Annexure – VIII

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. Title of the Project: **To study effects of pesticide on soil microflora of vegetable cultivating area of Karveer Tahasil.**
2. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR: **Mr. Shankarrao Adhikarao Patil**
3. NAME AND ADDRESS OF THE INSTITUTION **Vivkeanand College, Tarabai Park, Kolhapur**
4. UGC APPROVAL LETTER NO. AND DATE: File No.**47-1917/(WRO) dt 11th January 2012**
5. DATE OF IMPLEMENTATION **1st April 2012**
6. TENURE OF THE PROJECT **2 years**
7. TOTAL GRANT ALLOCATED Rs. **1,50,000/-**
8. TOTAL GRANT RECEIVED Rs. **1,075,00/-**
9. FINAL EXPENDITURE Rs. **1,45,317/-**
10. TITLE OF THE PROJECT: **To study effects of pesticide on soil microflora of vegetable cultivating area of Karveer Tahasil.**
11. OBJECTIVES OF THE PROJECT

    i. To analyse soil microflora in vegetable cultivating fields.

    ii. Role of soil microbes in soil fertility

    iii. To enlist vegetable cultivating villages of Karveer Tahasil near to Kolhapur city.

    iv. To enlist major insect pests found on commonly cultivated vegetable crops.

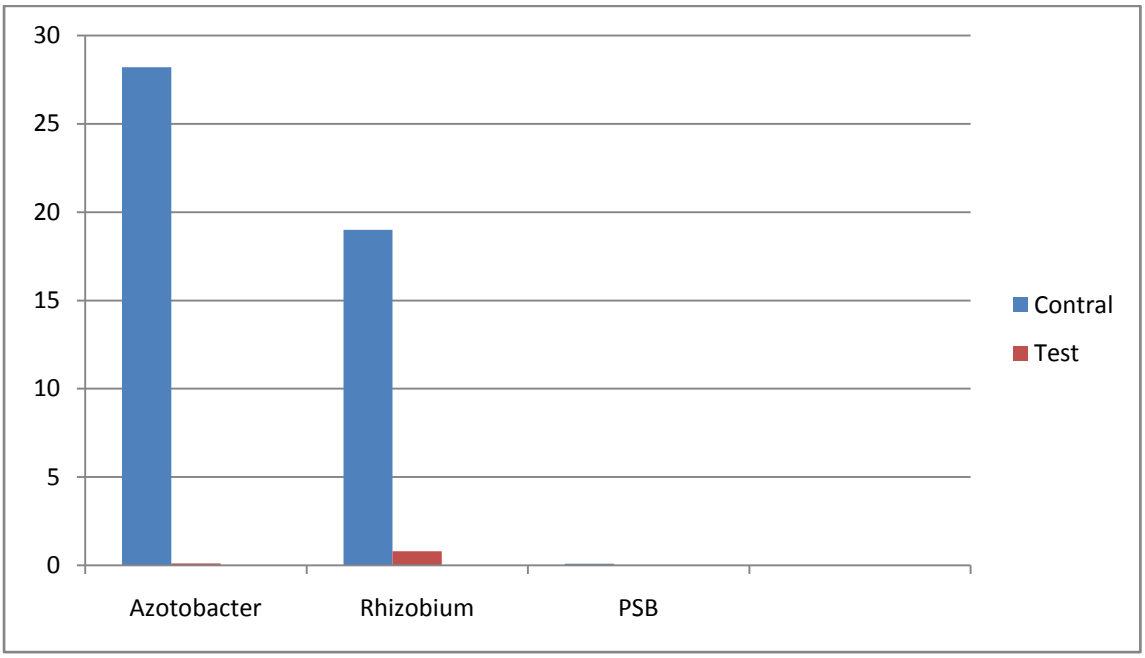
    v. To enlist common pesticides used to control major insect pests of vegetable crops.

    vi. To analyze effects of applied insecticides on soil microflora.

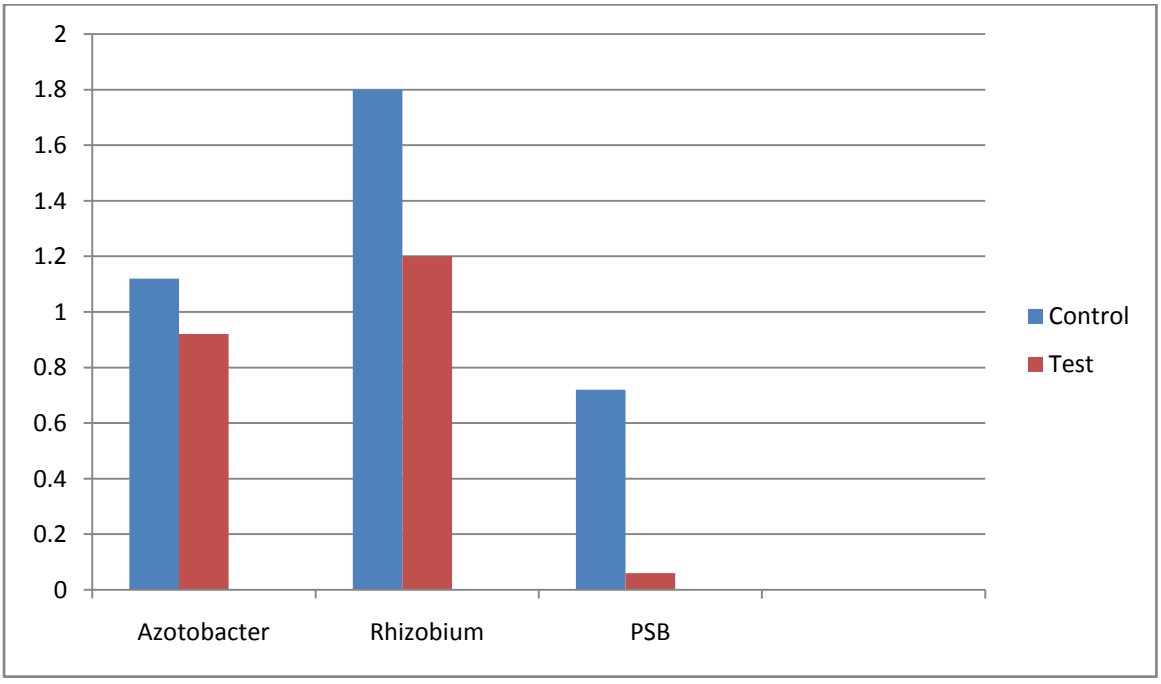
vii. To put forth the suggestions for prevention of adverse effects of pesticides on soil microflora and sustaining fertility of soil for longer use.

