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In Coconut Gardens...

Vermicomposting from baby corn for more return

Cultivation of baby corn as a component crop in coconut interspaces yields agro-residues in the form of baby corn stover after harvesting of cobs. The baby corn stover could be successfully converted to quality vermicompost using coconut leaf degrading epigeic earthworm, *Eudrilus* sp., available at CPCRI, Kasaragod. The baby corn stover vermicompost has 21% organic carbon, 2.3% nitrogen, 0.4% phosphorus and 0.4% potassium. The agro-wastes generated from coconut-based cropping system can be recycled within the farm for soil and plant health improvement.

Vermicomposting is one such option which farmers can exercise to produce quality manure to improve soil health and fertility of their farm for sustainable crop production. A technology has been developed at the ICAR-CPCRI, Kerala, to convert matures and senescent dry coconut leaves to vermicompost by addition of cowdung and an indigenous strain of *Eudrilus* sp. earthworms. Using this technology, approximately 4-5 tonnes of healthy organic manures can be produced annually from 1 ha coconut garden, if coconut is grown as a monocrop. However, large interspaces between coconut palms allow scope for growing a variety of crops which can be substantially exploited to improve economic returns of farmers throughout the year. A number of highly productive and remunerative cropping models including intercropping systems, mixed cropping systems and high-density multispecies cropping systems, can be grown.

Baby corn growing in the interspaces of coconut palms

Residues from baby corn

The cultivation of baby corn generated baby corn stover (also referred to as maize stover) as a recyclable biomass or fodder for animals. Cob constitutes around 15% of total dry mass of baby corn crop, remaining 85% of total dry mass of crop is residues such as stalk, leaves and husk which are left in the field after harvesting. These residues, called baby corn stover, consist of stalk (around 48% of total dry mass), leaves (28%) and husks (8%). It is an agricultural residue similar to paddy straw that are either dried and burnt in the field or used as a source of roughage for dairy animals. As appreciable quantities of baby corn stover is generated in field trials, it was decided to evaluate whether the coconut leaf degrading earthworm, *Eudrilus* sp., which has broad spectrum agro-waste recycling ability, could be extended to baby corn stover waste too. Our earlier studies had indicated that *Eudrilus* sp. can degrade not only coconut leaves, but also other agro-wastes which become available when inter-mixed crops are grown along with main crop, *i.e.* coconut. Banana is a highly compatible intercrop in coconut garden, pineapple is recommended to be grown

Baby corn cobs obtained

as a border crop and glyricidia is a suitable alley crop in a coconut garden. These crops generate their own residues and vermicomposting was successfully carried out by adding pineapple waste, banana pseudo stem and leaves and glyricidia leaves along with coconut leaves to produce high quality manure.

Vermicomposting of baby corn stover

An experiment was initiated to convert baby corn stover into vermicompost using the technology developed for production of vermicompost from coconut leaves through the use of *Eudrilus* sp. Baby corn stover is mixed with cowdung in 3:1. For each 60 kg of baby corn waste, 20 kg of cowdung slurry is mixed. Heaps of this mixture are readied in cement tanks and allowed to pre-decompose for two weeks before releasing 200 (*Eudrilus* sp.) earthworms per heap. The heaps are protected from direct sunlight and moisture is maintained by intermittent sprinkling of water on the heaps. There is no turning over required. After three months, vermicompost produced is separated and earthworms are sorted manually.

On an average, 38 kg of vermicompost is produced per heap and earthworm population doubled. The

Indigenous strain of *Eudrilus* sp. earthworm used for vermicomposting of baby corn stover

vermicompost is shade-dried and sieved to remove partially undegraded residues. Twenty-five kg of such fine textured, high quality vermicompost is thus obtained which consisted of mainly earthworm casts and microbially degraded residues (Table 1).

Properties

The vermicompost produced from baby corn stover is dark-coloured, granular, alkaline in nature with pH of 7.45 and has high water holding capacity. The product has organic carbon content of 21%, total N, P and K content of 2.3%, 0.4% and 0.4 %, respectively (Table 2). It also has good amounts of micronutrients such as Fe, Cu, Zn and Mn apart from Ca and Mg (Table 3). The baby corn stover vermicompost has higher pH and nitrogen content than coconut leaf vermicompost (Table 2).

Granular vermicompost produced from baby corn stover showing earthworm casts

Table 1. Input and output details of baby corn stover vermicomposting*

Baby corn stover + cowdung input (kg)	Vermicompost harvested (kg)	Fine, sieved, shade-dried vermicompost recovered (kg)	Earthworms added (nos.)	Earthworms harvested (nos.)
60 + 20	38	25	~200	~400

*Average values from 3 heaps

Table 2. Comparison of physico-chemical properties of vermicompost produced from baby corn stover and coconut leaves

Vermicompost produced from	Total N (%)	Total P (%)	Total (%)	OC (%)	pH (%)	Moisture (%)
Baby corn stover*	2.33	0.4	0.4	21.13	7.45	80.66
Coconut leaves[Â]	1.80	0.3	0.4	20.00	6.20	45-55

Table 3. Micronutrient status of freshly prepared baby corn stover vermicompost*

Micronutrient	Values
Ca (%)	1.54
Mg (%)	0.27
Cu (ppm)	28.1
Fe (ppm)	280
Mn (ppm)	97
Zn (ppm)	30

* Average of three values from each heap

The vermicompost produced is also microbiologically rich with plant-beneficial microbes such as phosphate solubilizing bacteria and fluorescent pseudomonads (Table 4). Phosphate solubilizing bacteria make the unavailable form of phosphorus available to the plants for their uptake and fluorescent pseudomonads are well known for both their plant growth promoting properties and also biocontrol effects. Bacteria formed the largest group in the vermicompost followed by actinomycetes. Presence of higher numbers of actinomycetes is desirable as they are known to produce several metabolites including antibiotics and help in suppression of soil pathogens among other things.

It can be seen that the vermicompost has high dehydrogenase, phosphatase and urease activities indicative of high microbial activity. Production of these extracellular enzymes, particularly phosphatase and urease, are significantly relevant in terms of phosphate- nitrogen mineralization in soil, therefore, impacting the soil fertility positively.

Finely sieved final product of vermicomposting of baby corn stover

Table 4. Microbial properties of vermicompost produced from baby corn stover

Microbial group	Population (cfu/g dry vermicompost; log_{10} transformed)
Bacteria	8.9
Fungi	6.9
Actinomycetes	7.8
Nitrogen fixers	4.2
Phosphate solubilizers	6.1
Fluorescent pseudomonads	4.9

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– Editor