



Photo: Author

Jugra Devi with her vermicompost bed.

Improving livelihoods through vermicomposting

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In the dry tropical regions of India, livelihood opportunities are often closely linked to soil fertility conditions. Although farmers in specific localities have similar social backgrounds and possess similar natural resources, there are often surprisingly drastic differences in their economic status. One of the factors determining the economic well being of farmers is soil fertility. The biological component of the soil, living organisms and dead organic matter, is the major factor limiting fertility of dryland soils. Therefore, improving the biological fertility is a priority of land development programmes. When activities designed for such purposes also provide livelihood opportunities, the potential benefits are much larger.

BAIF *Development Research Foundation*, based in Pune in India, is engaged in improving the livelihoods of rural communities through land-based activities. Most of the projects implemented by BAIF are sponsored by development agencies and a majority of the targeted beneficiaries are marginal farmers. Often, their land is so degraded that these farmers are forced to seek a livelihood elsewhere as migratory labourers. Making them realize that the land they possess can be turned into a valuable asset and encouraging them to return to their farms are therefore primary objectives. BAIF's strategy is to introduce sustainable systems, such as tree-based farming, and encourage practices, such as the use of compost to supplement the biological fertility of soil. Although several methods of composting are practiced, vermicomposting has proved to be the most popular method among participants in BAIF projects.

Vermicomposting

Composting is the process by which biomass is broken down to humus, which has several beneficial effects on soil physical and chemical properties. Further decomposition of humus releases nutrients for crop uptake. A requirement for composting is the presence of organisms that feed on biomass and break it down to physically finer particles and chemically less complex

substances. In nature, earthworms and microorganisms decompose dead biomass. This process can also be initiated by the deliberate introduction of earthworms into a stack of biomass, and is then called vermicomposting.

The quality and the state of the biomass available to most BAIF project participants in India influences their preference for vermicomposting compared to other methods of composting. Availability of biomass is limited and much is used for other purposes: farmers use straw, leaf litter and tender stems as fodder for farm animals and hardy stems and coarse leaves are sources of domestic fuel. The remaining biomass, after these immediate priorities are met, is coarse material that does not break down easily. Earthworms are very effective in initiating the decomposition process in such materials and paving the way for subsequent microbial action.

Another source of biomass available to farmers is cattle dung. Normally dung decomposes well by itself, producing farmyard manure of a very high quality but, unfortunately, the dung available to small farmers in India does not decompose well by itself. The animals usually graze in the open, and the dung is dry before it is collected. When dung becomes this dry it lacks the microbial populations required to decompose into farmyard manure. However, it becomes an excellent substrate for vermicomposting when wetted.

The method

The material needed for vermicomposting, on weight basis, is three parts of dry biomass (chopped into pieces of less than 10 cm) and two parts of wet dung. The biomass and dung are mixed well and wetted to have an overall moisture content of 30 - 40 percent. This can be readily estimated by farmers. At this moisture level, a ball made by pressing the substrate particles together breaks up when dropped. If it does not break up, the moisture content is too high whereas if the substrate is too dry a ball cannot be made. The substrate is made into a bed of a suitable length that is 100 cm wide and 50 cm high, and is kept

covered with a wet gunny (loose canvas or other coarse material). A simple shed can be constructed to provide shade for several beds. After two weeks, 200 earthworms are introduced for every 100 kg of substrate. The substrate is stirred and turned once a week, water is sprinkled if it is too dry and the bed remade. After about 45 days the vermicompost will be ready for use.

Livelihood opportunity

Recognizing the potential of vermicomposting in small farm conditions, BAIF introduced it to participants in its development projects in several states of India. A component of many of these projects is to grow fruit trees on marginal land, which requires filling the planting pits with manure and soil. Hence there was a need for manure such as vermicompost at these project sites. Farmers would collect dung and leaf litter from their own farm or from the neighbourhood and make the vermicompost with earthworms supplied by the project. The surface-feeding species of earthworms such as *Eisenia foetida* proved very effective because of their tolerance to the relatively high local temperatures. To emphasize the importance of earthworms, they were not given free of charge: Within three months every recipient was required to "pay an interest" of 200 worms for every 1000 worms they received. As a result, there were sufficient worms to go round in most project locations within a few months time.

