

# PROMINENCE OF VERMIWASH AS LIQUID MANURE IN ORGANIC FARMING

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## Introduction

Manures are plant and animal wastes that are used as sources of plant nutrients. They release nutrients after their decomposition. The art of collecting and using wastes from animal, human and vegetables sources for improving crop productivity is as old as agriculture. Manures are the organic materials derived from animal, human and plant residues which contain plant nutrients in complex organic forms. Naturally occurring or synthetic chemicals containing plant nutrients are called fertilizers. Manures with low nutrient, content per unit quantity have longer residual effect besides improving soil physical properties compared to fertilizer with high nutrient content.

Liquid organic manures are eco-friendly organic preparation made from the different animal and plant products. Manures are organic materials with plant nutrients in small concentrations. Organic manures are the main source of replenishing soil fertility. Organic farming is an internationally regulated legally enforced and standardized alternative paradigm relies on ecological processes, biodiversity for sustaining the health of soil. Liquid organic manure has largely remained in background of bio-dynamic farming. The plant can absorb nutrients about 20 times fast through the leaves than applied through the soil. Liquid manures are helpful to overcome temporary nutrient shortages, mainly used to stimulate growth during the season when nutrient uptake through the roots is hindered. Liquid organic manure has long shelf life, easy to disperse in water and it is rapidly up taken by plants compared to solid organic fertilizer. The use of organic liquid products such as panchagavya, sasyagavya, beejamrutha, sanjeevani, kunapajala, vermiwash, sea weed extract etc. resulted in higher growth, yield and quality of crops. They enhance crop growth and can help in sustainability of safe environment and crop productivity (Sattar *et al.*, 2014).

## Advantages of Liquid Organic Manures

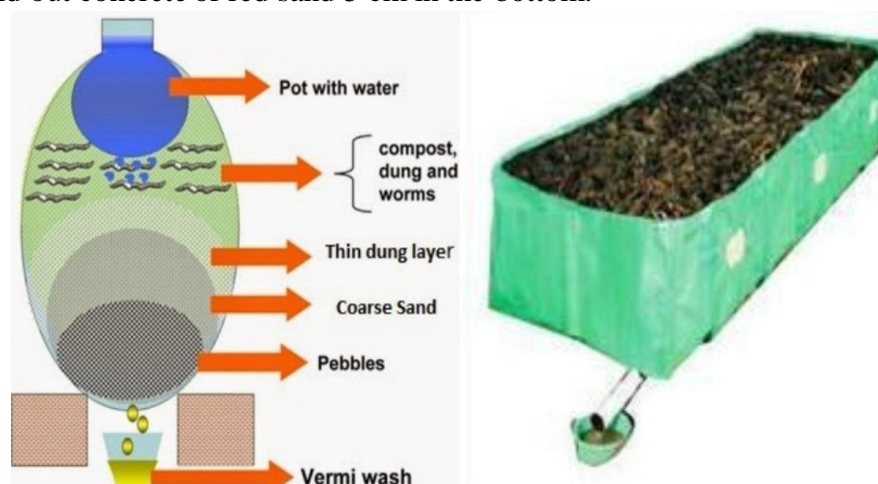
- ❖ Made up from locally available resources.
- ❖ Minimum production cost.
- ❖ Saves our health by reducing use of harmful chemicals.
- ❖ Improves the soil.
- ❖ Eco-friendly.

## Vermiwash

- Prepared from the heavy population of earthworms reared in earthen pots or plastic drums.
- Contains vitamins, plant growth-promoting hormones (auxin and gibberellins), enzymes (cocktail of protease, amylase urease and phosphatase that acts as antimicrobial), symbiotic microbes (nitrogen fixing bacteria such as *Azotobacter* sp., *Agrobacterium* sp., and rhizobium and Phosphate Solubilising Bacteria (PSB)) in addition to the macronutrients and micronutrients and other substances helpful for growth, quality and yield of plants (Shield and Earl, 1982). It acts as a pesticide and natural fertilizer for the crop plants in sustainable agriculture and increases the resistance power of crops against various diseases and enhance the growth and productivity of crops (Anand et al., 1995), Karuna et al., 1999).
- The treatment of vermiwash of vermicompost has been shown to reduced disease by necrotrophs as well as biotrophs (Al-Dahmani et al., 2003) and significantly decreases in soil borne pathogens and various pests (Nakasone et al., 1999).
- Foliar spray of vermiwash and vermicomposting would off era method of supplying nutrients to higher plants more rapidly than methods involving soil and root application (Marschner 1995).
- The species *Eisenia fetida* (Monroy et al., 2006) are commonly used globally for the management of organic wastes, and also in ecotoxicology, physiology and genetics studies.

