Technology inventory of AICRP on Palms - Coconut

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Introduction

The All India Coordinated Research Project on Palms of Indian Council of Agricultural Research (ICAR) under National Agricultural Research System (NARS) started functioning from 1972 is a unique mechanism for testing location-specific and need-based innovations in different agro-climatic conditions of the country. Under this system, both the ICAR and State Agricultural Universities (SAUs) work as partners with 75% and 25% budget sharing, respectively in an interdisciplinary approach. The Project provides a platform and opportunities to the scientists for exchanging ideas and materials for working on similar problems in different agro-ecological regions for collectively developing solutions. They work together in crop improvement, effective production and plant protection and disseminating the technology in the region towards stability and profitability of the mandate crops viz., coconut, oil palm, arecanut, palmyrah and cocoa and it is implemented in 28 centres, which are located in 14 states and one union territory covering 13 SAUs/SHUs, one CAU and four ICAR institutes. The AICRP on Palms contributes to the development of horticulture in the country through testing and release of the varieties and technologies besides the supply of quality planting materials. This, in turn, has contributed to an increase in the area under new varieties and technologies of plantation crops in several states.

Crop improvement

Evaluation of coconut germplasm and hybrids for their performance in different agro-climatic regions is one of the priority areas of research under AICRP on Palms. The germplasm maintained at different centres are used for location specific breeding programmes. Based on the comparative performance in evaluation trials, 20 high yielding varieties/hybrids have been released since its inception. The features of the recent varieties/hybrids which are notified by CVRC are presented in table 1.

Establishment of Nucleus seed gardens for released varieties in coconut

The success of coconut plantation establishment starts with the production of good quality planting materials. Selecting the best planting materials before field planting assures higher productivity. Planting coconut seed nuts directly in the field is not recommended and care must be taken in choosing the seedlings to start a plantation since high quality planting materials provide a good head start to sustain the coconut palms productive and economic lifespan of 60 or more years. Nucleus seed gardens with released varieties of coconut have been established for producing quality planting materials in AICRP Palms centres and supplied 9.67 lakhs of coconut seedlings of released varieties and hybrids to coconut farmers and this, in turn, has significantly contributed to the expansion of area under coconut with better production potential.

Sl. No	AICRP centre	Coconut Varieties
1	Aliyarnagar	Kalpa Pratibha, Kera Keralam
2	Arsikere	Kalpatharu, Gauthami Ganga
3	Ambajipeta	Gauthami Ganga, Kalpa Pratibha, Kera Bastar
4	Jagdalpur	Kera Bastar
5	Kahikuchi	Malayan Yellow Dwarf
6	Mondouri	Kalyani Coconut 1, Kalpa Mitra, Kera Keralam
7	Ratnagiri	Gauthami Ganga, East Coast Tall, Kera Bastar
8	Veppankulam	Kera Keralam, Kalpa Pratibha
9	Port Blair	CARI Annapurna, CARI Omkar, CARI Surya, CARI Chandan

Crop Production

• **Fertigation:** Application of 50% of recommended dose of NPK through fertigation in 10 monthly splits was found to be sufficient for higher yield of coconut in Kerala, Tamil Nadu and West Bengal. Similarly, 75%

Table 1. Varieties/hybrids released from AICRP on palms through selection and hybridization from germplasms

