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VERMICOMPOSTING FOR REVENUE AND EMPLOYMENT GENERATION

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Abstract:

Vermicompost is a safe, non-polluting, and one of the most economical and convenient ways of solving the waste disposal problems and recycling organic waste. It is an excellent form of natural manure which is cost-effective, easy to make, handle, and contains high nutrients with growth hormones, and is 4-5 times powerful growth promoter than all other organic fertilizers and over 30- 40% higher than the chemical fertilizer. Vermicompost is a safe and eco-friendly way to produce manure which is very beneficial to all crops/ agriculture farming. In the present study, Mr. Sukhpal, a young entrepreneur had started vermicompost production in his early years. Nowadays he was found to be doing vermicompost in 10 beds (10'x3'x2'). There was first installation cast was of Rs. 54,700/-. After that in every session of vermicomposting the total material, the cost was Rs. 63,658/- on ten beds with the production of Rs. 96,000/-. As Per Benefit-cost analysis the net return was found to be Rs. 32,342 with BC ratio 1:51. As per result, there was Rs. 0.51 revenue on investment of every rupee.

INTRODUCTION

Vermicompost is an organic fertilizer obtained from the earthworms by passing out the organic wastes through the digestive systems. The process of preparation of this organic fertilizer may be called vermicomposting. Earthworm improves and restores soil fertility and boost up crop productivity by the use of their excretory products known as vermicast (Yangchan *et al.,* 2019). Vermicomposting is the process of producing compost by utilizing earthworms to turn the organic waste into high-quality compost that consists mainly of worm cast in addition to decayed organic matter (Devi and Prakash 2015). Vermicastings are the excreta of earthworms, rich in bacteria and plant nutrients. Vermicastings have a beneficial effect on plant growth due to the presence of micro and macronutrients. Today vermicomposting is an important component of organic farming systems, because it easy to prepare, has excellent properties, and is harmless to plants. Vermicompost improves the physical, chemical, and biological properties of the soil as well contribute to organic enrichment (Chauhan and Singh 2013). Researches on vermicompost provide farmers with an environment-friendly fertilizer and assist in promoting the agriculture sector towards a Greene future. The use of such technology will help in cost management in agriculture which is increased in recent years and has added to the burden of farmers in terms of chemical fertilizers and chemical pesticides. Another side vermicompost production is also a lucrative self entrepreneur which gives high revenue just by using waste material and labor/work from family members. Consequently, the cost of production has increased many folds (Ramnarain et al, 2019). The increase in living standards around the world has created a growing demand for such organic produce, or cultivation using only

natural pesticides and fertilizers, which are perceived to be healthier for consumers and environment friendly (Kaplan 2016). So by keeping this point in mind the present study was conducted to evaluate the vermicomposting system by investigating the benefit and cost of production.

METHODS AND MATERIALS

A well-structured interviewing schedule was used for the collection of detailed information about vermicompost production. Survey data contained information on the economic characteristics of the activities involved in the production and input-output quantities. For economic analysis, the *Benefit-cost ratio* was used to determine the profitability of vermicompost production. A simple budgeting technique has been employed to estimate the cost and return production. vermicompost cost of production was estimated by incorporating all costs such as

Installation cost (*Ic*)= *Lc*+ *BMc*+ *Sc*+ *Wc*+*Ec*+ *SRc*+ *PSc*+*STc*……..…***equation-i***

Area/land cost (*Lc*)+ Bed making cost (*BMc*)+ Shade cost (*Sc*)+ Water cost (*Wc*)+ Electricity cost (*Ec*)+ Store room cost (*SRc*)+ Packet stitching cost (*PSc*)+ Sifting tool cost (*STc*)

The Input cost (*Ic*) for carrot production was calculated by the following expression;

Input cost (*Ic*)= *Dc*+ *DTc*+ *Ec*+ *PBc*+ *Ec*+ *Wc*+ *SPc*+*Lc* …… ……..***equation-ii***

(Dung cost (Dc)+ Dung transportation cost (DTc)+ Earthworm cost (Ec)+ Packing bags cost (PBc)+ Electricity cost (Ec)+ Water cost (Wc)+ Stitching of packet cost (SPc)+ Labor cost (Lc)

Further the total production cost (TPc) was calculated by incorporating land rent (LRc) and Interest cost (Ic) in variable cost (Ic). The estimated expression is given below.

