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

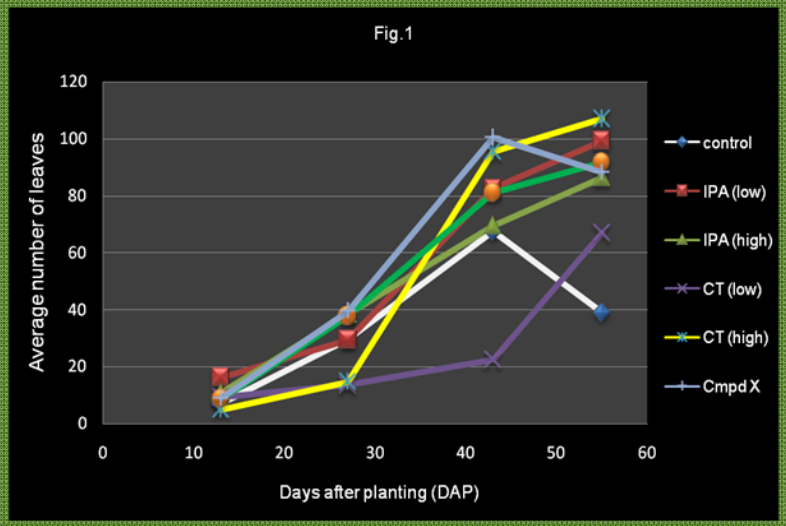
- T_1 – Control
- T_2 – VCT (low)
- T_3 – VCT (high)
- T_4 – IPA (low)
- T_5 – IPA (high)
- T_6 - Benzyladenine
- T_7- Compound X

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.

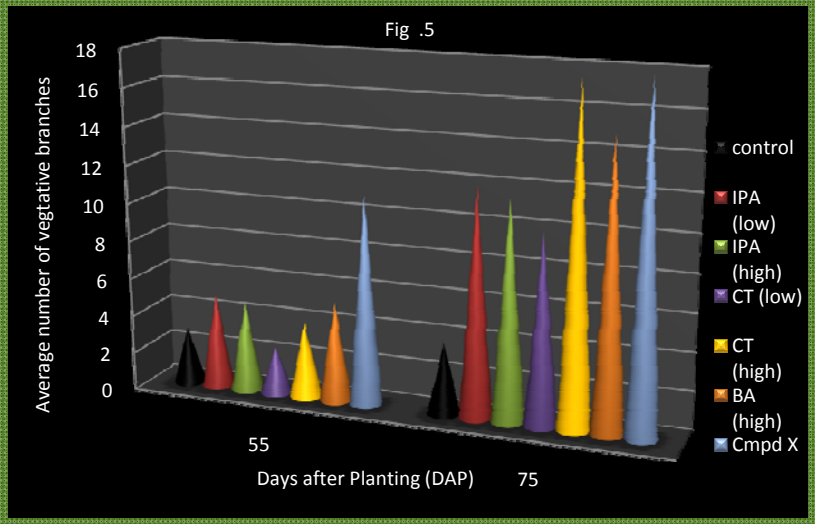
RESULTS

- 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 ($P < 0.0001$).