12. WHETHER OBJECTIVES WERE ACHIEVED: **Yes**
13. ACHIEVEMENTS FROM THE PROJECT: **One paper published**
14. **SUMMARY OF THE FINDINGS**

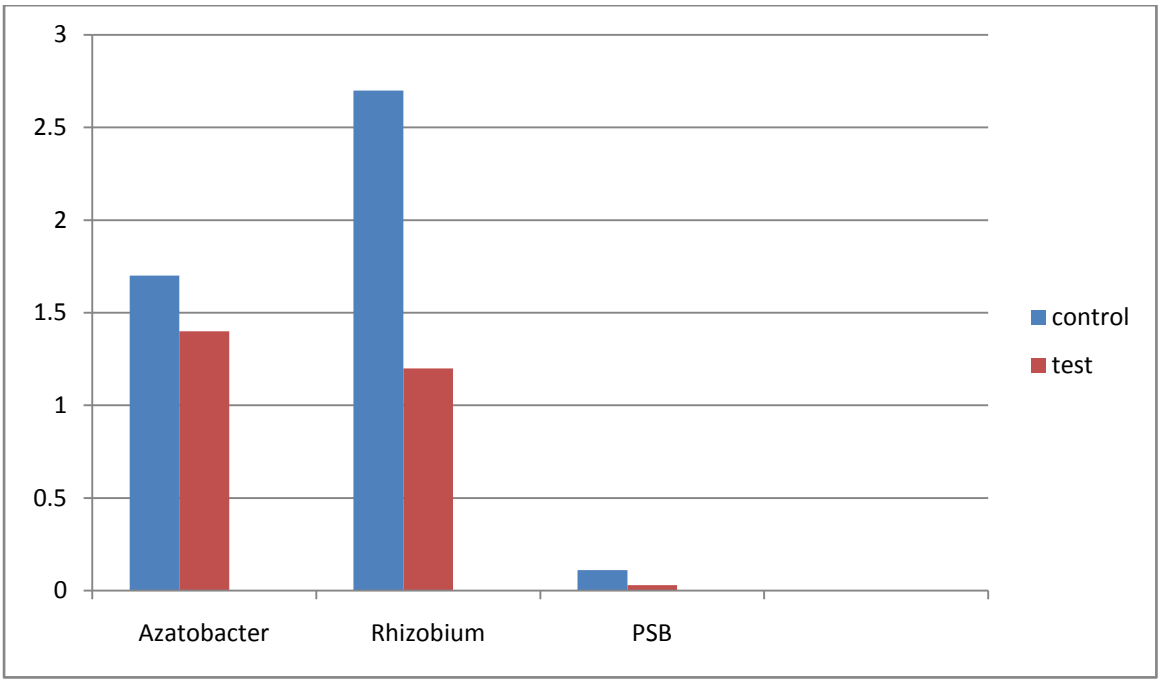
TVC of soil sample no. 1(Phoskill)



TVC of soil sample no. 2(Tricel)



TVC of soil sample no. 3(Phoskill)



TVC of soil sample no. 4 (Metasystox)

