

COMMUNICATION OF ORGANIC FARMING PRACTICES THROUGH VERMICOMPOSTING TECHNOLOGY TO RURAL AREAS OF NEPAL

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ABSTRACT

Vermicompost refers to organic manure produced by earthworms. It is a mixture of worm castings (faecal excretions), organic material including humus, live earthworms, their cocoons and other organisms. Vermicomposting is an appropriate technique for the disposal of non-toxic solid and liquid organic wastes. It helps in cost effective and efficient recycling of animal wastes (poultry, horse, piggery excreta and cattle dung), agricultural residues and industrial wastes using low energy. Vermicompost provides nutrients to the plants and helps the soil to hold moisture. A suitable site for vermicomposting should have adequate water supply and good drainage. It should also be close to the source of materials and must be well shaded. The worm used in Vermicomposting can live up to two years and grow up to 30 centimeters (1 foot). They thrive best at temperatures of 24-28°C, with moisture content of 60-80 percent. Materials used in vermicomposting are kitchen wastes (not including oil, meat and dairy products), garden wastes such as grass clippings and leaves and animal wastes. There is no policy on extension of vermiculture technology in Nepal. The policy is urgently needed in order to implement the programme of vermiculture and vermicomposting technology in rural areas of Nepal.

INTRODUCTION

Vermicomposting is an effective means of composting the decomposable organic wastes using earthworms naturally present in the soil. It is a mixture of worm casts enriched with macro and micronutrients (N, P, K, Mn, Fe, Mo, B, Cu and Zn), some growth regulating substances such as gibberellins and auxins and useful micro flora (Azospirillum, Actinomyces and Phosphobacillus) etc. The nutrient level of vermicompost (1-1.5%N, 0.6-0.8% P and 1.2- 1.5 K) is higher than any other compost. From the available information it is well documented that earthworms can consume all types of organic matter and convert them into available form of nutrients. Vermicompost improves the physical and biological condition of soil, improves soil fertility and pulverizes it through their churning and turning action in addition to contributing plant nutrients, improves aeration and water holding capacity. It is reported that soils with casts contain 5 times nitrogen, 7 times phosphorus, 11 times potash, 2 times magnesium and 7-8 times actinomyces more than in soils without earth worm casts. Being a natural means of soil fertility management it fits well into integrated plant nutrient management strategy for sustainable agriculture.

The farmers now have realized the disadvantages of chemical fertilizers and pesticides and are trying to turn back. In fact, they need some efficient, dynamic package of organic farming technologies. Considering the diversified climate of Nepal, vermiculture technology seems to be one of the most appropriate technologies for Nepalese farmers. It is also found that this technology is not only an appropriate one but also can play a role of missing link between chemical and organic agriculture to Nepalese farmers.

Nepal has a long tradition of agriculture and also has a rich heritage of ecofriendly agricultural technologies. The biodiversity of climate prevailing in Nepal is very congenial for farming. Taking an advantage of favourable environmental conditions, the Nepalese farmers developed such technologies, which were used to reap a big harvest throughout the ages, without disturbing the ecological balance.

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After 1970, Nepal adopted modern agricultural technologies, which included use of chemical fertilizers, pesticides, insecticides, hybrid seeds, etc. Unfortunately extravagant use of these technologies and interference in natural processes, so called modern agricultural technologies failed in maintaining the harmony with nature. As a result, environmental pollution has increased day by day.

TECHNOLOGY

Vermicomposting uses earthworms to turn organic wastes into very high quality compost. This is probably the best way of composting kitchen wastes. Four breeds are used in Vermicomposting ie, *Eisenia foetida*, *Allolophora sp.*, *Eudrilus eugeniae* and *Peronyx excuvatus*. The most common breed is *Eisenia foetida*. Many garden centres now supply them, and in most countries they can be bought by mail order from worm farms. Some sellers advertise special high-performance breeds or specially developed hybrids, but don't believe them they'll be one of these common breeds. There's no such thing as a hybrid worm. You'll need 1,000 worms (1 lb) to start a worm box, maybe twice that if you want to process your garden wastes too -- they breed very fast in the right conditions, but starting with more will give the system a good start.

Worm populations double each month. In ideal conditions they can reproduce much faster than that: 1 lb of worms can increase to 1,000 lbs (one million worms) in a year, but in working conditions 1 lb will produce a surplus of 35 lbs in a year, because hatchlings and capsules (cocoons or eggs) are usually lost when the vermicompost is harvested.

Mature redworms make two or three capsules a week, each producing two or three hatchlings after about three weeks. The hatchlings are tiny white threads about half an inch long, but they grow fast, reaching sexual maturity in four to six weeks and making their own capsules. Three months later they're grandparents!

This rapid breeding rate means the worm population easily adjusts to conditions in the worm box according to the feed supply and the proportion of worm casts to feed and bedding -- their casts are slightly toxic to them, and as the box gets "full" they'll either leave, if there's anywhere for them to go, or they'll die off.

This is an important consideration -- if you only want the vermicompost for the garden it doesn't much matter if the worms die off, as long as you've kept some aside to set a new box going. It also makes it easier to harvest the castings, and you'll have a higher proportion of pure castings.

One or two people usually produce about 4 lb of food waste a week: use a 2ft x 2ft box 8" deep. For three people make it 12" deep, for more, 2ft x 3ft x 12" deep -- or two 2-person boxes might be better, because bigger boxes can be too heavy to move when they're full.

