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Promotion of Low Cost Vermicompost Production for Livelihood Improvement in Morigaon District of Assam

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ABSTRACT

Empowering women through developing skill in various income generating activities of agriculture and allied sector would play a significant role in uplifting the rural economy. An enterprise involved in vermicompost production with locally available material is now emerging as an income generating avenue for farm women. Vermicompost is produced by the earthworms on partially decomposed organic material. The compost is rich in essential plant nutrients, beneficial to soil microorganisms, plant growth promoting substances, vitamins and enzymes. Krishi Vigyan Kendra (KVK) Morigaon conducted front line demonstration (FLD) on low cost vermicompost production involving ten numbers of farm women with an aim to wide scale adoption of the technology among others for upliftment of socio-economic standard of the rural people. In the FLD programme, the technology demonstrated was pit method of vermicompost preparation in a tank of size 2.5 m(L) X 0.91 m (B) X 0.91 m(D) using locally available materials such as bamboo and polythene sheet. Vermi wash was collected in an earthen pit of size 0.31 m (L) x 0.31 m (B) x 0.31 m (D) by connecting the pit with vermicomposting unit by a PVC pipe. The result of the demonstration programme was satisfactory and spread by the members of the NGO trained by KVK, Morigaon to fifteen operational villages under them leading to the formation of a Farmers' Producer Company named Yangli.

Key Words: Cost, Empowerment, Demonstration,Production, Vermicompost, Women.

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INTRODUCTION

Vermicompost is produced by the activity of earthworm on partially decomposed organic material leaving behind the cast which is rich in essential plant nutrients, beneficial for soil microorganisms, plant growth promoting substances, vitamins and enzymes such as protease, amylase, lipase, cellulase and chitinase (Olle, 2019). Nutrient content in vermicompost is dependent on the type of organic material used for vermicomposting. Studies revealed that vermicompost preparation using banana pseudostem and leaves along with cattle manure in the ratio of 8:1 contain 1.5% N, 0.4% P_2O_5 and 1.8% K_2O (Ushakumari *et al*, 1999). Bordoloi (2021) reported that vermicompost is a suitable method to recycle of crop waste available in the Ri-Bhoi district and it is an appropriate organic fertilizer for yield improvement of crop as well as for improving the soil nutrient status. It helps in improving the water holding capacity of the soil due to the hygroscopic nature of the mucus associated with it (Kumar *et al*, 2018). Studies revealed that application of vermicompost increases the soil organic matter, improves cation exchange capacity of soil, reduces bulk density of soil, prevents soil erosion and soil compaction, maintains optimum pH level of the soil and removes soil salinity and sodicity (Sinha *et al,* 2014). Vermicompost also has the ability to repel hard bodied pests and also suppresses activity of aphids (*Myzus persicae*), mearly bugs (*Pseudococcus spp.*) and Cabbage White Caterpillars (*Peiris brassicae*) on pepper, cabbage and tomato (Olle, 2019). Application of vermicompost stimulated flowering of crop leading

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to the increase in yield (Arancon *et al,* 2008). Application of 10t vermicompost per hectare in integrated nutrient management approach along with recommended dose of N, P and K fertilizer in field pea increases the yield than application of chemical fertilizer alone (Reddy *et al*, 1998).

During the vermicomposting process, coelomic fluid of the earthworm is also released which is known as vermiwash. The wash is rich in enzymes, plant growth hormones like IAA, Cytokinin and GA3, vitamins, macro and micro nutrients (Bucker Field *et al*, 1999). It also contain mucus secretion of earthworm along with excretory substances, humic acid from soil and organic waste materials released after percolation of water through different layers of vermicomposting unit which can be easily absorbed by plant tissues (Sundaravadivelu *et al,* 2011). It is generally used as foliar spray in standing crops. It has been observed that foliar spray of vermiwash enhances the growth and yield parameters of brinjal plant. Increased plant growth, flowering and productivity was reported by after application of vermiwash as foliar spray (Nath *et al*, 2009).

Considering the beneficial effect of vermicompost on crop production as well as on soil health, demand for the compost has increased in recent years. Hence, there exist an opportunity for establishment of an enterprise in vermicompost preparation at community level involving farm women. Low cost vermicompost preparation using locally available material is one of the best suited technology for the small and marginal farmers of Morigaon district of Assam.

Krishi Vigyan Kendra, Morigaon conducted training and demonstration programee for promotion of low cost vermicomposting technology in the district. At the beginning, one and two days training progammes on low cost vermicomposting were provided to the farmers and farm women. Farmers attending the training programme adopted the technology but the spread of the technology was limited and problem of marketing of compost arises. Hence, production of vermicompost was limited in the district. In the year 2019, one of the Non Governmental Organization (NGO), named Rastriya Gramin Vikash Nidhi (RGVN), working in Morigaon district contacted KVK, Morigaon for training and demonstration on low cost vermicompost preparation in their operational villages and as such KVK designed one Front Line Demonstration programme engaging ten numbers of farm women of Bormanipur village of Morigaon district during 2020-21. Prior to the demonstration programme, KVK planned to conduct a training programme involving farm women enrolled under the FLD programme along with other farm women, Field Facilitators and Local Service Providers of the FPC with an aim of developing master trainers for spread of the technology in the operational villages of the NGO. Considering this, a twenty five days skill development training on job role Vermicompost Producer sponsored by Agriculture Skill Council of India was organized.