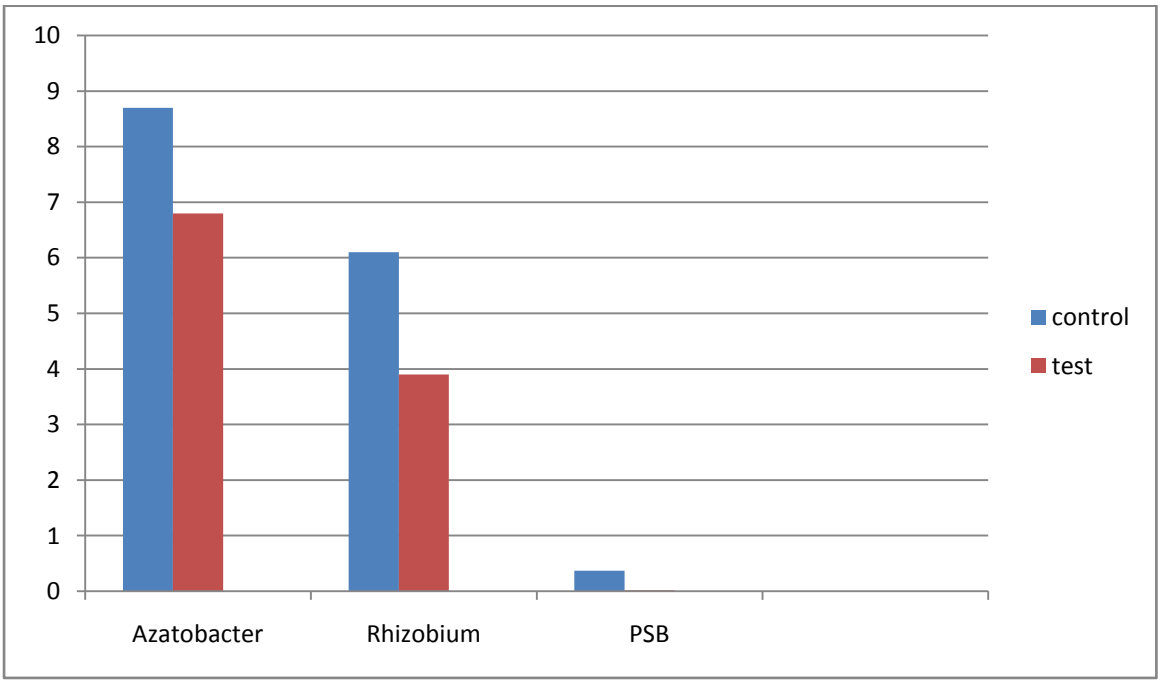


Table: Total viable count of different soil isolates.

TVC of soil sample No.1:

Effect of Phoskill on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	28.2×10^4	19.0×10^4	0.085×10^4
Test	0.111×10^4	0.8×10^4	0.021×10^4

TVC of soil sample No.2:

Effect Tricelon soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	1.12×10^4	1.8×10^4	0.72×10^4
Test	0.92×10^4	1.2×10^4	0.06×10^4

TVC of soil sample No.3:

Effect of Phoskill on soil bacteria

	Azotobacter	*Rhizobium*	PSB
Control	1.7×10^4	2.7×10^4	0.11×10^4
Test	1.4×10^4	1.2×10^4	0.03×10^4

TVC of soil sample No.4:

Effect of Metasystox on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	$8.7 X10^4$	$6.1 X10^4$	$0.37 X10^4$
Test	$6.8 X10^4$	$3.9 X10^4$	$0.02 X10^4$

TVC of soil sample No. 5:

Effect of Doom on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	$4.0 X10^4$	$0.71 X10^4$	$0.73 X10^4$
Test	$1.0 X10^4$	$0.13 X10^4$	$0.61 X10^4$

TVC of soil sample No. 6:

Effect Metasystoxon soil bacteria

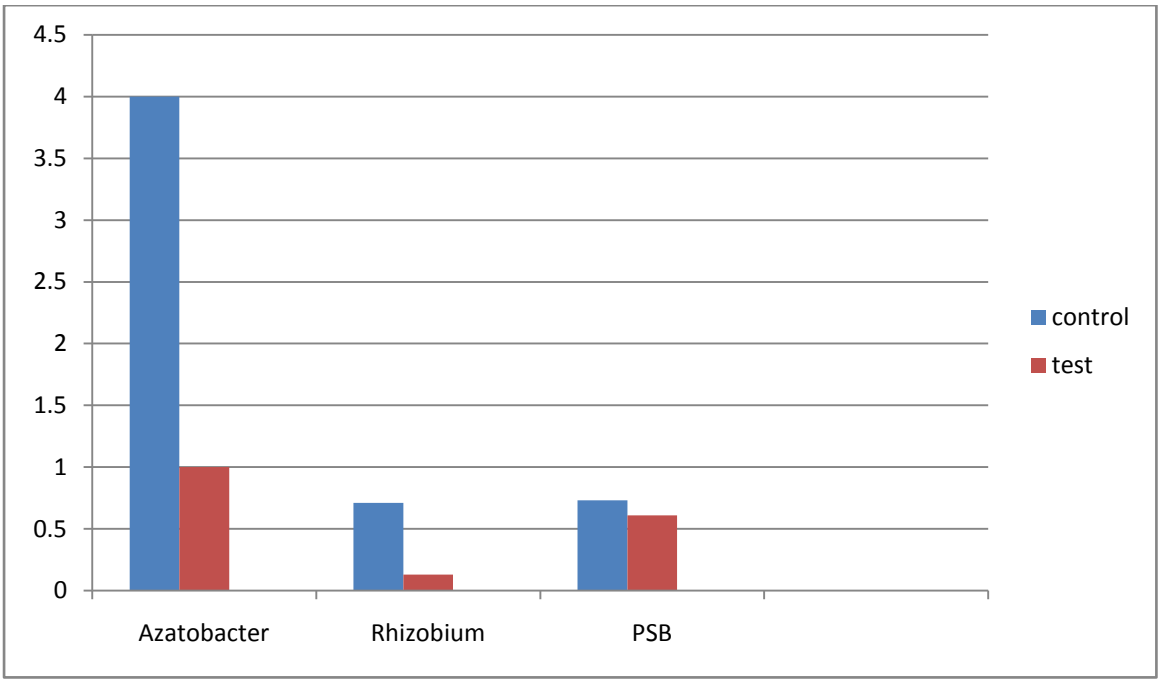
	Azotobacter	*Rhizobium*	PSB
Control	$4.8 X10^4$	$2.6 X10^4$	$0.85 X10^4$
Test	$3.9 X10^4$	$1.9 X10^4$	$0.50 X10^4$

TVC of soil sample No. 7:

