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Innovation The Research Concept

# Cytotoxic Effects of Trichoderma Biopesticide on Vicia Faba Seeds

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**Abstract**

The present study is undertaken to determine the cytotoxic effects of Trichoderma solution on *Vicia faba* L. The seeds were treated with different concentrations of Trichoderma solution for 4,6,8, hrs. Reduction in mitotic index was observed in seeds exposed to Trichoderma solution as compared to control which decreased with an increase in concentration of Trichoderma solution. On the basis of these results, it was concluded that all Trichoderma concentrations significantly affect the cytomorphology of *V. faba*, while higher concentrations of Trichoderma solution were found cytotoxic. In present study it is observed that the cytotoxic effects of Trichoderma solution on the *Vicia faba* L. seeds for 4, 6, 8, hrs. Tthe mitotic index accompanied with some percentage of chromosomal aberrations was observed with higher concentration of solution. The mitotic index decreases due exposure to Trichoderma solution in higher concentration and longer duration period. The mitotic index is minimum at 800ppm concentration of Trichoderma (solution) for 8 hrs that is 17.81 which is lower from control that is 22.11.The antimitotic effect was in low frequency at 300 ppm of for 4,6,8 hrs was 21.89,21.06, 20.95 respectively.

**Keywords:** Cytotoxic, *Vicia Faba* Seeds

**Introduction**

*Vicia faba* L. (2n=12) belongs to family fabacae commonly known as broad bean which is grown as vegetable crop. This crop is cultivated in most of the areas of Uttar Pradesh and Uttarakhand at places it is also grown as manure crop and it comprises stock feed also the feed value of broad beans is high .In some areas broad bean is preferred over to yield peas or other leguminous crops . Biopesticides are alternative methods to control disease and pest. Trichoderma has been used as biopesticides for many years. It is very much helpful to destroy some pests. Many microorganism growth are stopped by trichoderma. It is good alternative and ecofriendly disease management. But in some cases and concentration it causes abnormality in mitosis. The untreated and treated seeds of *Vicia faba* varieties were sown in the Rabi season in the field/ experimental plots as well as in the pots to study the growth performance at the outset. The experimental materials used in the present study were grown in the experimental plots in the Randomised Block Design with three replications. The seed treatments were done in order to assess the suitability and impact on the growth and morphological behavior. The harmful effects of synthetic chemicals used for agriculture practice and mostly increase the environmental pollution which is a recent global issues so that many attempts were taken to find out lethal activity of chemical /natural compounds for more ecological safety.

**Aim of the Study**

The aim of this study is the effect of trichoderma solution at different concentrations on mitotic index of *Vicia faba* L plants.Biopesticides used in the agricultural practices having some chemicals used in disease controlt without considering their side effects on plants.The use of biopesticides has become necessary but some chemical present in biopesticides indirectly effect on mitosis activity.

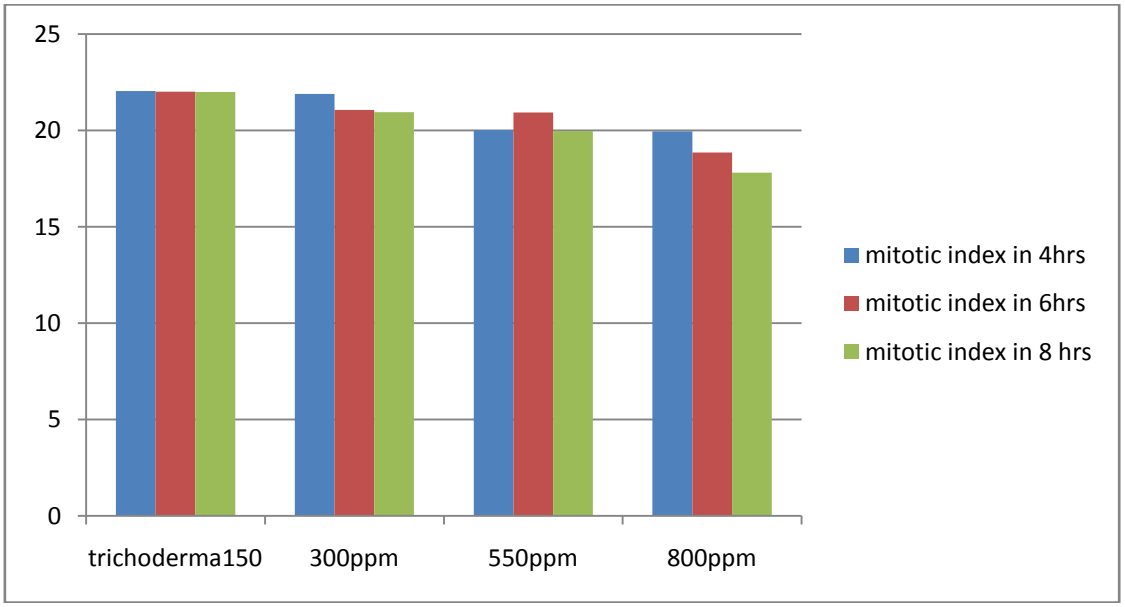
**Materials and Methods**

Three sets of seeds were employed the one set was exposed 4hrs and the one set was 6hrs and the last one for 8 hrs. The root tips were harvested /collected and fixed in acetoalcohol (1:3) for future study. The root tips were pretreated with paradichlorobenzene and the root tips washed thoroghly with distilled water and thereafter transferred to 70% alcohol for future use. The fixed root tips were hydrolysed with 1 N HCL and were smeared in acetocarmine solution and mitotic indices for the root tips of *Vicia faba* varieties were recorded.The experiment was carried