As this activity caught on, it was observed that in most farm-holdings, vermicomposting had become the responsibility of women as it required continuous involvement without hard manual labour. The simple production process and flexibility in terms of time needed to attend to the activity allowed the women to readily incorporate it in their routine of household chores. To take advantage of the skills of women in managing this activity and to convert the dung, leaves and other bio-wastes found littered in rural areas, vermicompost making developed into an income-generating activity. In particular, it became an attractive opportunity for landless people in the villages.

Self-help groups, where 10 - 20 like-minded women work together with a common aim, were used to support this development. Groups were given training and the women were quick to acquire the necessary skills and thereafter to manage the activity on their own. Each group received one kilo of earthworms, worth about US\$25.00. Sometimes, the women were initially very reluctant to touch the earthworms, but the perseverance of the trainers eventually paid off. Project staff visited the groups regularly to conduct discussions and provide guidance. These interactions helped the women get over their aversion to handling earthworms. The women realized that vermicompost production was a simple activity requiring only a few hours each day, with the entire group able to share the tasks amongst themselves. Each member now collects dung and other biomass from their farms, homesteads and common areas, including forests.

The vermicompost produced by the groups was mostly sold to the BAIF projects for use in the fields of beneficiaries establishing the tree-based system. The availability of a ready market outlet served as an incentive for the vermicomposting groups. As a result vermicomposting has become established as a successful income-generation activity in almost all the areas where it was introduced. In a project location in Gujarat, for example, more than 250 self-help groups comprised of tribal women produced nearly 2 000 tons of vermicompost in a year. The value of this is about US\$8 500, a sizeable amount considering the economic status of the local people. The members of the group share the proceeds from the sale of the vermicompost.

Soil fertility

It is imperative that the vermicompost made by Self-Help Groups is used to enrich the fertility of soils within the locality. Ideally, the biomass taken out from a farm by each member of a self-help group should return to the farm in the form of vermicompost. However, this is difficult to ensure as the objective of the groups is income generation. As of now, the main buyer of the vermicompost produced by the groups is the development projects implemented by BAIF, so it remains within the village and used on small farms. Once the project activities are completed, there is a possibility of the produce getting sold to large farmers outside the villages. This export of biomass from the site of its origin is undesirable. It is expected that the experience of the farmers in project villages will result in their buying the vermicompost from these groups for their farms.

Vermicompost made by individual farmers is used for fruit trees as well as annual crops. Some farmers who earlier used small amounts of chemical fertilizers in combination with organic manures are now able to grow their crops with vermicompost alone and get almost the same yield. In general, farmers are introduced to a package of improved practices and application of vermicompost is one of them. Therefore, the quantitative improvement in the productivity solely due to vermicompost use is difficult to ascertain. But farmers often tell about the benefits in different aspects of crop production. An example is how the paddy crop in fields where vermicompost had been applied survived long dry spells during the monsoon season, due to the increase in the water holding capacity of the soil.

Another example of successful use of vermicompost is in a project in Gujarat, where a group of small-scale farmers were encouraged to adopt intensive vegetable production. Each farmer cultivated more than 10 species of vegetables on 0.1 ha of land, with irrigation. The rate of vermicompost application in these fields is 10 - 15 tons per hectare per year. In spite of heavy nutrient extraction through repeated harvests, these farms have been able to sustain their production during the past three years. Several of the farmers are of the view that the fertility of their land has been gradually improving because of the continuous addition of vermicompost.

Sustainability

The sustainability goals of this initiative are two-fold: firstly, that vermicompost making should sustain itself as an income-generation activity; secondly, that it should contribute to sustainable farming locally. With this in view, the method as well as the functioning of the groups are regularly reviewed and improved. In the beginning of this activity, more than 70 percent of the material used was dry dung and the remainder was straw and dry litter. Some groups were using the same proportion of wet dung. It was recommended that no more than 40 percent dung be used, so that a larger proportion of straw and litter can be made into vermicompost. The aim is to maximize the recycling of waste biomass for increasing the biological fertility of soil.

Vermicompost making through self-help groups is a good example of BAIF's strategy. By combining technical interventions with community mobilization, BAIF tries to enable the rural poor to come out of poverty.

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