## Preparation of Vermiwash

- Big earthen pot/plastic drum with a tap fitted to the bottom placed in the shade.
- Laid out concrete or red sand 5 cm in the bottom.



- 30-40 cm thick layer of soft kitchen waste or 10 days old dung filled in the pot.
- Introduce 500-1000 earthworms in the pot.
- An earthen pot with the minute hole in the bottom hanged over the pot after 15 days of inoculation.

- After 2-5 days extract collected in the earthen pot from the tap is called vermiwash.

#### **How to use Vermiwash**

- ✓ Dilute with water (10%) before spraying effectively on the plant.
- ✓ Vermiwash must be diluted 5 to 10 times with water and then applied, it can also be mixed with cow's urine and diluted for use as foliar spray and pesticide as follows;
- 1 liter of vermiwash
- 1 liter of cow's urine
- 8 liters of water.

#### **Application of Vermiwash :**

##### **Spray system**

Vermiwash is diluted in water for 5 times and sprayed on the foliage of crops as it enriches the soil with nutrients and controlling plant diseases.

##### **Flow system**

Vermiwash can be mixed with irrigation water at 50 litres per hectare either through drip irrigation or flow irrigation.

##### **Seed/seedling treatment**

The seedlings before transplanting are dipped in vermiwash solution which is diluted 5 times with water for 15-20 minutes and then transplanted.

##### **Soil drench**

Vermiwash is diluted about 10 times with water and soil is drenched with the solution to prevent soil-borne pathogens as it has anti-microbial properties.

##### **Soil application**

It enhances the nutrient uptake by the plants and thereby it acts as a natural fertilizer for the crop.

**Root dip or stem-** seedlings of the plants are dipped in vermiwash solution for 15 to 20 minutes before transplantation. The solution wants to be diluted 5 times with water and then after they can be transplanted.

**Vermiwash as growth promoter** – Vermiwash alone or mix with cow urine is an excellent growth promoter. Dilute one litre of vermiwash or 0.5 litres of vermiwash+0.5 litres of cow urine in 20 lit of water and use as a foliar spray. Three to four applications are required for excellent results.

##### **Benefits**

- ✓ Rich in dissolved nutrients and amino acids which are easily obtainable for plants.
- ✓ Non-toxic and eco-friendly compound, which arrests the bacterial growth and forms protective layer for their survival and growth.
- ✓ Vermiwash at 5 to 10 percent dilution inhibits the mycelial growth of pathogenic fungi.
- ✓ It has the capacity to encounter worms thereby saving the plants and their productivity.
- ✓ As a foliar spray, it was reported to initiate flowering and lasting inflorescence.
- ✓ Used as a liquid fertilizer applied to the rhizosphere.

- ✓ No pathogen can survive in this fluid, thus protecting the earthworms from the diseases caused by pathogens.
- ✓ Acts as a plant tonic and thus helps in reducing several plant pathogenic fungi.
- ✓ Increases the rate of photosynthesis in crops or plants.
- ✓ Increases the number of micro-organisms in the soil which helps in decomposing soil organic matter.

▪ **Role of Vermiwash in sustainable crop production**

Vermiwash can be used as a potent biofertilizer to develop the germination and seedling survival rates in crop plants growing on nutrition depleted soils thus paving the way for sustainable agriculture using organic farming practices. It could be utilized efficiently for sustainable plant production at low input basis green farming. Vermiwash recorded significant growth and productivity in the black gram, natural growth supplement for tea, coconut and also horticultural crops.

**Cost of Vermiwash** – It varies from farmer to farmer. However, the farmer can sell Vermiwash at the rate of Rs. 50 per liter.

**Physio-chemical properties of vermiwash**

Parameter	vermiwash
pH	7.11
OC (%)	0.18
Total Nitrogen (%)	0.02
Available phosphate (ppm)	48.86
Total potassium (ppm)	245.67
Total Ca (ppm)	192.4
Total Mg (ppm)	142.53
Total Mn (ppm)	0.04
Total Fe (ppm)	2.21
Total Cu (ppm)	0.35
Total Zn (ppm)	0.03

Source: Ansari and Sukhraj (2010)

**Biochemical and microbiological properties of coconut leaf vermiwash (CLV)**

Biochemical constituents ( $\mu\text{g ml}^{-1}$ )	Indole acetic acid	Gibberellic acid	Total humic acid
CLV	0.52-1.15	0.23-1.61	100-142
Microbial population ( $\text{cfu ml}^{-1}$ )	Phosphate solubilizers	Free living nitrogen fixers	pseudomonas

CLV	$2 \times 10^2$	$15 \times 10^2$	$8 \times 10^2$
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Source: Gopal *et al.* (2010)

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