Original Research Article

Assessing the effectiveness of various decomposer in sugarcane trash composting

ABSTRACT

Sugarcane produces about 10 to 12 tonnes of dry leaves per hectare per crop. The detrashing is done during its growth period. This trash contains organic carbon, nitrogen, phosphorus, potassium. The sugarcane trash incorporation in the soil influences physical, chemical and biological properties of the soil. There is a reduction in soil EC, improvement in the water holding capacity, better soil aggregation and thereby improves porosity in the soil. Villupuram district one of the highest sugarcane producing district in Tamil Nadu. The farmers in this district are not aware about the sugarcane trash composting and burning the trashes in the field itself. Burning of sugarcane trash is a hazardous practice which has affected soil health, air, human health etc. leading to massive impact as well as monetary losses. The present study aimed at assessing the various decomposers in sugarcane trash. the average compost yield of TNAU Biomineralizer is 1.04 ton whereas the compost yield of Waste decomposer is 1.23 ton and which is 18.00 % increase over than TNAU Biomineralizer. Regarding the duration of composting process, the waste decomposer taken only 63 days in an average to decompose the sugarcane trash whereas TNAU biomineralizer taken 73 days in average to decompose the sugarcane trash. The composting process is faster in waste decomposer applied sugarcane heap than the TNAU Biomineralizer applied heap. The C:N ratio of TNAU bio mineralizer applied sugarcane trash was 28:1 whereas the C:N ratio of waste composer applied sugarcane trash was 25:1. Composting process is faster in waste decomposer applied sugarcane heap than the TNAU Biomineralizer applied heap. The compost yield was also comparatively high in waste decomposer applied sugarcane heap.

Keywords: [Sugarcane, Trash composting, TNAU bio mineralizer, Waste decomposer

1. INTRODUCTION

Sugarcane (Saccharum officinarum L.) is one of the world's major food-producing crops, providing about 75% of sugar produced in the world for human consumption [1]. It is an important cash crop in India and grown in an area of about 4.5 million ha occupying 3.7 per cent of the area and contributes to around 4.6 per cent of the total value of agriculture output. Total sugarcane production reported in India was 306 million tonnes catering to the need of about 731 sugar factories [2]. In Tamil Nadu, it is cultivated in an area of about 26.31 lakh ha producing about 28.1 lakh tones with an average productivity of 106.8 t / ha. [3].

The consumption demand increased continuously, leading to crop yield focused on agriculture activities that ignore the sustainability of agro-ecosystems [4]. Therefore,

agricultural intensification for a long period has degraded soil organic matters and ultimately resulted in the reduction in soil fertility [5] and favored the occurrence of soil-borne diseases [6].

In India approximately 6.5 million tonnes of sugar cane trash are being produced every year and most of the residues are usually burnt in the field due to lack of proper composing techniques and to simply the harvesting process which could reduce the labour cost. Greater attention is given only in improving the sugarcane yield and not much awareness on sugarcane trash recycling [7]

Sugarcane is one of the important crops widely cultivating in Villupuram District of Tamil Nadu. The sugarcane plant requires steady irrigation for its growing period of 8 months to 12 months. The depleting soil health and crop productivity in the sugarcane cultivating area of Kanai block is a major concern because of reduced yields. Although soil fertility is closely linked to the physical and chemical characteristics of the environment, it is strongly influenced by human management practices. Farmers usually burn the trash with the opinions that its management is laborious, will reduce germination and hinders routine ratoon cultivation practices. Further, most of the organic matter and nutrients in the trash are lost, leading to environmental pollution. On the other hand farmers apply huge quantity of fertilizers to meet the nutrient requirement of crop. Hence it was proposed to assess various decomposer in Sugarcane trash composting ie, TNAU Biomineralizer and Waste decomposer. TNAU biomineralizer is the consortium of microorganism recommended for composting all the agro wastes. For one ton of trash, two kg inoculums are recommended. Waste decomposer composer contains beneficial microorganisms from Desi cow dung for soil health reviver. It can be used for quick composting from organic waste, soil health improvement and as plant protection agent.

2. MATERIAL AND METHODS

Krishi Vigyan Kendra for Villupuram district of Tamil Nadu state is situated in Tindivanam. It organized various activities mandated by Indian Council of Agricultural Research (ICAR), New Delhi viz. On farm testing (OFT) were organized on specific identified problem to come up with the result that which of the technologies tested is more suitable to the resources available in the district and cost effective. This is a form of participatory study where farmers' perspective is given most importance. To conduct this trial, the Kanai block of Villupuram was chosen based on the maximum area under sugarcane cultivation. The farmers were randomly selected by adopting simple random sampling technique with the consideration of cultivation sugarcane crop and lack of knowledge on sugarcane trash composting. Totally the trial were conduct in twenty farmers' field.

