EVALUATION OF BOTANICAL EXTRACTS AND SYNTHETIC INSECTICIDES AGAINST THRIPS INFESTING CHILLI

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Abstract

The experiment was carried out at Agricultural Research Institute (ARI) Tarnab Peshawar, Pakistan during, 2019-2020. The main focus of the present research was to study efficacy of different botanical extracts (Bitter gourd, garlic and domra) and chemical (acetamiprid and imidacloprid) against thrips (*Scirtothrips dorsalis*) in chilli crop. The results showed after 1st, 2nd and 3rd application among the different botanicals the highest control was recorded by bittergourd as followed by domra while lowest control was recorded by garlic treatment as compared with the check plot. Botanical extracts were showed significant control against thrips in chilli crop after 3 days of application while later on the efficacy was decreased noticed. Similarly, in case synthetic insecticides, the maximum control was recorded by acetamiprid while lowest was recorded by Imidacloprid as compared with the check plot. As from the results the best alternative of synthetic insecticide was recorded bittergourd so the research recommended bittergourd for controlling thrips in chili crop.

Keywords: Botanical extracts, Chili, *Scirtothrips dorsalis,* Synthetic insecticides

Introduction

Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae is an important species cum vegetable crop commonly used in Indian dietary (Raju and Luckrose, 1991). It is grown throughout the year as a cash crop and used in green and red ripe dried stage for their pungency, colour and other ingredients in all culinary preparations of rich and poor alike to impart taste, flavour and colour. Nutritionally, it is a rich source of vitamin A, B and C. Capsaicin an alkaloid responsible for pungency in chillies has medicinal properties and it prevents heart attack by dilating the blood vessels (Gill, 1989). The world production of chilli crop sums up to around 7 million tones, which is cultivated on approximately 1.5 million hectares of land. Chilli is also an important cash crop of Pakistan. Approximately 0.2 million tonnes chilli are produced by Pakistan. Sindh province is the major chilli producing province and its share in the total domestic production is about 82%. According to 2007 Pakistan Agriculture Research Council (PARC), report Pakistan was the fifth largest exporter in the world but according to there is continuous decline in the production of chillies in Pakistan. The reasons of this reduction are various and many but the major threat in chilli production are various pathogens and pest which cause considerable losses every year. Pests typically are more mobile and multiply more quickly than beneficial insects. Chilli is affected by number of pests attack on chillies crop during the growing season. For example, aphids, thrips, leaf hoppers, ear wigs, crickets, mites, root grubs, pod borers, cut worms, flea Beatles, etc damage or destroy the crop. Thrips may affect chili crop in seedling, branching and flowering stages (Hussain and Muhammad, 2011). Chillithrips (*Sirthothrips dorsalis* Hood) is important pest of vegetable, ornamental and fruit crops in southern and eastern Asia, Africa, and Oceania (Nelson *et al.*, 1994). The small size (< 2 mm) of*Scirtothrips dorsalis* life stages and rapid movement make it difficult to detect this insect in fresh vegetation. The very tiny eggs are inserted into soft plant tissues, and the egg stage may last one week. These characteristics increase the chance of transportation of *Scirtothrips dorsalis* through international trade of fresh plant materials. *Scirtothrips dorsalis* life stages occur on all the above-ground plant parts of its hosts, and cause scarring damage due to feeding or the transmission of pathogens (Chang *et al.*, 1995; Seal *et al*., 2006). Chemicals provide a limited level of thrips control. It is important to initiate application before thrips populations increase to threshold levels. Reapply as needed based on label requirements. Use the shortest labeled interval when pest pressure is high and temperatures are warm. Insecticides' mode of action should be rotated with each treatment or at most with each

generation of thrips, unless the label indicates otherwise. Modes of action of different contact and systemic insecticides available for thrips control. The effectiveness of insecticides in managing thrips can be limited due to the insects' evasion of treated surfaces/ tissues. A heavy infestation of Scirtothripsdorsalz's in pepper plants changes the appearance of the plant to what is called "chilli leaf curl." Appearance of discolored or disfigured plant parts suggests the presence of *Scirtothrips dorsalis* (Seal *et al*., 2009). Keeping in view the significance of Chili thrips this study was performed to know about comparative efficacy of insecticides and bio pesticides against *S. dorsalis* under field conditions.

Material and Method

The field experiment was performed to know about comparative efficacy of insecticides and bio pesticides against *S. dorsalis* under field conditions at the Agricultural Research Institute (ARI) Tarnab, Peshawar during year 2019-2020.

