Quantification of micro and macro nutrients from different types of vermiwashes

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QUANTIFICATION OF MICRO AND MACRO NUTRIENTS FROM DIFFERENT TYPES OF VERMIWASHES

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ABSTRACT

Vermiwash is a liquid fertilizer used as foliar spray collected after the passage of water through a column of worm activation. The mixture of vermiwash with diluted urine of cow can be treated as pesticide on certain horticultural crops. In the present work four plastic containers of 15 liters capacity were selected. The partially decomposed cow dung was uniformly filled in the entire vessel about 10kg. After the introduction of earthworms, the vermiwash was collected as 20th day and 30th day for the all the experiments. Result indicates that 20th day vermiwash collection shows higher nutrient value than the 30th day vermiwash and control level. The macro nutrients such as Nitrogen (0.42%), Phosphorous (0.30%), Potassium (1.82%) and micro nutrients such as Zinc (1.44 ppm), Copper (0.08 ppm), Iron (4.82 ppm), Manganese (3.03 ppm) were observed in control. The vermiwash of Lampito mauritii have more macro and micro nutrients than the control. The observed values such as Nitrogen (0.52%), Phosphorous (0.35%), Potassium (0.70%) and micro nutrients such as Zinc (1.69 ppm), Copper (1.04% ppm ), Iron (5.69 ppm), Manganese (3.16 ppm). The vermiwash of Eudrilus eugeniae shows similar results like L.mauriti. The macro nutrients such as Nitrogen (0.42%), Phosphorous (0.30%), Potassium (1.82%), and micro nutrients such as Zinc (1.82 ppm), Copper (1.12 ppm), Iron (6.22 ppm), Manganese (3.51 ppm). The vermiwash of Eisenia foetida shows very low nitrogen when compared with other vermiwashes while the phosphorous value is marginally higher than other vermiwashes. The study was carried out to find the exact amount of macro micro nutrients of various vermiwash as for sustainable development of plant growth was using different composting earthworms namely Lampito mauritii, Eudrilus eugeniae and Eisenia foetida.

KEY WORDS: Lampito mauritii, Eudrilus eugeniae, Eisenia foetida and Vermiwash.
**INTRODUCTION**

Vermiwash is an excellent growth promoting factor besides serving as biopesticide. Vermiwash is a brown colored liquid also collected after the passage of water through a column of worm action and is very useful as a foliar spray. This liquid partially contains water wash from the body of earthworms and vermicompost. In recent days the vermiwash is used as liquids manure. Vermiwash includes collection of excretory products and mucus secretion of earthworms along with micronutrients from the soil. These are transported to the leaf, shoots and other parts of the plants in the natural ecosystem. Vermiwash actually increase the chlorophyll content of the leaves of Red amaranth (*Amaranthus cruentus*) and Capsicum (Berova and Karanatsidis, 2009). Vermiwash is rich in aminoacids, vitamins, nutrients like nitrogen, potassium, magnesium, zinc, calcium, iron and copper and some growth hormones like “auxins” “cytokins”. It also contains plenty of nitrogen fixing and phosphate solubilizing bacteria of nitrogen nitrosomonas and Actinomycetes. It has the capacity to receive even a dying plant. Vermiwash was very effective for foliar application in nurseries. Plants treats with vermiwash are green much more resistant to pests and disease and also more vigorous in growth many agricultural industries use compost and vermiwash to grow plant by this vermitechnology. This kind of organic farming helps to provides many advantages such as eliminate the use of excessive chemical in the form of fertilizers / pesticides to improve soil texture.

**MATERIALS AND METHODS**

**Collection of animals:**

The exotic epigeic earthworm species such as *Eudrilus eugeniae* and *Eisenia foetida* were obtained from a farm in Periyar Maniyammai College at Thanjavur. While the *Lampito maruitii* was collected from a field in Kottur village near Aduthurai.

**Preparation of vermiwash:**

In the present work four plastic containers of about 15 liters capacity were selected. Then 10 kg of partly decomposed cow dung was uniformly filled in the entire vessel. Among the four A was kept as control. The 100 matured earthworms *Lampito mauritii* was introduced into a B container. Where us 100 matured worm of *Eudrilus euginae* were introduced into C container and finally the 100 matured worms *Eisenia foetida* were introduced into a D vessels.
Collection of vermiwash:

The water was sprinkled everyday to maintain the moisture content about 75-80% and temperature at 25° C. Initially the vermiwash was collect on 20th day. Then sealed the bottom of the vessels. Every day the water was sprinkled over and it extends upto 30th day. The opening seal was made collected the vermiwash. The collected vermiwashes were stored in a tightly closed container and analyzed for macro and micro nutrients levels. 4 different samples of vermiwash was collected from all the four containers on 20th day and 30th day.

