



Planting Material Production in Coconut: Status and Strategies

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Introduction

Coconut, the most important of all cultivated palms, provides livelihood security to several millions of people across the world. It provides food, drink, shelter and materials for industries. Evolved and adapted along the coastal ecosystem in tropical world, coconut spread to other regions subsequently with human assistance and became part of human culture. Presently, coconut is cultivated in 11.91 million hectares in 94 countries producing 67128 million nuts (Asian and Pacific Coconut Community (APCC) Statistical Year Book 2015). The Philippines, Indonesia and India are the major producers, contributing about 74% of total world production. Coconut today is being positioned as a food, nutritional and high value crop rather than oil crop. It also provides services to environment by way of helping in soil conservation, offering wind break, responsible for establishing parks and reserves and by being most suitable for integrated farming systems.

Coconut is cultivated in India since ages and it plays an important role in the social, economic

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and cultural activities of the people. It is cultivated in 18 states and three Union Territories in India. Through the systematic research conducted during the last century, a substantial number of viable technologies pertaining to improved varieties including hybrids, integrated nutrient management, water management and irrigation, multiple cropping and integrated farming, integrated pest and disease management and value addition through product diversification have been evolved for enhancing coconut productivity and profitability. But coconut farmers are not able to exploit the production potential from these technologies to the extent desirable due to various socio-economic, technological, infrastructure and other constraints. Major problems experienced by coconut growers include price crash/price fluctuation in the market, ever increasing cost of cultivation, fragmented holdings, predominance of senile and disease affected palms, lack of skilled climbers for harvesting and plant protection etc. Adoption of high yielding improved varieties is one of the important strategies for enhancing coconut productivity. However, the extent of adoption of improved varieties of coconut is very low and lack of availability of quality planting material of coconut is a major reason attributed for the low level of adoption of improved coconut varieties by the coconut growers.

Area, production and productivity

In India coconut is cultivated in 2.08 million ha with production of 23.9 million nuts and productivity of 11,481 nuts/ha. The four southern states, Kerala, Karnataka, Tamil Nadu and Andhra Pradesh account for 90% of area under coconut and 93% of production. Table 1 provides the details of area, production and productivity of coconut in India in the year 2016-17.

Area under coconut in India has shown an increasing trend over the past six decades realising 3.3 times of initial area, with an annual compound growth rate (ACGR) of 1.83%. Decadal growth rates show that area has increased with highest rate in 1961-70 and 1981-90 period whereas the decades 1971-80 and 2001-10 has shown a negative growth rate in area expansion mainly due to reduction in area in Kerala (9.05 to 7.7 lakh ha). Similarly, yield has shown a growth of 2.18 times that of the yield in 50's, with an overall growth rate of 1.18%. During 1961-70 and 1971-80, growth rate was negative and as represented graphically, there was no substantial increase in coconut yield till 1990. During the past 27 years, yield increase was almost double; 5992 to

11491 nuts per palm per year.

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Sl No.	States / Union Territories	Area ('000 hectares)	Production (million nuts)	Productivity (nuts/ha)
1	Andhra Pradesh	115.21	1,377.53	11,957
2	Assam	20.60	153.27	7,440
3	Bihar	14.90	141.09	9,469
4	Chhattisgarh	1.48	8.77	5,926
5	Gujarat	24.44	336.65	13,775
6	Karnataka	513.85	6,773.05	13,181
7	Kerala	770.79	7,448.65	9,664
8	Maharashtra	20.90	198.85	9,514
9	Nagaland	0.47	2.67	5,681
10	Odisha	50.91	341.68	6,711
11	Others	52.76	142.38	2,699
12	Tamil Nadu	461.06	6,570.63	14,251
13	Telangana	0.50	2.09	4,180
14	Tripura	4.61	32.23	6,991
15	West Bengal	29.63	374.56	12,641
	Total	2,082.11	23,904.10	11,481

(Source: Horticulture Division, Dept. of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India).

