

## **On Farm Recycling of Biomass for Sustainable Farming: An Analysis of Farmers' Experiences in the Production and Use of Vermi-compost**

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### **INTRODUCTION**

There is a growing awareness among farmers about organic farming. However, lack of availability of quality organic manure is a major difficulty experienced by farmers. Adoption of vermi-composting of organic wastes available in the farm would be a potential way to overcome this difficulty. Technology has been standardised at Central Plantation Crops Research Institute (CPCRI) for the production of vermi-compost as quality organic manure using coconut leaves. Many farmers have started vermi-compost production using on farm wastes including coconut leaves.

Farmers' practices and experiences pertaining to the on farm recycling of biomass through vermi-composting were studied in two gramapanchayats in Kannur District of Kerala State by randomly selecting forty farmers adopting vermi-composting practices. Data on various aspects of vermi-compost production and use were collected from farmers using a pre-tested interview schedule. Besides, samples of vermi-compost were collected from four units representing different substrate combination used for vermicomposting and the nutrient contents were analysed.

The profile of the farmers revealed that majority of them was between 35–55 years of age. All of them were literate. 43% of them were having high school level education while 13% were degree holders. Three-fourth of the farmers was depending on farming alone as their occupation. The profile features indicate that educated, comparatively young and full

time farmers are taking up vermicomposting technology as an integral part of sustainable farming practices. It was found that more than 50% of the farmers started the practice of vermi-compost production after the year 2000.

### Factors Influencing the Adoption

The perceived benefit of vermi-composting to enhance soil and plant health was the most important factor, which influenced the farmers to adopt vermi-composting technology. Lack of availability of green leaves for manuring crops, motivation by extension personnel of local Krishibhavan, scope to keep the farm clean by removing the biomass for recycling were some other factors, which prompted the farmers to go for vermi-composting. Earlier studies have shown that lack of availability of organic manures and their high cost is a major problem adversely affecting the sustainability of farming and many farmers have started showing keen interest in vermi-composting technology (Thamban *et al*, 2006).

80% of the farmers attended training on vermi-compost production technology. CPCRI and Krishibhavan were the important sources of information about vermicompost production technology. Fellow farmers, farmer organisations like INFARM and private agencies were the other sources of information. 50% of the farmers procured earthworms from fellow farmers while 33% of the farmers obtained the earthworms from CPCRI. Private agencies and NGOs also distribute earthworms to farmers and organise awareness programmes on organic farming practices and vermi-compost production.

Majority (67%) of the farmers used a mixture of coconut leaves, banana leaves and wastes, arecanut leaves, leaf litters, etc., in varying proportions as the substrate for vermi-composting (Table 14.1). Only 33% of the farmers used coconut leaves alone as the substratum. A sizeable proportion of farmers (32%) used less than the recommended quantity (100kg for one tonne substratum) of cow dung for vermicomposting.

**Table 14.1.** Substrate used for vermi-composting

Substrate	Number of units	Percentage
Leaf litters + Coconut leaves + Arecanut leaves	9	22
Coconut leaves +Banana leaves and pseudostem	10	25
Coconut leaves + Leaf litter +Arecanut leaves + Banana leaves and pseudostem	8	20
Coconut leaves alone	13	33
Total	40	100

68% of the farmers obtained 200–400 kg vermi-compost per production cycle. In majority (60%) of the cases, 60–75 days were taken for vermi-composting while in 18% cases it took more than 90 days. Majority (65%) of the farmers used the entire quantity of vermi-compost in their own farms while the remaining farmers used part of the vermi-compost in their farms and part sold to other farmers at Rs. 5-6 per kg. Studies have

shown that a substantial number of farmers produce vermicompost more than required for their farms and sell surplus to other farmers (Ninawe, 2008). Farmers are benefited not only by the improvement of soil fertility through vermicompost application but also by earning income through the sales of surplus vermicompost and earthworms.

The nutrient content of vermicompost produced by farmers in terms of N, P, K and organic carbon were higher for the units in which a mixture of coconut leaves, banana leaves and wastes, arecanut leaves, leaf litters, etc., were used in varying proportions as the substrate for vermicomposting (Table 14.2) when compared to units in which coconut leaves alone were used as substrate. Vermi-compost prepared from Leaf litters + Arecanut leaves + Coconut leaves had the highest N content of 2.19 % with lowest C:N ratio of 8.26. Wherever leaf litter was added as a component substrate, the nutrient contents were high. In general vermi-compost prepared by the farm unit had the favourable C:N ratio for facilitating liberal availability of nitrogen to the crops. Application of 15 kg vermi-compost per palm per annum contributes about 200–328 g N, 15–41 g  $P_2O_5$  and 61–75 g  $K_2O$  to the coconut palm.

**Table 14.2.** Nutrient content of vermicompost prepared from different substrates

<i>Substrates</i>	<i>N (%)</i>	<i>P<sub>2</sub>O<sub>5</sub> (%)</i>	<i>K<sub>2</sub>O (%)</i>	<i>Organic carbon (%)</i>	<i>C: N ratio</i>
Leaf litters + Arecanut leaves + Coconut leaves	2.19	0.28	0.49	18.08	8.26
Coconut leaves + Banana leaves and pseudostem	1.33	0.11	0.45	17.76	13.36
Coconut leaves + Leaf litter + Arecanut leaves + Banana leaves and pseudostem	2.03	0.25	0.51	20.47	10.07
Coconut leaves alone	1.34	0.22	0.41	17.15	12.80

Farmers experience many constraints in vermi-compost preparation and use (Table 14.3). As per farmers' perception, the most important constraint experienced in the production of vermi-compost was damage to earthworms caused by ants and rats (77%). High cost for constructing cement tank, lack of development schemes to provide incentives for constructing cement tank and difficulty in marketing the surplus vermi-compost were the other important constraints pointed out by farmers. Lack of knowledge about vermicomposting technology was also cited as a constraint by 20% of the farmers, which indicate the necessity for organizing appropriate training programmes on vermi-composting technology for farmers.

**Table 14.3.** Constraints experienced by farmers in vermi-composting

<i>Sl. No.</i>	<i>Constraints</i>	<i>Number of farmers</i>	<i>Percentage</i>
1.	Damage to earthworms caused by ants and rats	31	77.00
2.	High cost for constructing cement tank	28	70.00
3.	Lack of incentives for construction of tank	24	60.00
4.	Difficulty in marketing the surplus vermi-compost	14	35.00
5.	Transportation of biomass to the vermi-composting tank	13	33.00
6.	Lack of knowledge about vermi-composting technology	8	20.00
7.	Difficulty in regulating the moisture content in the unit	6	15.00
8.	Damage to earthworms caused by flatworms ( <i>Bipalium sp</i> )	5	12.00

The perceived benefits of vermi-composting to enhance soil and plant health were the most important factor, which influenced the farmers to adopt vermicomposting technology. The results of the study indicate the necessity for implementing suitable development schemes to promote vermicomposting technology among farmers and also for organising training programmes to educate the farmers about the scientific methods of vermi-compost preparation. There is also a need for standardising the methods of vermicompost preparation using different combination of substratum including coconut leaves and other farm wastes.

## *References*

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