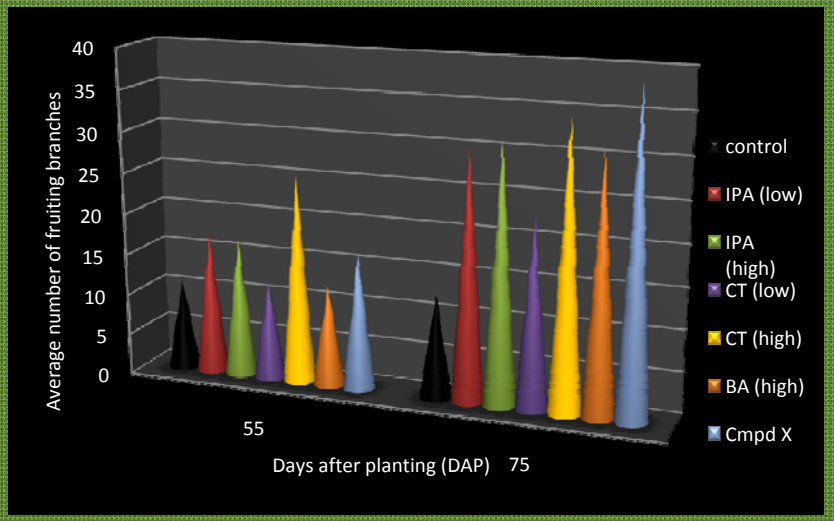
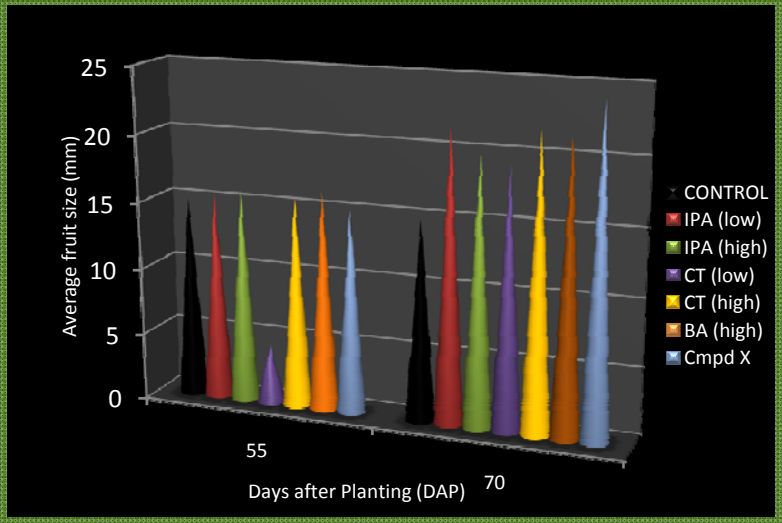


Fig 3 and Fig 4: average number of vegetative and fruiting branches for the treatments during the growing period.

- Treatment T3 produced significantly more fruits ($P < 0.0008$) (Fig. 5) and larger fruits than the control plants ($P < 0.0001$) (Fig. 6).



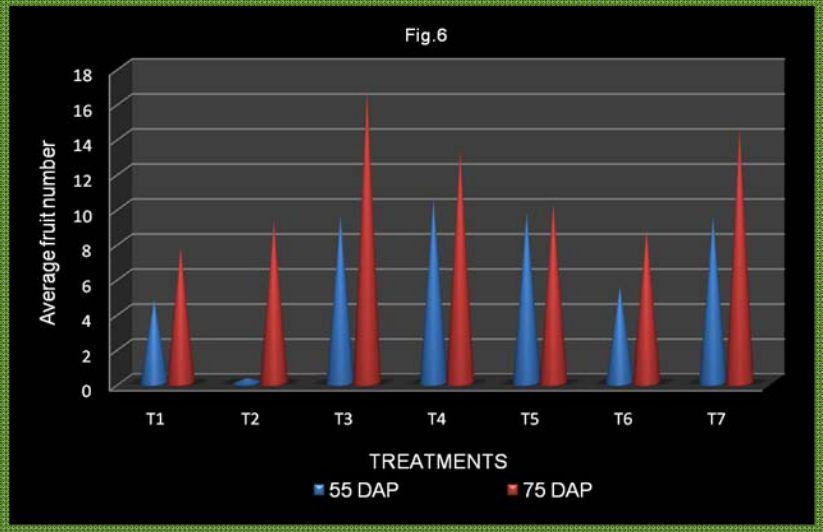


Fig 5 and Fig 6: Average fruit size and fruit number for the treatments in the growing period.