in three replicates. The mitotic observations in root meristem of *Vicia faba* with all different test concentrations subjected differently at different durations were made. The seeds of *Vicia faba* were treated with distilled water and organic pesticide-Trichoderma solution. The washed and sterilized seeds were soaked in distilled water for 12hrs. The seeds were put to germinate under suitable laboratory condition in petridishes. Trichoderma solution is diluted to the concentrations of 1) 0ppm (control), 2) 150ppm, 3)300ppm, 4)550ppm, 5)800ppm respectively. Seeds of *Vicia faba* treated with different test concentrations differently at different duration (4, 6, 8 hrs) of treatments. The treated seeds were put to germinate under suitable laboratory condition in petridishes with filter papers with periodical inspection of progress of germination. Cotyledons were removed to isolate radical for further studies when radical attained 1-2cm length. The root tips collected, fixed and subjected to cytological studies. The fixed root tips were stained in acetocarmine and mitotic indices of *Vicia faba* were recorded. The mitotic index decreases due exposure to Trichoderma solution in higher concentration and longer duration period.

**Discussion**

Cytototoxic effects of biopesticide were indicated by decreases in mitotic index. The biopesticide mitostatic action increased with increasing concentration and duration of treatment like some time some plant extract and can also effect on the mitosis that plant extract exerted its inhibition effects on seed germination, *Amaranthus retroflexus* and *Vicia sativa* and the inhibition was aconcentrations dependent and the higher concentration are mitostatic some morphological character like root growth are changes that can be measured and can be associated with biological mitotic index technique that is cytogenetical assay.The influence of allelochemicals on seed germination depends on the concentration used. The influence of the type of extract also depends on the sensitivity of the tested plant to chemical compounds present and affect with inhibition of root growth is also affected by exposure to plant extract has been used extensively as one of the most distinct and earliest symptoms of cinnamon plant extract toxicity . Mitosis analysis indicates effect of biopesticides on mitosis by reducing the percentage of prophasic and cause reduction in MI. These data demonstrate that plant extract and disturb cell division. The reduction of MI in treated roots is probably due to disturbances in the cell cycle as well as chromatin abnormality which is induced by interactions between genetic material and the components of chemical extract. Effect of biopesticide are gradually changed MI slowly with different concentration 150,300,550ppm in 4, 6, 8, hrs in time duration. Slight reduction in MI was recorded in mitotic index is minimum at 800ppm concentration of Trichoderma (solution) for 8 hrs that is 17.81 which is lower from control that is 22.11.The antimitotic effect was in low frequency at 300 ppm of for 4,6,8 hrs was 21.89,21.06, 20.95 respectively. Similar results were observed in many previous studies about other chemcals and some times the cell death was observed and depressor of the mitotic activity.




**Conclusion**

Some of compounds and biopesticides can be cytotoxic and some can be antigenotoxic. The results of this study suggest that, some biopesticides showed can cause serious problems when it is used dangerously. The increment of the concentrations of the solutions where the mitotic index showed a gradual decrease in relation to the control. The mitotic index is minimum at 800 ppm concentration of Trichoderma (solution) for 8 hrs that is 17.81 which is lower from control that is 22.11.The antimitotic effect was in low frequency at 300 ppm of for 4,6,8 hrs was 21.89,21.06, 20.95 respectively. The mitotic index decreases due exposure to Trichoderma solution in higher concentration and longer duration period. The mitotic index is minimum at 800ppm concentration of Trichoderma (solution) for 8 hrs that is 17.81 which is lower from control that is 22.11.The antimitotic effect was in low frequency at 300 ppm of for 4,6,8 hrs was 21.89,21.06, 20.95 respectively.

**Table 1: Abnormal Mitotic Index after Treatment of *Vicia Faba* Root Tips with Different Concentration of Trichoderma (Solution).**

| Trichoderma (solution) | hours | Mitotic index |
|---|---|---|
| control | | 22.11 |
| 150 | 4 | 22.05 |
| | 6 | 22.01 |
| | 8 | 21.99 |
| 300 | 4 | 21.89 |
| | 6 | 21.06 |
| | 8 | 20.95 |
| 550 | 4 | 20.01 |
| | 6 | 20.93 |
| | 8 | 19.96 |
| 800 | 4 | 19.95 |
| | 6 | 18.86 |
| | 8 | 17.81 |

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