

## LIQUID ORGANIC MANURES ON GROWTH OF LETTUCE (*LACTUCA SATIVA*) IN A STERILIZED COIR DUST MEDIUM

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### Introduction

The current global scenario firmly emphasizes the need to adopt eco-friendly agricultural practices for sustainable food production. The cost of inorganic fertilizers is increasing enormously to an extent that they are out of reach of small and marginal farmers. The Vermiwash, Panchagavya and Jeevamrutha are ecofriendly organic preparations made from on-farm inputs.

Vermiwash, Panchagavya and Jeevamrutha have been widely reported to have a more positive effect on plant growth and plant health than conventional compost (Chhonkar, 2002; Chandra and Chauhan, 2004; Tandon, 1992; Kalembasa and Deska, 1998). Vermiwash is an indispensable part of vermicompost, which is a watery extract of earthworms. It is basically a combination of secretion and wash of earthworms, present in the medium. It is a nutrient rich liquid produced by earthworms, feeding on organic waste material and plants residues. It is also non toxic and ecofriendly, which arrests bacterial growth and. Jeevamrutha is important

to provide a congenial environment to microorganisms that help in making available the essential nutrients for plant growth and multiplication of microbes (Birendra and Christopher, 2007). Panchagavya, an organic product has the potential to play the role of promoting growth and providing immunity in plant system (Raghavendra *et al.*, 2014).

The aim of this work was to evaluate the influence of Vermicompost, Panchagavya and Jeevamrutha on seed germination and plant growth of lettuce grown in plant house.

### Methodology

Pot and laboratory experiments were conducted in plant house and Biology laboratory at Uva Wellassa University during mid January to mid May 2014 using lettuce (*Lactuca sativa*) as the planting material.

### Preparation of organic fertilizers: Vermiwash, Jeevamrutha and Panchagavya

For vermicomposting 5 Gallon plastic bin was used. First empty bin was taken and 2-3" Gravel layer, 3" of top

soil layer and 3" of cow dung layer were kept orderly. Then *Eisenia fetida* earthworm culture was kept. Wild sunflowers were shredded and laid at top of the *Eisenia fetida* cultures. A tap was fixed on the lowest side of each bucket. The bucket was placed on a stand to facilitate collection of vermiwash according to the method described by Kale (1998).

Panchagavya was prepared following the procedures outlined by Pandurang Vaman Kane, 1941. It contained fresh cow dung - 0.5 kg; cow urine - 1.0 L; cow milk - 7.0 L; curd - 1.0 L; ghee - 1.0 L and coconut water - 1.0 L. These ingredients were taken in a 25.0 L concrete pot, mixed well and allowed to stand in shade for 21 days with intermittent stirring. After 21 days, the preparation was ready to use. Panchakaavya at 3 % was used as foliar application for lettuce.

To prepare Jeevamrutha, 200 L water, 10 kg cow dung, 5L Urine, 2 kg jaggery, flour of dhal and one handful of soil were mixed together and stored it in shade for 4-5 days.

Lettuce seeds were sown in trays (10"×20") using sterilized coir dust medium. Thirty seeds per each treatment sown in plastic trays and 10 ml of prepared vermiwash, Jeevamrutha and Panchagavya were injected to coir dust medium twice per

day. pH of the initial medium, germination percentage and seedling height were recorded. Twenty number of healthy and vigorous lettuce seedling were selected for each treatment and transplanted in plant house after 14 days. Lettuce seeds were sown in black plastic pots (14 cm, vol. 1.2 L) using sterilized coir dust as growing substrate. Each day, 200 ml of organic fertilizer was added. Four treatments were used as T1: application of vermiwash, T2: application of panchagavya, T3: application of Jeevamurtha and T0: without adding any organic fertilizer/ unfertilized substrate. Experiment was laid in Completely Randomized Design (CRD). Each treatment was consisted with 20 replicates. After 45 days, number of leaves per plant, plant height and dry weight recorded. Data was analyzed through Minitab 14 software. Mean comparison was done using Tukey test.

### Results and Discussion

According to the Table 1, the highest germination percentage (80 %) was recorded in control treatment and treatment 3. The lowest germination (73.3 %) was recorded in T1 treatment. Significantly the highest seedling height ( $2.7 \pm 0.53$ ) was recorded in treatment 3. pH 5.3 to 5.8 is considered as optimum pH to cultivate lettuce. Treatments consist pH in that ranges with higher germination ability.

Table 1: Effect of Vermiwash, Jeevamrutha and Panchagavya on the growth of lettuce seedlings

Treatment	pH of Initial Mixture	Germination %	Seedling height (cm)
T0:Control	5.5	80	1.9 <sup>b</sup>
T1:Vermiwash	7.32	73.3	2.3 <sup>ab</sup>
T2:Jeevamrutha	5.82	76.7	2.2 <sup>ab</sup>
T3:Panchakaavya	5.32	80	2.7 <sup>a</sup>

\*Different superscripts along the column are significantly different at  $p < 0.05$ .

Table 2 shows that the lettuce seedlings planted in Panchagavya recorded the highest number of leaves ( $24.3 \pm 0.29$ ). Significantly the highest plant height was recorded in treatment 1 ( $31.5 \pm 0.40$  cm) and treatment 3 ( $32.72 \pm 0.34$  cm). Highest dry weight ( $0.74 \pm 0.3$  g) was resulted in treatment 3 at 5 % of significant level where Panchagavya used as growth medium.

Table 2: Effect of Vermiwash, Jeevamrutha and Panchagavya on the growth of lettuce plants

Treatment		Plant height (cm)	Dry weight (g)
T0:Control	18.55 <sup>b</sup>	24.4 <sup>b</sup>	0.35 <sup>ab</sup>
T1:Vermiwash	22.45 <sup>b</sup>	31.5 <sup>ab</sup>	0.57 <sup>b</sup>
T2:Jeevamrutha	21.8 <sup>b</sup>	29.7 <sup>ab</sup>	0.45 <sup>b</sup>
T3:Panchakaavya	24.3 <sup>a</sup>	32.72 <sup>a</sup>	0.74 <sup>a</sup>

\*Different superscripts along the column are significantly different at  $p < 0.05$ .

Note: Measurements were taken at the harvesting stage

According to Table 2, dry weight of lettuce given in Panchagavya was 47 percent higher than the control treatment. Higher nitrogen concentration in growing media was positively reflected in plant height and dry weight. Presence of macro (N, P, K and Ca) and micro (Zn, Fe, Cu, Mn) nutrients besides total reducing sugars (glucose) were observed in Panchagavya. Chemolithotrops and autotrophic nitrifiers (ammonifiers and nitrifiers) present in panchagavya which colonize in the leaves increase the ammonia uptake and enhance the total N supply (Beulah *et al.*, 2002). Kalarani (1991) reported that the action of the growth regulators in the plant

system stimulated the necessary growth and development in plants and better yield. The preparation of Panchagavya includes coconut water, which contains kinetin which increases the biomass and yield (Mamaril and Lopez, 1997). According to these reasons significant increment in growth can be seen in Panchagavya treated plants.

### Conclusions

Application of Panchagavya was found to be most effective liquid manure compared to jeevamurtha and vermicompost on growth of lettuce (*Lactuca sativa*) in a sterilized coir dust medium. Significantly, it increased the germination percentage, seedling

height, number of leaves per plant, plant height and dry weight of lettuce plant. Further research is needed to investigate microbial and chemical analysis of above liquid organic manures.

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