Total production cost (***TPc)***= *Ic*+ *LRc*+*Ic* …….. ***equation-iii***

In the next step, the gross revenue (*GRc*) of vermicompost production was calculated by multiplying gross production/unit (*GpU*) with price/kg (*PpK*) received by the vermicompost unit owner.

Gross revenue (***GRc)***= *GpU* ×*PpK* …….. ***equation-iv***

Furthermore, net returns to carrot growers were estimated by the following expression.

Net returns *NRc*= *GRc-TCc* …….. ***..equation-v***

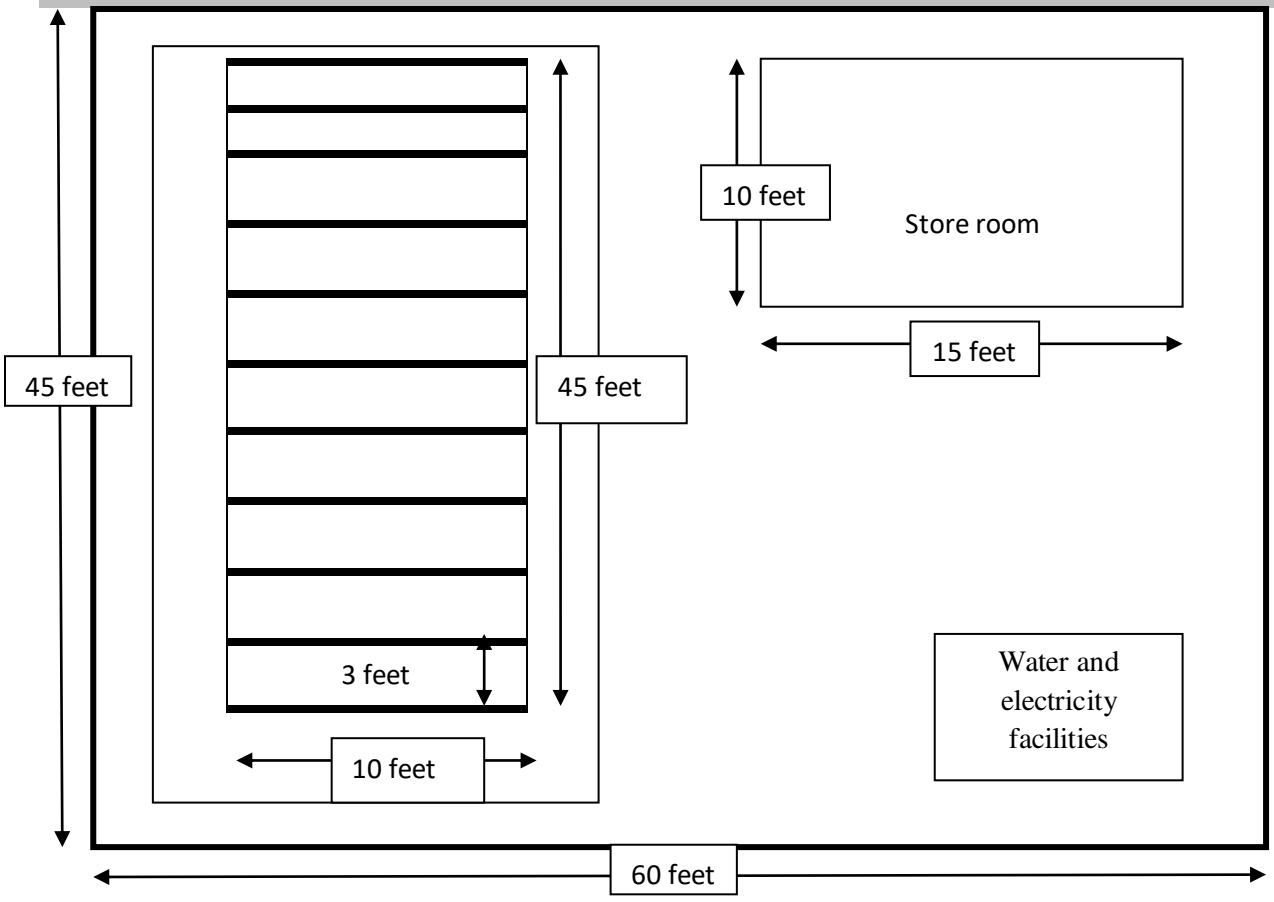
Furthermore, the benefit-cost ratio was calculated to estimate the return on per rupee investment through the division of net revenues to the total cost.