To conduct this on farm trial, the various decomposer were taken. Accordingly TNAU Biomineralizer was taken as technology option 1 (TO 1) and Waste decomposer was taken as technology option 2 (TO 2). The TNAU biomineralizer was released by Tamil Nadu Agricultural University in the year 2008. It is the consortium of microorganism recommended for composting all the agro wastes. For one ton of trash, two kg inoculums are recommended. Waste decomposer was released from National Centre for Organic and Natural Farming in the year 2015. The waste decomposer contains beneficial microorganisms from Desi cow dung for soil health reviver. It can be used for quick composting from organic waste, soil health improvement and as plant protection agent. These two decomposer were given to the selected farmers to practice in their field. As part of this programme, the demonstrations, on and off campus training programmes were also organized for the beneficiaries to explain about how to prepare the sugarcane trashes and

how apply the various decomposer in trashes and what are all the other procedures to be followed in decomposing method. Finally the Compost Yield (t/ha), Duration of composting process and the CN ratio before and after decomposing were assessed with suitable statistical tool.

3. RESULTS AND DISCUSSION

The result of compost yield and duration of composting process while using the TNAU Biomineralizer and Waste decomposer have been recorded for twenty trials and depicted in the table 1.

Table : 1 Details of compost yield and Duration of composting process

Trial	Compost yield (In tons)		Duration of composting process (In days)	
	TO 1: TNAU Biomineralizer	TO 2: Waste decomposer	TO 1: TNAU Biomineralizer	TO 2: Waste decomposer
1.	1.00	1.25	75	62
2.	1.05	1.3	75	60
3.	1.1	1.28	72	63
4.	1.02	1.2	70	60
5.	1.06	1.25	71	62
6.	1.00	1.3	73	62
7.	1.02	1.17	78	68
8.	1.05	1.25	78	69
9.	1.08	1.18	72	62
10.	1.02	1.15	70	61
11.	1.05	1.2	72	62
12.	1.04	1.22	75	65
13.	1.00	1.15	76	68
14.	1.06	1.25	79	69
15.	1.02	1.2	74	62
16.	1.05	1.23	78	68
17.	1.02	1.15	70	65
18.	1.05	1.3	75	65
19.	1.06	1.32	70	60
20.	1.08	1.25	75	63
Average	**1.04**	**1.23**	**63**	**73**

Table 2 : Average C:N ratio, compost yield and Duration of composting process

Average	TNAU Biomineralizer		Waste decomposer	
Compost yield (In tons)	1.04		1.23	
Duration of composting process (In days)	63		73	
C: N ratio	Before composting	After Composting	Before composting	After Composting
	80: 1	28:1	80:1	25:1

It is observed from table 2 that the average compost yield of TNAU Biomineralizer is 1.04 ton whereas the compost yield of Waste decomposer is 1.23 ton and which is 18.00 % increase over than TNAU Biomineralizer. Regarding the duration of composting process, the waste decomposer taken only 63 days in an average to decompose the sugarcane trash whereas TNAU biomineralizer taken 73 days in average to decompose the sugarcane trash.

The compost maturity was tested based on the Carbon: Nitrogen ratio of the final product. In all the treatments compost maturity was obtained after 60 days of decomposition except control. The C/N ratio is considered to be one of the simple indices to evaluate any organics for its suitability for soil application and it is the index traditionally used to establish maturity degree of the compost [8]. It was observed that the C:N ratio of TNAU bio mineralizer applied sugarcane trash was 28:1 whereas the C:N ratio of waste composer applied sugarcane trash was 25:1. The increased microbial activity on the added organic matter might have increased the available nitrogen level of the soil.

4. CONCLUSION

It was evident from the study that the composting process is faster in waste decomposer applied sugarcane heap than the TNAU Biomineralizer applied heap. The compost yield was also comparatively high in waste decomposer applied sugarcane heap.Since, the waste decomposer is a consortium of beneficial bacteria which are isolated from desi cow dung the composting process was made faster. The increased microbial activity on the added organic matter might have increased the available nitrogen level of the soil. Hence, awareness programmes and the training programmes may be organized for the sugarcane farmers for decomposing the sugarcane trash and to apply the compost in field to increase the microbial activity in the soil.

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