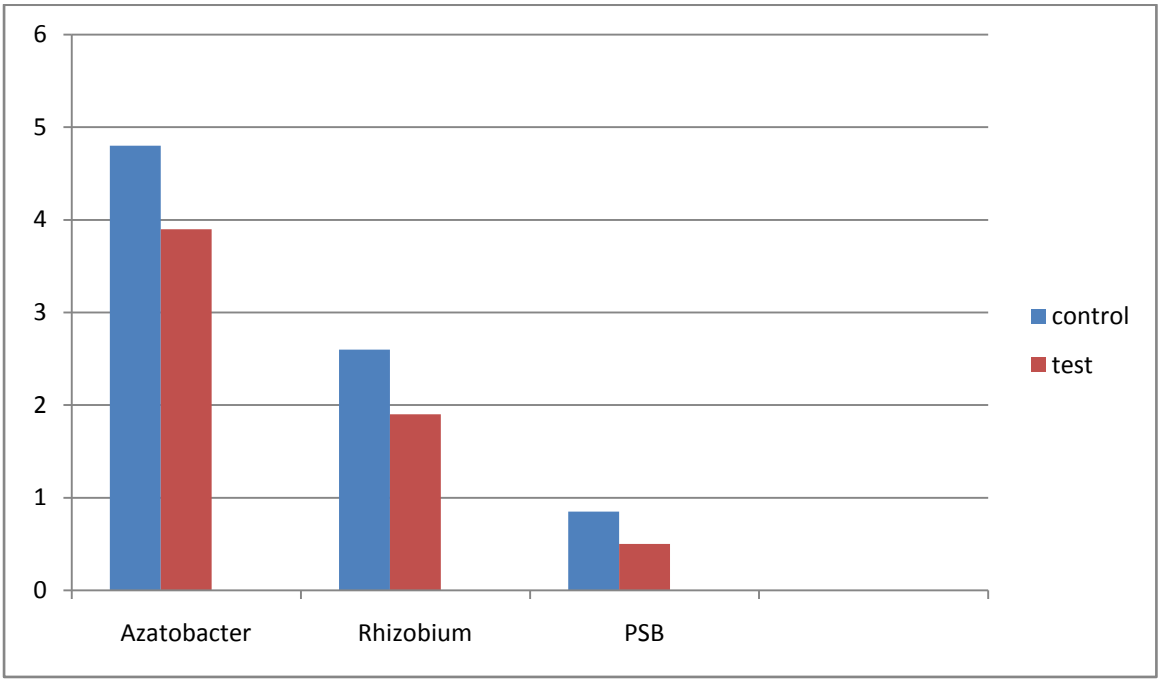
Effect of Tricel on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	$4.66 X10^4$	$0.82 X10^4$	$0.91 X10^4$
Test	$2.12 X10^4$	$0.03 X10^4$	$0.10X10^4$

TVC of soil sample no. 5(Doom)



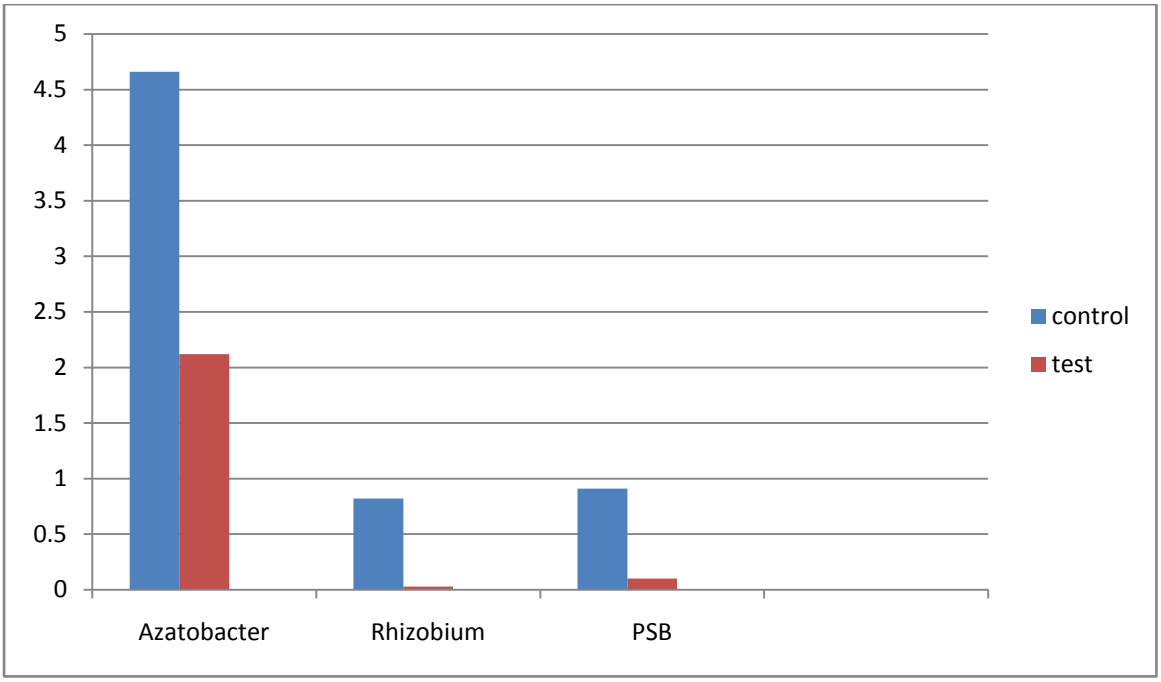
TVC of soil sample no. 6 (Metasystox)



