala, Karnataka and Tamil Nadu
Hybrids			
15	Konkan Bhatye Coconut Hybrid -1	GBGD x ECT	Maharashtra
16	Kalpa Samrudhi	MYD x WCT	Kerala and Assam
17	Kalpa Sreshta	MYD x TPT	Kerala and Karnataka
18	Vasista Ganga	GBGD x PHOT	Andhra Pradesh and Karnataka
19	Godavari Ganga	ECT x GBGD	Andhra Pradesh
20	Kalpa Ganga	GBGD x FJT	Karnataka
21	VPM -5/VHC 4	LCT x CCNT	Tamil Nadu

Achievements of AICRP on Palms in coconut research

Crop improvement

• Germplasm collection- A total of 112 local ecotypes of coconut was collected from different agro-climatic zones and are being evaluated for their performance.

• Elite mother palms have been identified in different agro-climatic regions for collecting seed nuts and further quality seedling production.

• Nucleus seed gardens for the released coconut varieties/hybrids were established at the respective State Coconut Research Stations to meet the demand of seedling requirement.

• The following location-specific coconut varieties/hybrids have been released for commercial cultivation.

Crop Production

Nutrient management

• Integrated nutrient management packages were recommended for the cultivation of coconut in different regions.

• Tamil Nadu: 1000:250:1000g NPK /palm/ year

• Assam: 500:500:2000 g NPK/palm/year

• WB: 1000:500:1000 g NPK/palm/year

• Konkan : 1000:500:2000 g NPK/palm/year

• Karnataka: 1000:250:1000g NPK /palm/year

Water management:

Drip irrigation: Region specific drip irrigation schedule was recommended for improved water use efficiency

Region	Months	Quantity of water (lit/palm/day)
Western region of Tamil Nadu	February-May	65
	January, August - September	55
	June-July, October - December	45
Eastern region of Tamil Nadu	March-September	80
	October - February	50
Maiden tracts of Karnataka	February-May	65-75
	Oct-January	40-50
Konkan region	February to May	40
	October to January	30

Drip fertigation: Improvement in water and nutrient use efficiency and reduced cost of production of coconut through location-specific fertigation schedules.

- Application of nutrients through drip irrigation in eight splits from October to May was found to be optimum.

- In Aliyarnagar and Arsikere centres, recommended dose of fertilizer (RDF) through drip fertigation recorded significantly higher yield which was on par with 50 and 75% of fertilizer application through drip fertigation. Hence, 50% RDF can be recommended for drip fertigation in coconut.

- In Aliyarnagar, Veppankulam, Mondouri and Kasaragod Centres, fertigation of 50% (RDF) was found to be on par with fertigation of 75% RDF and soil application of 100 per cent RDF. Hence, fertigation of 50% RDF can be recommended.

- In Ambajipeta, Ratnagiri, Arsikere Centres, 75% RDF through fertigation recorded significantly higher yield compared to soil application of 100% RDF and on par with 100% RDF through fertigation. Hence, drip fertigation of 75% RDF can be recommended.



Multi species cropping system



Gladiolus as intercrop



Turmeric as intercrop

Location specific coconut based cropping system with different crops:

Sl. No.	Region	Component crops
1	Tamil Nadu	<ul style="list-style-type: none"> • Coconut + banana + turmeric + EFY + pineapple + tapioca + bhendi • Coconut + black pepper + banana + elephant foot yam + coriander • Coconut + galanga + lemon grass + patchouli • Coconut + aloe + galangal + tulsi • Coconut + marigold + gomphrena + chrysanthemum
2	West Bengal	<ul style="list-style-type: none"> • Coconut + black pepper + pineapple • Coconut + sarpagandha + aswagandha + arrowroot • Coconut + gladiolus + tuberose + gerbera
3	Odisha	<ul style="list-style-type: none"> • Coconut + banana + tube rose (in young coconut garden) • Coconut + stevia + artensia
4	Chhattisgarh	<ul style="list-style-type: none"> • Coconut + black pepper + carnation + chrysanthemum • Coconut + stevia + amahaldi + sarpagandha + tikhur + patchouli
5	Asom	<ul style="list-style-type: none"> • Coconut + black pepper + turmeric • Coconut + pipali + patchouli + citronella + sarpagandha • Coconut + gerbera + tuberose + gladiolus
6	Maharashtra	<ul style="list-style-type: none"> • Coconut + turmeric + banana + pineapple + tapioca • Coconut + sathavari + adulsa + arrow root + lemon grass + citronella • Coconut + lily + jasmine (Jasminum multiflorum) + heliconia
7	Karnataka	<ul style="list-style-type: none"> • Coconut + banana + drumstick + french bean + ladies finger + red gram • Coconut + banana (High water requirement) • Coconut + annual drumstick (Medium water requirement) • Coconut + red gram (low water requirement) • Coconut + lemon grass + garden rue + tulsi + kalmegh + arrow root + makoi • Coconut + chrysanthemum + crossandra + jasmine (J. multiflorum)
8	Gujarat	<ul style="list-style-type: none"> • Coconut + turmeric + amorphophallus
9	Andhra Pradesh	<ul style="list-style-type: none"> • Coconut + palmarosa + mango ginger + patchouli + citronella

