Strategy for planting material production in coconut

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Quality planting material is an important component for enhancing the production and productivity from any crop. It has more relevance in a perennial crop like coconut with a gestation period of four to six years and a bearing period of more than 60 years. Most of the coconut plantations in our country are old and hence a strategy for rejuvenation of the existing coconut plantations has paramount significance. For effective implementation of large planting material production programme, long term and short term strategies are to be planned and implemented effectively.

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Rationale

The national level growth rate in area of coconut during the past decade was 0.8 %. In the coming years also this trend would continue and an average growth rate of 1% can be anticipated. This brings annually an additional area of about 18,950 hectares (18,94,570 ha X 1 %) under new planting. Considering the planting density of 175 palms per hectare, the annual requirement of planting material for new planting alone is around 3.3 million seedlings. Besides, under planting and rejuvenation takes place in about 2% area, for which 6.6 million seedlings are required annually. Thus the annual requirement of planting material is around 10.0 million seedlings. If replanting programme in the root (wilt) disease affected areas is extended to other districts of Kerala and parts of Tamil Nadu, there will be an additional requirement of one million seedlings annually.

Coconut seedling production scenario in India

High yielding varieties and hybrids of coconut have the potential to yield atleast 25-40 % more than the locally cultivated talls. The yield levels of the released varieties and hybrids of coconut ranges from 2.3 to 4.5 tonnes of copra/ha/year under optimum management conditions. Though many varieties and hybrids have been released during the past three decades, these are yet to reach the farmers in adequate numbers. Even today the bulk of the planting material is produced from the local talls (Rethinam, 2010). The details of major coconut seed gardens /seed nut collection areas and those under Coconut Development Board are listed below (Table 1 & 2).

The total production from all the above sources works out to 2.85 million seedlings (one tall mother palm will yield 25-30 seed nuts

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during January-April season, which in turn will give 20 quality seedlings. Similarly, one tall / dwarf mother palm subjected to artificial pollination during November-April season will yield 40 seed nuts which in turn will give 20 hybrid seedlings. In addition, the coconut seedling production from all agricultural universities (KAU, TNAU, ANGRAU, UAS, AAU, BCKVV, KKV and OUAT) comes to 0.35 million seedlings. Hence, the total production from the governmental sector works out as 3.2 million seedlings whereas the demand is 10 million seedlings. This reveals that the production from approved sources accounts for only 32 % of the total requirement. Besides, most of the seed gardens produce seedlings of tall varieties (depending on the region) to the tune of 80-85% and hybrids/dwarfs comprise only 15-20% production from the seed gardens. The approved standard for any replanting programme is to plant with Talls:Dwarfs:Hybrids in the ratio of 60:20:20 (Anon, 2005). So the 85% production of talls from the seed gardens should come down to 60 % and the 15% production of dwarfs/ hybrids should be enhanced to 40%. This requires removal of the excess mother palms of tall varieties from the seed gardens in a phased manner and replanting the same with parental palms of dwarf varieties. The dwarfs planted will serve as the source for production of dwarf/hybrid planting materials. During the period 2007-2010 (four year period) 13 varieties and hybrids of coconut have been recommended for release during the AICRP (Palms) workshop. The parental palms for production of the newly released varieties (eg: Kalpa Mitra, Kalpa Dhenu and Kalpa Prathibha) are available with CPCRI. It is suggested that coconut seed gardens located all over India