Experiment: To know about comparative efficacy of insecticides, bio pesticides against *S.dorsalis* in field

The experiment was carried in a Randomized Block Design with three replication having the plot size of 14x20 sq.m. For the purpose Chilli variety (Kashmiri and china) will be raised at 4.8x2.8 cm spacing. All the Recommended agronomical practices except plant protection to be follow for raising the crop. First spray application of respective insecticides was given on the appearance of the pests and subsequently two sprays was given using manually operated knapsack sprayer having duromist nozzle with slight runoff stage. The observation on the population of thrips to record by selecting five plants randomly from net plot area of each plot and tagged. From three tender leaves of tagged plants, the number of nymphs as well as adults in case of thrips will be counted. The thrips population's was recorded before as well as 3, 5 and 7 days after each spray. Analysis of bio-pesticides which was prepared locally as compared to insecticides. Use best insecticides which are commercially available in markets. Apply both chemicals on thrips to compare the control of thrips. Check mortality rate of both treatments. Collect data randomly and enlist best chemicals for control of thrips.

Statistical analysis

The data was subjected to statistical analysis mean+ SEM using Graphpad Prism software.

Results and Discussion

Evaluation of various botanical extracts on thrips infesting chilli

The data on mean thrips population (Fig.-1) was recorded one day before spraying indicated that the differences in population of thrips were non-significant among different treatments. The data (Fig.-1) recorded at one day after first spraying indicated that all the botanical extracts recorded non-significant lower number of thrips per plant as compared to control. The treatment bitter gourd showed highest control in chilli thrips as followed domra while lowest performed by Garlic after 3 days of spray. Similarly, highest control was also recorded by bitter gourd and domra as compared with garlic one after 5 days of spray. The bar chart also concluded that highest controlled was noticed in domra followed by bitter gourd after 7 days of spray while lowest were observed by garlic extracts after first application. Similarly, day before application mean population of thrips indicated that there was non-significant difference in population of thrips among all treatments (Figure-2). One day after second spray data of mean population thrips (Figure-2) indicated that all the botanical treatments significantly reduced population of thrips per plant as compared to control. After 3 days of spray amongst all the treatments best performed by domra as followed by bitter gourd extracts while poor performed by garlic extracts. The data recorded highest number of thrips controlled by bitter gourd and domra as compared to garlic extracts after 5 days of spray. While decreased was noticed after 7 days of spray in bitter gourd, domra and garlic respectively after second application. However, after third application, mean thrips population (Fig.-1) was noticed one day before spraying indicated that the differences in population of thrips were non-significant among different treatments. The data (Fig.-1) recorded at 1 day after first spraying illustrated that all the botanical extracts recorded non-significant lower number of thrips per plant as compared to control. The treatment bitter gourd showed highest number of thrips controlled as followed by domra then garlic after 5 days of spray. Thus after 7 days of spray decreased in controlled was identified by domra followed by bitter gourd and garlic extracts. These finding are similar to the finding of Abbas *et al.* (2015), Morita *et al.* (2014) and Baraskar *et al.* (2019).

Evaluation of two different insecticides on thrips infesting chilli after spraying

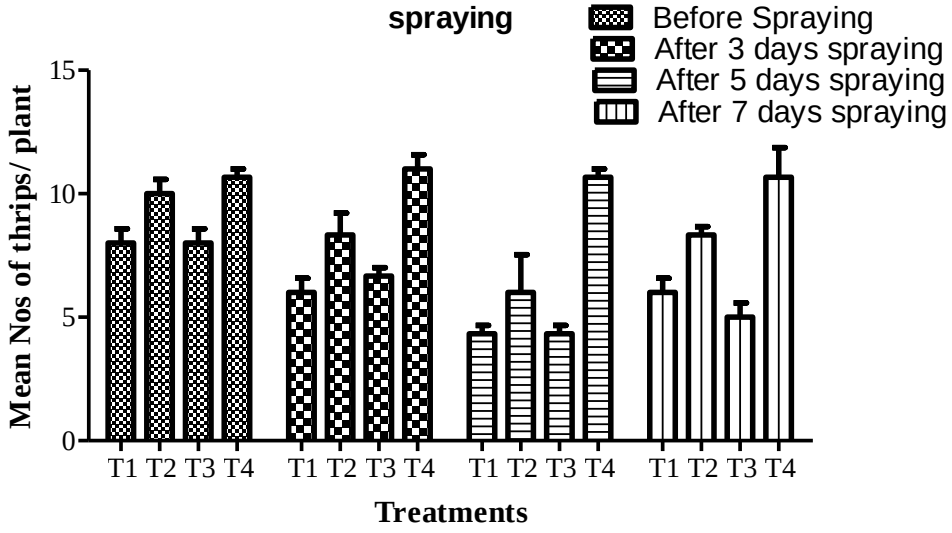
Figure 4 investigated the two different insecticides against thrips in chilli crop. The data on mean thrips population was noticed one day before spraying indicated that the differences in population of thrips were non-significant among different treatments. The data recorded after first spraying