Analysis of macro and micro nutrients:

The vermiwash obtained from L. mauritii, E. euginae, E. foetida, macro nutrients such as nitrogen, phophorous, potassium and micro nutrients such as zinc, copper, iron and manganese were also estimated in the above samples at soil testing laboratory Indian Rice Research Institute, Aduthurai at Thanjavur. Results were tabulated and compared for their macro and micro nutrients.

Table : 1 Macro and micro nutrient values of vermiwash obtained from L. mauritii, E. eugeniae, E. foetida after a period of 20 days.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameters</th>
<th>Control</th>
<th>L. mauritii</th>
<th>E. eugeniae</th>
<th>E. foetida</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Nitrogen(%)</td>
<td>0.42± 0.008</td>
<td>0.52 ± 0.007</td>
<td>0.5 ± 0.005</td>
<td>0.02 ± 0.010</td>
</tr>
<tr>
<td>2</td>
<td>Total Phosphorous (%)</td>
<td>0.3 ± 0.007</td>
<td>0.35 ± 0.006</td>
<td>0.34 ± 0.007</td>
<td>0.52 ± 0.02</td>
</tr>
<tr>
<td>3</td>
<td>Total Potassium (%)</td>
<td>1.82 ± 1.02</td>
<td>0.7 ± 0.02</td>
<td>0.72 ± 0.01</td>
<td>0.58 ± 0.05</td>
</tr>
<tr>
<td>4</td>
<td>Zinc(PPM)</td>
<td>1.44 ± 1.05</td>
<td>1.69 ± 1.04</td>
<td>1.82 ± 1.02</td>
<td>0.03 ± 0.08</td>
</tr>
<tr>
<td>5</td>
<td>Copper(PPM)</td>
<td>0.08 ±0.013</td>
<td>1.04 ± 1.02</td>
<td>1.12 ± 1.10</td>
<td>0.06 ± 0.003</td>
</tr>
<tr>
<td>6</td>
<td>Iron (PPM)</td>
<td>4.82 ± 1.03</td>
<td>5.69 ± 1.02</td>
<td>6.22 ± 1.03</td>
<td>3.19 ± 1.002</td>
</tr>
<tr>
<td>7</td>
<td>Manganese(PPM)</td>
<td>3.03 ± 1.02</td>
<td>3.16 ± 1.07</td>
<td>3.51 ± 1.07</td>
<td>0.04 ± 0.007</td>
</tr>
</tbody>
</table>

Data are means ± SD ; for 5 samples
Fig.1: The nutrient content of vermiwash on *L. mauritii*, *E. eugeniae*, *E. foetida* on 20 days.

Table : 2 Macro and micro nutrient values of vermiwash obtained from *L. mauritii*, *E. eugeniae*, *E. foetida* after a period of 30 days.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameters</th>
<th>Control</th>
<th><em>L. mauritii</em></th>
<th><em>E. eugeniae</em></th>
<th><em>E. foetida</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total Nitrogen (%)</td>
<td>0.42 ± 0.009</td>
<td>0.61±0.008</td>
<td>0.58±0.005</td>
<td>0.08±0.10</td>
</tr>
<tr>
<td>2</td>
<td>Total Phosphorous (%)</td>
<td>0.30±0.008</td>
<td>0.41±0.003</td>
<td>0.40±0.002</td>
<td>0.64±0.004</td>
</tr>
<tr>
<td>3</td>
<td>Total Potassium (%)</td>
<td>1.82±0.13</td>
<td>0.74±0.005</td>
<td>0.76±0.004</td>
<td>0.48±0.009</td>
</tr>
<tr>
<td>4</td>
<td>Zinc (PPM)</td>
<td>1.44±1.07</td>
<td>1.54±1.06</td>
<td>1.66±1.08</td>
<td>0.01±0.007</td>
</tr>
<tr>
<td>5</td>
<td>Copper(PPM)</td>
<td>0.08±0.001</td>
<td>1.02±0.01</td>
<td>1.09±0.02</td>
<td>0.03±0.08</td>
</tr>
<tr>
<td>6</td>
<td>Iron (PPM)</td>
<td>4.82±1.02</td>
<td>4.32±1.04</td>
<td>5.02±1.01</td>
<td>2.49±1.09</td>
</tr>
<tr>
<td>7</td>
<td>Manganese(PPM)</td>
<td>3.03±1.02</td>
<td>2.13±1.01</td>
<td>2.24±1.02</td>
<td>0.02±0.009</td>
</tr>
</tbody>
</table>

(Data are means ± SD ; for 5 samples)
Fig. 2: The nutrient content of vermiwash on *L. mauritii*, *E. eugeniae*, *E. foetida* on 30 days.

