



Sericulture Waste: A Boon for Farmers

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Sericulture is a commercially sustainable farm based economic enterprise favoring rural poor in the unorganized sector, because of its relatively low requirement of fixed capital and high return. Huge amount of waste is generated in sericulture enterprise which includes all the left out materials from the silkworm rearing unit as well as from silkworm industry. The waste in sericulture contains organic matter like larval excreta, leaf litter, dead larvae, moth and cocoons and are not properly utilized in preparing compost of high nutritive value.

Reports have shown that the seri-waste from mulberry culture can also be utilized for production of organic manure

In recent years, recycling of crop residues has received considerable interest. In sericulture farms, the left over mulberry leaves from rearing bed and field and other waste including silk worm litter are not properly utilized in preparing compost of highly organic and nutritive value. Hence, it is essential to convert the sericulture farm waste in to valuable compost by adopting suitable technology. Sericulture waste serves as good source of organic nutrients for the crops. Seri waste contains more amounts of plant nutrients like macro and micro nutrients which contribute to increased production.

Seri waste compost practiced only in mulberry to produce high yielding and healthy leaves to improve the silk yield. As a new trend, to use the seri waste in field crops for increasing yield and quality of the food grains has emerged. The success of future agriculture depends upon sustainability of production system. This has necessitated research on use of organic manures. It helps farmers to reduce input of commercial fertilizers, thereby increasing profit margin. Nutrients contained in organic manures are released slowly and stored for a long time in the soil, ensuring a long residual effect. Safety of environment as well as public health are also important reasons for advocating increased use of organic materials. But, the use of organic manure alone, cannot sustain the cropping system due to unavailability of required quantities and their relatively low nutrient content in a long term basis.

Seri waste compost

Rearing waste and mulberry farm residues and weeds (removed before flowering) are collected in a pit of convenient size with 1 m depth. The left over stems/shoots can also be decomposed. However, they should be crushed before putting them in pit, which makes their decomposition faster. The thin layer of cattle dung and water or spent slurry of biogas plant are spread into the pit regularly after every collection of one foot thick compacted layer of the wastes. When the pit is filled, it is plastered with a layer of mud and cattle dung. The pit should be protected from rain and direct sunlight by providing a thatched shed over it. As decomposition process usually takes about 4-5 months, the pit should be left undisturbed and opened only after 5 months. The decomposition of organic waste is a complex process involving various biochemical activities of microorganisms, especially the *Bacillus*, *Pseudomonas*, *Trichoderma*, *Aspergillus*, *Belaromyces*, etc. Therefore, to speed up the process of decomposition, the culture of these microbes can be added along with sericulture waste. As the species of *Bacillus*, *Pseudomonas*, *Trichoderma* and *Verticillium* are also known to be the potential bio control agent of plant diseases, the compost enriched with these microbes are effective in controlling the soil borne diseases of mulberry.



Procedure/ Method of composting

1. The farm waste should be collected in pits of convenient size.
2. Two pits of size 3 x 1 x 1 m are adequate to receive farm waste from 1 acre.
3. Sericulture waste like silk worm litter, left over mulberry leaves weeds etc., should be collected every day and spread in a thin layer.
4. A layer of fresh cow dung, ash and water is sprinkled over the layer and compacted.
5. At the end of the rearing, the left over leaves of the garden along with the young mulberry twigs can also be added to the pit.
6. Super phosphate is also added to enrich the compost. When the pit is filled and when the bed height is 30-40 cm above the ground level, it is plastered with 2.5 cm layer of a mixture of mud and cow dung.
7. Thatched shed is provided to protect the compost pit from rain and direct sunlight.
8. To enhance the decomposing process, a consortium of lingo cellulose decomposing fungi like *Aspergillus sp.*, *Trichoderma sp.*, and *Belaromyces sp.*, could also be added @ 1 kg per ton of organic waste. By adopting anaerobic and aerobic process of composting, it is possible to generate approximately 10-15 tons of well decomposed and nutritionally rich seri waste compost from a sericulture farm of one hectare every year.

Seri waste vermi-compost:

Vermiculture is the culture of earthworms. It is a simple and cheap way to produce a continuous supply of organic compost of high quality. Vermiculture is the intensive exploitation of earthworm for the production of humus and animal protein. The humus is a result of the decomposition of organic matter by the action of microorganisms and the process of transformation done by earthworm. The earthworm eats the equivalent of their own weight on a daily basis. Of all the material that they eat, around 60% is transformed to humus and other 40% is used for the earthworm's metabolism.

Vermicomposting is the process by which earthworms are used to convert organic materials (usually wastes) into humus-like material known as vermicompost. The goal is to process the material as quickly and efficiently as possible.

Preparation of vermicompost using sericulture waste

- A thatched shed in an area of approximately 7.5 x 6.0 m is constructed on a slight elevated ground for a mulberry farm of one ha area. Stone bunds are constructed all around the shed to prevented predators.
- Eight trenches each measuring 2.4 x 0.6 x 0.45 m are prepared parallel to each other in two rows with 4 each. The shed is lined with polythene sheet or stone at the bottom and side walls on the inner side to avoid migration of earthworms. The depth of the trench should not be more than 0.45 m.