illustrated that both insecticides acetamiprid and imidacloprid) recorded non-significant lower number of thrips per plant as compared to control. The bar chart concluded that the highest controlled were observed after 3 days of applying acetamiprid as compared with imidacloprid followed by after 5 days of application then 7 days after spraying. Bar graph concluded that overall best performance was showed by acetamiprid instead of imidacloprid. The present study revealed that acetamiprid was most effective synthetic insecticide against chili thrips, followed by imidacloprid. Kadri and Goud (2006) studied the effectiveness of imidacloprid, emamectin benzoate and acetamiprid against onion thrips and discovered that these insecticides significantly reduced thrips populations.

Conclusions and Recommendations

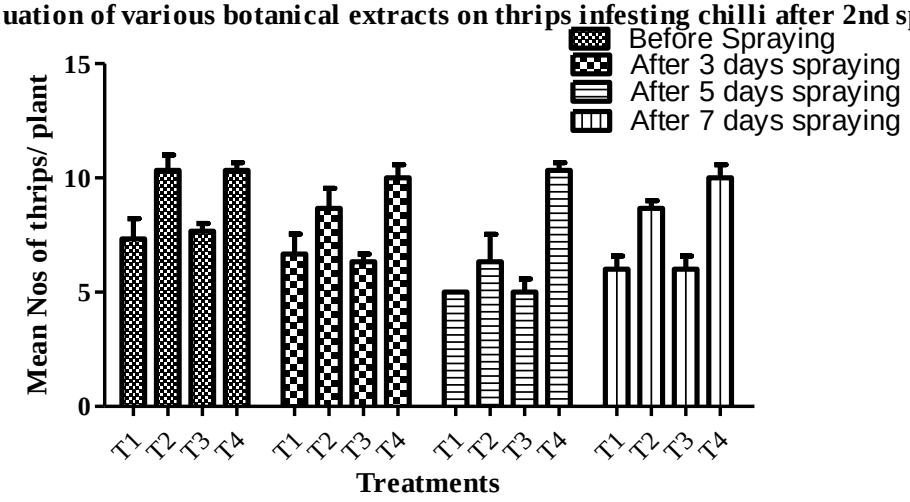
The current research work concluded that among the teste botanicals maximum control was recorded by bittergourd followed by domra while minimum control was recorded by garlic against the chili thrips. Instead of this the overall best chemical insecticide was recorded acetamiprid. As from the results the best alternative of synthetic insecticide was recorded bittergourd so the research recommended bittergourd for controlling thrips in chili crop.

Figure-1 : Evaluation of various botanical extracts on thrips infesting chilli after 1st spraying



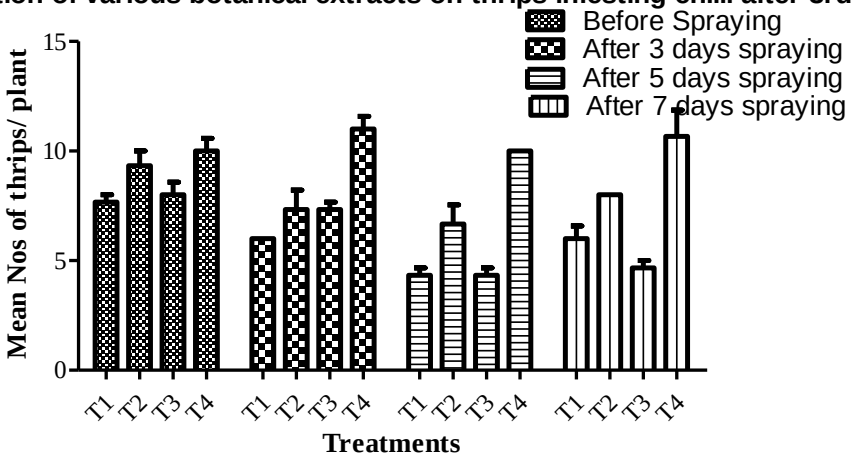
T_1 Bitter gourd, T_2 Garlic, T_3 Domra, T_4 Control.

