

# USE OF VERMIWASH IN THE FIELD OF AGRICULTURE

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## INTRODUCTION

Sustainable agriculture has become important in the present time owing to pollution and soil degradation. The use of organic manures and fertilizers and now days organic nutrients which are of biological origin is one of the important practices in this form of agriculture. Vermiwash is an organic nutrient obtained from units of vermicompost. It is rich in dissolved nutrients and amino acids and therefore, good source for plant nutrients in organic agriculture.

In recent years the use of organic nutrients viz. vermiwash, cow dung slurry, cow urine, panchagawya given in the form of foliar sprays and for drenching has gained importance. Vermiwash is an organic fertilizer obtained from units of vermiculture / vermicompost

in the form of drainage. The basic principle of vermiwash preparation is very simple. Earthworm worked soils have burrows formed by them called as drilosphere. Water that passes through these burrows washes the nutrients from these burrows to the roots to be absorbed by the plants. Different soluble plant nutrients such as N, P, K, Ca and micronutrients are the main nutrients present in vermiwash. Different types of hormones such as cytokinin's, auxin, different amino acids, vitamins, enzyme cocktails of proteases, amylases, urease and phosphatase, some other secretions and many useful microbes such as heterotrophic bacteria, fungi, actinomycetes including nitrogen fixing bacteria like *Azotobacter spp.*, *Agrobacterium spp.*, *Rhizobium spp.*, phosphate solubilizers are present in the vermiwash. Vermiwash is rich in dissolved nutrients and amino acids which are easily available for plants. It is also a non-toxic and ecofriendly compound, which arrests the

bacterial growth and forms a protective layer for their survival and growth. As a foliar spray, it was reported to initiate flowering and long-lasting inflorescence. It can also be used as a liquid fertilizer. It acts as a plant tonic and thus helps in reducing many plants pathogenic fungi. It increases the rate of photo synthesis in crops/plants. It also increases the number of micro-organisms in the soil which helps in decomposing soil organic matter.

Vermiwash is rich in dissolved nutrients and amino acids which are easily obtainable for plants. It is a non-toxic and eco-friendly compound, which arrests the bacterial growth and forms a 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. It can be 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. It acts as a plant tonic and thus helps in reducing several plant pathogenic fungi. It increases the rate of photosynthesis in crops or plants. It increases the number of micro-organisms in the soil which helps in decomposing soil organic matter.

The Vermiwash contains necessary plant nutrients, 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 some Phosphate Solubilising Bacteria (PSB)) in addition to the macronutrients and micronutrients. It can be used as a foliar spray as well as soil application whereby it acts as a pesticide and natural fertilizer for the crop plants in sustainable agriculture. Vermiwash is a part of Good Agriculture Practice (GAP).



# CHEMICAL PROPERTIES IN VERMIWASH

Sr. No.	Parameters	Value	Unit
1.	pH	7.42	-
2.	Ec	1.37	(dSm-1)
3.	Organic Carbon	0.008	(%)
4.	Nitrogen (N)	0.45	(%)
5.	Phosphorous (P)	1.31	(%)
6.	Potassium (K)	0.25	(%)
7.	Iron (Fe)	0.21	(ppm)
8.	Copper (Cu)	0.10	(ppm)
9.	Zinc (Zn)	0.77	(ppm)
10.	Magnesium (Mg)	1.33	(ppm)
11.	Manganese (Mn)	0.66	(ppm)
12.	Calcium (Ca)	4.00	(ppm)

## EFFECT OF VERMIWASH ON SOIL PROPERTY

Organic formulations can be a potent source to move forward soil fertility. Vermicompost and vermiwash combination recorded a significant influence on the biochemical characteristics of the soil with marked development in soil micronutrients and better qualitative improvement in the physical and chemical properties of the soil. Soil treated with a mixture of vermicompost and vermiwash had significantly improved soil Physio-chemical properties comparison to unamended soil.