Variety/ Hybrid and year of release	Breeding method and Parents	Important traits	Recommended state
Kalpatharu (2009)	Selection from Tiptur Tall	Suitable for ball copra production. The average yield of 20300 nuts/ ha, copra yield of 35 q/ha and oil yield of 25 q/h.	Rain fed and irrigated regions of Karnataka, Tamil Nadu an d Kerala states.
Kalpa Samrudhi (2009)	Hybrid (MYD x WCT)	High yielder (104 nuts/palm/year) with higher copra out turn (3.1 t/ha) and oil content (68.0%) The hybrid is semi-tall, precocious bearing (comes to bear at 5 years)	Kerala and Assam
Kalpa Jyothi (2012)	Selection from IND 058(MYD)	Dwarf variety with yellow fruits, higher average yield of 114 nuts per palm per year under rainfed conditions with estimated copra yield of over 16 kg per palm per year.	Kerala, Karnataka and Assam
Kalpa Surya (2012)	Selection from IND 048(MOD)	Dwarf with Orange fruits for tender nut purpose. The average yield is 123 nuts per palm per year under irrigated conditions with estimated copra out turn of 23 kg per palm per year.	Kerala, Karnataka and Tamil Nadu
Kalpa Sreshta (2014)	Hybrid (MYD x TPT^{-})	The mean yield is 167 nuts/palm/year, with estimated high copra out turn of 35.9 kg/ palm/year or 6.28t/ha copra. The hybrid is suitable for tender nut purpose; ball copra purpose also.	Kerala and Karnataka
Vasista Ganga (2014)	Hybrid (GBGD x PHOT)	Found promising based on its precocity, higher nut yield (125 nuts/palm/year), copra output (21.9 kg/palm/year), oil content (69% and oil yield 15.1 kg/palm/year) with good tender nut water content (395 ml) and TSS (6.20Brix).	Andhra Pradesh
Abhaya Ganga (2014)	Hybrid (GBGD x LCOT)	High yielding, precocious; having heavy bunches with average nut yield (128 nuts/ palm/year), copra output 21.7 kg/palm/year, oil content 72 % and oil yield 15.5 g/palm/ year).	Andhra Pradesh
Kalpa Ganga (2014)	Hybrid (GBGD x FJT)	Nut yield of 120 nuts/ palm/year. Copra out turn of 3386 kg /ha. Short stature and suitable for ball copra production.	Karnataka
VPM 4 (2015)	Hybrid (LCT x CCNT)	The mean nut yield of the hybrid during the stabilized bearing period was 161 nuts/palm/ year, with copra content of 149.8 gm/ nut and oil content of 70.0 % with higher quantity of tender nut water (368 ml /nut) of good quality (4.8 °brix TSS).	Tamil Nadu
Kalpa Shatabdi (2016)	Selection from San Ramon	It records an average yield of 105 nuts / palm / year and has large nuts with a copra content of 272.9g/nut with an estimated copra yield of 28.65 kg/palm.	Tamil Nadu, Karnataka and Kerala
Kalpa Ratna (2018)	Selection from Federated Malay States (IND 010 S)	A tall coconut variety selected from Federated Malay States (IND 010 S) with copra content of 162 g/ nut and a copra yield of 12.7 kg/ palm/ year.	Karnataka, Kerala and Tamil Nadu


Kalpatharu


Kalpa Samrudhi


Kalpa Jyothi


Kalpa Surya


Kalpa Sreshta


Vasista Ganga


Abhaya Ganga


Kalpa Ganga


VPM 4


Kalpa Shatabdi


Kalpa Ratna

of dose of NPK through fertigation in 10 monthly splits was found to be sufficient in Andhra Pradesh and Karnataka.

• **HDMSCS:** Coconut Based High Density Multi Species Cropping System involving crops like Black Pepper, Cocoa, Banana, Drumstick, Nutmeg, Cinnamon, Pineapple, Turmeric, Elephant Foot Yam, Tapioca, Bhendi and Coriander were recommended with suitable combinations for different regions, which enhanced the net income to the tune of Rs. 1.75 lakhs to Rs. 3.25 lakhs/ha as compared to coconut monocrop (Rs. 70,000 to Rs. 90,000/ha).

• **Intercropping with medicinal and aromatic crops:** Crops such as Galangal, Lemon grass, Patchouli, Pipali, Citronella, Aloevera, Tulsi, Palmarosa, Sarpagandha, Aswagandha, Arrow root, Amahaldi, Sathavari, Garden rue, Mango ginger, Makoi and Kalmegh were recommended for cultivation in coconut garden in different regions - resulted in an additional net income to the tune of Rs. 1.20 lakhs to Rs.1.75 lakhs/ha.

• **Intercropping of flower crops in coconut garden:** Suitable flower crops identified to be grown under coconut are Marigold, Gomphrena, Celosia, Zinnia and Chrysanthemum at Aliyarnagar (Tamil Nadu), Chrysanthemum, Crossandra, China aster and Marigold at Arsikere (Karnataka), Gerbera, Tuberose, Gladiolus and Marigold at Kahikuchi (Assam) and Gladiolus, Tuberose and Gerbera at Mondouri (West Bengal) and Lily, Heliconia and Jasmine at Ratnagiri (Maharashtra) - enhanced the net income to the tune of Rs. 2.00 lakhs to Rs. 4.00 lakhs/ha.

• **Integrated Nutrient management under coconut based cropping system:** Application of 50% of RDF (NPK) + 50% N through organic recycling with vermicompost + vermiwash + biofertilizer and in situ green manuring recorded higher system productivity followed by 75% of recommended NPK + 25% through organic recycling with vermicompost or fully organic - recommended from Aliyarnagar, Ambajipeta, Arsikere, Bhubaneswar, Jagdalpur, Kahikuchi, Mondouri, Navsari, Ratnagiri, Sabour and Veppankulam centres for adoption by farmers.