Coconut based farming systems: Coconut based cropping systems under integrated nutrient management developed at different AICRP Centres showed higher productivity and income than monocrop of coconut

Crop Protection

Pest management

Rhinoceros beetle: An IPM strategy involving removal and burning of dead coconut palms, collection

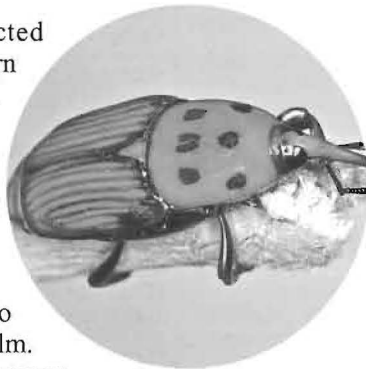


and destruction of various bio stages of the beetle from manure pits, examining the crowns of the palm frequently and hooking out the adults, placing three naphthalene balls or chlorantraniliprole

(Ferterra) 5g + 25g soil / palm at the base of the inner most leaves once in 45 days, application of *Metarhizium anisopliae* @ 5 x 10¹¹ spores / m³ on manure heaps, setting up of Rhinolure traps @ one per 2 ha, resulted in gradual decrease in the level of damage caused by rhinoceros beetle on leaf, spathe and spindle. Nanoporous matrix CPCRI lure was found to be effective against rhinoceros beetle at Aliyarnagar, Ambajipeta and Ratnagiri centres.

Red palm weevil:

Chisel out affected trunk region and burn the infected portion. Smear the wounded portion with coal tar. After cleaning the trunk, fill the tunnelled portion of trunk with cement and sand mixture to give strength to the palm.



Installation of Nanoporous matrix CPCRI lure along with Kairamone blend was found to be effective against red palm weevil at Amabjipeta and Ratnagiri centres.

Black headed caterpillar:

Braconid parasitoid, *Bracon brevicornis* and Bethyloid parasitoid *Goniozus nephantidis* were mass multiplied at the AICRP centres in the respective states and supplied

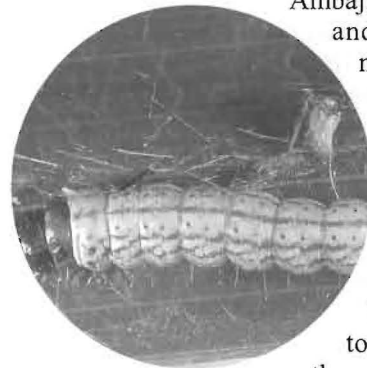
to farmers in large numbers (Aliyarnagar- 8,06,800, Ambajipeta-32,30,000

and Ratnagiri- 92,000 numbers) to control incidence and spread of the caterpillar.

Slug caterpillar

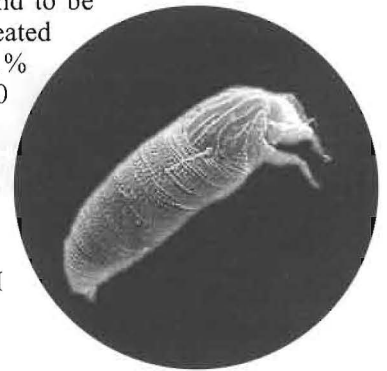
Light traps @ three traps/ha with 200 W incandescent bulb 1 ½' above + Water pan was found to be effective against

the slug caterpillar, Darna nararia. Installation of 4-5 light traps/ha along with spraying of Bt formulations (1g/l) successfully controlled pest population in Ramenahally and Bommenahally villages of Karnataka during a recent outbreak of slug caterpillar.