## PREPARATION OF VERMIWASH COLLECTING UNIT

Use a plastic barrel/ drum with capacity to carry 20 liters for the vermiwash preparation. Provide a tap at the bottom of the barrel or made a whole at the bottom to collect the vermiwash. The followings steps to be followed for the vermiwash preparation:

A layer of the broken bricks of 10 cm thickness should be added at the bottom. A layer of stones of 10 cm thickness should be added. A layer of sand of 10 cm thickness should be

added. A layer of cow dung of almost 15 cm thickness should be added. 60-70 earthworm spp. *Eisenia foetida* should be added to the cow dung. 7-10 cm thick layer of the straw should be added on the top. 1 lit water should be added to the barrel daily for 20 days. After 20 days, a pot should be hung on the top of the barrel with the whole at the bottom. Add the water to the barrel drop by drop through the pots. A clear and transparent fluid will be obtained from the bottom of the barrel, which is called vermiwash. Collect it in a vermiwash collecting device.

## EXTRACTION OF VERMIWASH

Vermiwash extracted from the Vermiwash collecting device. The drops of water made the upper surface of vermiwash collecting device wet and moist. Earthworm started decomposing the dung present in the container and water sprinkled on the upper layer passes through the dung decomposed by the earthworm. The watery extract of vermicompost that means Vermiwash drained out of the drum and collected, drop by drop into the container or vermiwash collecting device.

A) Sprouted cutting by application of vermiwash



B) Vermiwash collection



## ROLE OF VERMIWASH IN CROP PRODUCTION

Vermiwash can be used as a organic nutrient for germination of seeds and seedling survival and also for growth of various cuttings 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 various plants. Vermiwash is a natural growth supplement for Tea, Coconut, Black pepper cuttings, Curry leaf cuttings, Piper betel cuttings and also for other horticultural crops.

## HOW TO USE VERMIWASH-

- **By Dipping-** Dip the seedlings and cuttings of the plants in Vermiwash solution for 15 to 20 minutes before transplantation or before planting. It gives good results in survival.
- **As a Foliar spray-** Dilute the Vermiwash with water as 10 % (100ml for 1ltr water), 20% (200ml for 2 lit water) and sprayed on the crops. It enriches the soil with nutrients and this helps in controlling plant disease.
- **By drenching-** Dilute the vermiwash with water and soil is drenched with the solution to prevent some of the soil-borne pathogens as it has anti-microbial properties.
- **As an organic manure-** Soil application enhances the nutrient uptake by the plants and thereby it acts as a natural fertilizer for the crop.
- **As A growth promoter -** Vermiwash alone is an excellent growth promoter and also use as a foliar spray. Three to four applications of vermiwash are required for excellent results.



## BENEFITS OF VERMIWASH IN AGRICULTURE-

- It is a biofertilizer or an ecofriendly natural fertilizer which is completely organic and is obtained from degrading the organic wastes. It is free from the chemicals.
- Vermiwash acts as a plant tonic and helps to reduce several plant diseases.
- 10% Vermiwash (100ml/1ltr water) acts as biopesticide and liquid manure. It improves the physico-chemical properties of the soil such as soil texture and soil aeration. Because of the organic matter present in the vermiwash is high, it leads to improvement in the water holding capacity of the soil.
- As it promotes the sprouting and root growth of the cuttings.

## CONCLUSION:

For sustainable agriculture we need to follow organic methods in agriculture. Vermiwash, this will prevent the usage of some of the agrochemicals because Vermiwash can act as a plant growth enhancer and as a foliar spray. *Eisenia foetida* is the species of the earthworms used in the vermiwash preparation. It is a colemic extraction which contains many macronutrients, micronutrients and vitamins. It contains many enzymes and plant growth hormones such as gibberlins and cytokinin etc. It contains potassium, calcium, iron, zinc, manganese, copper; nitrogen etc. As vermiwash seems to possess an inherent property which acts as plant booster. It can be used as an effective input in organic agriculture from nursery stage till disease and pest management.