Farm /Location	Details of parental palms	App. no. of mother palms
CPCRI, Kasaragod (Kerala)	COD, MYD, MOD, MGD, CGD, GBGD, LCT, WCT, ADOT, ADGT, CCNT, JVT	710
Seed Garden Complex, Nilambur, Malappuram (Kerala)	COD, MYD, MOD, MGD, CGD, WCT	4,910
Chowghat & Kannur Area (Kerala)	COD, CGD	
Kannur, Kasaragod, Kozhikode areas (Kerala)	WCT	48,250
Central Seed Farm, Aralam, Kannur (Kerala)	WCT, LCT	
Alappuzha, Ernakulam, Idukki, Kollam, Kottayam, Pathanamthitta, Trichur areas (Kerala)	Root (wilt) disease-free WCT mother palms	8,750
Dharmaveera Horticultural Farm, Bellara (Karnataka)	COD, WCT	5,300
Seed Garden, Bangalore (Karnataka)	GBGD	2,000
Tiptur, Kodur, Arsikere, Tumkur areas (Karnataka)	Tall Ecotypes	4,000
CPCRI, Seed Farm, Kidu (Karnataka)	COD, CGD, GBGD, MOD, MYD, MGD, WCT, LCT, ADOT, ECT, BGRT	2,010
Navloc, Ranipet, Vellore (Tamil Nadu)	COD, ECT	1,500
Ettankulam, Tirunelveli (Tamil Nadu)	COD, MYD, MOD	7,500
Neyveli , Cuddalore (Tamil Nadu)	ECT	8,800
Seed Gardens at Madurai, Pollachi & Coimbatore (Tamil Nadu)	MGD, MYD, MOD and ECT	4,500
Bishwanahakani, Cuttack (Orissa)	COD, MYD, MGD, WCT	4,000
Konark (Orissa)	COD	1,100
Tadepalligudam, (AP)	ECT, GBGD	2,400
Shri Appa Rao Gardens, Vizianagaram (AP)	ECT, MGD	1,000
Seed Garden, Aswaraopet, Khammam District (AP)	COD, GBGD, MGD, MOD, MYD	2,400
Mittal Farms, Srikakulam (AP)	ECT	7,500
	Total	116,630

Table 1. Major coconut seed gardens/ seed nut collection areas in the country

DSP Farm	Variety	No. of mother palms available
Abhyapuri, Assam	WCT, ECT, LCT Tiptur Tall, MYD, **MOD**	4,045
Kondagaon, Chattisgarh	WCT, ECT, Tiptur Tall, LCT, **MOD**	4,596
Madhepura, Bihar	ECT, WCT, Tiptur Tall, LCT, MYD	3,593
Mandya, Karnataka	COD, CGD, **MOD,** MYD, Tiptur Tall,	3,614
Neriamangalam, Kerala	MYD, **MOD**, MGD, CGD, COD WCT	2,048
Vegiwada, Andhra Pradesh	WCT, Tiptur Tall, GBGD, CGD, MYD, COD, Pratap	3,991
Pittapally, Orissa	Tall, Dwarf , hybrid and Exotic	4,100
	Total	26387

Table 2. Mother palms available at Coconut Development Board - Demonstration cum Seed Production Farms

should have sufficient number of parental palms of varieties released for that particular state.

Case study of coconut planting material production in Kerala

Kerala alone requires 28-30 lakh seedlings every year for gap filling and replanting (Anon, 2005). However, the total coconut seedling production for 2010-11 from various governmental agencies works out as 7.74 lakhs (Table 3). In Kerala, eight out of the fourteen districts (stretching from Trivandrum to Trichur) are affected by root (wilt) disease. Here the focus should be on production of planting materials with resistance/ tolerance to root (wilt) disease of coconut. CPCRI has released Kalpasree (CGD selection), Kalparaksha (MGD selection) and Kalpa Sankara (CGD X WCT) for the disease prevalent tract. Studies carried at CPCRI have revealed that seedlings produced from the disease-free WCT palms located in 'disease hotpsots' are better adapted to the diseased conditions compared to seedlings produced from healthy palms located in 'disease-free zones'. Accordingly, the seed gardens and coconut nurseries located in these eight districts should supply the varieties recommended for the root (wilt) disease prevalent tract and WCT seedlings collected from the disease-free mother palms located in "disease hotspots".

