

Vermi-Compost: An Eco-Friendly Manure in Agricultural Sector of Bangladesh

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Abstract

In this modern period, when world is going to attach with chemical fertilizer in the field, no way without organic manure. Chemical free safe food is an urdent item in our daily life. Through this, vermi-compost in the crop field or on rooftop gardening ensures our insecticide free environment. In the wildlife especially birds will come in garden and can enjoy by taking those live insects. Biodiversity will be preserved by this vermi-compost plant. Compost earthworms are now available in Bangladesh and very easy to maintain this in plant production by allowing bovine animals remarkably cows and very cheap and common appliances can be used. Cowdung or kitchen garbage are our daily and common household material. Quatitative and qualitative methods can be used in this work. As bangladesh is a land of crops so that we need abundant of vermi-compost. Now in Bangladesh rooftop gardening/agriculture is increasing enourmously. For regain our biodiversity and for human health by taking safe food no shortcut of vermi-compost manure. This manure has no side effect on nature and natural resources.

Results

Earthworm and Its Classification

From the Agriculture Office of Kushtia, Bangladesh they supplied one type of earthworm (*Eisenia fetida*) for producing vermi-compost. In a slab, 500 earthworms are needed for producing this manure properly. Per piece earthworm is sold by only 1 taka.

Phylum: Annelida
Class: Clitellata
Sub-class: Oligochaeta
Order: Haplotaxida
Family: Lumbricidae
Genus: Eisenia (Gustav A. Eisen, 1940, American Entomologist and Archaeologist)
Species: fetida (meaning foul smelling (anti predator adaptation) Savigny 1826)

This earthworm is native in Europe except Antarctica. Relative species is *E. andrei*.



Figure 1: Colony of Eisenia fetida

Procedure and Collection of Manure

40 cemented ring slab (3 feet round) were used for storing the vermi-compost earthworms. After collecting the cowdung from the cow, at first all dung are stored for 15 days. That time water material runs out from the dung and becomes dry. Then this dung is transformed into a ring slab and release earthworms. Within

one month in each slab all dung converted into manure. Some chickens can eat the earthworm but this is very few because earthworms are normally stored within the dung. When the moisture of the soil will be 35-40%, all worms will come out automatically. Only for selling purpose the worms need this moisture 80-90%. One cow produces 8kg dung daily. The moisture of the dung is naturally 50-60%. 75kg cowdung needs 500 worms for producing the vermi-compost properly. Three days interval one ring needs 1 litre water for removing the dryness of the cowdung. Sand, rainy water, and mud are the culprits for the worms death. Sixty villagers can get 2000-6000 taka per month by selling cowdung. When top layers appeared somewhat dark brown and seems granules were ready to collect vermi-compost. From the upper side the dung (manure) is netted and from the net all earthworms are collected again for releasing another slabs. After netting then drying the vermi-compost on sun for two hours, it will be ready for selling and suitable to use in lands. According to the producer, an average production cost for per kilogram vermi-compost was found 7-8 taka and usually sold 10-12 taka. One or two workers of the house is enough for maintaining those slabs. In a large vermi-compost plant of course we should appoint more manpower.



Figure 2: Ring slabs (2.3 feet diameter)



Figure 3: Vermi-compost after netting

Discussion

Not only in Bangladesh but also in the world the environment is changing day by day. For over population, we need to demand lots of safe food. Vermi-compost organic manure can open a new door on our agriculture sector. The land of Bangladesh is naturally fertile, so we need not use any chemical fertilizer. Through this vermi-compost, we easily can use cowdung or other kitchen garbage. In our land, normally digger earthworm is available which are not suitable for producing this so called vermi-compost. Two types of earthworm (*Eisenia fetida* and *Perionyx excavatus*) are used for composting these garbage. These earthworms normally eat those garbage as well as animal dung. It has no bad odour and looks tea dust. In open market some illegal shop keepers mix tea dust, saw dust, or others with this vermi-compost and sell which is really punishable. This vermi-compost manure is good for any crops as well as rooftop gardening. When we use this manure in tub at the first stage, need half with the normal soil. After one year it will be used one fourth and gradually needs lower amount. By using this manure the farmers get more benefit. In this vermi-compost plant, need not any extra components. In Bangladesh, most villagers have some cows. Its dung is excreta just by using this dung they easily can make vermi-compost manure. Only 5000 taka for 10 pots is sufficient for starting a vermi-compost plant. We have lots of scope to establish this type of vermi-compost plant around the country.

