Recent Trends in Arecanut Research

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The last two years represent a significant milestone in the history of our agriculture. Being on the threshold of a major agricultural transformation there has been widespread realisation that there should be radical changes in the agricultural methods and systems to have a break-through in production of almost all agricultural commodities. The problem and production-oriented research in progress at the Central Arecanut Research Station, Vittal as well as its five Regional Research Station spread over in the States of Kerala, Mysore, Assam and West Bengal, has opened up new vistas for increasing the per acre yield of arecanut. Developments in biometrical genetics, crop management technology and plant protection were made use of for achieving this quick gain. The results achieved in the recent past are discussed in this article.

An early bearing mother palm

Genetically Superior Planting Material

Seed arecanuts were hitherto being collected from high yielding mother palms. The heritability of yield being low (0.2) no appreciable improvement in the yield of the progeny can be expected from such a selection procedure. Under such a circumstance, selection based on characters related with yield and having high heritability alone will be useful. Heritability of some of the important characters in

arecanut and their genotypic correlation with yield are given below:

Correlation of different characters with yield (number of nuts) and their heritability

Characters	Genotypic correlation	Heritability per cent
1. Age at first bearing	0.55	72
2. Number of leaves shed	0.53	32
3. Number of inflorescences produced	0.02	46
4. Number of female flowers produced	0.44	8
5. Percentage of nut set	0.88	33
6. Number of nuts per bunch	0.86	22

From the above it will be seen that age at first bearing alone has high heritability and correlation with yield. This will mean that progenies of such early bearing palms will have a higher proportion of early bearers. By confining selection of seednuts to palms coming to harvest in the fifth year after transplanting, a yield increase of 8 to 15 per cent can be obtained.

'Crossing for hybrid vigour"

Another method of selection that was tried was based on the most superior combination of all the available characters (selection index) so as to get the maximum benefit. A selection index based on 29 characters was found to be five times superior to the usual method of selection of mother palms based on high yield alone. Since this sort of a selection cannot be practiced by the cultivator, a simpler method of locating palms of superior type was worked out. This consists of selecting seedlings having maximum number of leaves and minimum height at the time of transplanting. To be precise multiply the number of leaves present at the time of planting by 40 and subtract the height of the concerned plant from this figure. Plants which have a high value for this alone should be selected. This method of selection has been found to be 332 per cent more efficient than selection based on high yield alone.

A germplasm bank consisting of nine species and 39 types obtained from different parts of India as well as from important arecanut-growing countries such as Ceylon, Philippines, Indonesia, Singapore, Saigon, Solomon Islands, Malaya, Fiji, etc., has given genes for dwarfness, early bearing, suckering habit which opens up ample opportunities for resorting to vegetative propagation, high fruit set and large number of nuts and field resistance for mite, a serious pest of arecanut. In addition, a few varieties suitable for direct introduction have also been spoted out. These have given higher yields ranging from 265 to 306 per cent over the local. Attempts made to exploit hybrid vigour have also given encouraging results.

Plantation Management Efficiency

It has been observed that there is considerable scope for improving the yielding potential of the plantation as well as the yield itself by appropriate techniques. Correlations worked out between plant characters recorded after one and two years of growth in the transplanted field with yield have shown that girth at collar one year after transplanting and the number of nodes two years after transplanting have pehnotypic and genotypic correlations with yield. The yield behaviour of the plants under different groups for the above two characters was as follows:

Characters correlated with yield	Levels	Percentange of occurrence	Mean yield per tree per year nuts (four years)
Girth at collar (cm.)	Less than 20	6	67
	20–25	10	121
	26 and above	84	194
No. of nodes	Less than 4	7	87
	4	9	151
	5 and above	84	191

It can be seen from the above table that plants which have less than 20 cm girth after one year growth and plants which have produced less than four nodes after two years' growth show very low yield potential. These groups of plants which constitute nearly 13 per cent of the original population will, therefore, have to be rejected during the first two years of establishment of the plantation. This will increase the overall yield of the plantation by nine per cent.

Improvement of yield potential is also possible in the case of plantation in bearing. A critical study of a group of bearing palms under good conditions of management has shown that 16% of the palms give less than 100 fruits per year while another 17% give yields ranging from 101 to 200 nuts. At the present cost of maintenance a tree which yields less than 100 nuts will not cover its maintenance expenses and those yielding 101 to 200 nuts are either self maintainers or giving only marginal profit. Thus the overall position is that 33 per cent of the capital expenditure is not a sound investment. Such trees should be replaced with fresh stock. This will not only improve the productive potential of the plantation but also reduce its maintenance cost.

Plants with more than four nodes

Conclusive results have also been obtained from some of the agronomic experiments that are in progress. Under the South Kanara conditions, arecanuts planted at a spacing of 2.7 m × 2.7 m was observed to give both high yield as well as maximum net profit. Growing banana as an inter crop during the initial four years of the arecanut plantation has been found not to have any adverse effect on the growth

of arecanut palms. In Southern Kerala where arecanut gardens are not normally irrigated, it was found that manuring with irrigation gives three times as much yield as manuring alone. In an experiment with different organic manures it has been observed that the source of bulky organic manure has considerable effect on the organic matter content of the soil. Forest leaf and cattle manure have been found to be the best sources of organic matter while Gliricidia decreases the organic matter status. This finding is of considerable importance to perennial crops like arecanut which are applied with bulky organic manures only once in a year.

Evidences from the other trials have also shown that the arecanut palms not only require higher levels of nutrients but also application of the same in split doses. The following fertilizer schedule is recommended over and above 12 kg. each of compost and cattle manure per bearing palm.

Nutrient	September-October		February		
	Quantity/tree grams	Sources and quantity/tree grams	Quantity/tree grams	Sources and quantity/tree grams	
N	80	Suphala (15:7.5:15) 533 gm.	20	Calcium ammonium nitrate or ammonium sulphate	100
P_2O_5	40		—		
K_2O	80		60	Muriate of Potash	100

Plant Protection Measures

The crop has to be protected against the attack of pests and diseases using the recommended chemicals. Combination sprays of insecticides and fungicides whenever possible will reduce the cost of application. In the recent past there has been further threat to the crop from pests such as mites attacking the tender arecanut fruits. This pest, noticed in the months of March to July in the Kerala States causes severe nut shedding. The extent of damage has been found to be about 7.5 per cent. Large scale field trials have shown that the pest can be effectively controlled by spraying Rogor 30 EC, a systemic acaricide, at 1 cc per litre of water to the bunches. The kill of the pest is cent per cent and one round of spray has been found to be sufficient. In the case of the yellow leaf disease, results obtained so far have shown that application of lime at the rate of 1 kg. per palm followed by manuring them as per the doses recommended above and protecting the palms against pests such as spindle bug and mites and diseases such as Koleroga and bud rot keep the disease under check and enhance the yield more than 100 per cent.

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