INPUT MANAGEMENT FOR OBTAINING TARGETTED YIELD IN COCONUT

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Coconut palm grows well and is productive up to an altitude of 900m. It requires a well distributed annual precipitation of about 2000 mm. The optimal mean air temperature is 27°C and temperature below 15°C may impair the fruiting. Coconut palm needs an annual sunshine of 2000 hours with at least 120 sunshine hours per month to express its production potential. The palm grows well in most soils, ranging from coastal sand to laterite and alluvium and adapts well to a wide range in soil pH, viz., 5.0 to 8.3. The soil should be preferably 1.0 to 1.5 m deep and well drained.

While selecting a site for raising coconut, shallow soils and hill tops which are normally shallow and are subjected to soil erosion and moisture stress are better avoided. Heavy soils like deep black cotton soil which develop cracks during summer are also not desirable.

EFFECT OF CULTURAL OPERATIONS

Coconut palm, being a hardy perennial, yields a few nuts even under total neglect. In the long term studies conducted at Kasaragod, the palms under neglect yielded 13-15 nuts/ palm/year. Ploughing twice a year increased the yield by 25 nuts to 38 nuts/palm/year. Patel (1938) stated that the variation in the mean annual yield of palms receiving good management was low, compared to that of palms in the untilled and unmanured plot. At Nileshwar, ploughing thrice a year increased the yield by 6 nuts over digging once with mammuty. Ploughing 4" deep was found better than ploughing 6 " deep (Albuquerque and Koyamu, 1957).

EFFECT OF FERTILIZERS

Nitrogen

Nitrogen improves the rate of leaf production, production of bunches, female flowers and yield of nuts. But it adversely affects the setting percentage and copra content of nut. At Kasaragod, the response to N in terms of yield of nuts was observed from the third year of application (Muliyar and Nelliat, 1971). Application of 340 g nitrogen/palm/year increased the yield by 8.1 nuts (16.9%), but reduced the copra/nut by 9.0%. Response to N was also reported to be inversely proportional to the pre - application yield level of the palm (Murray and Smith, 1952). The poor yielders showed greater response to N whereas palms yielding more than 100 nuts did not respond to N fertilization.

Phosphorus

Phosphorus is essential for the proper growth and development of young palms and increases the yield by increasing the female flower production. The response to P is often observed only after a number of years of continued application.

At Kasaragod, the response was observed from the ninth year and only from the 26th year in an experiment in Sri Lanka (Anonymous ,1962). Application of 340 g P_2O_5 / palm/ year to WCT palms enhanced the yield by 2.6 nuts/palm/ year at Kasaragod.

Potassium

Potassium application improves the fruit set and increases the copra/nut. Adequate K fertilization results in large increase in the yield of copra/palm. At Kasaragod, response to K application was noticed from the fifth year. However, in situations where adequate N is available and K is deficient, response to potassium application may be manifested from the second year itself because of the improved setting percentage. Application of 680 g K_2O / palm gave an increased yield of 4.4 nuts/palm/year and improved the copra weight/nut by 5.2%. The beneficial effect of K fertilization tended to increase with time.