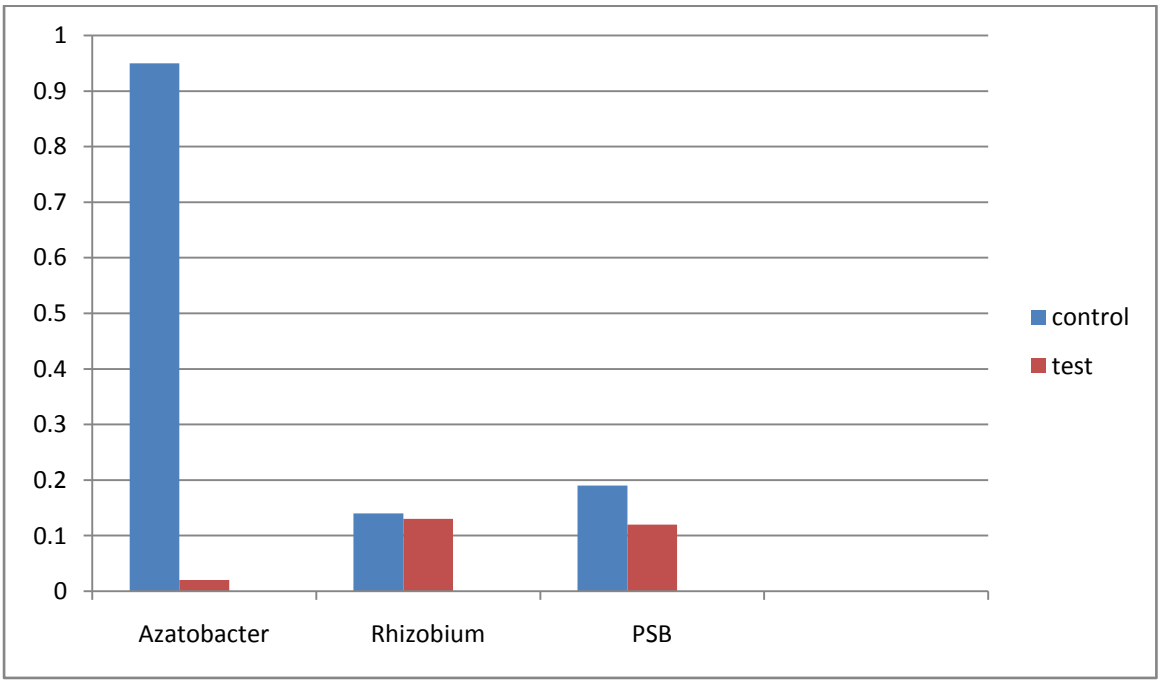
The soil samples collected from different fields are studied for Total Viable Count of agriculturally important microorganisms, like *Azotobacter, Rhizobium, phosphate* solubilizing bacteria. It is found that after application of insecticides, the number of soil isolates goes on decreasing.

- **The soil sample no. 1** was inoculated with the insecticide **Phoskill**. It was found that phoskill drastically affect the number of *Azotobacter* as compare to control that is the soil before application of insecticide. No growth of *Azotobacter* was found after application of insecticide. From the same soil, growth of *Rhizobium* was affected by insecticide with a little growth. Phosphate solubilizing bacteria were not isolated from control soil, hence effect of insecticide is not determined.
- **The soil sample no. 2** was inoculated with the insecticide **Tricel**. *Azotobacter* show growth in presence of Tricel. It was found that *Azotobacter* was quite resistant to Tricel, whereas *Rhizobium* was sensitive to the insecticide. PSB was drastically affected by Tricel and very poor growth was observed. In all the *Rhizobium* & Phosphate Solubilizing Bacteria are sensitive to insecticide Tricel whereas *Azotobacter* is resistant.
- **The soil sample no. 3** was inoculated with the insecticide **Phoskill**. It was found that very less number of *Azotobacter* was inhibited by phoskill. About 50% of growth of *Rhizobium* was inhibited by this insecticide. Also approximately half of the number of PSB was decreased by phoskill. Accordingly, it is concluded that, *Azotobacter* is more resistant to phoskill than *Rhizobium* & PSB.
- **The soil sample no. 4** was inoculated with the insecticide **Metasystox**. According to TVC of soil inoculated with metasystox, it was found that *Azotobacter* & *Rhizobium* less sensitive to the insectide. But the growth of PSB was completely destroyed by the insecticide.
- **The soil sample no. 5** was inoculated with the insecticide **Doom**. By comparing TVC of control & test, it was found that, very large number of *Azotobacter* was killed by Doom. Approximately, $3/4^{th}$ number of *Azotobacter* was inhibited as compare to control. *Rhizobium* was also inhibited by the same insecticide but PSB was found to be less sensitive.
- **The soil sample no. 6** was inoculated with the insecticide **Metasystox**. It was found that the number of *Azotobacter* , *Rhizobium* & PSB was less sensitive to metasystox and the number of these bacteria was not much affected as compare to control.
- **The soil sample no. 7** was inoculated with the insecticide **Tricel**. It was found that the number of *Azotobacter, Rhizobium* & PSB was drastically affected by Tricel. Almost all cells of *Rhizobium* were inhibited by the insecticide.

