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RESEARCH NOTE

Economics of Nutrient Recycling in Oil Palm Plantations

Oil palm is blessed with the potential of yielding the highest quantity of vegetable oil per unit area basis. This crop also has got the capacity of supplying a huge quantity of vegetative biomass for recycling regularly as well as at the end of the crop. The bio mass available annually in the form of fronds, empty fruit bunches, mesocarp wastes and effluent are of high nutrient value and it is estimated that almost the full requirement of nitrogen, 50 per cent requirement of phosphorus and 75 per cent requirement of potassium could be met by these bio wastes, if properly recycled. (Sunitha and Varghese, 1999).

Various techniques of composting oil palm bio wastes have been tried including vermi composting. Aerobic digestion is found to be comparatively economic and suitable technique for large-scale production of compost even without chopping the wastes. It is reported that about 40% of the cost of cultivation of oil palm annually is spent on chemical fertilizers (Varghese and Nampoothiri 1988). The economics of using palm waste compost in place of inorganic fertilizers in different proportions was compared using the data recorded from an ongoing integrated nutrient management trial.

The study was an RBD with five different treatments involving different combinations of organic and inorganic fertilizers. The treatments were T_1- full dose of NPK requirement as inorganic fertilizers; T_2- *2/3* NPK dose as inorganic and 1/3 dose as organic fertilizers; T_3- 1/3 dose as inorganic and *2/3* dose as organic fertilizers; T_4- full NPK dose as organic fertilizers and T_5- control without any fertilizers. Oil palm waste compost was produced from fronds and empty fruit bunches mainly by the technique of aerobic digestion. The compost samples when analyzed for nutrient levels had 1.8-2.0% N, 0.3-0.4% P 1.0-1.2% K and 0.3-0.45% Mg. The economics of producing compost was also worked out based on the prevailing conditions.

The cost of nutrient management of palms under various treatments was calculated based on the average quantities of compost and fertilizers applied every year since the experiment was started during 1996. The FFB yield under different treatments was also recorded. With these data, the economics of various combinations was compared.

The cost of producing compost based on the production from a standard pit size 5x2x1 m which could accommodate about 4500kg of bio mass taking into consideration the men and material cost involved.

Table 1 : Cost of production of oil palm waste compost

Item	Man days	cost	Total
Collection of materials	2 @80/-	160/-	160/-
Starter materials		150/-	150/-
Filling pits & turning	5 @80/-	400/-	400/-
Total cost			**710/-**

On an average, 70% of biomass put for composting is expected to be recovered on fresh weight basis, ie., from 4500 kg of wastes, 3150 kg could be recovered. On an average, 40% of the weight account for moisture and then the actual recovery of dry compost would be 1890 kg. Thus, the cost of production of one kg of compost would be nearly 40 ps.

Table 2 : Cost of nutrition per palm per year (Rs.) in different treatments

Treat	Fertilizers*	Compost**	Total Cost
T_1	29.0	-	29.0
T_2	22.0	9.0	31.0
T_3	15.5	17.5	33.0
T_4	9.0	26.0	35.0
T_5	-	-	-

*- current rate of fertilizers @ urea-4.85/-,rock phosphate-2.64/-, and muriate of potash-4.40/- per kg ; **- compost @ 40ps per kg

The treatments were imposed-on palms from 1996 onwards and the yields were recorded from 1999 onwards. The average yield of palms for four years (1999-00,2000-01, 2001-02, 2002-03) was taken for comparison as returns in different treatments. The data on yield and expected returns are presented in Table 3.

Table 3 : FFB yield and return per palm per year in different treatments

Treatment	FFB yield / (kg) palm	Gross returns*(Rs.)	Net returns/ palm (Rs.)	Net returns/ ha. (Rs.)
T_1	116	464	435	62,205
T_2	113	452	421	60,203
T_3	118	472	439	62,777
T_4	92	368	333	47,619
T_5	64	256	256	36,608

*- with the current price of FFB @ Rs.4 per kg

Assuming that the cost of cultivation of palms other than for nutrition is uniform for all the treatments, T_3 has given slightly more return as compared to the inorganic fertilizer application. The returns from T_1, T_2 and T_3 are comparable. In T_4, the yield is less, because a sudden substitution of full nutrient requirement through compost which must have reduced the immediate availability of nutrients to the palms. Being a perennial crop growing flowering and yielding continuously throughout the year, the full substitution of nutrients through organics alone may not be sufficient to meet the immediate nutrient requirement. But in the long run, the trend may change and compost should meet the requirement of palms throughout the year in a slow release manner. The absolute control recorded the lowest yield and returns as expected.

The data indicated that, even though the cost of nutrition is slightly high by the use of organic compost in place of inorganic fertilizers, the yield is not adversely affected. Up to 2/3 of the nutrient requirement of the palms could be replaced by compost. In addition to the major nutrients, compost also contains 0.3-0.4% Mg and micronutrients viz., Fe, B, Zn, Mn etc, which also must have supported the palm performance. In the long run, the organic addition alone may even sustain the productivity. Moreover, the negative effects of chemical fertilizers reported, could be overcome if the available biomass in a plantation is properly utilized. The-higher cost involved by using organic compost could thus be substantiated by the almost equal net; returns expected from a hectare of plantation compared to inorganic fertilizer application and also the expected improvement in quantity and quality of produce.

REFERENCES

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