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## Chemical analysis of vermiwash (sp. *E. foetida*)

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**Abstract**

The experiment was conducted to study the effect of different concentrations of vermiwash on survival and growth of black pepper cuttings. With six treatments and four replications. Trial showed effectiveness of vermiwash on various growth factors of black pepper. It is observed that growth parameters were significantly influenced by vermiwash drenching as compare to control. Chemical analysis of vermiwash revealed that vermiwash is a transparent pale yellow liquid bio fertilizer. It is a collection of excretory products of earthworms along with major micronutrients of the soil and soil organic molecules that are useful for plants. This bio-liquid is rich in nutrients and plant growth hormones.

**Keywords:** Vermiwash, cuttings, analysis

**Introduction**

Black Pepper is one of the oldest spice in the world. The history of black pepper in India dates back to the prehistoric times. Black pepper was referred as "black gold" in ancient India, due to its high trade value. Botanically it is *Piper nigrum* L. which belongs to family piperaceae. It is originated from Western Ghats of India. Black Pepper is valued for its pungency and flavour which is attributed by the alkaloid piperine and the volatile oil. (Ravindran *et al.*, 2000) [1]. The essential oil present in black pepper was used extensively since ancient time and is utilized in different ways in modern India as well. Black pepper is cultivated to large extent in Kerala, Karnataka and Tamil Nadu whereas in Maharashtra cultivated on small scale.

Besides medicinal usages, black Pepper was also used for serving other purposes in ancient India. Pepper is valued for its pungency and flavour, which is attributed by the alkaloid piperine and the volatile oil. (Ravindran *et al.*, 2000) [1] The essential oil present in black pepper was used extensively in ancient times and is utilized in different ways in modern India, as well. The oil is produced from the steam distillation of the dried and crushed black pepper corns and is considered as anti-septic, analgesic, digestive, anti-catarrhal, and diuretic, stimulant, bactericidal, expectorant and a tonic. Black pepper is used as a mental stimulant, helps to increase stamina and aid alertness. It can be used to help increase concentration and prevent memory loss.

Earthworms play a vital role in plant growth. It is a quite possible to effect quick change over for sustainable agriculture by harnessing brand new vermicompost technology to the soil. In recent times, the commercial vermin culturists have started promoting a product called vermiwash. This vermiwash would have enzymes, secretions of earthworms which would stimulate the growth and yield of crops and even develop resistance in crops receiving this spray. Such a preparation would certainly have the soluble plant nutrients apart from some organic acids and mucus of earthworms and microbes (Shivsubramanian and Ganeshkumar, 2004) [2].

Vermiwash is a transparent pale yellow liquid bio fertilizer. It is a mixture of excretory components and mucous secretion of earthworms and organic micronutrients of soil which may be promoted as a potent fertilizer for better growth and yield of plants (Yadav *et al.*, 2005) [3] also vermiwash is a liquid fertilizer collected after the passage of water through a column of worm activation. It is a collection of excretory products of earthworms along with major micronutrients of the soil and soil organic molecules that are useful for plants. This bio-liquid is rich in nutrients and plant growth hormones (Nath *et al.*, 2009) [4]. vermiwash is nutritive fluid filtered through body of earthworms which promotes growth and works as organic pesticides (Sinha *et al.*, 2009) [5].

The growth of black pepper cuttings is very slow at nursery stage, hence, they do not attain appropriate size at the planting and selling time. This leads to heavy mortality after planting. Hence, the present study was undertaken to achieve rapid growth of cuttings by drenching vermiwash at nursery stage so that they will attain appropriate size i.e. height at the time of planting in the field as well as at the selling time.

### Material and methods

An investigation was carried out to study the "Effect of different concentrations of vermiwash on survival, and growth of black pepper cuttings (*Piper nigrum* L.)" at the Department of Horticulture, College of Agriculture Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli and Dist. Ratnagiri during the period 2018-2019. Under Randomized Block Design (RBD) with six treatments and four replications. Fifty cuttings per treatment were used. Size of a polybag 4"×8" and growing media used soil: compost (3:1). Cuttings were pretreated with bavistine (2gm/1lit. Treatments were T1: Vermiwash 10% drenching, T2: Vermiwash 20% drenching, T3: Vermiwash 30% drenching, T4: Vermiwash 40% drenching, T5: Vermiwash 50% drenching, T6: Control (no drenching).

### Assay of physiochemical parameters in vermiwash

The various physicochemical parameters such as pH, Electric conductivity, Organic carbon by using standard methodologies.

### Analysis of macronutrients and micronutrients present in vermiwash

Vermiwash have higher content of macro and micro nutrients like nitrogen, phosphorous, potassium, calcium, sodium, magnesium and micronutrients like iron, copper, zinc respectively.

N was determined by alkaline potassium permangnet method, P by Brays no.1 method, K was determined by flame photometer method, Ca and Mg by versanet titration method, organic carbon was determined by walkely and black wet oxidation method, and Fe, Mn, Zn by atomic absorption spectrometer method.

### Extraction of Vermiwash

Vermiwash is collected from well maintained vermicompost unit. From the species *E. foetida*. Vermiwash extracted through vermiwash collecting device which is made up of plastic or metals drum. The watery yellowish to black extract of vermicompost, vermiwash drainage out off drum. After 1 to 2 days the process of extraction has been completed. The vermiwash were used for chemical analysis.

### Result and discussion

**Table 1:** Analysis of vermiwash sample used for drenching of black pepper cuttings.

Sr. No.	Parameter	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)

### Chemical analysis

The vermiwash sample used for trial contains pH (7.42), Ec (1.37 dSm-1), Organic Carbon (0.008%), Nitrogen (N) (0.45%), Phosphorous (P) (1.31%), Potassium (K) (0.25%), Iron (Fe) (0.21%), Copper (Cu) (0.10 ppm), Zinc (Zn) (0.77 ppm), Magnesium (Mg) (1.33 ppm), Manganese (Mn) (0.66 ppm), Calcium (Ca) (4.00 ppm).

Vermiwash contains nitrogen, phosphorus and potassium, which play role in plant growth functions viz., cell enlargement, greater photosynthesis activity, formation of carbohydrates, translocation of solutes (Hiradeve *et al.*, 2011)<sup>[6]</sup>. In chemical analysis of vermiwash macro and micro nutrients were considerably high this is useful in various growth factors of black pepper cuttings.

This is an analysis of pure vermiwash which was collected directly from vermicompost unit and in trial vermiwash treatments were applied by mixing water. The treatments were T1: Vermiwash 10% drenching, T2: Vermiwash 20% drenching, T3: Vermiwash 30% drenching, T4: Vermiwash 40% drenching, T5: Vermiwash 50% drenching and T6: Control (no drenching). Treatment T5 contains more vermiwash concentration as compare to other treatments and

in T6 there was no vermiwash concentration. The growth regulators, macro and micro molecules were highest in T5 but treatment T4 (vermiwash 40% drenching) shows the good results over the growth parameters of black pepper cuttings. The high dose of vermiwash (vermiwash 50% drenching) may not be suited for the growth of pepper cuttings. C

### Conclusion

Vermiwash sample used for the trial contains good amount of macro and micro nutrients which plays a very important role in the growth factors. Our present study suggests that, vermiwash revealed potential application in sustainable development in agriculture with respect to biopesticide and ecofriendly soil conditioner.

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