Reluctance to replace old, unproductive and senile palms with improved varieties, coupled with scarcity of quality planting materials, is the major

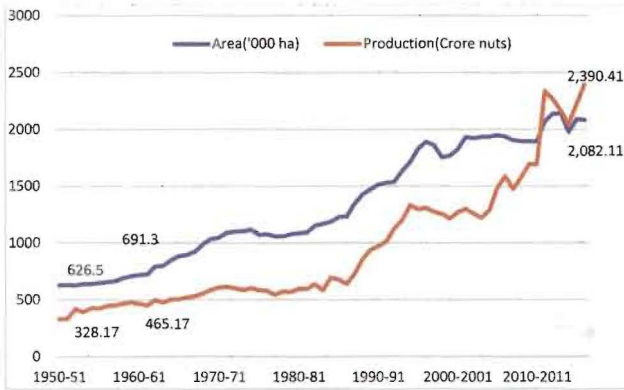
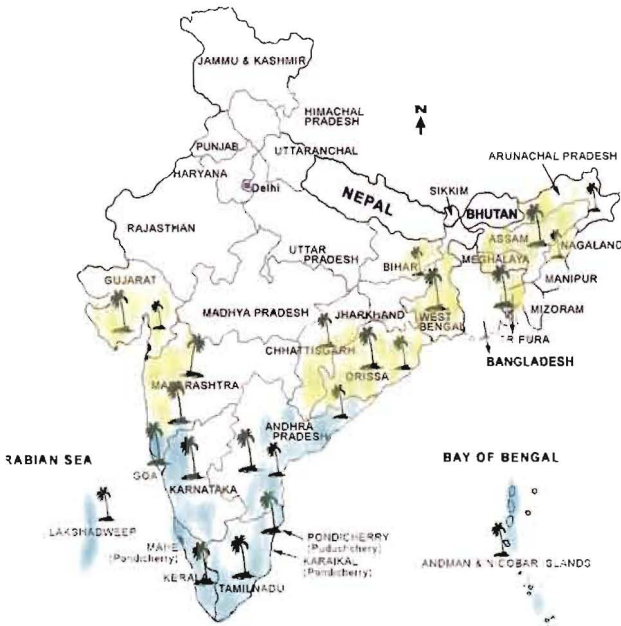


Fig 1. Area (000 ha) and Production (crore nuts) of coconut in India (1951-2017)



reason for low productivity in traditional areas.

The changing scenario has created a huge demand for coconut planting material, but has worsened the already strained environment of planting material production and distribution, opening avenues for unscrupulous elements to exploit the situation by pushing dubious seedlings. The situation warrants development of strategies to improve the availability of quality planting material and to develop a mechanism to check the quality of the material in distribution chain. Analysis of present scenario of planting material production in coconut in the country is a pre-requisite for developing such strategies.

Improved varieties for enhancing productivity

The most important input for increasing productivity is cultivation of high yielding varieties. Traditional or local varieties in coconut yield up to 9000 Kg/ha of husked nuts and 15 Kg copra/palm. Improved varieties have the potential to give yield up to 15000 Kg/ha of husked nuts and 25 Kg copra/palm. By cultivating improved varieties, farmer can realize an additional 6000 Kg/ha of husked nuts or an additional 10 Kg of copra/ palm. In coconut, research on development of new varieties has received due attention from the very beginning. Germplasm collections from exotic and indigenous sources have enriched the diversity available for developing new varieties.

Fig 2. Annual Compound Growth Rate ACGR (%)

Decade	Area	Production	Yield
1951-60	1.30	3.44	2.11
1961-70	3.76	3.10	-0.64
1971-80	-0.05	-0.30	-0.25
1981-90	3.33	5.03	1.64
1991-00	1.78	2.32	0.53
2001-10	-0.19	2.71	2.91
2011-17	0.09	0.39	0.30
Overall	1.83	3.04	1.19

Many varieties have been developed by selection from exotic and indigenous collections. Discovery of heterosis, research on combining ability and evaluation of various cross combinations have lead to development of many hybrids. ICAR-CPCRI, ICAR-CIARI and State Agriculture Universities, which are the main agencies involved in coconut research have so far developed 49 varieties which include 29 high

