

Method of Applying Manures to Coconut Gardens in the Laterite Soils

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Introduction

Manuring and **intercultivation** are the two **vital** factors in any system of successful crop production. **Coconut**, being a perennial crop producing fruits practically throughout **its** life time from the commencement of first flowering, removing manurial ingredients from soil throughout, **should** be manured **systematically** at **regular** intervals.

In manuring the coconut trees, the method of application is an important consideration. Though all the workers in coconut are unanimous in their opinion on the necessity and advantage of manuring, the best and the most economic methods of applying manures to coconut gardens have not been clearly and precisely stated. Manures are generally applied in shallow circular basins dug around the trees, in trenches round the trees, in between rows of trees or rarely applied broadcast and ploughed in. Whether the manures should be **applied** broadcast or in **basin** or in trenches of different patterns is still a disputed point.

Manuring must necessarily be economical. The method of applying manures plays an important role. The process of application is usually costly. The operations involved in certain methods are comparatively cost-

lier, while some are uneconomical. Want of adequate knowledge on the method of applying **manures**, causes considerable loss to the coconut growers. Information on this aspect based on the results of an experiment conducted at the Agricultural Research Station, Pilicode (Nileshwar I) is published in this paper.

Review of Literature

Sampson (1923) was of the opinion that except in the first year of growth of a plantation, any manure should be broadcast over the **whole** area. If manuring was necessary in the first year, this should be mixed with the soil of the planting hole. According to his view, if manure was broadcast over the **whole** area of the **planta-**tion and ploughed in, there would be an unbroken mass of feeding roots over the whole area below the level of the soil mulch, instead of having this concentrated within a relatively small area, which would be the case, if the manures were only applied within a certain radius from the **stem** of the tress as advocated by Brown and **Munros Belford** and Hoyre and reviewed by **Patel (1938)**. A series of experiments were conducted at the Agricultural Research Station, Kasargod from 1932 to

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1937 to test the effect of different manures applied according to the two methods viz. broadcasting and **application** in basins. The difference between the two methods of application was not found **significant** but on grounds of economy, the broadcast application was preferred to the **application** in basins (Station Report 1937-38). Narayana ('52) considered it necessary to apply the manures broadcast over the field, as the feeding roots of the coconut are found **all** over the field. He also advised to put the manures as deep into the soil as possible as roots go down to a depth of some 3 to 4 feet below the ground level. For this purpose, he recommended to plough the field so as to incorporate the manures in the deeper layers of the soil. He also mentioned that **cultivation** of coconut gardens by ploughing not only keeps down weeds but also gives a pruning to the roots in the superficial layers of soil. This might also induce the **developmet** of roots at lower levels.

Materials and Methods

To find out the best method of applying the usual manures to coconut gardens in gravelly laterite soils, an experiment was started in 1948 at the Agricultural Research Station, Pilicode (Nileshwar I). The station is situated on the top of a gravelly laterite hill, 50 feet above the mean sea level, in the Hosdrug taluk of Cannanore District, Kerala State. An **average** annual rainfall of 350 cms. is received in the **locality** distributed over 120 rainy days; most of this is received during the period, June to **October**. The temperature is also characteristic of the tract with the highest maximum temperature of about 100°F in April-May and the lowest minimum of about 60°F in **December-January**. The water

table is low in summer being 30 feet or more **below** ground level; the level rises up very high to about 5 feet below ground level in rainy seasons.

Purpose of the experiment:— To find out the best method of applying the usual manures to coconut gardens in laterite gravelly soils.

Year of commencement—1948

Year of termination—1957.

A. Basal Conditions

Soil type: Laterite, gravelly.

Previous history of the experimental area: All the trees received **uniform** cultural and manurial treatments prior to the commencement of the experiment.

Variety: Local West Coast tall coconut called the "TALL".

Method of propagation: From one year old seedlings.

Date of planting: Planted on 23-5-1918.

Method of planting: Triangular method, surface planted.

Spacing: 30 feet.

Irrigated or unirrigated: Rainfed.

Period of harvest: Monthly.

B. Treatments

- Applying manures (T₁) in circular basins dug round each tree with a radius of 8' and to a depth of one foot,
- (T₂) Broadcast over the entire area and plough in,
- (T₃) in linear trenches 2' wide and one foot deep in between rows of trees,

C. Design

Design: Randomised blocks.

Number of replications: Five.

Number of trees per plot: Nine.

Plot size: Total experimental area 2.97 acres comprising of 15 equal plots.

D. General Conditions

The experimental area received the general cultural treatments of ploughing thrice, first ploughing in April-May and the second and third in August-September and November respectively. The showel cultivator is worked twice in summer months. All the trees received a general dose of manures namely

4½ lb. of Ammonium sulphate, 2 lb. of Bone-meal, 30 lb. of Ash and 100 lb. of green leaf per tree per annum. Ammonium sulphate, Bonemeal and green leaf were applied in August-September while Ash was applied in October-November.