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 :

T_1 – Control

T_2 – 50% VCT + 5000 eggs

T_3 - 50% VCT + 10000 eggs

T_4 – 100% VCT + 5000 eggs

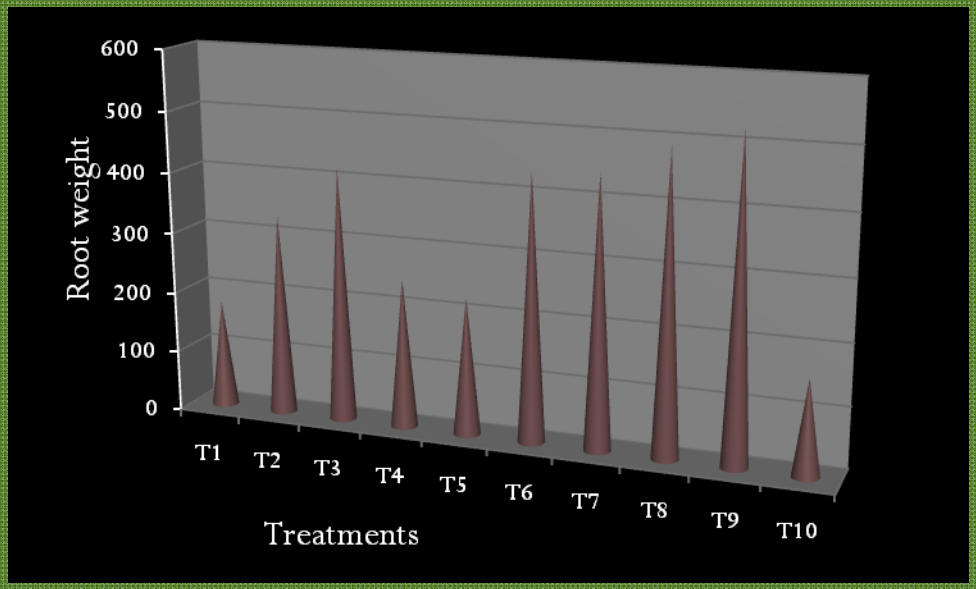
T_5 – 100% VCT + 10000 eggs

T_6 – IPA + 5000 eggs

T_7 – IAA + 5000 eggs