Benefit-cost ratio (*BCRc)*= *GRc/NRc* …….. ***equation-vi***

RESULTS AND DISCUSSION

Mr. Sukhpal, from Daya village, had started vermicompost farming in his early years. He is educated up to 12th and now working as a messenger (contract basis) in CCSHAU, Hisar. He was found to be involved in vermicompost production from 2001 to till now by following the passion of his father. He had five members in the family and all were engaged in vermicompost production in their anyhow way. In 2011 he took the training on vermicompost production from LUVAS, CCSHAU Hisar 2011. After that, he developed a new big unit of vermicompost at home. The below diagram shows the detail of the unit. As the total area under the unit was 45'x60' used to set vermicompost unit of 10 beds; each having dimension of 10'x3'x2' with storage room with dimensions of 12'x15' for keeping compost and packing material, besides this there was a small place for water and electricity outlet.

Fig. 1 Layout of vermicompost unit



Methods of Vermicomposting (for 10 beds size of 45'x10')

The method of vermicompost production started with cleaning of bed. Then the beds were covered with polythene so the worms and bacteria of the soil didn't affect the vermicomposting system. Each bed was filled up with dung (2quintal/bed) and earthworms (2kg/bed). Total 20quintals dungs and 20 kg earthworms were used in 10 beds. After

that, each bed was coved by using *bori/jute bag/parali.* Then the material was kept for the retting/fermentation process. During the retting period, water spraying was done on alternative days (in summer) and once a week (in winter). After 40 days of the vermicompost process, the compost was ready. The compost was filtered out by using from above layer and earthworms were found in the lower layer of vermicompost. In each bed, there was 1.2 quintal compost with an increase in earthworm number by 30 grams. Compost was again sifted and filled So the total production of compost in 40 days was 12,000 kg and 330 grams of earthworms.

