



Research Article

Efficacy of a novel phytopesticide against *Thrips tabaci*, an insect pest on onion

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Abstract: Onion is an important crop cultivated as vegetable. Onion thrips is a key insect pest in most of the onion production regions of the world. A new biopesticide prepared from the crude leaf extracts of ten plants in cow urine was evaluated for their efficacy against *Thrips tabaci*. The biopesticide was tested in agricultural field on onion plants in varying concentrations and was found to be highly efficient in eradicating the thrips in an eco-friendly manner.

Keywords: Biopesticide, leaf extracts, efficacy, *Thrips tabaci*, eco-friendly.

Introduction

Onion (*Allium cepa* L.) is an important export-oriented vegetable crop. It is an herbaceous biennial vegetable crop. India is the second largest onion producing country in the world. Like any other crops, onion is also attacked by many pest organisms causing considerable losses in quality and yield. Thrips (*Thrips tabaci*) is a common and potential insect pest of onion which has become a global pest issue. *T. tabaci* feed on leaves and can reduce the onion yield upto 50% (Fournier *et al.*, 1995). The pests are miniature in size (Fig. 1) and have cryptic habits. The adult thrips are slender yellowish-brown insects and about 1 mm in size. They are usually found at the base of leaf (Fig. 2) and the attacked leaves become curled (Fig. 3), wrinkled and gradually dried. Both nymphs and adults infest onion and causes damage directly through feeding and indirectly through the transmission of lethal plant viruses. Failure to control this pest timely and by effective means causes considerable damage and results in immense economic losses by remarkably reducing yield.



Figure 1. Onion thrips



Figure 2. Thrips on leaf bases



Figure 3. Infected plants

Management of pests with conventional pest control methods using chemical pesticides has many adverse effects on the ecosystem. The repeated application of these chemicals can lead to the development of insecticide resistance also (Shitole *et al.*, 2002). Synthetic insecticides are hazardous to non – target organisms, have risk of user's contamination, residual effects and environmental pollution (Tapondjou *et al.*, 2002, Mehdi & Qamar, 2013). Thus, biopesticides are the best alternative for controlling the pest organisms in an eco-friendly

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way. Ecofriendly pest management strategies can be achieved by using plant products as a suitable substitute to chemical insecticides as plants are rich sources of bioactive compounds (Khan & Qamar, 2015).

Botanical pesticides have long been touted as attractive alternative to synthetic insecticides as the natural products have lesser environmental and human health impacts (Isman *et al.*). They are ecofriendly, economic, target specific and biodegradable. Green plants appear to be reservoir of biotoxins. The aim of the present study is to investigate the effectiveness of a novel biopesticide prepared from plant extracts against onion thrips.

Materials and Methods

Seedlings of onion variety, RED BULL were transplanted in open plots with 10 cm spacing between plants. Leaves of 10 commonly found plants were collected for biopesticide preparation.

- *Melia azedarach*
- *Vitex negundo*
- *Jatropha curcas*
- *Cymbopogon sp.*
- *Nicotiana tabacum*
- *Ricinus communis*
- *Ageratum conyzoides*
- *Lantana camara*
- *Parthenium hysterophorus*
- *Datura metel*

Fresh leaves of all except tobacco (dry) were collected and washed. Later 250gms leaves of each species were weighed out and chopped and then

transferred into a bottle (10 lit) containing 5 litres of cow urine (Fig. 4). The container was closed and kept under room temperature for 3 weeks. The resultant solution was filtered out and sprayed at different concentrations on the thrip infested crops twice. First spray was applied when the density of thrips reached 15+ per leaf and spray was repeated after 15 days interval.

Results and Discussion

The phytoextract was sprayed at concentrations of 20%, 40%, 60%, 80% and 100%. All the concentrations were effective in controlling the onion thrips. Among the different concentrations used, 40% and above were most effective, as thrips population was highly reduced after first and second applications. Minimum reduction of the pest was recorded in 20% concentration. The biopesticide at 40% concentration was found to be the best as the plants were found to be completely free from the thrips (Fig. 5) and also showed good growth. The higher concentrations were found to retard the growth and development of crop. The effect of varying concentrations of the biopesticide on the thrips and growth of crop plants is represented in Table no.1. Thus, based on the present investigation, spray of this novel phytoextract at 40% concentration at 15 days interval may be advocated to the onion growers as an effective strategy for managing thrips on onion. At present, onion thrips are controlled mainly by using chemical pesticides which can lead to the development of resistance and ecological disruption. Therefore, development and commercialization of newer pest management products which are ecofriendly is the need of the hour.

Table 1. The effect of varying concentrations of the biopesticide on the thrips and growth of crop plants

Sr.No.	Concentration of biopesticide applied	No. of thrips per plant (mean)	Effect on thrips	Effect on growth of plants
1	20%	61	++	++
2	40%	65	+++	+++
3	60%	57	+++	--
4	80%	67	+++	---
5	100%	54	+++	---



Figure 4. Phytoextract preparation



Figure 5. Onion plant after treatment

Conclusions

The experiment was conducted to find the effectiveness of a novel phytoextract prepared from 10 commonly occurring plants against onion thrips. The bioextract evidently showed toxic effects against the onion thrips. This biopesticide preparation involves almost no expense and the extraction procedure is also very simple, so that every farmer can prepare it. The biopesticide at 40% concentration in water when sprayed, completely eradicated the thrips. Thus the use of this extract can be practiced and can be commercially developed as a potent biopesticide thereby putting a limit to the indiscriminate use of synthetic insecticides. It has very low adverse effects on human health and the ecosystem. It would fit well in the IPM practices as a bioinsecticidal component.

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