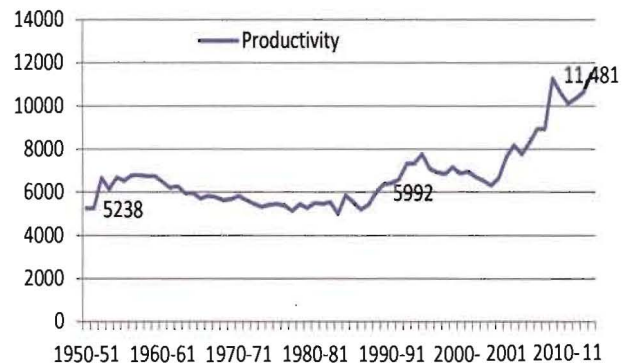


Fig 3. Productivity (nuts/ha)

yielding selections consisting of 11 Dwarfs and 18 Talls and 20 hybrids (8 DxT and 12 TxD combinations). Sixteen varieties have been recommended for tender nut purposes, 35 varieties for copra, six varieties for dual purposes and three for ornamental purposes (Table 2).

Agency	Tall Variety	Dwarf Variety	Hybrid Variety	Total
ICAR-CPCRI, Kasaragod	8	5	6	19
ICAR- CIARI, Andaman		4		4
KAU, Kerala	1	1	5	7
TNAU, Tamil Nadu	3		4	7
ANGRU, AP	1	1	1	3
AAU, Assam	1			1
IGAU, Chhattisgarh	1			1
BCKV, West Bengal	1			1
UHS, Bagalkot	1		1	2
BSKKV, Maharashtra	1		1	2
Dr. YSRHU, AP			2	2
Total	18	11	20	49

Spread of improved coconut varieties

Impact of new varieties on national productivity is possible only when the varieties spread to large areas. In coconut, spread of new varieties has been limited due to various factors. A study on the spread of hybrid varieties has revealed that coconut hybrids were cultivated only in 14 per cent of the farmer gardens in Kerala. Many of these gardens had only two or three hybrid palms. Lack of availability of planting materials of hybrids was often cited as a major constraint in adopting coconut hybrids (Thamban and Venugopalan, 2002).

Coconut is a long duration crop, giving economic yield up to 70 to 80 years. But, initial flowering and stabilization of yield take 5-7 and 10-12 years in dwarfs and talls respectively. This long juvenile period slows down the multiplication of planting material. A 10 year seed to seed time means that new mother palm population of a variety is possible only after a gap of 10-14 years. The long juvenile period in coconut has greatly reduced establishment of mother palm gardens with new varieties. Another impediment in coconut seed production is the low number, approximately 50, of planting material possible from a mother palm per year. This reduces the multiplication rate of new varieties. As a consequence of all these

In public sector including CDB, ICAR-CPCRI, SAUs and State Agriculture Departments, 630 ha land is being utilized for seed garden. It is possible to have one lakh mother palms that can supply five million quality planting material by fully utilizing these seed gardens.

factors, spread of a new variety possible in the first 10 years is 0.25 ha/annum/mother palm. Initial number of mother palms available at the time of release of a new variety determines the quantity of planting material possible and speed of spread of the variety. In the case of hybrid varieties, production of planting material requires skilled climbers well versed with hybridization techniques. Shortage of such skilled workers call for capacity building of climbers by providing training in hybridization technique.

The major constraint in the production of quality planting material is the limited availability of mother palms. If a variety is released with 100 mother palms, it can spread to 250 ha during the first 10 years, which is only 0.01% of total area under coconut in India. In coconut, variety development process is limited by area available for evaluation. Hence, most of the time, evaluation is carried out with limited number of palms ranging from 12 to 36 palms. In the case of varieties developed through selection, these are the only mother palms once the new selection is released. In the case of hybrid variety development, number of mother palms of a specific hybrid is even more limited as only 4-5 palms are required for initial development of a combination. In all the hybrids, dwarf coconut cultivar is one of the parents and the numbers of these dwarf palms are very much limited. Limited number of mother palms available with the agencies developing new varieties has been the major cause of low spread. There is a need to specify minimum number of mother palms required for releasing a new variety.

Research agencies responsible for developing

new varieties need to have a plan for scaling up the planting material production. Planting advanced lines or promising lines in nurseries and farms under public sector will improve the availability of mother palms when these lines are released as new varieties. Another approach can be the farmer participatory



evaluation where advanced lines or promising lines are evaluated on farm. Mother palm blocks of released varieties can be established in nurseries under public and private sector as long term strategy to improve the availability of planting material.