Fig. 2 Methods of Vermicomposting

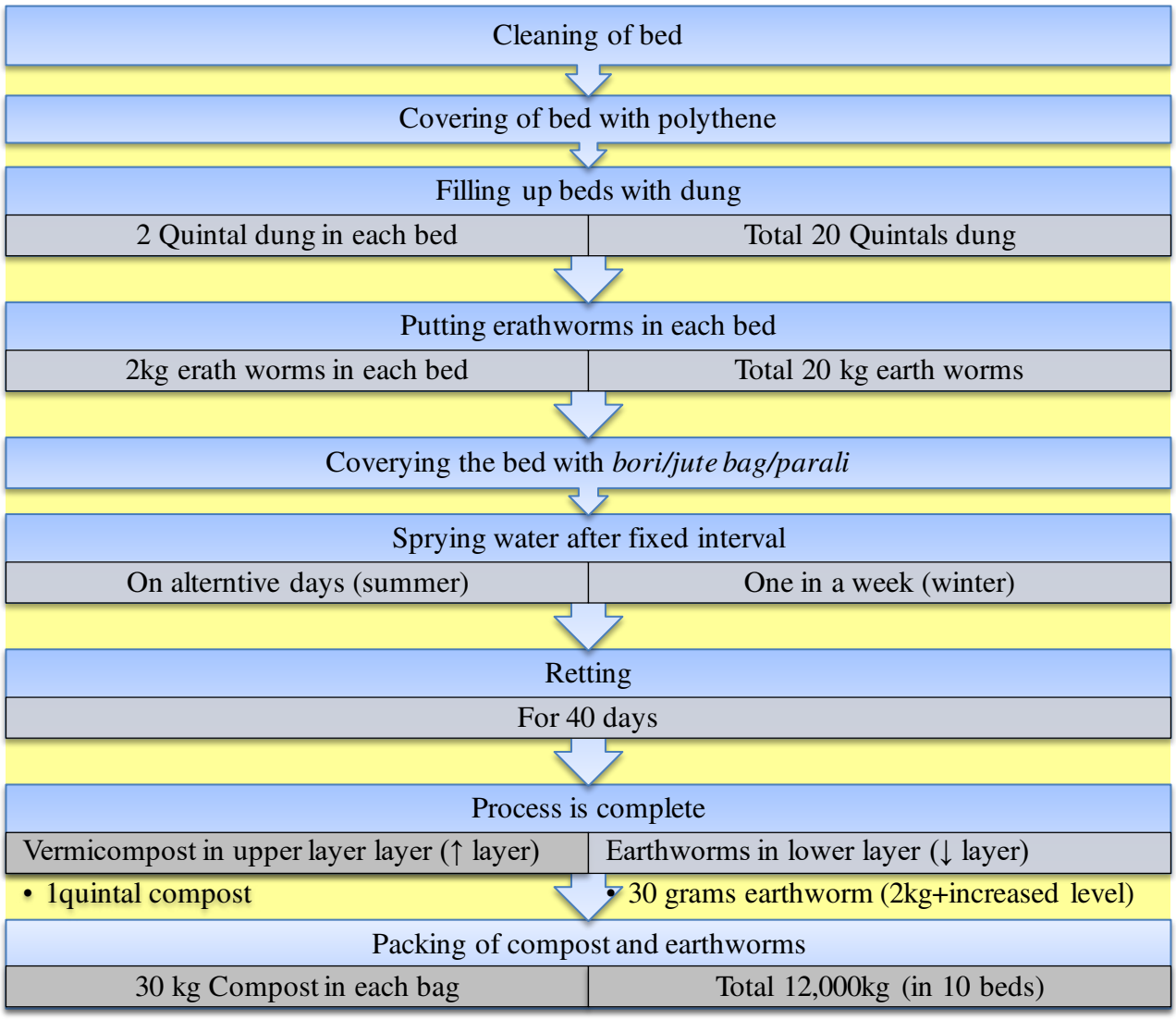


Fig.3 steps in Vermicompost production

Collection of Compost

Sifting of Compost

Packing of Compost

Fig.3 steps in Vermicompost production



Table 2 Installation cost (once during starting of unit)

	Variable	Material required	Cost
Installation cost	Bed making cost (BMc)	Brick+cement+other material	10,000
		Labor	1,000
	Shade cost (Sc)	Pipe+net+other raw material	8,000
		Labor	500
	Store room cost (SRc)	Brick+cement+other material	15,000
		Tiles+other roof construction material	5,000
		Labor	3,000
	Water cost (Wc)	Supply cost	200
	Electricity cost (Ec)	Wire+other material	1,000
		Installation+ Labor	500
		Electricity bill	3,200
	Stitching of packet cost (PSc)	Packet sewing machine	7,000
	Sifting tool cost (STc)	Sift	1,500
	Total cost		54,700

The data in the above table represent the cost involved in the installation of a vermicompost unit at an area of 45x60' with ten vermicompost beds (10'x3'x2'). The calculated cost was base on 7 variables of contraction including bed making, shade, water, electricity, storeroom, packet sewing machine, and sifting tool. The cost involved in bed, shade, and store making was the material cost and labor cost. Besides water cost and electricity cost were also included. The above table unveiled the total amount required for starting the vermicompost unit i. e. Rs. 54,700/-

Table 3 Material cost (required for one cycle of vermicompost production; 40days)