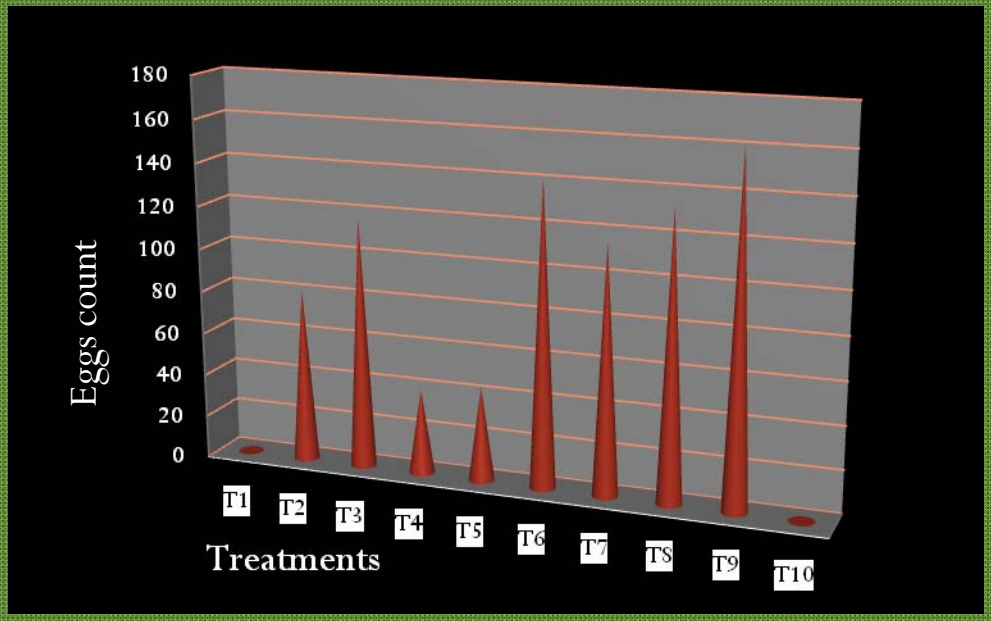
T_8 - 5000 eggs

T_9 - 10000 eggs



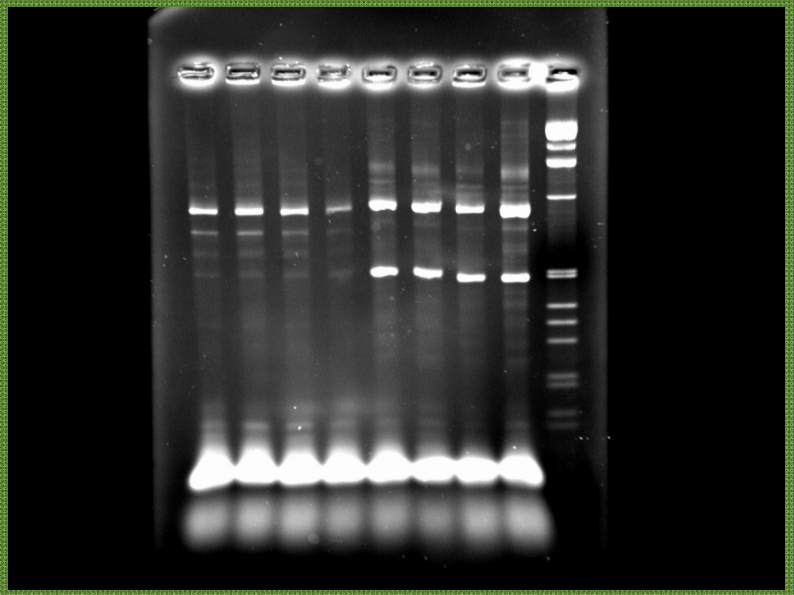
Root weight

Nemtode count

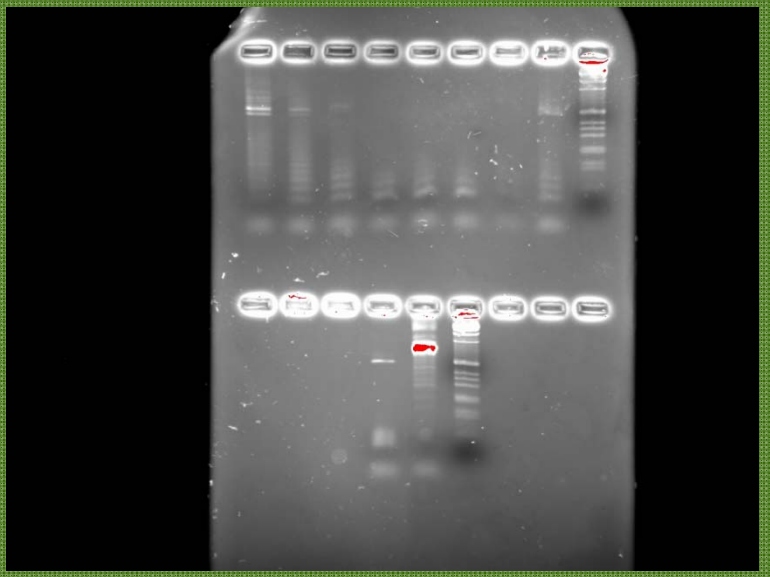


Obj 4: Examine the microbial population in VCT (RISA and SSU).