Strengthening functional linkages between research and development agencies under public sector is required to operationalize the planting in advanced lines and establishing mother palm blocks of released varieties in nurseries and farms under public sector. Infrastructure available with the development agencies and the technical know-how with the research agencies need to be synchronized for the benefit of farming community.

Seedling requirement and present status of production in the country

Coconut is cultivated in 2.16 million ha land in India. Approximately 350 million palms are in the field. Replacement of 2.5% of total palms in the field annually requires 8.75 million seedlings. Additional 1.75 million seedlings are required annually to meet the demand for replanting 0.4 million ha in root (wilt) affected areas. National average area expansion in coconut is about 23,300 ha per annum. Approximately four million seedlings are required annually for covering the area expansion. Altogether, 14.5 million seedlings are required annually to meet the planting material demand in coconut. In an earlier study, Rethinam (2002) estimated that 15 million seedlings are required in coconut annually. An expert committee constituted by CDB in 2005 reported that the annual demand for coconut seedlings will be 13.9 million (CDB, 2005).

Coconut seedlings are produced and distributed by ICAR-CPCRI, CDB, SAUs and State Agriculture Departments from public sector, and a few nurseries, from private sector. Public sector contribution is about 4.2 million seedlings only (Table 3). It is projected that another four million seedlings comes from private nurseries and farmers.

Table 3. Seedling production under public sector

Agency	No. of seedlings		
ICAR-CPCRI	1,08,085		
CDB	9,00,000		
State	University	Department	Total
Kerala	126758	637979	764737
TamilNadu	81099	1004000	1085099
Karnataka	18676		18676
Andhra Pradesh	19978		19978
Maharashtra	104207	28274	132481
Assam	5000		5000
Gujarat	18300	82199	100499
Odisha	876	1030000	1030876
West Bengal		16000	16000
Total	374894	279852	41,81,431

The major constraint in enhancing production under public sector is the limited number of mother palms available with them. Many seed gardens established are facing various problems that have resulted in further reduction in number of palms. Rejuvenation of these seed gardens by planting mother palms of newly released varieties require immediate attention. Present status of mother palm availability is given in the Table 4. In public sector including CDB, ICAR-CPCRI, SAUs and State Agriculture Departments, 630 ha land is being utilized for seed garden. It is possible to have one lakh mother palms that can supply five million quality planting material by fully utilizing these seed gardens.



Table 4. Availability of mother palms of released varieties with public sector

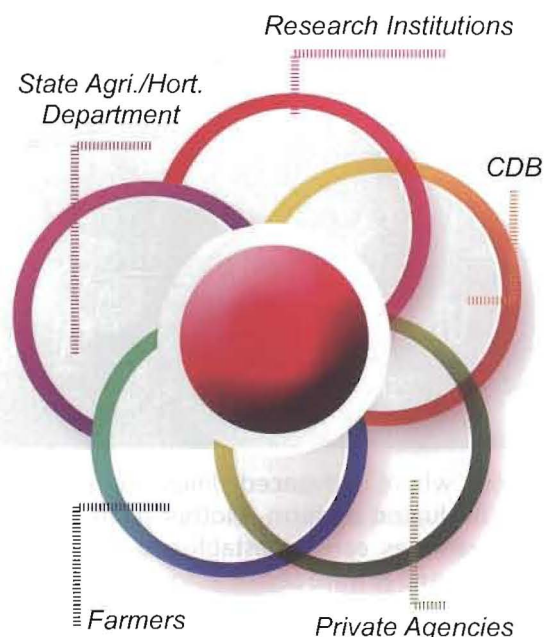
Tall Variety	Numbers	Dwarf Variety	Numbers
WCT	10666	Gauthami Ganga	411
ECT	4443	Kalpa Jyothi	704
LCT	1297	COD	2614
Kerachandra	121	Kalparaksha	302
Kamrupa	150	Kalpasurya	292
TPT	390	Kalpasree	219
Kera Bastar	179		
Pratap	51		
Sakhigopal	602		
ADOT	98		
Kalpa Pratibha	48		
Kalpa Mitra	43		
ADGT	20		
Kalpa Haritha	45		
Total		Total Mother palms	27810

The existing nursery infrastructure can be strengthened by planting mother palms of varieties suitable for respective agro-eco zones. Research agencies developing varieties should make breeder's seed seedling available for such planting on priority.