Coconut based cropping systems

Intercropping of flower crops in coconut garden

Disease Management

▶ *Leaf blight*

• Molecular characterization of Lasiodiplodia theobromae isolates was carried out at Aliyarnagar Centre. Through PCR amplification of ITS region of L. theobromae isolates, an expected amplicon of 550 bp was obtained and the sequences were deposited in Gen Bank (Accession numbers; MG685854, MG685855and MG 697234).

• At Aliyarnagar Centre, in the field evaluation trial, sequential root feeding of carbendazim @ 5 g/ 100 ml of water during January and July followed by propiconazole @ 5 ml/ 100 ml of water during April and October was found to be effective in controlling the disease.

▶ *Stem bleeding*

• The new fungicide molecules with combi product (carbendazim 25% + Mancozeb 50% WS) was tested against mycelial growth of Thielaviopsis paradoxa under in vitro conditions. Cent percent inhibition of pathogen at lower concentration i.e. 100 ppm indicated its strong action against the test pathogen. Application of neem cake based formulation of "Trichoderma harzianum" cakes (one cake /bleeding patch/year) was found effective for the management of stem bleeding disease in coconut in Andhra Pradesh.

▶ *Bud rot*

• Talc based formulation of Trichoderma reesei @ 5 g/coconut seedling at spindle region is recommended for application during pre monsoon period in Andhra Pradesh State.

▶ *Basal stem rot*

• Soil application of talc based formulation @ 125g each of Trichoderma reesei and Pseudomonas fluorescens+ 5 kg of neem cake per palm at yearly interval have been recommended for the management of basal stem rot disease in coconut.

Insect-Pest Management

▶ *Management of rhinoceros beetle*

Application of CPCRI Botanical cake @15 g/ palm + paste@ 15g /palm is recommended against rhinoceros beetle in juvenile palms as it was found effective in reducing spindle damage and leaf damage in coconut.

▶ *Management of Eriophyid mite*

Effective INM and IPM package involving (i) application of recommended dose of fertilizers with 20 kg vermicompost and 5 kg neem cake/palm (ii) growing of green manure crops viz., cowpea / sunnhemp in the inter rows and ploughing in situ at flowering stage (iii) application of Keraprobio (100 g/palm) (iv) root feeding with fenpyroximate 5% EC @ 10 ml (in the month of March) and (v) spraying of palm oil-sulphur emulsion (during December) are effective packages for reducing infestation of eriophyid mite in coconut.

▶ *Management of Rugose Spiraling Whitefly*

Installation of Yellow Sticky Traps in coconut garden is recommended for effective attraction of RSW in coconut in order to mitigate their incidence.

• Black headed caterpillar: Black headed caterpillar management in coconut was carried out by production and release of parasitoids like Goniozus nephantidis (4,20,000 nos.), Bracon sp.(4,30,100 nos.) in farmers' fields of different regions.

▶ *Release of parasitoid by a farmer*

Integrated management of Slug Caterpillar: The

IPM packages comprising mechanical removal and destruction of larval and pupal stages, installation of light traps @ 5 nos./ha, application of recommended dose of fertilizers, spraying of insecticide chlorantraniliprole 18.5 % SC @ 0.3 ml/litre and release of potential parasitoid Pediobius imbreus @ 60/palm is recommended for effectively managing the incidence of slug caterpillar in coconut. ■

COCONUT MILK MURUKK

Coconut Recipe

Ingredients

Rice Flour: 2 cups
Coconut Milk: 1 cup
Urad dal flour: ½ cup
Asafoetida powder: 2 pinches
Seasame seeds : 2 tsp
Butter : 1½ tsp
Oil: as required for frying
Salt: to taste

Method : Take a bowl and add rice flour, asafoetida powder, urad dal powder, sesame seeds and salt. Add butter and mix well. Pour coconut milk little by little and mix and make a soft dough.

Heat oil in a pan. Take the murukk dough in the murukku maker (Sevanazhi) in which the disc with one hole is put. Now press it to the hot oil in circular motion in the shape of murukku. When both sides become golden brown transfer them to a strainer. After a while, place them in a paper towel to avoid extra oil in it. Transfer to a washed and sun dried bottle. These murukks are easy to bite since it is prepared with coconut milk and is crispy.

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