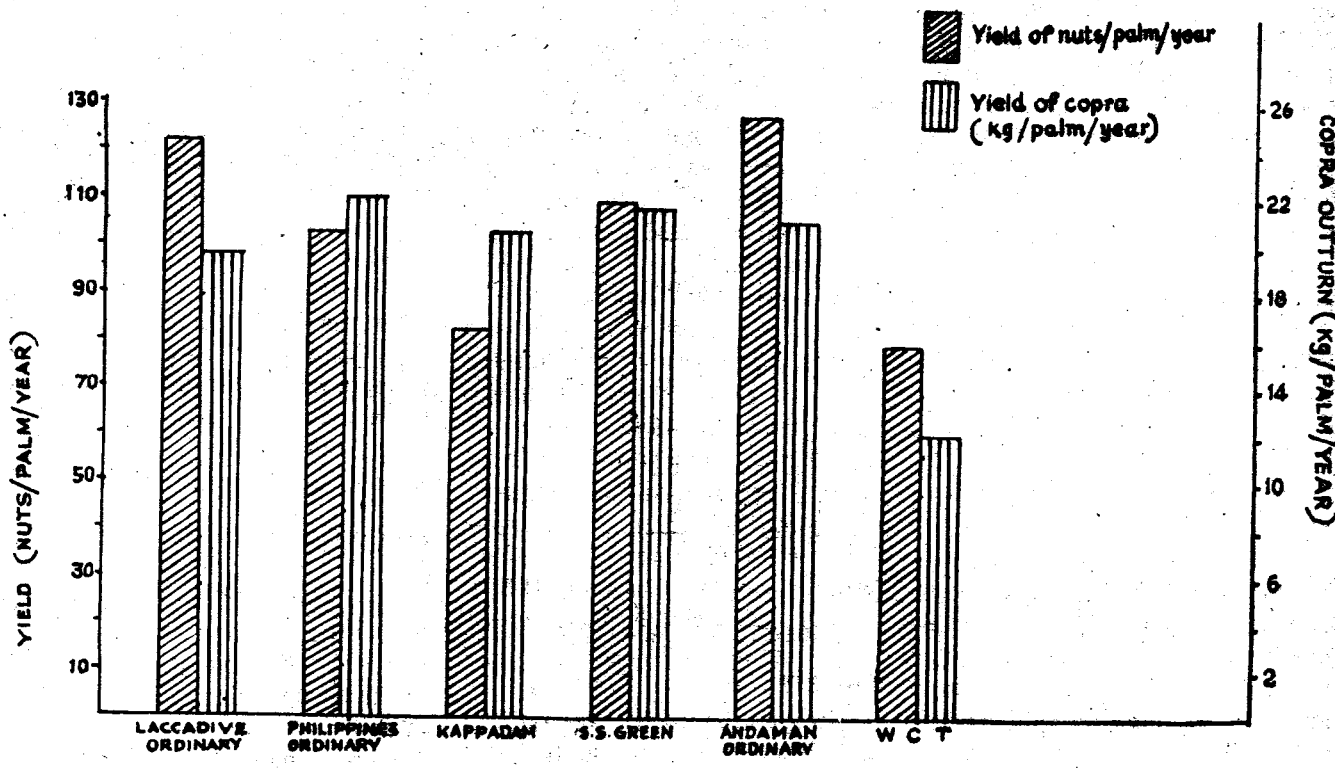
MANAGEMENT PRACTICES SUGGESTED FOR DIFFERENT YIELD LEVELS

Rainfed - West Coast Tall

The minimum yield that a farmer can expect without taking any care (under total neglect) is about 13 nuts/palm/year. This yield level can be improved step by step by adopting better management practices. The simplest operation suggested is carrying out digging around the base. This practice will increase t yield by about 4-5 nuts/pal year. Tillage of the interspa i. e. ploughing the entire ar twice or thrice a year, will en ance the yield to about nuts/palm/year (an increase 25 nuts over neglect). Th mean yield of 30 nuts/palm/ye in the country indicates th most of the coconut growe do not adopt any improved mana gement practice beyond the abov

Yield levels higher than 3 nuts/palm are possible by t application of manures an fertilizers. Data over years fro the permanent observation plo and fertilizer experiments Kasaragod showed that annu application of 500 g N + 320 P_2O_5 + 1200g K_2O / palm w

FIG 1 YIELD OF COCONUT VARIETIES UNDER RAINFED CONDITION



Source :- Promising Coconut cultivars and hybrids 1980 Pamphlet No.16, CPCRI, Kasaragod

ensure a sustained yield of around 60 nuts/palm/year under rainfed conditions. Application of this annual dose in two splits will also help to obtain an increase in yield of about 8% (Markose and Nelliat, 1975).

Coconut palms grown under neglect since planting can also be made to produce satisfactory yields by adopting proper management practices. Application of double the recommended dose of fertilizers to such palms in the first year followed by the normal dose in later years will result in the earlier manifestation of the benefical effects. The mean yield of such palms went up to 58 nuts in the fifth year after starting fertilizer application compared to 27 nuts in the Control plot. (Nelliat et al, 1982).

VARIETIES AND HYBRIDS

Varieties such as Laccadive Ordinary, Philippines Ordinary, Kappadam, SS Green and Andaman Ordinary are found to outyield the WCT even under rainfed conditions (Fig. 1).