E. Results

The five years results obtained by statistical analysis (Co-variance method) using the average pretreatment yield data (1946-'48) as concomitant variate are furnished in tables I to IV and the economics of the experiment worked out in table V.

TABLE I
Mean yield of nuts 1950-'54 per tree

Particulars	Treatments			General mean	Standard error	Significant or not P=0.05	General critical difference
	T ₁	T ₂	T ₃				
Adjusted mean yield of nuts per tree per year	42.40	43.97	40.76	42.37	1.02	Yes	2.41
As percentage on general mean	100.01	103.8	96.08	100.0	2.41	—	5.68

Conclusion : $\overline{T_2}, \overline{T_1}, \overline{T_3}$

TABLE II
Mean yield of nuts 1953-'55 per tree

Particulars.	Treatments			General mean	Standard error.	Significant or not. P=0.05	General critical difference
	T ₁	T ₂	T ₃				
Adjusted mean yield of nuts per tree per year	42.34	42.24	39.51	41.03	0.61	Yes	1.43
As percentage on general mean.	103.01	102.09	96.03	100.00	1.03	—	3.04

Conclusion : $\overline{T_1}, \overline{T_2}, \overline{T_3}$

TABLE III
Mean yield of nuts 1954-'56

Particulars.	Treatments			General mean	Standard error	Significant or not P=0.05	General critical difference.
	T ₁	T ₂	T ₃				
Adjusted mean yield of nuts per tree per year	46.0	50.3	44.7	47.0	1.92	Yes	4.43
As percentage on general mean.	97.9	107.0	95.1	100.0	4.01	—	9.43
Conclusion:				T ₂	T ₁	T ₃	

Table IV.

Mean yield of nuts 1955-'57 per tree

Particulars.	Treatments			General mean	Standard error	Significant or not P=0.05	General critical difference
	T ₁	T ₂	T ₃				
Adjusted mean yield of nuts per tree per year	43.91	44.69	40.86	43.13	2.56	No	—
As percentage on general mean.	100.07	102.08	94.6	100.0	5.93	No	—

TABLE V
Economics of the experiment (average 1955-57)

Particulars	Cost per acre (55 trees)		
	T ₁	T ₂	T ₃
	Rs.	Rs.	Rs.
Cost of intercultivation	20.00	*8.00	20.00
Manures and manuring as per schedules	119.66	86.83	102.91
Searching for beetle and tying bunches	15.00	15.00	15.00
Harvesting and transporting nuts	19.21	19.21	19.21
Total cost of cultivation per acre	173.87	129.04	157.12
Average cost of cultivation per tree per year	3.16	2.35	2.86
Average yield of nuts per tree (1955-57)	43.09	44.07	40.09
Cost of nuts at 0.21 nP. each	9.22	9.39	8.59
Net profit per tree per year	6.06	7.04	5.73

* Method of manuring coupled with two of the ploughings given as intercultivation.

Discussion of Results

From the results obtained in the years 1954—56, it is seen that the treatments T_1 and T_2 are on a par and in all the cases superior to T_3 .

However, the difference in yield of nuts per tree obtained in 1957 was not statistically significant in favour of any of the treatments. But in all the years comparatively higher yield of nuts were obtained from the trees under treatments T_2 and T_1 than from those under T_3 . Therefore the methods adopted namely, applying manures broadcast and ploughing in and applying them in circular basins are definitely superior to the method of applying them in linear trenches dug in between rows of trees.

It is also evident that application of manures broadcast and ploughing in resulted in considerable reduction in cultivation expenses. From the economics of the experiment worked out and presented in Table-V, a net profit of Rs. 7.04 per tree per year was obtained from the trees under treatment T_1 , whereas the trees under T_2 and T_3 gave only Rs. 6.06 and 5.73 per tree per annum respectively. The increase in income obtained from the trees under T_2 can be attributed mainly to the reduction of the expenditure under the item of applying manures which is made possible by combining intercultivation with application of manures.

Patel (1938) stressed the necessity and importance of intercultivating coconut gardens and pointed out that better manuring and better cultural practices that preserve soil moisture have to go hand in hand. His finding that mere intercultivation throughout

the gardens has resulted in better yields than plots receiving manures in circular basins around the trees with intercultivation has been confirmed in the subsequent years. Albuquerque and Koyamu (1957) indicated that ploughing the gardens thrice a year will ensure better yields and higher monetary returns to growers in laterite soils of the West Coast. In treatment T_2 , application of manures and intercultivation go hand in hand.

Summary and Conclusions

(a) The past work on the subject has been reviewed.

(b) From the review of the results obtained by statistical examination of the yield data of the experiment for four years, it is concluded that the methods of applying manures broadcast and ploughing them in, and applying them in circular basins dug round the trees are definitely superior to the method of applying them in linear trenches dug in between rows of trees. Such trenching is recommended to be discouraged.

(c) By presenting the economics of the treatments, it is stressed that the best and the most economic way of applying manures is by broadcasting and ploughing in.

(d) Broadcast and ploughing in of manures in coconut gardens is a unique method where in intercultivation and manuring are combined into one operation.

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