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Application of sericulture waste by the farmers to ameliorate crop yield

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Abstract

Sericulture is an agro based, ancient and effective sub- branch of agriculture. India is the country where there are lot of resources and labor. Sericulture industry is beneficial to rural, poor and tribal people providing opportunities for the improvement of their livelihood. Silk has got tremendous importance in our country which is used during wedding functions or widely used during festival seasons. Apart from production of silk, sericulture also produce number of by-products from mulberry plantation and silkworm. Thus the sericulture farm waste is converted into valuable waste by adopting suitable technology. The conversion of sericulture waste into nutrient based vermicompost by using earthworm species Eosina foetida can be recycled into organic manure. This improves the soil fertility and crop production. Use of sericulture waste will ultimately add value to industry as a whole. On the other hand it will help lot of poor, rural and the farmers of Maharashtra who is fighting for their livelihood every day and facing various problems like suicides.

Key words
Sericulture, farmer, Sericulture waste, vermicompost.

Introduction

China is the origin of sericulture industry. Sericulture is basically divided into two sectors i.e, farm and industry (Shrivastav, 2005).Silk industry has a lot of socio-cultural and traditional linkages in India and plays a vital role on rural economy thus the primeval are practicing sericulture and agriculture for their livelihood (Thangavelu, 2002). China and India are the two important countries who are involved in more than 60% of the silk production among the world every year presently (Nagaraju, 2008). In India all four types of high quality silk are produced (i.e., mulberry, eri, tasar and muga)(Rathore et al., 2010).

An outline of Agriculture in Maharashtra and Vidarbha

Most of the Indian villagers are engaged in agriculture sector along with animal husbandry, forestry and fisheries. Most of the people in developing economies mostly depend on agriculture and its allied activities. Agriculture and supporting business provides employment generation and help the people in the betterment of their livelihood.

New innovative techniques and approach is necessary for the production of globally competitive skilled human resources. This type of skilled manpower is needed to bring about the major transformation in agriculture for getting higher economic returns to the community of farmers with less investment.

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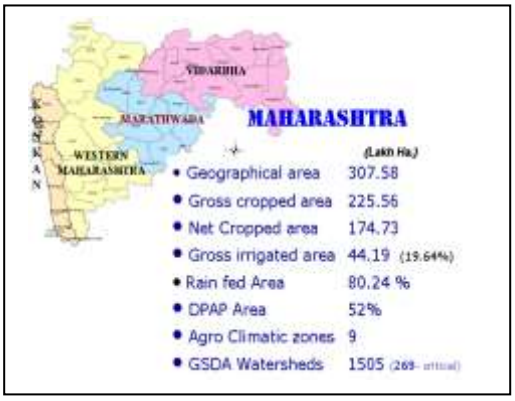

Fig. 1 (Map Source:https://rkvy.nic.in)

Vidarbha in Maharashtra comprises of 11 districts i.e., Akola, Amravati, Bhandara, Buldhana, Chandrapur, Gadchiroli, Gondia, Nagpur, Wardha, Washim and Yavatmal. Maharashtra is one of the developed state in India but still lot of problems are there in agriculture sector which includes global warming or sudden change in climatic conditions, irrigation problems, declining public interest and their expenditure on agriculture sector are some of the reasons by which the agriculture is affected. 65% of the rural population is totally dependent on agriculture for their livelihood.

Cash crops of Vidarbha region

Vidarbha region and western Vidarbha are primarily cotton growing districts. Vidarbha has soyabean as the second growing crops, Eastern Vidarbha is growing Paddy crops, Citrus family fruits or oranges are the main crops grown in Nagpur. This all types of crops are grown in different regions in different seasons. Apart from facing various problems like the climate change, sudden rainfall, and water scarcity agriculture is also lacking application of proper quality of fertilizers to enhance the crop production. Therefore, promotion of organic farming in sericulture is imperative to sustain the industry and intensive research on production of organic silk