MATERIALS AND METHODS

Earthworm species

Earthworms are divided into three categories based on their feeding habit: Epegeic, Endogeic and Anecic. Among them, Epegeic species are surface feeder and feed on decaying organic matter and lives in surface litter. In the FLD programme, *Eisenia foetida* was used in vermicompost preparation due to its high multiplication rate and is highly efficient in recycling of partially decomposed organic material. It also has capacity to withstand a wide temperature range of 0ºC to 35ºC.

Production technology of vermicompost

Pit Method: Low cost vermicomposting tank was fabricated using locally available materials such as bamboo and polythene sheet of size 2.5 m(Length) X 0.91 m (Breadth) X 0.91 m (Depth). For collection of vermiwash, an earthen pit of size 0.31 m (Length) x 0.31 m (Breadth) x 0.31 m (Depth) was used which was connected to the vermicomposting unit by a PVC pipe (1.27 cm diameter). Cool, moist and shady area was selected

Table 1. Cost of production of vermicompost.

Sr. No	Particular	Quantity	Rate (Rs.)	Amount
Fixed cost (for construction of one tank)				
01	Bamboo	8 No	200/piece	1600.00
02	Labour	6 No	300/day	1800.00
03	Plastic	LS	LS	400.00
04	Sand and Gravel	LS	LS	200.00
05	Earthworm	750 g	2500/kg	1875.00
Operational cost for one year				
06	Labour	24 No	300/day	7200.00
07	Cowdung	1440 kg	1.5/kg	4320.00
Total cost of production				17,395.00
Return per tank per year				
08	Vermicompost	23.88 q	8.00/kg	19104.00
09	Earthworm	7.2 kg	2500.00/kg	18000.00
10	Vermiwash	156 L	10.00/L	1560.00
Total				38,664.00
Net Return				21,269.00

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for the installation of the tank. Organic wastes were than collected, chopped to a size of 5cm and heaped in sun for 7-10 days before filling in the tank. Cowdung slurry was sprinkled over the heap for partial decomposition of the organic material. A 5cm layer of sand was first placed at the bottom of the tank. A bedding material of rice straw of 5cm thickness was placed above the sand layer. Partially decomposed organic material and cowdung was mixed in 60:40 ratio and then filled in the tank. Earthworm species (*Eisenia foetida*) of 750g was then released above the organic material and cowdung mixture. The mixture was then covered with gunny bags. The mixture was kept at a moisture level of 70-80%, and to do so sprinkling of water as and when required was carried out.

Harvesting: The time required for preparation of compost was 2.5 to 3 months. Harvesting period was judged when the organic materials were completely decomposed and turns into granular structure. Gunny bags were then removed and sprinkling of water was stopped and the compost was heaped which enabled downward movement of earthworms. Sieving operation was carried out with a 2mm size sieve for separation of compost from earthworms. Earthworms and the cocoons separated were stored in a safe place.

RESULT AND DISCUSSION

Vermicompost production

It was found that the time required to produce vermicompost was 2.5 to 3 months in summer season and 3 to 3.5 months in winter season. On an average, total 3 times vermicompost was produced from one tank in one year from the low cost vermicomposting units. Average vermicompost production recorded was 8.30 q in one cycle and 23.88 q in a year from one tank (Table 2). The FPC also took the initiative to analyze the nutrient content of the vermicompost at North Eastern Regional Institute of Water and Land Management (NERIWALM), Tezpur, Assam and the result of the analysis reflects fine quality of compost.

Vermiwash Production

An Earthen pit was used for collection of




Training on job role vermicompost producer sponsored by ASCI




Demonstration on low cost vermicompost production



Director of Extension Education (Assam Agricultural University, Jorhat) visited the packaging site of Yangli FPC



Vice Chancellor (Assam Agricultural University, Jorhat) visited the packaging site of Yangli FPC

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vermiwash which was connected by a PVC pipe with the low cost vermicomposting tank. On an average, 45 L and 156 L of vermiwash was collected from one tank in one cycle and in a year respectively.

Earthworm Production

At the time of harvest, sieving operation was carried out which separates the compost from the earthworms. On an average, 2.7 kg of earthworm was collected in one cycle and 7.2 kg in a year.

Economics of Production

Total fixed and operational cost of production recorded was Rs. 5,875/- and Rs. 11,520/-, respectively with a net cost of Rs. 17,395/- for one tank in a year (Table 1). In return, average net profit of Rs. 21,269/- was recorded from one low cost vermicomposting unit with a B:C ratio of 2.22 in a year (Table 2).

Impact of the FLD programme

The technology demonstrated in the FLD programme was found suitable and accepted by the farm women. At the same time, the technology was also spread by the Field Facilitators and Local Service Providers of the NGO RGVN trained by KVK, Morigaon in their operational villages. Later on, Farmers' Interested Groups (FIG) were identified by them from fifteen villages and a Farmers' Producer Company (FPC) named "Yangli Farmer Producer Company Limited" was formed comprising of 102 numbers of FIGs. As on date, 1022 numbers of shareholders are involved in low cost vermicompost production which is marketed at district and state level. The FPC had a net revenue of Rs. 27,94,267/- as on 31st march, 2022. Continuous effort of KVK, Morigaon and in collaboration with NGO RGVN results in establishment of a small scale industry in village level which sets an example for other women farmer in the district for establishment of a community level enterprise for uplifting the rural economy.

CONCLUSION

From the present study it was clear that a community effort could bring a revolution in farming sector. In this case, a group of farm women motivated by KVK, Morigaon and the NGO (Rastriya Gramin Vikash Nidhi) created an enterprise which was registered as Farmers' Producer Company. The successful implementation of low cost vermicomposting enterprise by the group of farm women was popularized by different print and electronic media leading to easy marketing of the compost within the state as well as in other states also.

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