Quality control in planting material production

The quality planting materials available in the country from various sources in public and private are insufficient to meet the estimated demand. This has always forced farmers to use any material available for planting thereby opening a wide gate for spurious material to enter. Absence of any quality control of planting material distributed has made it easier for the unscrupulous elements to operate. In order to bridge the gap in demand and supply in planting material production, CDB has initiated certain measures like involving farmer organizations for planting material production. These initiatives need to be supported with infrastructure to check the quality, adherence to released varieties and linkage with research institutes for technical support. There are a few nurseries in the private sector catering to the need of farmers by producing planting material. National Horticulture Board has started accreditation process that grades the nurseries in a scale of five stars. Certification of planting material

Strengthening the Linkage Among all Stakeholders



and registration of mother palms along with labeling of planting material is needed to ensure the quality.

Linkage among various stake holders

Planting material production is addressed by various agencies like ICAR-CPCRI, CDB, SAUs, State Agriculture Departments, private nurseries and farmers. These agencies are facing many issues ranging from mother palm availability, land requirement, shortage of trained manpower to varietal identity and seedling quality. Research institutes are strong in technology development and possess expertise for planting material production but their capability in production and distribution of planting material is limited. Development agencies are strong in production and distribution of planting material but lack in expertise in technology. Private enterprises and farmers need to be more conscious about seedling quality and adherence to varietal identity. Linkage and cooperation among all the agencies involved are essential to bring quality and quantity changes in the scenario (Fig. 4).

Way forward

There is a need to strengthen the available nursery infrastructure with mother palms suitable to generate required quantity of quality planting material of the recommended variety for the respective agro-eco

Shri. Narendra Singh Tomar takes charge as the Hon'ble Union Minister of Agriculture and Farmers Welfare Shri. Parshottam Rupala and Shri. Kailash Choudhary are the Hon'ble Union Ministers of State for Agriculture



Shri. Narendra Singh Tomar

Shri. Narendra Singh Tomar took charge as the Hon'ble Union Minister of Agriculture and Farmers Welfare, Rural Development and Panchayati Raj. He is elected as the Member of Parliament from Morena (Madhya Pradesh) Lok Sabha constituency. During the 16th Lok Sabha period from 2014 to 2019, he served as the Union Minister of Steel, Mines, Labour and Employment and later took charge as the Minister of Panchayati Raj, Rural Development and Drinking Water & Sanitation. Shri. Tomar is a native of Murar village in Gwalior district of Madhya Pradesh and graduated from Jiwaji University.



Shri. Kailash Choudhary

Shri. Parshottam Khodabhai Rupala has sworn in as the Union Minister of State for Panchayati Raj, Agriculture and Farmers Welfare. He is a Member of Rajya Sabha representing the State of Gujarat and was a former Member of Gujarat Legislative Assembly from Amreli. He has served as Minister in the Government of Gujarat.



Shri. Parshottam Rupala

Shri. Kailash Choudhary also took charge as the Union Minister of State for Agriculture and Farmers Welfare. He is a Member of Parliament from Barmer Lok Sabha constituency and was a former Member of the Rajasthan Legislative Assembly representing the Baytoo Vidhan Sabha constituency.



zones. Research agencies need to concentrate more on production of breeder seeds and in establishing mother palms of released varieties. Decentralized evaluation for varietal development involving farmers, government and private agencies will help in improving mother palm availability once the material is released. Rejuvenating mother palm blocks of existing seed gardens and nurseries under public sector need coordinated efforts. Expanding nursery infrastructure under public sector by establishing new nurseries especially in non-traditional areas is required for meeting the future requirement. Seed certification including mother palm registration and seed labeling coupled with regulatory mechanism to check the quality of planting material is essential to improve the situation. Creating common platform for planning, monitoring, regulatory mechanisms etc. at the national level will help the cause. ■

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