### RESULTS

Vermiwash contains a collection of excretory products and excess secretion of earthworms along with micronutrients from soil and digested organic matter or molecules. As the main substrates inserted in the waste is of rich source of micro and macro nutrient resultant complex materials can easily broken by secretary enzymes of earthworms. The nutritional parameters were observed in the present study includes total nitrogen, total phosphorous, total potassium, zinc, copper, iron, manganese in the vermiwash obtained from cow dung and leaf litter by using three types of earthworm species during a period of 20 and 30 days. The table 1 shows the nutritional values of 3 different earthworm species. The value of total nitrogen in control was 0.42 which was increased to 0.53, 0.50 but in *Eisenia foetida* values are reduced to 0.02. Total phosphorous in control was 0.30 which was increased to 0.35, 0.34, 0.56 total potassium in content was 1.82 which was greatly decreased to 0.70, 0.72, 0.58. Micro nutrients such as zinc in control were 1.44 ppm. Which was increased to 1.69, 1.82 ppm but *E. foetida* values was decreased to 0.03 ppm. Copper in control was 0.08 ppm which was increased to 1.04, 1.12 ppm but *E. foetida* decrease the value 3.19 ppm manganese control was 3.03 which was increase the value of 3.16, 3.51 but reduced into 0.04 ppm in the vermiwash of *E. foetida*. After 30 days of vermicomposting collection of vermiwash and its analysis was presented in the table 2. Total nitrogen in control was 0.042 which was increased to 0.61, 0.58 but in *Eisenia foetida*
showed reduced value of 0.08. Total phosphorous in control was 0.30. Which was increased to 0.41, 0.40, 0.64. Total potassium in control was 1.82 which decreased to 0.74, 0.76, 0.48. Micronutrients zinc to 1.54, 1.66 ppm but reduced into 0.01 ppm in the vermiwash *E. foetida*. The copper control was 0.08 ppm which was increased to 1.02, 1.09 but reduced into 2.49 ppm in the vermiwash. *E. foetida* from control was 4.82 ppm which was increased to 4.32, 5.02 ppm but reduced into 2.49 ppm in the vermiwash *E. foetida* manganese control was 3.03 ppm, which was decreased to 2.13, 2.24 ppm but reduced into 0.02 ppm in the vermiwash *E. foetida* respectively. Result indicates that 20th day vermiwash collection was higher nutrient value than the 30th day vermiwash and control level.

**DISCUSSION:**

The vermiwash was much darker in colour than originally and had been processed move or less into heterogeneous. Mixture after 20 and 30 days of earthworms activity. Total nitrogen content was increased in between initial (0.42) and *Lampito mauritii* 0.52, *E. euginea* 0.50, *E. foetida* 0.02 final products of different vermiwash because of mineralization of organic matter (Tabel 1 and 2) Hand et al., (2008) have been already reported that *E. foetida* and *E. eugeniae* in cow dung slurry increased the nitrate nitrogen content losses of organic carbon might be responsible for nitrogen addition in the form of mucus nitrogenous excretory substances, growth stimulatory hormones and enzymes from the gut the earthworm. These nitrogen rich substances were not originally present in feed and might have contributed additional nitrogen content. Total phosphorous was greater in final vermiwash than initial vermiwash. The micro nutrient such as zinc, copper, iron, manganese level was increased in these vermiwash followed by table 1,2. The treatment vermiwash was highly significant with improvement soil quality. It is more effective source in the micro nutrients content. The present study also shown that zinc, copper, iron, manganese nutrient level were increased in *L. mauritti* and *E. eugeniae* compared to the control but reduced in the vermiwash of *E. foetida*. The chemical fertilizers and pesticides contain heavy toxic substances. It affects the living organism through food chain. The vermiwash approach is a best approach for development. It gives more crop production without any side effects.

**CONCLUSION:**

The chemical fertilizers and pesticides contain heavy toxic substances and remains for a longer duration. Affects the living organisms through food chain. The vermiwash approach is a
best approach for development. It gives more crop production without any side effects. Macro and micro nutrients are essentially required for plants, for their normal growth & propagation. According to Lalitha et al., 2000 application of organic fertilizers have an emphatic effect on plant growth and production. The soil enriched with vermiwash provides additional substances that are not found in chemical fertilizers (Ansari and Ismil 2009).

REFERENCES:


