



Short Communication

Utilization of vermiwash potential against insect pests of tomato

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Abstract

Vermiwash is brownish red coloured liquid obtained from the body of earthworm containing excretory products, mucus and soil micronutrients collected after passing water through column of worm action. It is used as spray on tomato plants for controlling insect pests. Our study examines the effect of vermiwash on the pest infestation (at 20%, 30%, 40% and 50% concentration of vermiwash) on the tomato plants. Vermiwash caused significant reduction in pest infestation of tomato crop. In order to evaluate the impact of vermiwash (at 20%, 30%, 40% and 50% concentration of vermiwash) in suppressing insect pests of tomato, a field experiment was conducted. The vermiwash concentration 20% and 30% solutions were less effective as compared to 40% and 50% solutions against insect pest of tomato.

Keywords: Vermiwash, Bio-pesticides, Pest, Vegetables, Earthworm.

Introduction

Tomato (*Lycopersicon esculentum* L) the most important nutritious plant is considered as the king of Vegetables. The tomato is widely grown vegetable crop all over the world. Tomatoes are very rich source of vitamin A and C. Vitamin A plays vital role in cell division and differentiation, re-epithelization of gut, respiratory and urinary tracts. Vitamin A boosts body's immune system and helps to regulate bone growth. Vitamin C, on the other hand participates in collagen formation. Collagen, basic structural protein in turn provides structural integrity to cartilages, muscles, bones and blood vessels¹.

The tomato plant is attacked by number of insect pests and which reduces its yield and fruits quality. A number of chemical pesticides are available in market for the control of pest of vegetables. However their indiscriminate use has created the problems of air, soil and water pollutions, development of resistance in target insect pest and serious health hazards due to the toxicity of their residues. Efforts are being made for finding alternatives to chemical insecticides to overcome these problems.

Vermiwash, a liquid fertilizer filtered through the body of earthworms and obtained by passing water through natural column of earthworm action. Vermiwash is an excellent bio-fertilizer and improves soil fertility and plants' quality. The vermiwash of municipal solid wastes is full of organic matter, plant nutrient and soluble salt which increase the soil nutrient and moisture content^{2,3}. Vermiwash is more toxic against survival of insects pest, eco-friendly, non-hazardous, less expensive and easily pre-parable. The use and application of potent plant pesticide with vermiwash is the best alternative of chemical fertilizer and pesticides⁴.

Materials and methods

Experimental plant material: The experimental plant material was used in the present investigation is tomato (*Lycopersicon esculentum* L) Var. Vaishali, which is extensively, cultivated in and around Bhende village Tal newasa dist- Ahmednagar. Tomato crop were raised in the experimental fields employing conventional cultural practices. The field was marked into several small plots of 5 X 5 m size. Seedlings were provided with uniform agricultural practices and reared uniformly. Vermiwash was screened for insecticidal activity against tomato insect pests.

Common pests found on tomato: Some important insect pest of tomato plants are *Spodoptera exiava* (tomato army worm), *Circulifer tenellus* (Leaf hopper), *Agrotis ipsilon* (Cut worm), *Epitrix nirtipennis* (flea beetles), *Myzus persicae* (aphids), *Helicoveria zea* (Fruitworm), *Keiferia lycopersicella* (Pinworm), and *Autographa californica* (loopers).

Method of preparation of vermiwash: A vermiwash unit was designed as per Ismail with few modifications⁵. For the preparation of vermiwash select plastic container of 15 to 20 liters capacity.

The base of container is fixed with a tap. Fill the container with the layer of medium size (marble size) stones up to height of 10-15 cm at the base. Above the base layer, place a layer of pre-decomposed organic wastes of 40-45 cm, then a layer of cow dung 20 -25cm thick and soil and composting of 10 cm. All the layers of container were moistened with water. Introduce about 2000 to 2500 earthworms (*Eisenia fetida*) into the container. Pour the container with 4-5 L water daily. The water should be

poured slowly. Everyday about 2-3 L of vermiwash can be collected. The unit was produce good quality vermiwash after ten days.