- As a feed for the earth worms the sericulture waste including weeds are mixed with cow dung slurry and mixed with 100 liters of water for every ton of waste .It is left in an open pit for about 7-10 days for partial decomposition .while decomposing, the material should contain a minimum of 30-40 percent moisture. During the decomposition process, the temperature of the semi decomposing material will rise to 50-60⁰ C. Hence, the material is turned upside down once or twice to bring the temperature to normal to normal state.
- Later each trench is filled up with 200-300 kg of semi decomposed sericulture waste having moisture content of 30-40 per cent
- A mixer culture of earthworms viz., *Eudrillus euginae*, *Eisenia foetida* and *Perionyx excavatus* in juvenile stage is introduced in the feed @ 1.5Kg per metric tones of wastes in each trench and left aside for 6-7 weeks. While releasing earth worms care is taken to ensure approximately 30-40 % moisture and normal temperature in the feed. During feed preparation, temperature of the decomposing waste increase beyond 50⁰ C which may kill the worms and hence it is essential to bring down the normal temperature.
- After 2-3 days of release of earthworms, water is sprinkled regularly to keep the feed moist a protective cover of coconuts fronds or any green leaves is provided to avoid evaporations. Once a week the materials is turned upside down for proper composting
- After 6-7 weeks time if most of the feed is found as loose granular casts (brown to black in colour) the material can be harvested and sieved through wire mesh to separate earth worms and cocoons for reuse.
- After sieving brown to black loose granules of vermicasts can be collected and used as manures. While harvesting moisture is evaporated for better result. Maximum quantity of vermicasting can be harvested if the material is allowed to dry for sometime inside the shed.
- It is necessary to keep the shed dark moist and cool while vermicompost is under progress to get best result as earth worms do not prefer light.
- The final product, vermicompost should be used for crop production without much delay to get best results.
- Seri waste vermicompost is blackish brown humus like coarse, granular material which is loose, fine, soft to touch, light in weight and free from any foul smell, having electrically charged particles meant for improved adsorption of plant nutrients in the soil
- As such it can be broadcasted.
- The resultant seri compost will contain approximately 30% moisture, 2.0-2.24 % Nitrogen 0.93-1.0 % Phosphorous and 1.5-1.8 % Potash beside zinc, iron, manganese and copper as micronutrient.

Seri waste could be easily converted to high quality vermicompost. *Eisenia foetida* is considered as most efficient worm for commercial productions of vermicompost. Earthworms are not able to efficiently digest nitrogen as a result, their excrement contains 73% of the nitrogen found in the composted seri waste. The significant increase in mulberry leaf quality in terms of N, P, K, moisture percentage and chlorophyll content is due to application of seri waste compost with full dose of chemical fertilizer. This indicates that the superior nutritive value of the seri waste compost is produced from sericulture waste.

Application of compost manure produced out of sericulture waste including silkworm litter is highly beneficial for mulberry cultivation and is much effective than conventional use of farm yard manure. A sericulture farm waste comprising of silkworm litter, left over leaves, soft twig and farm weeds of one hectare can generate annually an approximate quantity of 12-15 Million tonnes of waste. This waste has a tremendous manurial value of nitrogen (280-300 kg), phosphorus (90-100 kg) and potassium (150-200 kg) as well as micronutrient like iron, zinc, copper etc.

Thermo guard mat has been devised by using waste mulberry twigs and local grass *Impertea cylindrica*. Thermo guard mats are highly economic and easily affordable by the farmers in



maintaining required temperature and relative humidity of seriwaste vermeries. Bioconsortium formulation of potential isolates of beneficial microbes helps in hastening the decomposition of seriwaste; a microbial enriched seri-compost can be prepared by inoculating them to organic residues during the process of composting. A rapid technique of composting of seriwaste within 50-60 days, using earthworms as versatile bio-reactor can also be used, which is found to be highly remunerative in sericulture industry.

Advantages of seri waste composting

- Its is an eco friendly technology
- The composting of the waste can be performed quickly.
- Composting is completed in 50-60 days in vermi casting where as anaerobic composting takes 120-150Days

Conclusion

Composting is an environmentally friendly method rather than directly dumped into earth and it method is useful to convert organic waste to useful products and that would otherwise have been land filled. Compost has a lot of benefits like: reduce landfill space, reduce surface and groundwater contamination, reduce methane emissions, reduce transportation costs , reduce air pollution from burning waste, provide more flexible overall waste management, enhance recycling of materials and can be carried out with little capital and operating costs.

Seri waste compost practiced only in mulberry to produce high yielding and healthy leaves to improve the silk yield and also sericulture waste serves as good source of organic nutrients. It contains more amounts of plant nutrients like macro and micro nutrients which contribute to increased productionThe success of future agriculture depends upon sustainability of agricultural production system.

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