Eriophyid mite

Eriophyid mite damage based on mean damage grade index was found to be the lowest in palms treated with azadirachtin 1% (root feeding) (10 ml + 10 ml water)+ IPM+INM practices when compared to the untreated control garden and garden with IPM and INM practice alone.



Disease Management

Leaf blight (*Lasiodiplodia theobromae*):

Combined application of talc-based powder formulation of *Pseudomonas fluorescens* to soil (50 g/palm/year) and neem cake (5 kg/palm/year) followed by root feeding of 100 % culture filtrate of *P. fluorescens*



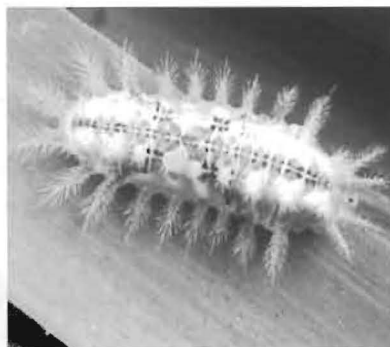
Mass rearing of parasitoid in laboratory



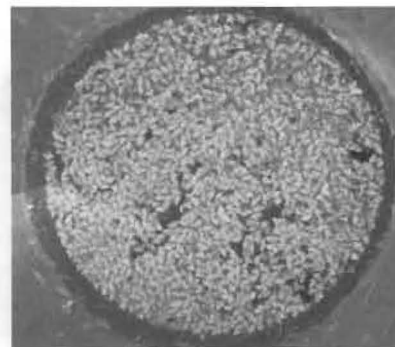
Releasing of parasitoids against black headed caterpillar



Garden infested by slug caterpillar



Larval stage of *D. nararia*



Adult moths of *D. nararia* trapped in light trap



Leaf blight affected palm



Basal stem rot affected palm



Application of *T. viridae* + neem

at half yearly intervals is effective in managing the disease. Soil application of microbial consortia consisting of *P. fluorescens*, *Bacillus subtilis* and *Trichoderma viride* @ 300g along with FYM 5 kg/palm at quarterly interval was found to be effective in reducing the leaf blight disease incidence.

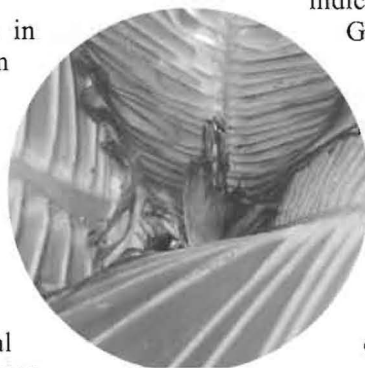
Root feeding of Tebuconazole @ 2ml + 100 ml water at quarterly interval reported maximum reduction in disease severity of leaf blight disease under field conditions at Puliyanakandi village in Coimbatore district and Gomangalampudur village in Tirupur district of Tamil Nadu.

Bud rot

Application of talc formulation of *P. fluorescens* @ 10g was effective when compared to *T. viride* @ 10g and application of culture filtrates of 100% and 50% of both the bio agents.

Basal stem rot

Bengal gram and red gram were identified as efficient



indicator plants for basal stem rot pathogen *Ganoderma lucidum* at Ambajipeta and Arsikere centres.

Integrated disease management practices include application of recommended dose of fertilizers to the coconut palms every year, drip or basin method of irrigation, frequent irrigation especially during summer months, raising in situ green manure crops like sunhemp and sesbania to increase soil organic matter and antagonistic microflora, sowing of indicator plants in the tree basins and observation for symptom development there by early detection of the disease, uprooting and destruction of diseased and dead palms along with the roots, application of 50 g of *T. viride* in combination of 5 kg of neem cake to the diseased palms once in every year and application of the above said mixture at the rate of 1kg to all the healthy palms in the diseased garden as a prophylactic measure.

Hexaconazole 5% SC at 0.1% was found effective against the pathogen under in vitro conditions in Ambajipeta and Arsikere. ■