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NEW VERMIVASH MODEL FOR SUSTAINABLE AGRICULTURE IN INDIA

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ABSTRACT

During first green revolution, use of excess synthetic fertilizers, pesticides and other inputs, adversely affected ecosystems. The second green revolution started as organic farming. Keeping this view in mind, a new eco-friendly vermiwash model has been developed with five main modifications, to get qualitative and quantitative vermiwash. Vermiwash is liquid bio-fertilizer obtained from earthworm activities, i.e., coelomic fluid and vermicasting filtrate.

INTRODUCTION

In India, the first green revolution tremendously enhanced the agricultural production, but on the other hand, abundant use of synthetic fertilizers, growth promoters, pesticides and improved seed varieties, adversely affected ecosystems like soil, water, and food contamination and gene pool of wild seeds.

The second green revolution started as organic farming (Sathe 2004, Sharma 2004). Keeping this view in mind, a new vermiwash model, with five major modifications has been developed. The use of vermiwash on different types of crops and fruit trees shows good qualitative and quantitative effects for betterment of mankind and animals (Verma 1993, Kale 1986).

Earthworms live in moist soil, and if water logged conditions exist around, water enters into the coelomic fluid simply through body wall. This water when excludes out, is rich source of organic and inorganic compounds. The integumentary, pharyngeal and septal nephridia (exo and endonephric) are osmo-regulatory and excretory in functions (Ismail 1997, Bahl 1947) and remove out excess water along with organic and inorganic materials, symbiotic gut bacteria and fungi, called vermiwash. It is liquid bio-fertilizer obtained from the worms activities, i.e. coelomic fluid and vermicasting filtrate.

MATERIALS AND METHODS

A plastic barrel of 200 liters capacity, fitted with a plastic tap at the lower side aws used for producing vermiwash. Inside the barrel (bottom to top) three layers were arranged; first layer of brick pieces (7”), second layer of coarse sand (6”) and third layer of fine sand (5”). After third layer a circular mosquito netlon mesh was put and 15” to 17” fresh dung + partly decomposed dung + decayed leaf moulds (2:2:1) were poured over it. In middle of feeding layer a small perforated plastic pipe having 2’ length and 2” breadth was inserted up to the netlon mesh. Two kg mature earthworms (*Eudrilus eugeniae*,1200 to 1500 in number) were released in the unit (Fig.2). The preference was given to *Eudrilus eugeniae*, because of its better size, length and voracious feeding

Table 1: Chemical analysis of the vermiwash.

Parametres	Value
pH	7.39 -7.5
Colour	Golden yellow
Total Solids, mg/L	2448
Volatile Solids, mg/L	738
Silica, mg/L	8
Phosphorus, mg/L	10.15
Nitrogen, mg/L	49
Potassium, mg/L	10.20
Zinc, mg/L	0.90
Copper, mg/L	0.01
Iron, mg/L	0.83
Manganese, mg/L	0.14
Sodium, mg/L	196
Magnesium, mg/L	219
Calcium, mg/L	404
Organic Carbon, mg/L	228
Fungi, cfu/mL	8
Bacteria, cfu/mL	4×10^4
Auxin IAA, µg/L	0.98
Cytokinin, µg/L	0.68

habits (Julka 1983, Stephenson 1923). Water flow was adjusted to 2 L/day, drop by drop at 4 places though a plastic pipe with 4 water regulators mounted on a circular iron ring. The total unit was set on an iron stand, two feet above the ground level, for easy management and protection from predators (Fig.1 a, b and c).

The united started to yield vermiwash was after 8 to 10 days, but best quality vermiwash was yielded after 15 days at the rate of 1750 mL/day. (Fig.3). About 250 mL water was lost due to evaporation and metabolic activities. The upper 6" feeding zone was removed after 4 weeks, while the whole 15" to 17" feeding layer was removed after 4 to 6 months.

RESULTS AND DISCSSION

The new vermiwash production unit has low cost (single unit Rs.1100), highly durable, easily manageable and with minimum space requirement (2 × 2 feet). It can give an additional business to farmers. The vermiwash has easy foliar spray, no side effects, no pollution and ecofriendly (Barley 1959).

The five main modifications in the model were, central plastic pipe with small pores for better aeration in feeding layer, use of synthetic mosquito netlon mesh in between feeding and fine sand layer to prevent the entry of worms from feeding to sand layer and easy management, changes in the thickness of layers (bottom to top) for better filtration of vermiwash and selection of mature earthworms (*Eudrilus eugeniae)* because of its voracious feeding habit, high rate of reproduction, maximum intake of water and exit of filtrate, i.e., vermiwash.

Vermiwash acts as a plant tonic, because it contains number of microorganisms, actinomycetes, enzymes, hormones and other nutrients. It increases disease resistance of plants against bacterial,viral and fungal diseases (Kale et al. 1986). Vermiwash increases 15% vegetative and reproductive growth in fruit trees and flowering plants and results in increase of 40% to 80% in the yield. It is a good foliar spray, prevent detachment of flowers, helps in fruit setting, increases size, taste, better luster, keeping quality, and leaves no toxic residues in the fruits. If it used on flowering plants, it increases size, colour, luster of the flowers. It can also be used as post-harvest tonic. It is good in nursery for cutting, grafting and layering. It avoids all sorts of pollution like water, soil and food (Kale 1988).

The vermiwash can be applied in the form of spray as follows.

1-L vermiwash + 4-Lwater: For specific targets like flowers and fruits (3 doses/year)

1-L vermiwash + 9-L water: Entire fruit tree (5doses/year)

1-L vermiwash + 14-L water: For general crops (3 to 5 doses/year)

1-L vermiwash + 200-L water: Along with water in soil for any crop

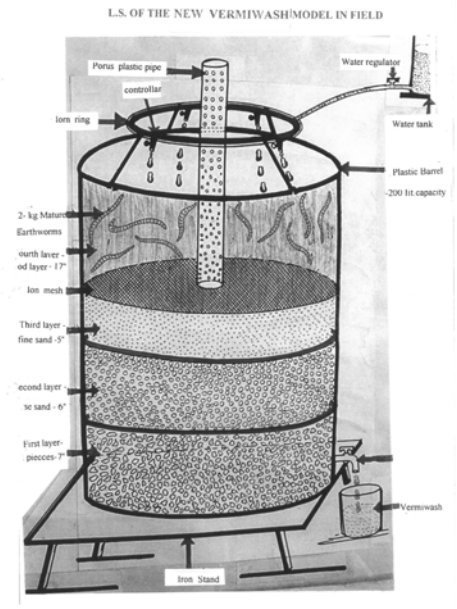

Fig. 1(a): Construction and working of new vermiwash model.

Fig. 1(b): Close-up of working model of vermiwash.

Fig. 1(c): Vermiwash models in field.

Fig. 2.: Photograph of mature earthworms.

Fig. 3: Finally produced wermiwash in a bottle.

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