Figure-2 : Evaluation of various botanical extracts on thrips infesting chilli after 2nd spraying



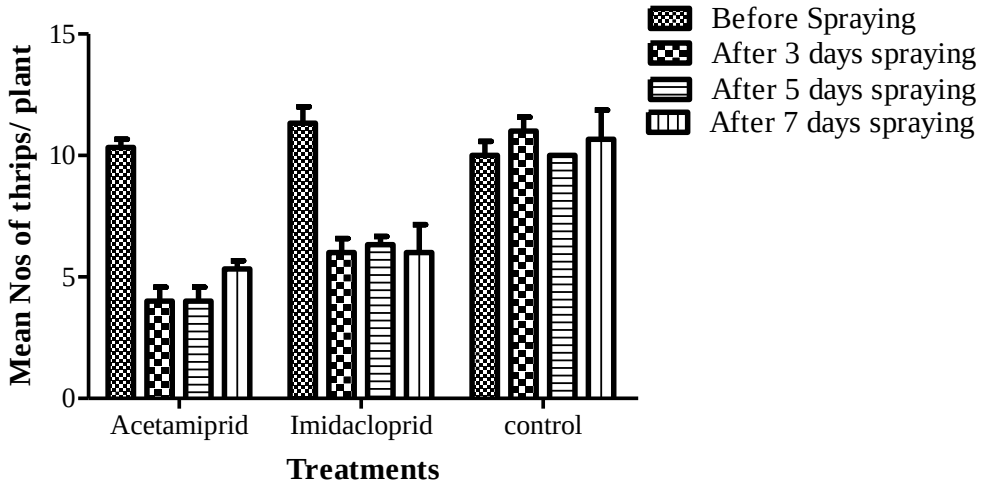
T_1 Bitter gourd, T_2 Garlic, T_3 Domra, T_4 Control.

Figure-3 : Evaluation of various botanical extracts on thrips infesting chilli after 3rd spraying



T_1 Bitter gourd, T_2 Garlic, T_3 Domra, T_4 Control.

Figure-4 : Evaluation of 2 different insecticide on thrips infesting chilli after spraying



References

Abbas, G., A. Ahmed, M. Amer, Z. Abbas and M. Rehman. 2015. Comparative efficacy of pesticides against sucking insect pests of cotton (*Gossypiumhirsutum* L.) crop under arid condition. Sci. Int., 28(3): 211-216.

Baraskar, J., V.K. Paradkar, S. Kadwey, B. Thakre, A. Rithe and R. Vishwakarma. 2019. Bio-efficacy of different group of insecticides against the major sucking pests. BEPLS., 8(12): 110-118.

Chang, N. T. 1995. Major pest thrips in Taiwan..In Parker BL, Skinner M and Lewis T (editors), Thrips Bio and Management.Plenum Press. New York. 105-108

Gill, H. S. 1989. Improved technologies for chilli production. Indian Cocoa Arecanut and spices Journal. 12:118- 119.

Kadri, S. W. and G. K. Basavana. 2010. Efficacy of newer molecules of insecticides and botanicals against onion thrips, Thrips tabaci (Lindeman)(Thysanoptera: Thripidae). Karnataka Journal of Agricultural Sciences. 19(3): 17-25.

Morita, M., T. Yoneda and N. Akiyoshi. 2014. Research and development of a novel insecticide, flonicamid. J. Pestic. Sci., 39(3): 179–180.

Raju, K. V. and C. K. Lackrose. 1991, Trend in area, production and impact of chillies from India. Agric. Situ. India. 45: 764 - 772.

Seal, D. R., M. A. Comperlik., M. L. Richards and W. Klassen. 2006. Distibution of Chilli thrips, *Scirtothrips dorsalis* (Thysanoptera: Thripidae), in pepper fields and pepper Fla. Entomol. 89 (3): 311-320.

Seal, D. R., W. Klassen and V. Kumar. 2009. Biological parameters of chillithrips. *Scirtothrips dorsalis* Hood, on selected hosts. Environ Entomol. 39(5): 1389-1398.