Though there is large number of chemical fertilizers which initially increases the crop production but have a negative impact on leaf yield, quality and cocoon productivity is pronounced in a few years and they show toxic effects after the long term use on human body. Now a days organic farming is very effective which use the vermin compost to enhance the crop production. This research paper shows the highly effective nature of the seriwaste. The conversion of sericulture waste into nutrient based vermicompost by using earthworm species *Eosina foetida* can be recycled into organic manure. This improves the soil fertility and crop production. Most of the host plant cultivation requires high dose of manure and chemical fertilizers which is very difficult for small and marginal farmer to comply with the recommended dose of manure in economic plantation. Also the cost of manure is increasing day by day and mostly is not available at the required time. During these circumstances, use of sericulture farm waste may help farmer which decreases the dependency and expenditure on farm yard manure and chemical fertilizers (Gujalakshmi and Abbasi, 2008) Use of sericulture waste will ultimately add value to industry as a whole.

Sericulture waste

Sericulture waste, comprising silkworm litter, unfed leftover mulberry leaves, soft twigs, farm weeds, cocoons, pupae and excreta are obtained from a hectare of mulberry garden annually, from which the

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plant nutrients such as nitrogen, phosphorous and potash as well as all essential micro nutrients like zinc, copper iron etc can be generated when properly composted. Anaerobic composting takes nearly 120-150 days while composting from sericulture waste can be produced within 50-60 days (Bharathi D. 2019).

Sericulture waste of about 12-15 metric tonnes, comprising of silkworm litter, unfed leftover mulberry leaves, soft twigs, farm weeds etc are obtained from a hectare of mulberry garden annually. This helps to produce plant nutrients such as nitrogen (280-300kg), phosphorous (90-100kg) and potash (150-200kg) as well as all essential micro nutrients can be produced when properly composted.

In sericulture, not only silk but various by products and waste products are obtained at different stages of silkworm rearing. Silk waste is categorized in two major categories i.e., cocoon waste which includes floss, double cocoons, pierced cocoons and stained cocoons etc. The other is the thread waste which includes re-reeling waste and twisted waste. Following are some of the silk waste which is used to improve the soil fertility.

1. Mulberry leaves

The dried fallen leaves can be used as a best source of compost which increases the soil fertility (Mishra and Dash, 1992). It has been observed that these left over leaves or the mulberry branches can be recycled to produce an eco-friendly urea that can be used as a fertilizer. This is very important for sustainable agriculture and can be used for horticulture (Zhang et al., 2014).

2. Silkworm litter

Silkworm litter is used as cattle feed and excreta for biogas production. It is also used as organic manure. It is used as alternative and also supplemented with cow dung and old slurry for biogas production (Kalimuthu and Rajasekaran, 1992). It has been observed that silkworm litter when mixed with organic wastes produces maximum quantity of gas during bio gas production For the biogas production silkworm litter makes the fermentation fast (Shivappa Shetty et al., 1978). Silkworm excreta help in water holding capacity of the soil also destroying harmful pathogens.

3. Silkworm Pupae and moth

The larval form gets converted into pupae. This pupa gets enclosed inside a hard shell called as the cocoon out of which the moth emerges out. Silkworm pupae and moth are also used as manure (Bharathi D. 2019).

4. Spun silk

Spun silk waste obtained from hand spinning and mill spinning can be recycled into good organic manure through composting (Naik et al., 1992, Singhal et al., 2001).

5. Silkworm cocoons

Silkworm cocoon waste which includes half reeled cocoon, unreelable cocoon, and

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waste generated from charkha system, non-twisted silk waste obtained during the silkworm reeling along with cooking waste which can act as good manure after decomposition and also can be used as an alternative for the farmyard manure. *Pleurotus florida* and *Pleurotus streatus*, the species of fungi can degrade the woody material and help in the proper decomposition of sericulture waste thereby improving the soil health (Naik et al., 2012).

Conclusion

Proper utilization of sericulture waste and its by products can generate an extra income to farmers in addition to silk the main output and hence adds a value of up to 40% to the silk industry as a whole. This will help most of the farmers and rural people involved in this farming to double or triple their incomes with reduced cost of input applications. This can solve the problems like decline in silk production to some extent. Thus the sustainable agriculture with the adoption of sericulture waste technology will help farmer to ameliorate crop yield.

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