Effect of vermicompost tea (VCT) on the morphology and physiology of tomato and the suppression of root knot nematode

by
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INTRODUCTION

• Vermicompost was made from field waste, leaf litter, straws and horse manure acted upon by earthworms.

• Vermicompost formed are then brewed to form vermicompost tea in a commercial compost tea brewer.

• Vermicompost tea - obtained from Salton Sea Farms in Thermal, CA.

• Two types for the Experiment – VCT and nsVCT
OBJECTIVES:

- **Obj 1:** Identify and quantify hormones in VCT (Radio Immuno Assay- RIA).

- **Obj 2:** Hormone concentration - cause a response in the growth and yield parameters of tomato.

- **Obj 3:** nsVCT can suppress root knot nematode (*Meloidogyne incognita*) infestation.

- **Obj 4:** Examine the microbial population in VCT (RISA and SSU).
Obj 1: To identify and quantify hormones present in VCT (RIA).
Obj 2: To observe if the hormone concentration is sufficient to cause a response in the growth and yield parameters of tomato.

Experiment set up:

Treatments

- $T_1$ – Control
- $T_2$ – VCT (low)
- $T_3$ – VCT (high)
- $T_4$ – IPA (low)
- $T_5$ – IPA (high)
- $T_6$ - Benzyladenine
- $T_7$ - Compound X

Biometric parameters: Plant height (cm), Plant Biomass, Number of leaves and flowers

Yield parameters studied (harvesting): Number of vegetative and fruiting branches, per cent fruit set and total yield in number.
RESULTS

• VCT contained 41.73 μg - IAA, 1.44 μg - IPA but only 0.022 μg - ABA per 100 ml.
• No treatment had a significant effect on tomato shoot height or tap root length (data not shown).
• Plants watered daily with VCT (T3) had more leaves than plants in all other treatments ($P < 0.0001$)(Fig.1).
• The plants receiving treatments T3, T5 & T7 had significantly greater dry weight than the control (T1) (Fig.2).
• VCT (T3) and (T7) had more vegetative and fruiting branches than VCT (T2), Benzyladenine (T6) and IPA (T4 and T5) \( P < 0.0001 \) (Fig. 3 & 4).

• Plants in all treatments showed a significant increase in fruit number and fruit size as compared to the control \( P < 0.0001 \).

Fig 3 and Fig 4: average number of vegetative and fruiting branches for the treatments during the growing period.
- Treatment T3 produced significantly more fruits ($P < 0.0008$) (Fig. 5) and larger fruits than the control plants ($P < 0.0001$) (Fig. 6).

Fig 5 and Fig 6: Average fruit size and fruit number for the treatments in the growing period.
Obj 3: Determine if VCT can suppress root knot nematode (*Meloidogyne incognita*) infestation.

**Experiment set up:**

- $T_1$ – Control
- $T_2$ – 50% VCT + 5000 eggs
- $T_3$ – 50% VCT + 10000 eggs
- $T_4$ – 100% VCT + 5000 eggs
- $T_5$ – 100% VCT + 10000 eggs
- $T_6$ – IPA + 5000 eggs
- $T_7$ – IAA + 5000 eggs
- $T_8$ – 5000 eggs
- $T_9$ – 10000 eggs
- $T_{10}$ – VCT
RESULTS:

T1 - Control
T2 - 50% VCT + 5000 eggs
T3 - 50% VCT + 10000 eggs
T4 - 100% VCT + 5000 eggs
T5 - 100% VCT + 10000 eggs
T6 - IPA + 5000 eggs
T7 - IAA + 5000 eggs
T8 - 5000 eggs
T9 - 10000 eggs
Root weight

Nemtode count

Eggs count
Obj 4: Examine the microbial population in VCT (RISA and SSU).

Fungal composition in VCT

Bacterial composition in VCT
CONCLUSION & FUTURE WORK

- The hormones present in the VCT(RIA) were IPA, IAA and ABA.

- The low VCT concentration was sufficient to cause a response in the growth and yield parameters of tomato. However, high VCT concentration was better.

- VCT can suppress root knot nematode (*Meloidogyne incognita*) infestation whereas hormones present may not have a role in that.

- Microbial Population of VCT and nsVCT revealed more of fungal component than bacterial component.
Thank You!!