Earthworms are considered as the friends of farmers. Earthworm species convert waste into better end product and provide solution to the problem of organic waste degradation [1,2]. Vermi-compost contains plant hormones like auxin and gibberellin and enzymes which believed to stimulate plant growth and discourage plant pathogens. It improves the fertility and water holding capacity of the soil. It also enriches the soil with useful micro-organisms which add different enzymes like phosphatases and cellulases to the soil. Vermi-compost enhances germination, plant growth, and thus overall crop yield [3]. *Eisenia fetida*, *Eudrilus eugeniae*, *Perionyx excavatus* were used for the production of vermin-compost. In the other study, vermin-compost was prepared from kitchen waste using *Eisenia fetida* and then vermin-compost was chemically analyzed. Similar kind of study was carried out on crop residue along with cattle dung [4]. Similar kinds of studies were reported for increased yield of spinach, onion, potato and in turnip with the application of vermi-compost [5]. The efficacy of the prepared vermicompost was studied on the three flowering plants *Mirabilis jalapa*, *Calendula officinalis*, and *Clitoria ternatea* over a period of 75 days by sowing the seeds of the plants in the pots. Vermi-compost was ready within 48 days and hence other control observations were also carried out till the 48th day only [6]. Approximately 16380 tons per day of waste is generated in the urban areas of Bangladesh. Declining productivity due to soil degradation and good soil should have organic matter content more than 3.5%, but in Bangladesh most of the soils have less than 1.7%, and some soils have even less than 1% organic matter. Until now, however, Bangladesh agriculture has not been able to benefit from the growing global organic market, and they have even failed to create a good domestic market of organic foods. Vermi-compost is a nutritive organic fertilizer rich in 2-3% nitrogen, 1.85-2.25% potassium, and 1.55-2.25% phosphorus with beneficial bacteria and fungi. Vermi-compost can enhance soil fertility physically (aeration, porosity, bulk density, water retention), chemically (pH, electrical conductivity) and biologically (increase growth and yield production of plants). In Bangladesh, within 21 to 30 days this manure can collect. A survey stated that about 87% respondents of the experimental group are now applying vermi-compost in their vegetables plots, 30% in rice fields, and 17% in other crops [7].

Conclusions

In the soil of Bangladesh, it exhibits lots of digging soil. Recently from the Agriculture Office of the country has supplied composting earthworm. Its overall management are very easy and it is converted garbage either those plant of animal into organic manure. Now, in Bangladesh we have made rooftop gardening where our production of vegetables, flowering, and fruits are remarkable. In Jashore, Bangladesh we are producing huge export quality flowers and there only vermin-compost are using. For this manure the size and color of all flowers are mentionable. In addition, by using this manure the water holding capacity increases so that all physiological activities of plants show good. Lots of peels of fruits and vegetables can make pollution after throwing anywhere and in this case these can be a good and effective source or raw materials for vermin-compost. Normally we do not use cowdung but it has great significance not only fuel but also main source of vermicomposting than other bovine animals. Bangladesh is full of bovine animals like cow in most rural areas. On any rooftop of Bangladesh by allowing moderate amount of vermin-compost we easily can produce our daily vegetables requirements like cauliflower, green pepper, bean, brinjal, pumpkin etc. Research based study on various types of plants can be performed in the nursery by using this vermi-compost. In some places we see very few organic materials and it is surely said that there is no shortcut of this manure because vermi-compost is a good nutritive organic fertilizer. Unlike the chemical fertilizer, vermi-compost is an organic material so it has no bad impact on the environment. We should establish an organic market for the betterment of human health. This study is important to find out the knowledge for establishing a vermi-compost plant for the crops and rooftop plants and try to ensure the chemical free food for the people.

Recommendations

- Manage loan for small scale farmers.
- Give training on it.
- Store cowdung (recycling).
- Should maintain personal hygiene.
- Kitchen garbage should store.
- Control other birds which can eat earthworms.
- Carefully handling earthworms.
- Establish the plant far from of residence.
- Beware from the rain and excess moisture.

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