Use exterior-grade 1/2" plywood. Don't use chemically-treated wood. Treat the wood with a non-toxic wood preservative, or paint it with vegetable oil, or linseed oil. Use galvanized nails. Drill at least a dozen 1/2" holes in the bottom for aeration, and arrange it so that two opposite sides are half-an-inch deeper so that the bottom stands off the ground. Stand the box in a tray, because it will probably leak a bit. Once filled, cover the surface with black plastic sheeting (a garbage bag) slightly smaller than the surface area: this will keep the moisture in, and the worms will work right up to the surface

Worms will eat just about any type of kitchen waste including vegetables and fruits, coffee grinds, tea bags and egg shells. Avoid putting in meats and fats.

You can feed your worms every few days, or once a week if you prefer. Simply pull aside some of the bedding, bury the food waste, and cover it with bedding. Each time you feed the worms, choose a different location to bury the food. The vermicompost might need screening, especially if you've used rough stuff in the bedding that takes time to break down. A circular gardener's sieve with a 3/16" mesh will work best. Try to get one with stainless steel mesh, it'll do the job much quicker, the worm castings won't stick to the mesh, and it won't rust.

Vermicompost gives seedlings a really good start in life. In pots and containers, don't use pure vermicompost. About 25% of the growing mixture seems to be about ideal, but experiment- it might vary according to what you mix it with.

Don't let the vermicompost dry out before using it -- it loses a lot of its value and resists wetting. If you store it, don't use an airtight container. It will keep for a year or more.

The container should be shallow (8 - 12" deep), and provide one square foot of surface area for every pound of food waste per week (i.e. six pounds of food waste requires a bin 2' x 3'.)

| People NO. | Quantity of Worms | Bin Size |
|------------|-------------------|-------------------|
| 1 or 2 | 1 lb. | 1ft x 1.5ft x 2ft |
| 2 or 3 | 1 lb. | 1ft x 2ft x 2ft |
| 4 to 6 | 2 - 3 lbs. | 1ft x 2ft x 3.5ft |

WAYS OF COMMUNICATION OF VERMICULTURE TECHNOLOGY

1. Videocassettes

The videocassettes seem to be the most effective media to transfer a technology, than any other media available. Hence, we videocassetted our experiments at every growth stage of crop. The method of manufacturing of vermicompost and the technique should be used. Then the programs of video show arrange at different potential districts of Nepal at farmer' groups, at the meetings of farmer's group and at agricultural research institutes. Along with video show, the subject should be discussed with farmers, researchers, and agricultural officers in detail. The same programme can also broadcast in the programme of countryside classroom of Agriculture college. The trainer's training programmes should be arranged for working CBO/NGO/Farmer's groups. Through these NGOsCBOs the vermiculture technology will spread nearly to each and every corner of Nepal.

2. Articles and seminars:

The articles should published through a Krishi patrika, Annual publication of Ministry of Agriculture and Cooperative, DAo, and seminars conduct by DOA,DAE to inform and educate the farmers about the vermicompost and its effects. The language should be used in Nepali. The Krishi patrika will successful in transmitting advanced knowledge about farming to farmer's level. The articles and seminars will useful in giving information.

3. Manufacturing of Vermicompost

The farmers who see the video show or read the articles, they will request us to provide vermicompost. It is thought that if the farmers won't get sufficient vermicompost, then they are bound to use chemical fertilisers, which would make the problems of

agriculture more serious. Hence there will no alternative but to produce vermicompost on large scale.

4. Field Visits

Communication of any new technology would not be effective unless, field visits are arranged. Hence, the ways of only writing the articles, video-cassetting the experiments and manufacturing of the vermicompost will not sufficient to communicate the technology. So field visits should arrange through leader farmers and some agricultural consultants. The technology discusses with the farmers in detail without hiding any technical concept. It will emphasize that this particular technology will have to use patiently, the changes in soil and plant should be observed with open eyes, and that if the farms would not be interfered with the technology of chemical agriculture, the farmers will achieve not only success in earthworm farming, but as the soil flora and fauna increase in sufficient numbers, the farmers may be able to lead to organic.

RECOMMENDATIONS AND CONCLUSION

Today we are spending a lot of money to buy chemical fertilizers and pesticides. Most of these are petro-chemical based, which are not available indefinitely and are becoming more and more expensive with more foreign exchange required. In addition to high price of chemical fertilizers, it has negative impact on the environment. Environment gets highly polluted due to excessive use of chemical fertilizers and pesticides. The small farmers cannot afford these chemical fertilisers because the soil needs more and more of these chemicals. On the face of this, vermicompost technology will save our environment, a lot of foreign exchange and also the fossil energy. In turn, we will have much better sustainable agriculture. Hence, farmers welcome this type of enterprise. Vermicompost technology is very easy to handle and they can effort cost of manufacturing vermicompost.

Vermicosposting is set to become increasingly popular in the next century as it yields rich organic fertilizers, recover energy rich resources, safely disposes organic wastes and helps tackle environment problem such as landfill and expense of collecting and transporting this waste.

Vermicomposting waste will produce no pollution or unusable residue making it a very effective form of recycling. It is an ideal example as the worm composting process resemble closely to the nature. The environment is being damaged by human activities and we are also keen for saving the environment. Earthworms are perhaps nature's most ingenious solution for a cleaner environment.

Vermicompost technology is very new for Nepalese farmers; therefore they need training on Vermicomposting and vermiculture. Therefore, Ministry of Agriculture and Cooperative and Department of Agriculture should make policy on Vermicomposting and launch the programme through DADO Offices. The cost of chemical fertilizer is increasing day by day and farmers cannot buy needed fertilizers, in this contest Vermicomposting technology is very necessary for our poor farmers.

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