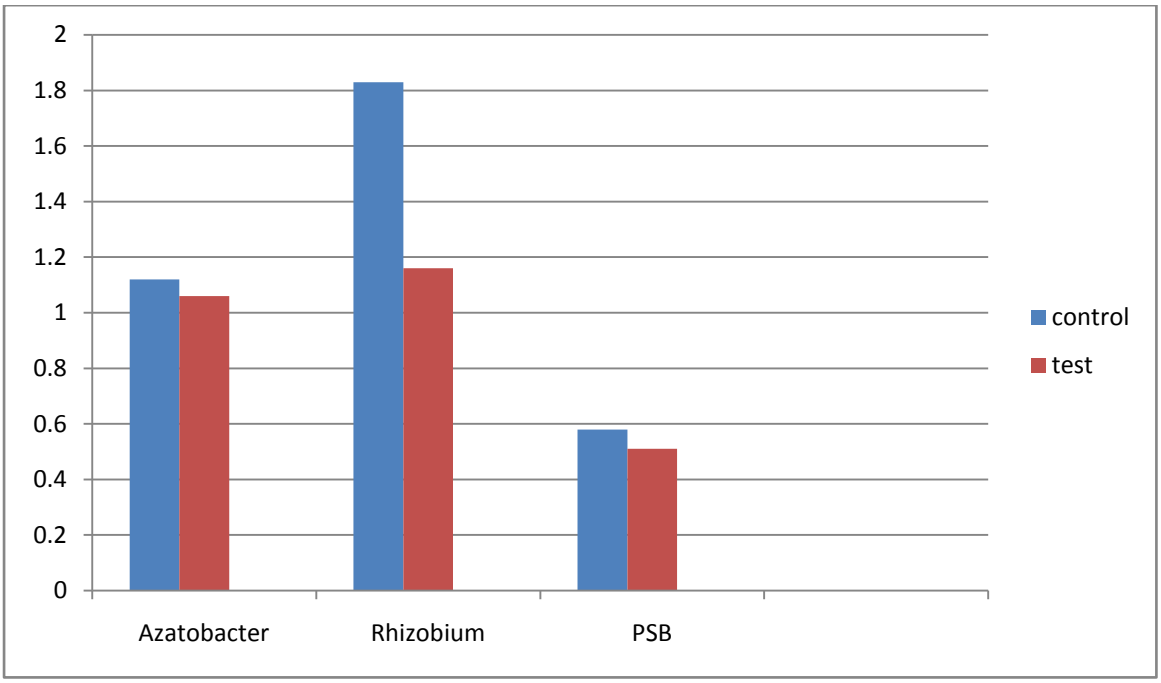
TVC of soil sample no. 7(Tricel)



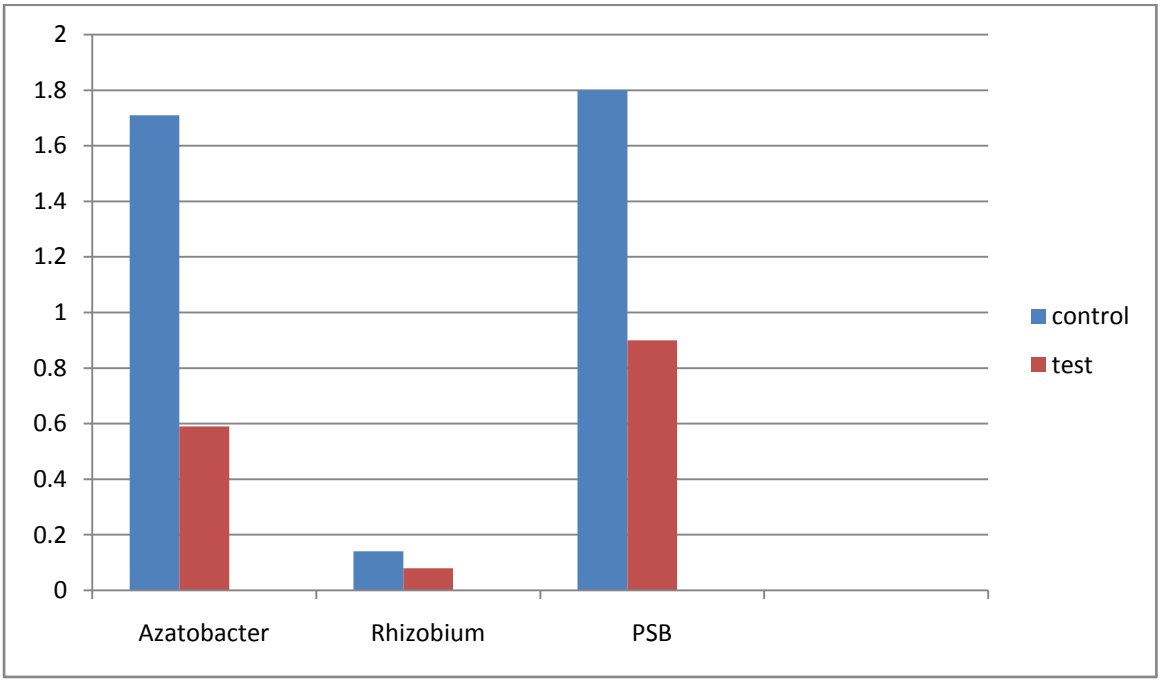
TVC of soil sample no. 8(Phoskill)



TVC of soil sample no. 9 (Metasystox)



TVC of soil sample no. 10 (Metasystox)



TVC of soil sample No. 8:

Effect of Phoskill on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	$0.95 X10^4$	$0.14 X10^4$	$0.19 X10^4$
Test	$0.02 X10^4$	$0.13 X10^4$	$0.12 X10^4$

TVC of soil sample No. 9:

Effect of Metasystox on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	$1.12 X10^4$	$1.83 X10^4$	$0.58 X10^4$
Test	$1.06 X10^4$	$1.16 X10^4$	$0.51 X10^4$