In the case of the remaining six districts (Palghat, Malappuram, Kozhikode, Wyanadu, Kannur and Kasaragod) the focus should be on production of seedlings of released varieties from KAU and CPCRI (Talls: Chandra Kalpa, Kera Chandra, Kalpa Dhenu, Kalpa Mitra, Kalpa Prathiba, Kalpa Tharu, Kera Sagara; Dwarfs : COD & Kalparaksha; Hybrids: Chandra Sankara, Kera Sankara, Chandra Kalpa or Kalpa Samrudhi). But in reality, most of the seed gardens in Kerala are utilizing the available dwarfs/talls for producing DXT or TXD hybrids. It is suggested that all seed gardens should produce only the recommended and released varieties.

Parental palms of Andaman Tall, Gangabondam and Strait Settlement Apricot Tall are not available in some of the seed gardens in Kerala. The seed gardens may not be in a position to produce hybrids like Ananda Ganga, Kera Ganga, Laksha Ganga and Kera Sowbhagya, even though these hybrids were released for cultivation during 1988-1993.

In all the seed gardens in Kerala/ Karnataka (under Department of Agriculture) and those under Coconut Development Board, Malayan Orange Dwarf (MOD) occupies a major share of the area. But the fact is that MOD was never released as a promising dwarf variety and it is just a pollen donor for one coconut hybrid (VHC-3) released from Tamil Nadu. It would be appropriate if the MOD palms planted there can be partly replanted with parental materials of the recently released varieties hybrids.

Focus for the XIIth Five Year Plan:

1. It may be difficult to sanction more seed gardens in governmental sector due to reasons like delay in acquiring land, creation of new post etc. Hence, to increase the quality seedling production in coconut (presently the seedling production from the governmental sector is just 31% production of the total demand), it is suggested to establish coconut seed gardens in a Private Public Partnership (PPP) mode (eg: Seed garden established at Kasaragod by a progressive farmer Shri. Chowta). The assistance to such seed gardens should be ensured for the first ten years till it becomes operational for planting material production.

2. Since most of the established seed gardens in the traditional coconut growing belt (Kerala, Tamilnadu, Karnataka and

Andhra Pradesh) are more than 25 years old, the existing mother palms (especially dwarfs) in such seed gardens are nearing senility. Hence, urgent action should be initiated for replanting such seed gardens with true to type parental materials. Sufficient funds should be earmarked for strengthening the existing seed gardens all over India for rejuvenation and for replanting with parental palms of recently released varieties.

3. To increase the hybrid seedling production in coconut, a decentralized production mechanism can be envisaged by maintaining a centralized pollen storage and supply mechanism under scientific supervision. The dwarf mother palms in seed gardens and those identified in farmers' plots can be selected for hybridization with the pollen supplied from central pollen preservatory. Dwarf mother palms of varieties such as CGD, COD and MYD located in farmers' plots can be selected for hybridization under the supervision of officials of Department of Agriculture. Currently COD palms located in farmers plots (at Chowghat, Guruvayoor and Kannur) are used by Department of Agriculture of Kerala State for D X T production, but with pollen collected locally. The centralized mechanism will ensure the quality of the pollen parent. Collection and storage of pollen from tested male parental palms at one location will ensure that pollen is from a good combiner and also its viability. This can also be used for hybrid seed production in Kuttiyadi Departmental Farms.

Agency	No. of coconut seedlings including hybrids
Department of Agriculture, Government of Kerala	6,06,000
*Central Plantation Crops Research Institute	68,000
Kerala Agricultural University	80,000
DSP Farm, Coconut Development Board, Neriamangalam	16,250
Krishi Vigyan Kendra, Pathanamthitta	3,250
Total	**7,73,500**

*Coconut seedlings production from CPCRI *(distributed farmers from different states is 85,000 of which 68,000)* is distributed in Kerala State alone. Table 3. Coconut seedlings produced in Kerala by governmental agencies.

