



Vermiwash: Use in Organic Farming for Sustainable Crop Production

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Article History

Received: 10. 03.2023

Revised: 18. 03.2023

Accepted: 24. 03.2023

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INTRODUCTION

Vermiwash is a liquid that is made when water goes through a column of worms. It is very useful as a spray for plants' leaves. It is made up of earthworm waste and mucus, as well as small amounts of nutrients from the organic molecules in the soil. If you collect vermiwash the right way, it will be a clear, pale yellow liquid. It has been reported to have excellent growth promoting effects besides serving as bio pesticide. Vermiwash is a watery extract of vermicompost, extracted in the presence of rich population of earthworms and contains several enzymes, plant growth hormones, vitamins along with micro and macronutrients which increases the resistance power of crops against various diseases and enhances the growth and productivity of crops. The increasing trend of abundant use of inorganic fertilizers along with herbicides and pesticides and exploiting available water resources etc., in the present agriculture system poses a great threat to the sustainability of our agro ecosystem. Under such situation it is essential to look for alternatives which are effective and eco-friendly. Vermiwash is coelomic fluid extraction contains several enzyme, plant growth hormones like cytokinins, gibberlines and vitamins along with micro and macro nutrients required for plant growth. Nitrogen is present in Vermiwash as mucus, nitrogenous byproducts, growth-stimulating hormones, and enzymes. The pH and electrical conductivity is higher in the vermicompost compared to the vermiwash. The nitrogen content is about 57% and potassium content is about 79.6% higher in the vermicompost as compared to the vermiwash. However, the phosphorous content is about 84% higher in the vermiwash as compared to the vermicompost. The vermiwash was 89.1% and 97.6% richer in Ca and Mg as compared to the vermicompost respectively. Furthermore, the vermiwash was 97.8% richer in sodium content compared to the vermicompost.

Vermiwash increases the disease resistant power of various crops. Suggested that, Vermiwash revealed potential application in sustainable development in agriculture biotechnology with respect to its origin, cost effectiveness, availability, reproducibility, reliability as well as bio pesticide and eco-friendly soil conditioner.

Production Techniques of Vermiwash

The basic principle of Vermiwash preparation is that worm worked soils have burrows formed by the earthworms. These burrows are inhabited richly by bacteria, also called as the drilospheres. Water passing through these burrows washes the nutrients from burrows to the roots and to be absorbed by the plants (Somani *et al.* 2008). In preparation of Vermiwash it takes around 40-50 days to get clear brown coloured liquid collected at the bottom of the barrel. Preparation of vermiwash (V/W) was prepared by the method standardized by Ismail (1997). A plastic tub of dimensions 100 x 100 x 100 cm was fitted

with a plastic gate-valve to facilitate drainage of eluates. The tub was filled to a height of 25 cm with gravel (2- 4"size) above which was placed a layer of coarse sand (30 cm) and garden soil (30 cm). Above the soil, a layer of shade dried and powdered cow dung was added. This was gently moistened with distilled water and the excess of water was drained off. The unit was moistened every day (80% moisture). To this, 250 adult earthworms (*L. mauritii*) were released. After sixteen days, eluates were collected every day by slowly pouring five litres of distilled water from the top. Slowly, the water moved through the compost and drilospheres, picking up nutrients from the newly formed castings and washings from the drilospheres as it went through the filter unit. Collected elutes were stored at 4°C and used for analyses the physico- chemical nutrient composition. The quality of vermiwash produced by earthworms depends on the vermicompost that is used (Sreenivas 2000).



Application

At the time and before spraying on any plants dilute vermiwash with water (10 percent) and drench the soil to prevent from soil borne diseases. Before transplanting, seedlings are dipped in vermiwash solution for about half an hour after diluting it with water (5 times). Mix vermiwash with cow urine and dilute it with water to use it as a pesticide and foliar spray (1 litre vermiwash+1 litre cow urine+8 litres water) or dilute with 10 percent cow urine or neem extract or garlic extract to use it as a natural biopesticide. It can be added to compost pits to hasten the degradation process.

Importance of Vermiwash

1. The vermiwash contains soluble plant nutrients like N, P, K, Ca and micronutrients, different hormones like cytokinins, auxin, different amino acids, vitamins, enzyme cocktails of proteases, amylases, urease and phosphatase, some other secretions, and many useful microbes like heterotrophic bacteria, fungi, actinomycetes, nitrogen-fixing bacteria like *Azotobacter* spp., *Agrobacterium*

2. Vermiwash can be used as a potent bio-fertilizer to develop the germination and seedling survival rate in crop plants growing on nutrition depleted soil thus paving the way for sustainable using organic farming practices.
3. Vermiwash is non-toxic and ecofriendly compound, which arrests the bacterial growth and forms a protective layer for their survival and growth. Vermiwash at 5-10 percent dilution inhibits the mycelial growth of pathogenic fungi.
4. Vermiwash plays an important role in the plant growth and development contribute to initiation of rooting, root growth, plant development, promotion growth rate and improvement in crop production increasing the soil organic matter and increase in nutrient content which are readily available for the plants, resulting in good crop yield.
5. Vermiwash and vermiprotein for wide use in agro-ecosystem, aquaculture and poultry.
6. Vermiwash is a very good plant tonic which can be used for foliar spray on vegetables indicated that quality and quantity of yield were improved markedly.
7. It also increases the number of micro-organisms in the soil which helps in decomposing soil organic matter (Tripathi *et al.*, 2005).
8. Vermiwash has the capacity to encounter worms thereby saving the crops and their productivity. It could be utilized effectively for sustainable plant production at low input basis green farming (Edwards *et al.*, 2004). It is a natural growth the supplement for tea, coconut and horticulture crops.
9. Organic formulations could be a potent source to move forward soil fertility (Verma *et al.*, 2017). Combination of vermicompost and vermiwash [VW+VC] recorded a significant influence on the biochemical characteristics of the soil with marked improvement in soil

micronutrients and better qualitative improvement in the physical and chemical properties of the soil (Ansari and Kumar, 2010). The soil treated with mixture of vermicompost and vermiwash had significantly improve soil physico-chemical properties comparison to unamended soil (Tharmaraj *et al.*, 2011).

CONCLUSION

The vermiwash proves to be an effective fertilizer which contributes the growth, yield of plants when sprayed directly as well as mixed with a definite ratio of fertilizer or manure. Vermiwash revealed potential application in organic farming for sustainable crop development in agriculture with respect to its origin, cost effectiveness, easily availability, time saving, reproducibility, reliability and Eco friendliness.

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