Tomato seedlings were planted repeatedly, on large scale, in the experimental fields, during different seasons, to raise tomato crop. The experimental field was marked into several small plots of 5 X 5 m size. Out of these one will be used as a control plot, where the tomato plants are neither sprayed with vermiwash nor with any commercial insecticides. The magnitude of insect pests thriving on these tomato plants, serve as a reference or control to compare with the magnitude of insect pests present on other tomato plants after spraying with vermiwash . The other plots were used as experimental plots where the tomato plants were sprayed with vermiwash.

The intensity of insect pests present on these experimental plots after two sprays at interval of two days with various concentration of vermiwash (at 20%, 30%, 40% and 50% concentration) was assessed. This would aid us in checking the effect of vermiwash on controlling different tomato pests. The experiment was repeated several times and the data was collected.

Result and discussion

In order to evaluate the impact of vermiwash (at 20%, 30%, 40% and 50% concentration) in suppressing insect pest of tomatoes a field experiment was conducted. Results obtained after the treatment with vermiwash on tomato plants are shown in Table-1. Vermiwash were found to be very effective and showed 100% mortality or inactive the various pests of tomato after spraying for 3 to 4 days. This study indicates that the vemiwash effectively inhibited the tomato pest. Table-1: showed the biological evaluation of tomato pest after the

treatment of various concentrations with vermiwash. In order to evaluate the impact of vermiwash (at 20%, 30%, 40% and 50% concentration of vermiwash) in suppressing insect pests of tomato, a field experiment was conducted. The vermiwash concentration 20% and 40% solutions were less effective as compared to 40%and 50% solutions.

Vermiwash is brownish-red liquid organic fertilizer that comes from the body of earthworm. It is rich in amino acids, enzymes, vitamins, and other micronutrients. The presence of nitrogen-fixing and phosphate solubilising bacteria. Vermiwash acts as growth promoter and pesticide^{6,7}. The vermiwash significantly reduces arthropods pests in tomato. Spray of vermiwash is effective against pests and diseases⁸. Also, it significantly reduced the use of chemical pesticides and insecticides on vegetable crops^{9,10}.

Conclusion

The proposed investigation was of help in finding out alternate ways of controlling pests. From the above, it can be concluded that the pest attacking in tomato plants can be suppressed by vermiwash. The plots sprayed with 40% and 50% concentration of vermiwash showed significant decrease of pest population. The plots spray with 20% and 30% concentration proved moderately effective against the pest of tomato. This has also helped in bio-controlling of pests without harming the environment. This was of help in production of low cost, environment friendly and effective Bio-pesticides which can be locally produced even by the end users (farmers). These bio-pesticides are less harmful than conventional pesticides. They are cheap and effective in controlling agricultural pests and indicate that vermiwash have great potential as an alternative strategy to pesticides for vegetable pests.



Figure-1: Earthworm- *Eisenia fetida*.



Figure-2: Field View of Tomato Plants.

Table-1: Evaluation of Tomato Pest after the Treatment of various concentration of vermiwash

Tomato Pests	<i>Spodoptera exiava</i>	<i>Circulifer tenellus</i>	<i>Agrotis ipsilon</i>	<i>Epitrix nirtipemnis</i>	<i>Myzus persicae</i>	<i>Helicoveria zea</i>	<i>Keiferia lycopersicella</i>	<i>Autographa californica</i>
Vermiwash								
20% Aq. Sol ⁿ .	+	LA	-	-	+	LA	+	+
30% Aq. Sol ⁿ .	+	+	LA	+	LA	+	+	LA
40% Aq. Sol ⁿ .	M	M	LA	LA	M	IA	M	M
50% Aq. Sol ⁿ .	M	M	IA	IA	M	IA	IA	IA

M- Mortality, LA- Less active, IA-Inactive, + Sign - Positive effect (dose and hours depended manner), - Sign - Non effect.

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