4. Mandatory accreditation of all coconut nurseries in India which will ensure the quality of planting materials produced. Once sufficient quantity of planting materials from accredited nurseries is available, the production of coconut planting materials from other agencies (non-recognized) can be stopped.

5. Coconut nurseries and seed gardens should produce and sell only released varieties of coconut. Besides, majority of the seed gardens / departmental farms supply hybrids under the broad name either T X D or D X T. It is suggested that coconut hybrids should be sold specifically based on the names under which they have been released. This procedure will help the farmers to choose specific hybrids which in turn will ensure the quality of the coconut hybrids supplied.

6. Encouraging selected farmers, NGOs and farming communities for raising quality planting material of already tested high yielding local ecotypes like Kuttiyadi, Annur, Jappanan, Ettamozhi etc.

Potential impact of planned planting material production programme

If the planned planting material production programme is sanctioned during the 12th Five Year Plan (2012-2017 period), the existing coconut seed gardens all over India can be rejuvenated and new coconut seed gardens can be established. Once the rejuvenated and newly established seed gardens becomes operational (ie., by 2025) the entire planting material requirement of coconut can be met from these seed gardens. Within another 4-6 years the coconut productivity and net returns to coconut farmers will increase substantially.

Conclusion

A National initiative is required for strengthening the coconut seed gardens and to augment the planting material production in coconut in all

coconut growing states. A Regional Committee comprising of officials of CPCRI, Coconut Development Board, Officers from respective Agricultural Department and Agricultural Universities as members can co-ordinate and work out the strategy for planting material production in coconut for each state. At the National level, Director, CPCRI, Chairman, CDB, CCDO, CDB, Project Coordinator, Palms and one representative from each state as members shall form the National Advisory Committee for planting material production of coconut. Sufficient funds of Coconut Development Board should be earmarked for such activity because quality planting material alone can enhance the productivity in coconut by 50%. Many of the countries which were lagging behind India in Agricultural production over took India in productivity just by implementing a national planting material production programme as in the case of Vietnam for pepper production.

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Sl No	Hybrid/ Varieties	Parentage	Nut yield (palm/ year	Copra yield / ha(t)	Year of release	Agency
	A. Hybrids					
	T X D					
1	Chandra Laksha	LCT X COD	109	3.7	1985	CPCRI
2	Laksha Ganga	LCT X GBGD	108	3.7	1987	KAU
3	Ananda Ganga	ADOT X GBGD	95	3.6	1988	KAU
4	Kera Ganga	WCT X GBGD	100	3.5	1988	KAU
5	Kera Sankara	WCT X COD	108	3.5	1991	CPCRI
6	Kera Sree	WCT X MYD	112	4.2	1992	KAU
7	Kera Sowbhagya	WCT X SSAT	130	4.3	1993	KAU
	D X T					
1	Chandra Sankara	COD X WCT	116	4.4	1985	CPCRI
2	Kalpa Samrudhi	MYD X WCT	117	4.5	2009	CPCRI
3	Kalpa Sankara	CGD X WCT	84	2.6	2009	CPCRI
	B. Varieties					
1	Chandra Kalpa	selection from LO	97	3.3	1985	CPCRI
2	COD	**selection from COD**			1991	CPCRI
3	Kera Chandra	**selection from PO**	110	3.8	1995	CPCRI
4	Kalpa Dhenu	**selection from IND 006**	86	3.6	2007	CPCRI
5	Kalpa Mitra	**selection from IND 002**	80	3.4	2007	CPCRI
6	Kalpa Prathiba	**selection from IND 016**	91	4.1	2007	CPCRI
7	Kalparaksha	**selection from MGD**	65	2.1	2007	CPCRI
8	Kera Sagara	**selection from Seychelles**	99	3.5	2009	KAU
9	Kalpasree	**selection from CGD**	90	1.8	2009	CPCRI
10	Kalpa Tharu	**selection from IND 125**	116	3.6	2009	CPCRI

Table 4. Varieties and hybrids released for Kerala condition

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