	Material	**Quantity**	**Per piece cost (Rs)**	**Total cost (Rs.)**
Ic	Dung cost (Dc)	5 trolleys	800/trolley	5,000
	Transportation cost (DTc)	5 times	200/trip	1,000
	Earthworm cost (Ec)	20 kg	1000/kg	20,000
	Packing bags cost (PBc)	40 bags	5/bag	200
	Electricity cost (Ec)	40 days	-	2,300
	Water cost (Wc)	40 days	-	200
	Stitching of packet cost (SPc)	40 bags	Rs 2/ bag	80
	Labor cost (Lc)	1/day	500	20,000
	Input cost (Ic)			48,780
TPc	Land rent cost (LRc)	Per month	45'x60'	10,000
	10% Interest cost (ITc)	10% of total cost		4,878
	Total production cost (TPc)			63,658
Tr	Gross return *(GR)*	12,000kg	6/kg	96,000
	Net Return *(NRc)revamping (sustainable methodology)*	Gross return*(GR)*-Total production cost*(TCc)*		32,342

BCRc	Benefit cost ratio	Gross return*(GRc)*/ Production cost(TPc)	1:51

The findings in table five a clear picture of the production benefit analysis of vermicompost production. As per results input cost was studied based on eight variables i.e. dung cost (Dc), transportation cost (DTc), earthworm cost (Ec), packing bags cost (PBc), electricity cost (Ec), water cost (Wc), stitching of packet cost (SPc) and labor cost (Lc). The total cost involved in input material was Rs. 48,780/-. Further land rent cost (LRc) and 10 % interest cost (ITc) were added in input cost to find out the total production cost (Rs. 63.658/-). Gross production under 10 beds of vermicompost production was 12,000kg of compost which was having Rs. 96,000/- of selling cost. The net return was found at Rs. 32,342/-.per 40 days. And overall benefit-cost ratio (BC ratio) of production was 1:51 which means there was Rs 1.5/- income on investment of Rs. 1.0/-. In line same results were mentioned by Bajaj (2020) that by input of 10 quintals dung and 10 kg of earthworm in vermicompost bed the production could be generate about 26 quintals of vermicompost and 68 kg of earthworm having market value of @ Rs. 5/kg and Rs. 200/kg, respectively, the total production was of Rs. 41,500 in 2.5 months.

CONCLUSION:

Nowadays Mr. Sukhpal was making another vermicompost unit at his farm with a capacity of more than 15 beds. He was also going to start to train the interested people by organizing a workshop at his farm. Respondent was found highly satisfied with the work and profit he received. Mr. Sukhpal was making another unit of vermicompost at his farm, where he is going to start the vermicompost at big level simultaneously also going to start exhibition and training on paid basis.

References:

1. Bajaj, P. 2020. Vermicomposting - A Profession of Youth: A Success Story. Krishi Vigyan Kendra ICAR- Indian Veterinary Research Institute Izatnagar- 243 122
2. Yangchan, J., Ganie, S.A., Wani, M.A., Gupta, V., Kumar, A. and Kumar, Y. 2019. A Success Story of Farmer's using Vermicomposting for Revenue and Employment Generation in Trans-Himalyas of Cold Arid Region. *International Journal of Current Microbiology and Applied Sciences*, **8**(4): 1283-1288.
3. Ramnarain, Y.I., Ansari, A.A. and Ori, L. 2019. Vermicomposting of different organic materials using the epigeic earthworm *Eisenia foetida*. *Int J Recycl Org Waste Agricult,* **8,** 23–36. https://doi.org/10.1007/s40093-018-0225-7.
4. Devi J, and Prakash M. 2015. Microbial Population dynamics during vermicomposting of three different substrates amended with cowdung. Int J Curr Microbiol Appl Sci 4(2):1086–1092 https://www.ijcmas.com
5. Chauhan, H.K, Singh, K. 2013. Effect of tertiary combinations of animal dung with agrowastes on the growth and development of earthworm *Eisenia fetida* during organic waste management. *Int J Recy Org Agric* **2**:11. https://doi.org/10.1186/2251-7715-2-11
6. Kaplan, M. 2016. The National Master Plan for Agricultural Development in Suriname. Final Report. Kaplan Planners Ltd. Regional and Environmental Planning, pp 255. https://www.share4dev.info/kb/documents/5426.pdf