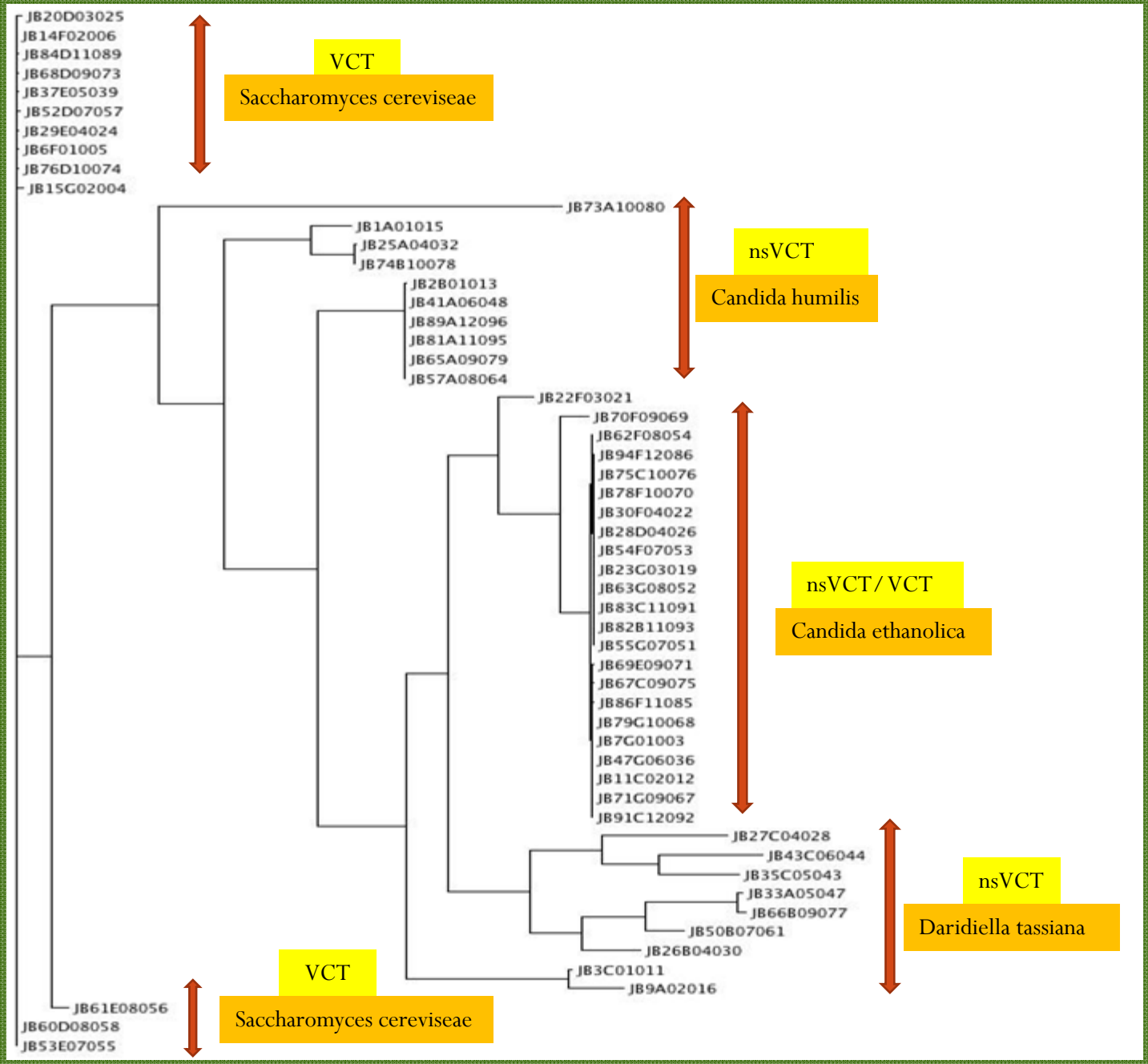
Fungal composition in VCT



Bacterial composition in VCT



RESULTS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JB84D11089
JB68D09073
JB37E05039
JB52D07057
JB29E04024
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JB15G02004
VCT
Saccharomyces cereviseae
JB73A10080
JB1A01015
JB25A04032
JB74B10078
JB2B01013
JB41A06048
JB89A12096
JB81A11095
JB65A09079
JB57A08064
nsVCT
Candida humilis
JB22F03021
JB70F09069
JB62F08054
JB94F12086
JB75C10076
JB78F10070
JB30F04022
JB28D04026
JB54F07053
JB23G03019
JB63G08052
JB83C11091
JB82B11093
JB55G07051
JB69E09071
JB67C09075
JB86F11085
JB79G10068
JB7G01003
JB47G06036
JB11C02012
JB71G09067
JB91C12092
nsVCT / VCT
Candida ethanolica
JB27C04028
JB43C06044
JB35C05043
JB33A05047
JB66B09077
JB50B07061
JB26B04030
JB3C01011
JB9A02016
nsVCT
Daridiella tassiana
JB61E08056
JB60D08058
JB53E07055
VCT
Saccharomyces cereviseae

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!!