TVC of soil sample No. 10:

Effect of Metasystox on soil bacteria

Treatment	*Azotobacter*	*Rhizobium*	PSB
Control	$1.71 X10^4$	$0.14 X10^4$	$0.8 X10^4$
Test	$0.59 X10^4$	$0.08 X10^4$	$0.9 X10^4$

- **The soil sample no. 8** was inoculated with the insecticide **Phoskill**. It was found that the number of *Azotobacter* was drastically affected by the insecticide. Very less number of *Azotobacter* remain alive after application of phoskill. The growth of *Rhizobium* was resistant to the insecticide. PSB was also less sensitive to it.
- **The soil sample no. 9** was inoculated with the insecticide **Metasystox**. According to TVC of soil inoculated with metasystox, it was found that *Azotobacter*& PSB was less sensitive to the insectide. But the small number of *Rhizobium* was inhibited by the insecticide.
- **The soil sample no. 10** was inoculated with the insecticide **Metasystox**. It was found that *Azotobacter* is sensitive to the insecticide. The soil sample supports very less number of *Rhizobium*. Surprisingly the soil show very high growth of PSB as compare to all other soil samples, but about half of the number of the PSB cells were inhibited by the action of the insecticide.

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15. **CONTRIBUTION TO THE SOCIETY**

The study is useful to society especially to the farmers in creating awareness about use of pesticides and their ill effects not only pest, but also impact on soil environment. Most of the pesticides show a high degree of toxicity because they intended to kill certain organisms and thus create some risk of harm. It not only concern of potential effects on human health but also impact on sensitive ecosystem. The pesticide residues in plants may be unavoidable even when those are used in accordance with good agricultural practices. In addition with pesticide residues constitute a danger to soil microflora.

i. The study suggest that Government should enforced routine monitoring on pesticide residues in the fields where pesticide use is a common practice employed by farmers to control all kinds of crop pests.

The farmers and the inhabitants should be educated on the danger of pesticide for pest control.

16. WHETHER ANY PH.D. ENROLLED/PRODUCED OUT OF THE PROJECT: **No**

17. NO. OF PUBLICATIONS OUT OF THE PROJECT: **One**

(PRINCIPAL INVESTIGATOR)
Mr. S. A. Patil

(CO- INVESTIGATOR)
Miss J. S. Pawar

VIVEKANAND COLLEGE ESTD. JUNE 1964 KOLHAPUR-416003

(SIGNITURE OF PRINCIPAL WITH SEAL)
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Kolhapur.

National Conference on Environmental Boitechnology *ISBN 978-81-8498-412-6*

EFFECT OF PESTICIDES ON SOIL MICROFLORA OF VEGETABLE CULTIVATING AREA OF KARVEERTAHASIL, DIST. KOLHAPUR.

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ABSTRACT

The insects that cause significant economic damage to crops are called as the insect pest. An insect reaches the status of pest when its number increases and inflicts significant damage.The direct losses due to insect pests to vegetable crops is by different types of insects. The major damage to vegetable crop is by chewing, sucking and boring type of insect.These pests can be controlled at economic thresh hold level by using different control measures. The control of injurious and troublesome pests, farmers takes several steps through mechanical, chemical, and biological methods. When mechanical control measures are ineffective, then farmers prefer chemical method. But for effective control of pests thefarmers unknowinglyprefers higher doses of pesticides than that of recommended doses ,which creates harm to eco-systems in relation to not only pests but also environment that surrounds the pest. Among which soil is badly affected by used pesticides. It adversely affects the property of soil, by alterationof pH of the soil required for microbial activities of beneficial bacteria The present study reveals that the potential effects of insectides applied on vegetable crops as foliar spray is most responsible for changing soil environment.The residues of insecticides used in crop field, drains to soil in the form of spray drops which changes physical, chemical and biological environment of soil. The degradation of fertility of soil with special reference in reduction of number of beneficial bacteria for few days till the more concentration of residual insecticide remain in the soil.The soil samples are collected from various area of KarveerTahasil,District Kolhapur. Total viable count of *Azotobacter,Rhizobium*and Phosphate solubilising bacteria was taken. The effect of pesticide on total viable count(TVC) of these microbes was studied. It is found thattotal viable count(TVC) of some beneficial bacteria for soil fertility such as *Azotobacter,Rhizobium*and Phosphate solubilising bacteria are variably changed with respect to different insecticides used.

KEY WORDS: pesticide,chlorpyriphos, microflora,*Azotobacter,Rhizobium*,TVC

INTRODUCTION

The soil is the loose outermost layer of earth surface. Agriculturally it supports plant life. The fertility of soil mainly depends on physical properties such as texture, porosity, water, air,temperature of the soil and biological properties like microflora of soil. The sustainability of fertility of soil mainly controlled by organic matter content of individual soil and the nature of microbial products which bind soil particles together.Soil

contains five major groups of microorganisms as Bacteria, Actinomycetes, Fungi, Algae, and Protozoa. The major bacteria play important role in soil fertility.

The insects that cause significant economic damage to crops are called as the insect pest. An insect reaches the status of pest when its number increases and inflicts significant damage. For the control of injurious and troublesome pests, farmers takes several steps through mechanical, chemical, and biological methods. The commonly used group of insecticide is organo phosphorous compounds,because its mode of action and immediate effect. Applications of insecticides on agricultural crops is now a common practice to check or control pests and pathogens to reduce or eliminate yield losses and preserve high product quality.

