19

Yield and Nutrient Status of Coconut as Influenced by Different Sources of Nutrients in Sandy Soil of Konkan Region of Maharashtra

D.D. Nagwekar, V.S. Desai, V.S. Sawant, S.C. Talashikar, P.M. Haldandar
A.D. Rangwala, S. Arulraj and B.B. Jadhav

INTRODUCTION

In India, coconut is grown in an area of 1.95 million ha with the production of 14,111 million nuts. Further it is distributed in 159 districts, 17 States and 3 Union territories. Coconut is perennial in nature and hence, nutrient management is very important in this crop. Continuous use of chemical fertilizers alone will result in imbalance in soil fertility; they are costly and also affect the environment. For achieving sustainable production in coconut and improving the soil fertility, application of organic manure is of utmost importance.

The effect of various organic material and chemical fertilizer on yield as well as soil and leaf nutrient status of WCT variety of coconut palm was studied at the Regional Coconut Research Station, Bhatye under the All India Co-ordinated Research Project on Palm during 1998-99–2005-06. Chemical fertilizers and organic manures such as vermi-compost, neem cake and bone meal were used. The vermi-compost prepared of coconut leaves by using *Eudrilus* spp. of earthworm was applied in the first week of June and chemical fertilizers were applied in three splits, i.e., June, October and February.

No significant variation in nut yield was observed among the treatments (Table 19.1) during the transition period of three years (1998-99–2000-01). However, from 2001-02–2005-06, different treatments started showing statistically significant difference in nut yield.

Table19.1. Yield of coconut (No. of nuts/palm/year) as influenced by organic and inorganic fertilizers in coconut

Sl. No.	Treatments	Yield (No. of nuts/palm/year)								Mean cumulative yield/palm/ year 01-02 to 05-06
		Transit period			Post-treatment period					
		98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	
1.	Control	87	105	70	58	58	57	54	62	58
2.	Recommended Dose of NPK	100	114	91	97	101	96	96	95	96
3.	100 % Vermi-compost	96	107	77	94	89	97	92	87	91
4.	Recommended Dose of NPK (50%) + Vermi-compost (50%)	89	102	88	91	77	70	92	90	83
5.	Neem cake + Bone meal + Ash	96	103	89	68	68	74	79	70	72
	SE +	8.34	10.53	6.99	7.63	7.95	6.53	8.29	7.21	5.77
	CD(P=0.05)	N.S.	N.S.	N.S.	23.51	24.51	20.06	25.57	22.21	17.79

NS = Not Significant The treatments are: T1-Control with no fertilizers; T2- 100% recommended dose of chemical fertilizers (1000:500:1000g N, P_2O_5, K_2O/palm/ year); T3- 100% nutrient supply on N basis through vermi-compost prepared from coconut leaves; T4 - 50% of nutrient supply on N basis through vermi-compost + 50% through chemical fertilizer and T5 - Neem cake (10 kg) + Bone meal (1 kg) + ash (20 kg) per palm per year

Application of recommended dose of chemical fertilizers-T_2 (1000:500:1000 N,P_2O_5 & K_2O/palm/year) recorded the highest mean yield of 96 nuts/palm/year followed by application of 100% vermi-compost-T_3 (91 nuts/palm/year) and application of 50% recommended dose of chemical fertilizers + 50% vermi-compost-T_4 (83 nuts/palm/year) and these treatments were statistically on par and significantly superior over T_1 and T_5. The soil of experimental site is sandy loam and continuous application of chemical fertilizer resulted in normal yield. Application of organic manures to palms which were under regular application of chemical fertilizers required longer time to make use of nutrients and give high yield compared with palms under continuous application of chemical fertilizers. Venkitaswamy (2002) reported that application of 100% composted coir pith/palm/year on N basis or application of 50% composted coir pith + 50% of recommended dose N, P_2O_5 chemical fertilizers was optimum for getting maximum nut yield.

Application of recommended dose of chemical fertilizers (T_2) resulted in higher net income of Rs. 41,690 with a B:C ratio of 1.70 followed by application of 100% nutrient supply on N basis through vermi-compost prepared from coconut leaves (T_3) with net profit of Rs.32,150 and B:C ratio of 1.52 (Table 19.2). However, the lowest net income (Rs.6,850/-) and B:C ratio (1.13) were obtained from the Control (T_1). The cost of production was found to be high in T_3 treatment.