The coconut hybrid CDO×T on an average yielded 78.4 nuts/palm compared to 52.1 nuts by the high yielding Tall at the same fertilizer level. The above hybrid did not show increased response to higher level of fertilizer application under rainfed conditions. In south Kerala (Kayangulam) where rainfall is more favourably distributed, the CDO×T palms had given a mean yield of 112 nuts/palm/ year, the highest recorded mean yield under rainfed conditions from a fairly large plantation. (CPCRI unpublished).

DISEASE AFFECTED AREA

Proper management will also help to obtain higher yields of coconut even in the diseased tract. The apparently healthy palms in the diseased tract gave 34.2% more yield of nuts under good management. The disease affected palms, though did not show marked increase in the yield of nuts, yielded 15.7% more oil / palm.

Intercropping

Yields over 60 nuts / palm/ year under rainfed conditions from WCT are not normally possible. But farmers can generate higher income by adopting intercropping, and following the recommended practices, viz. leaving an area of 2m radius around the base of the trunk without intercrop, manuring both the intercrop and coconut adequately and growing intercrops in rotation. Intercropping can be profitable even in root (wilt) disease affected tracts. Elephant-foot yam was found to be the most profitable intercrop. (Table 1).

Table 1. Response to intercropping with tuber crops in root (wilt) diseased area (1975-1977)

Intercrop	Yield (nuts / palm / year)		
	Pre-experimental period	Experimental period	Response (%)
Control	41.0	38.6	−5.76
Tapioca	49.8	48.9	−1.80
Elephant-foot yam	52.5	58.7	+11.81
Yam	57.0	58.3	+2.28

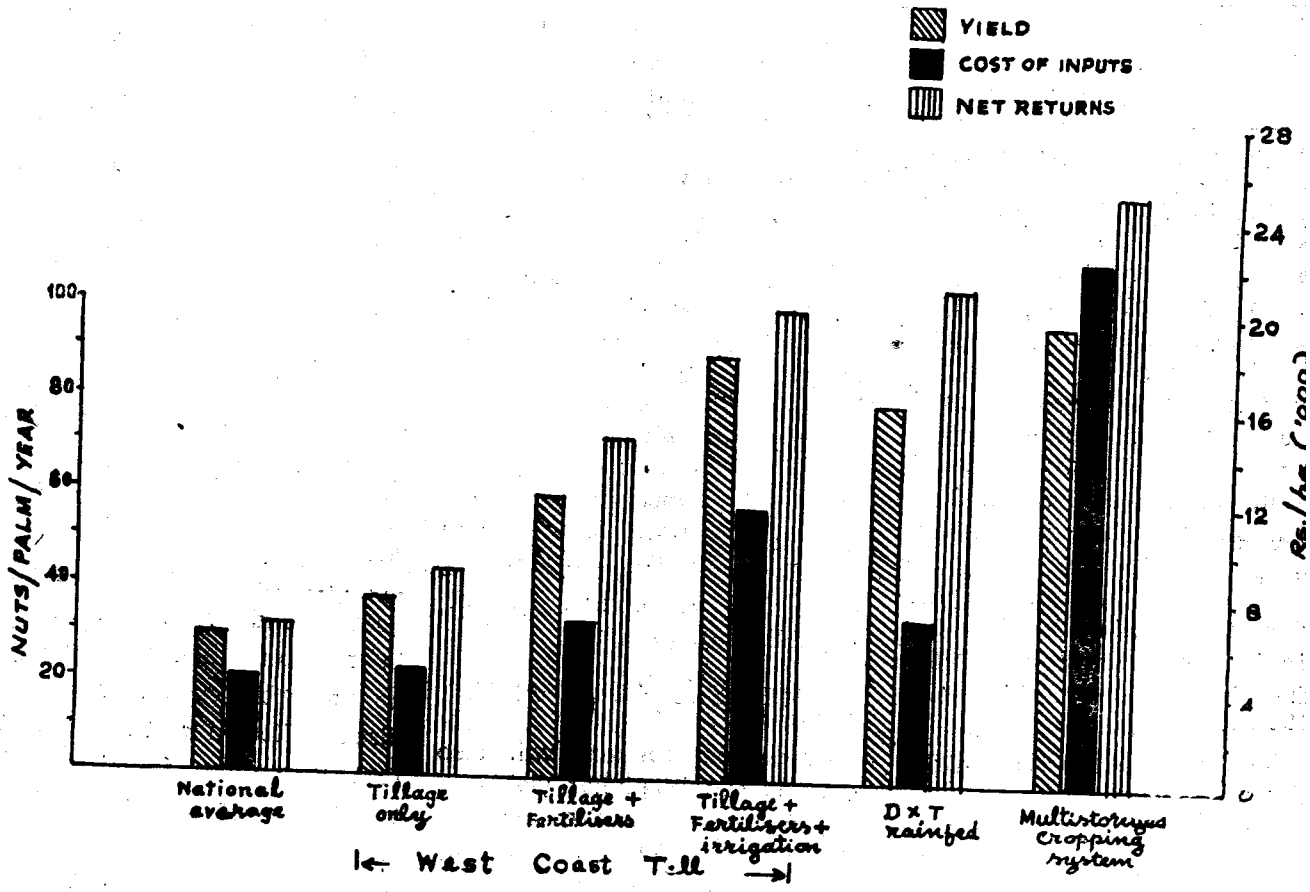
(Source : Menon and Nayar, 1978)

