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Impact of Vermicomposting Training Programme on Production, Economics and Employment Generation of Farmer – A Case Study

V. Dhanushkodi^{1*} and G. Porkodi²

¹*Krishi Vigyan Kendra, Sirugamani, Tiruchirappalli 639 115, Tamil Nadu, India.*

²*Krishi Vigyan Kendra, Virudhachalam, Cuddalore 606 001, Tamil Nadu, India.*

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The technologies available at present in the field of agriculture have no relevance whatsoever if these are not reached and adopted by the farmers for the improvement of crop productivity. Keeping this in view, the present study was undertaken to analyse the impact of vocational training in specific relevance to vermicomposting technology provided to the intended clientele group during 2012. The crux of the study was focused on the impact indicators like a) change in the level of production b) economics c) additional employment generated etc., on the intended clientele group. The present research study was confined to the operational cum jurisdictional area catered by Krishi Vigyan Kendra of Cuddalore district in the state of Tamil Nadu, India. The Krishi Vigyan Kendra is a district level knowledge centre formed under the policy guidance of Indian Council of Agricultural Research (ICAR) and which acts as the apex body to govern the Transfer of Technology (TOT) across the nation. One of the mandates of such district level knowledge centre is to provide vocational training to the farming individuals' viz. farmer, farm women, rural youths,

*Corresponding author: E-mail: dhanushselgi@yahoo.com.au;

and unemployed school drop-outs. Vermicomposting technology is a simple and quick process of converting farm waste into valuable compost which in-turn acts as a source of the organic amendment for improving soil health enhancing crop production. The farmers can learn the vermicomposting technology through hands on training and take-up this as a venture for additional income generation apart from crop husbandry and make this as one of the components in Integrated Farming System (IFS) for creating employment. One of the farmers by name Mr. V. Sekar of Kodukoor village in Cuddalore district attended the vocational training on vermicomposting organized by ICAR- KVK Cuddalore during 2012. Mr. V. Sekar got motivated and started a vermicomposting unit of size 6 x 2 x 2 feet with the technical guidance from KVK Cuddalore. The scientific validation of study revealed that Mr. V. Sekar was earning a net annual income of Rs. 1,15,500/- through the sale of vermicompost and vermi worms, thereby generating an additional employment of 426 man-days per year. It was concluded that the vocational training and technical backstopping extended by the KVK Cuddalore was the most viable technology transformation tool in enhancing farmers' income and employment generation.

Keywords: Vermicomposting; awareness; training; farmer's income and employment generation.

1. INTRODUCTION

Over the past few decades, chemical fertilizers have widely spread throughout the world with a focus that, the soil is an inert medium for plant roots, rather than as a living biosphere in which the crop is only one of hundreds or thousands of interacting species. However, it is now realized that in the field under intensive monoculture which receives heavy applications of chemical fertilizers alone, there is a slow decline in productivity [1]. The harmful result of the excess application of nitrogenous fertilizers results in emissions of greenhouse gases like nitrous oxide (N₂O) and ammonia (NH₃) which in-turn affect the natural ecosystem and food chain [2]. Besides this, nitrogenous fertilizers over long run increase the soil acidity and resulting in newer bio-types of insect pest and diseases damaging the crop and economic returns to the farmers [3]. To overcome such problems, farmers are advised to use organic manures along with judicious cum recommended dose of inorganic fertilizers.

The reasons like high water content of up to 99% (wet weight) in liquid manure and 70% in solid manure, long range haulage of fresh manure from a livestock make its uneconomical for direct application in the soil as a soil amendment [4]. Therefore, most of the manures are applied inland at high application rates close to the source, thereby diminishing its potential use as a soil amendment. Under such circumstances, composting has gained increased attention as a means of reducing the environmental impact of livestock manure [5]. Composting is a simple biotechnological process, which could provide a

'win-win' solution to tackle the problem of safe disposal of farm waste as well as the most needed plant nutrients for sustainable productivity [6].

Vermicomposting is a simple biotechnological process of composting, in which certain species of earthworms are used to enhance the process of waste conversion and produce a better end product is also called as vermicast. Earthworms consume various organic wastes and reduce the volume by 40–60%. Each earthworm weighs about 0.5 to 0.6 g, eats waste equivalent to its body weight and produces cast equivalent to about 50% of the waste it consumes in a day. Vermicast is popularly known as Black gold since it is rich in nutrients, growth promoting substances, beneficial soil micro-flora, having properties of inhibiting pathogenic microbes and synergistic relationship in plant rhizospheres [7]. The scientific facts reveal that vermicompost contain 17-36% humic acid and 13-30% fulvic acid of a total concentration of organic matter and vermicompost can promote growth 50-100 percent than compost and 30-40 percent over chemical fertilizers. Keeping in view the above facts and properties of vermicompost, KVK Cuddalore organized several on-campus and vocational training programmes to promote the production of vermicompost at farmers' site. The objective was to enhance farm income and employment to the intended clientele group. The present case study was undertaken to enumerate the level of adoption of vermicompost production technology and its impact on income cum employment creation of farmer. The case study was confined to Mr. V. Sekar, one of the KVK trained farmer during 2012 and the

parameters like a change in the level of production, economics, additional employment generated, etc. were assessed.