Although insecticides are manufactured under very strict regulation processes to function minimal impact on not only human health but also on soil environment where insecticide is applied. Most of the insecticides show high degree of toxicity because they areintended to kill certain organisms creating harm. Through wrong activities of application of pesticide the soiladversely affects properties of soil by altering nature of microbial activities of beneficial bacteria by changing physical and chemical properties of soil. The maintenance of soil biodiversity is most important for sustainable yield of crops.

For the present study most commonly used and foliarly sprayed organo-phosphorous insecticides are taken in to an account. The effects are not studied only on insect pests present on vegetable crop but also on soil micro flora of the same field where it is applied.

MATERIAL AND METHOD

Material

1. Collection of soil sample:-

The soil samples are collected from ten villages of KarveerTahasil where vegetable cultivation is in practice. The collection of soil sample in two phases as first, before cultivation of vegetable crop and secondly after cultivation of vegetable crop and application of pesticides on vegetable crop.

Soil Samples Collected From Vegetable cultivating fields of Karveer Tahasil Dist. Kolhapur

Soil sample No.	Name of the village	Name of the Farmer	Survey No/ Name of field
1.	Jatharwadi	Mr.KhotDattatrayMahadev	33
2.	Vadanage	Mr.ChaugaleVishwasSadashiv	393
3.	Bhuye	Mr.ChaugaleShamrao Baba	196
4.	Nigave	Mrs.PatilNirmala Suresh	107
5.	Nigave	Mr.PatilAnandaYashwant	225

2. Media: Nitrogen free mannitol agar, Cango Red Yeast extract mannitol agar, Ketznelson Bose Agar,

3.Organophosphorus insecticides: Chlorpyriphos 20%-Tricel

METHOD

1..Analysis of soil samples:-

1gm soil is dissolved in 10ml sterile distilled water, mix well & 1 ml from this tube is transfer to next 9ml sterile distilled water tube. Similar transfers are done upto 10

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tubes.0.1ml from each dilutions are spread inoculated on different selective media. Selective media for *Azotobacter* is N2 free agar, for *Rhizobium* is CRYEMA, for PSB is KB media.

All the plates are incubated at room temperature until the colonies appear on the plates. After specific incubation period total number of colonies of every dilution is counted.The total viable count (TVC) is calculated for control (before use of insecticide) and after use of insecticide by using formula,

$$TVC = \frac{\text{No. of colonies x Dilution factor}}{\text{Amount of diluent used}}$$

RESULT & CONCLUSION

1.Colony count of soil microbes:

* OnN2 free agar plates, white, translucent, glistening colonies of *Azotobacter*were identified & counted.

* On CRYEMA plate, pale white colonies of *Rhizobium* were identified & counted.

* On KB media plates,dirty white colored colonies with clear zonewere identified & counted.

* From the above study, it was found that organo-phosphorous pesticide have negative impact on the growth of soil microflora.

In soil sample no.1 pesticide decreases completely the growth of Azotobacter but slight growth of Rhizobium was observed as compaired to control. The same soil sample donot show growth of PSB

In the soil sample no.2 the growth of Azotobacter Rhizobium was slightly decreased while growth of PSB was remarkably reduced.

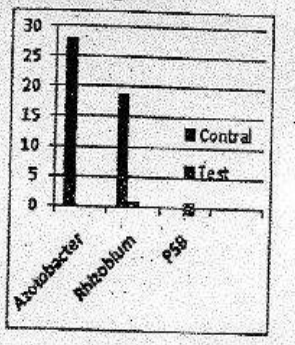
In the soil sample no. 3 growth of Rhizobium was highly reduced,while growth of Azotobacter& PSB was slightly reduced.

In the soil sample no. 4 growth of Rhizobium andAzotobacter was slightly decreased but PSB donot show existence due to insecticide.

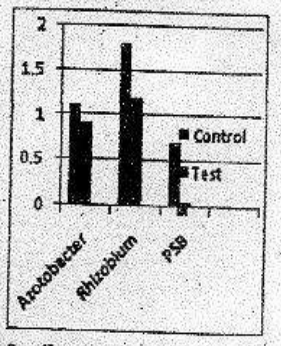
In the soil sample no. 5 growth of Azotobacter was remarkably decreased,that of Rhizobium was slightly decreased and very less effect of insecticide on growth of PSB.

Graphical re presentation of effect of insecticide on growth of soil bacteria

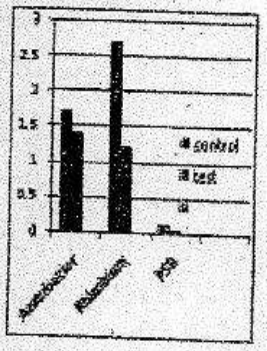
TVC of soil sample No.1



TVC of soil sample No.2



TVC of soil sample No.3



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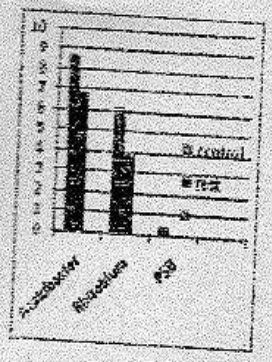
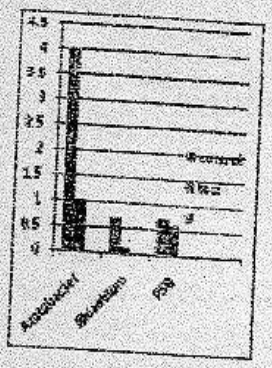
TVC of soil sample No.4



TVC of soil sample No.5



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