Growing grasses and legumes and adopting the mixed farming practice will also help to get higher yield in disease affected tracts. The mean yield of nuts/palm increased by 26.1% during the experimental period in the mixed farming plot compared to a decline of 2.0% in the control (CPCRI, 1976).

Irrigation

Providing summer irrigation further increases the yield. Increases ranging from 100% in Tall to 120% in the hybrid have been reported from Ivory Coast where the moisture deficit is around 1000 mm. Even in deep littoral sand where there was no response to manures and

Fig.2 YIELD AND RETURNS AT DIFFERENT LEVELS OF MANAGEMENT



cultural operations, irrigation had increased the annual yield by 25 nuts/palm (Marar,1963).

In sandy loam soil, summer irrigation increased the yield of young palms by 125%. Palms receiving only fertilizer application yielded 42.3 nuts. When this was combined with irrigation equal to pan evaporation, the yield went up to 94.8 nuts. A significant interaction effect between irrigation and fertilizer levels was also observed. When the irrigation water applied was equal to the pan evaporation, a fertilizer dose of 750 g N + 670 g P_2O_5 + 1500g K_2O + 170 g MgO/palm/year was observed to be the best, the mean yield being 94.8 nuts/palm. But when the irrigation applied was only three fourth of the pan evaporation, a higher fertilizer dose of 1000g N + 1000 g P_2O_5 + 2250 g K_2O + 170 g MgO gave the highest mean yield of 86.8 nuts / palm.

Even aged palms reapond to good management. At Kasaragod, palms more than 80 years old gave an increased yield of 6.1 nuts (9.4%) over the pre-experimental period, when brough under the mixed farming system with irrigation. But palms under the old system (unirrigated) recorded a decline in yield by 2.9 nuts. (4.4%) during the same period. This indicates that mixed farming combined with irrigation can sustain the productivity level of even very old palms.

Palms mixed with cacao and under multistoreyed cropping system gave markedly higher yields. The mean yield of coconut in these cropping systems ranged from 85 to 106 nuts/palm/year (Table 2).

Table 2. Mean yield of coconut in the different cropping systems

Treatment	Yield (nuts/palm/year) Pre-experimental period	Experimental period	% increase
A. Mixed Cropping with Cacao			
1. Control (No Cacao)	68	103	51.5
2. Cacao-single hedge	57	106	86.0
3. Cacao-double hedge	39	85	118.0
B. Multi-storeyed cropping			
1. Cacao-single hedge + Pepper + Pineapple	45	105	133.3
2. Cacao - double hedge + pepper + pineapple	48	89	85.4

CONCLUSION

The data presented and the discussions make it clear that it is possible to adjust the management practices to obtain desired yield levels (Fig.2). Yields ranging from 13 nuts / palm / year to 60-65 nuts could be obtained from WCT palms under rainfed conditions. Ordinary tall palms can yield 95-100 nuts/ palm / year with summer irrigation and good management. CDO x T hybrid is capable of yielding 80-90 nuts/palm/year in north Kerala region under rainfed conditions and good management; but the same hybrid gives yields of over 110 nuts/ palm/year in south Kerala where the rainfall distribution is more favourable. Still higher yields could be obtained from the hybrid under irrigated conditions and experimental evidences are expected to become available in the next few years. More income per unit area of land and higher yield from coconut can be obtained by raising inter / mixed crops and by adopting multi-storeyed cropping and mixed farming systems.

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