Table 19.2. Yield and economics of coconut as influenced by organic and inorganic fertilizers

Treatment	*Yield (No. of nuts/ha)*	*Total return (Rs)*	*Total cost (Rs)*	*Net profit (Rs)*	*B:C ratio*
Control	10150	60900	54050	6850	1.13
Recommended Dose of NPK	16800	100800	59110	41690	1.70
100 % Vermi-compost	15925	95550	62800	32150	1.52
Recommended Dose of NPK (50%) + Vermi-compost (50 %)	14525	87150	60954	26196	1.42
Neem cake + Bone meal + Ash	12600	75600	67350	8250	1.12

Build up organic carbon in the soil at 0–25 cm and 50–100 cm depth was noticed with the application of vermi-compost. Application of neem cake + bone meal + ash also resulted in increase of organic carbon of soil. Nitrogen build up in the soil was higher in T_3 followed by T_4 which were statistically on par. Potassium build up of soil was high with T_4 followed by T_5 and T_3 which were statistically on par at 0–25 and 50–100 cm depth. Kalpana *et al.* (2006) found that integrated nutrient management and cropping segment improve the soil physico–chemical properties through building up organic carbon and NPK content in the soil.

Table 19.3. Organic carbon, available, N, P_2O_5 and K_2O of soil as influenced by organic and inorganic fertilizers at different depths

Treatment	*Organic carbon (%)*			*Available N (kg/ha)*			*Available P_2O_5 (kg/ha)*			*Available K_2O(kg/ha)*		
	*0-25**	*25-50*	*50-100*	*0-25*	*25-50*	*50-100*	*0-25*	*25-50*	*50-100*	*0-25*	*25-50*	*50-00*
Control	0.46	0.33	0.26	162.65	97.55	84.23	20.6	9.6	7.6	308.5	216.5	174.7
Recommended Dose of NPK	0.46	0.41	0.40	183.05	125.12	94.78	27.5	13.7	9.2	391.4	268.9	205.3
100 % Vermicompost	0.55	0.43	0.42	205.45	169.15	106.64	29.1	14.7	10.5	481.6	325.9	294.4
Recommended Dose of NPK (50%) + Vermicompost(50 %)	0.47	0.38	0.34	200.18	156.75	106.05	25.6	15.8	12.1	519.1	375.9	302.4
Neem cake + Bone meal + Ash	0.54	0.45	0.36	194.28	137.62	100.06	30.9	14.9	9.2	502.1	349.1	294.6
SE (m) ±	0.016	0.013	0.008	4.40	4.32	2.02	0.79	0.52	0.14	12.42	9.20	7.22
C.D. (0 = 0.0 5%)	0.052	0.042	0.026	13.57	13.32	6.24	2.45	1.61	0.45	38.27	28.35	22.25

Depth of soil in cm

The leaf nutrient status indicated that 100% vermi-compost application recorded the highest value of N (1.98 %) followed by T_4 (1.95%) (Table 19.4). As regards to P status, it was the highest in T_2 (0.107%) followed by T_5 (0.106%) and T_3 (0.101%) which were statistically on par. The highest K was recorded in T_4 (1.0 %) followed by T_5 (0.95%). Higher leaf N and K status in organic treatments would have been due to the better uptake of N and K in application of organic treatment due to the increased availability. Venkitaswamy (2002) reported that composted coir pith treatment recorded more leaf N and K content at 2.07 and 1.55% respectively in the 14th leaf.

Table 19.4. N, P, K, content of leaf as influenced by organic and inorganic fertilizers

Treatment	*Total N (%)*	*Total P (%)*	*Total K (%)*
Control	1.42	0.096	0.50
Recommended Dose of NPK (R.D.)	1.63	0.107	0.66
100 % Vermi-compost	1.98	0.101	0.71
Recommended Dose of NPK (50%) + Vermi-compost (50 %)	1.95	0.098	1.00
Neem cake + Bone meal + Ash	1.77	0.106	0.95
SE (m) ±	0.012	0.0021	0.032
CD (P = 0.0 5)	0.037	0.0065	0.099

References

Kalpana, M., Rao, D.V.R. and Srinivasulu, B. 2006. Integrated nutrient management in coconut based cropping system under coastal ecosystem of Andhra Pradesh, *Joumal of Plantation Crops*, 2006, **34** (3):258-262.

Venkitaswamy, R. and Khan, H.H. 2002. Integrated nutrient management in coconut. In: *PLACROSYM XV*, (Eds) Sridharan K and Vinod kumar P.K. Mysore, Karnataka, India 2002, pp. 73-74.