2. METHODS AND MATERIALS

A case study was conducted to discover the effect of training on income and employment generation as a result of adopting vermicomposting production technology by the KVK trained farmer Mr. V. Sekar. He hails from Kodukoor village of Cuddalore district of Tamil Nadu, India. Agriculture is the main occupation for his livelihood and he earns an annual income of Rs.78000/- with an average BC ratio of 1.98. During 2012, Mr.V.Sekar approached KVK Cuddalore and underwent vocational training on vermicomposting production technology, with the technical guidance of KVK he started two units of vermicompost of size 6 x 2 x 2 feet during 2012. During 2013 gradually he expanded numbers of production units to four numbers with a production of 1.5 t/unit in his farm and producing over 36 tons of quality vermicompost per annum. After getting expected momentum, he started to supply surplus quantity vermicompost to the nearby farmers directly and through local Non-Governmental Organizations (NGO). Observations on income and employment creation by the adoption of vermicompost production were recorded as per the standard procedure.

2.1 The Method Adopted in Vermicompost Production

Vermicompost production unit (size 6x2x2 feet) was established in a cool, moist and shady place provided under the thatched shed. The number of units increased, according to the availability of raw materials and requirements. The farm waste and other organic waste like press mud (A by-product of sugar industry), cow dung and chopped dried leafy materials such as sugarcane trash, coconut fronds were mixed in the proportion of 1:3:1 and Effective Microorganism (EM) @2 lit/ton was mixed and kept for 40-50 days for partial decomposition. During this period, the heap was kept moist by a sprinkling of water so that temperature can be favorable to worms. Each bed contained 1.5-2 tonnes of raw material. After the preparation of vermicomposting beds, 10 kg of *Eudrilus eugeniae* (nightcrawler) was released on the upper layer of the pit/bed and covered with gunny bags so that worms can be saved from predators. Water sprinkled immediately after

releasing worms and kept it moist by frequent sprinkling as per need. First harvesting of vermicompost was done at 20 days after the worms release, then subsequently every weekly harvest was done according to the number of castings appeared on the surface of the bed. A reddish colour liquid, with an alkaline reaction having dissolved nutrients, called vermiwash also collected in the small chamber connected through drainage pipes fitted at the bottom of the bed. By this way, vermicompost was collected and amounting by weight 55-60 percent of the raw materials used. The harvested vermicompost was analysed and their nutrient status was shown Table 1.

Table 1. Nutrient content of vermicompost

S. no.	Parameters	Nutrient content
1.	Organic carbon (%)	12.6
2.	Total nitrogen (%)	1.35
3.	Total phosphorus (%)	0.48
4.	Total potassium (%)	0.85
5.	Total calcium (%)	1.65
6.	Total magnesium (%)	0.52
7.	Total iron (ppm)	0.8496
8.	Total manganese (ppm)	100.62
9.	Total zinc (ppm)	42.39
10.	Total Copper (ppm)	12.05

2.2 Preventive Measures Adopted during Production

- To prevent downward migration of worms, a cement floor was laid-out at the bottom of each vermicompost bed or unit
- To provide the cool, moist and shady environment, coconut fronds thatched sheds was established
- To protect earthworms worms from heat generation during degradation, use of fresh dung and fresh leaves was avoided
- The harmful materials like plastics, glass, stones, chemicals, pesticides and metals etc., were removed from the base material before laying-out vermicompost bed or unit
- To promote the ideal growth and multiplication of earthworms, proper aeration was ascertained.
- Preventive measures were taken to protect earthworms from ant, rat and birds.

3. RESULTS AND DISCUSSION

The success of any production system basically depends on need, availability of inputs and marketing channels by which one can market

Table 2. Income and employment creation through vermicompost production

S. no.	Products	Quantity produced (kg/yr)	Production cost (Rs./yr)	Gross income (Rs./yr)	Net income (Rs./yr)	BC Ratio	Employment generation (man days/yr)
1.	Vermicompost	36000.0	82000.0	180000.0	98000.0	2.19	426
2.	Earthworm	50.0	-	17500.0	17500.0	-	
	Total	36050.0	82000.0	197500.0	115500	2.40	426

with remunerative price by using locally available resources. The key to the success of the organic farming system is the production of all inputs like manures, plant protection, etc., and on-farm utilizing the local resources wherein animal husbandry plays a catalytic role [8]. The study on the economics of vermicompost production indicated that direct marketing of vermicompost from producer to consumer was found to be the strongest marketing channel, however, marketing through cooperatives and trader was also found in a few instances [8]. Economics of vermicompost production was arrived to compare benefit-cost ratio and it was observed that the BC ratio was around 2.19 from vermicompost production alone and it was 2.40 while including the sale of an earthworm. Figures in Table 2 shows that adoption of vermicompost provides an annual net income of Rs.115500/-. The results also indicated that the production of vermicompost provided about 426 man days throughout the year, which helped in reducing migration of rural youth to urban areas. The finding of the present study is in accordance with the findings reported by Lague et al. [2] and Bharti et al. [9]. This might be due to the need-based skill oriented training programme and technical backstopping extended by the KVK, which enhanced the knowledge level of the farmer and resulted in adoption level. The results were in tune with the finding of Kashmanian and Rynk [5].

4. CONCLUSION

The results of the current study revealed that benefit cost ratio (2.19:1 to 2.40:1) of vermicompost production was significantly higher and can boost-up Indian economy which is today's essential need besides serving as an eco-friendly venture for rural populace. From the results, it is evident that, the farmer earning an annual income of Rs.78000/- with an average BC ratio of 1.98 through agriculture, but after undergoing vocational training and with technical backstopping from KVK, he established vermicomposting units resulting in change of annual income to Rs.197500/- with an average BC ratio of 2.46, and in addition generated 426

man days employment to the farmer. From the study, it can be concluded that an organized and systematic training cum learning of technology with necessary technical guidance from knowledge centers like KVK can uplift the farmers to great height and attain desirable changes. Some of the teething issues like marketing and linkages must be formulated by the policy makers to promote marketing of such farm products to sustain the farmers' income and soil health in future so as to maintain nature ecology intact.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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