Biological Forum – An International Journal **15(8): 508-510(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Bio efficacy of Adathoda Leaf extract Soap against invasive Thrips *Thrips parvispinus* (Karny) (Thysanoptera: Thripidae) in Chilli

Talapala Sai Kumar[1*], T. Elaiyabharathi[2], A. Suganthi[3], C. Kavitha[4] and N. Sritharan[5]

[1]Master's, Department of Agricultural Entomology,
TNAU, Coimbatore (Tamil Nadu), India.
[2]Associate Professor (Agrl. Entomology), Department of Medicinal and Aromatic Crops,
TNAU, Coimbatore (Tamil Nadu), India.
[3]Associate Professor (Agrl. Entomology), Department of Agricultural Entomology,
TNAU, Coimbatore (Tamil Nadu), India.
[4]Associate Professor, Department of Fruit Science,
TNAU, Coimbatore (Tamil Nadu), India.
[5]Associate Professor, Department of Crop Physiology,
TNAU, Coimbatore (Tamil Nadu), India.

(Corresponding author: Talapala Sai Kumar[*])
(Received: 07 June 2023; Revised: 19 June 2023; Accepted: 25 July 2023; Published: 15 August 2023)
(Published by Research Trend)

ABSTRACT: A field study was carried out in the experimental area of Tamilnadu Agricultural University Orchard and parallelly in a farmer's field at Thondamuthur, Coimbatore during July 2023, to study the efficacy of Adathoda leaf extract soap formulation against the invasive thrips, *Thrips parvispinusin* chilli. Pre-treatment and post-treatment observations were recorded in both experimental fields. The results revealed that the adathoda leaf formulation applied @5gm/lit (43.91 to 45.52%) and 7gm/lit (49.32 to 50.98%) are the best doses against *T. parvispinus* in both locations without causing any Phytotoxic effect on the chilli plants. The leaf extract formulation proved better than fipronil 5% SC this novel formulation based on Adathoda proved effective for the management of thrips in chilli. Thus, the research promotes the development of an effective formulation using Adathoda leaves for the eco-friendly management of thrips in chilli.

Keywords: Chilli, *Thrips parvispinus*, Phytotoxic effect, Adathoda leaf extract soap, Eco-friendly management.

INTRODUCTION

Chilli (*Capsicum annum* L.) is one of India's most important vegetable crops, with large domestic requirements and great export potential. However, several limiting factors can be attributed to the low productivity. The crop occupies an area of 7.43 lakh ha with a productivity of 2576 kg/ha and production of 19.14 tonnes as per the Artificial Market Intelligence Centre (AMIC) (2021). Thrips, *Scirtothrips dorsalis* (Hood), *Thrips parvispinus* (Karny), green peach aphid, *Myzus persicae* (Sulzer), Whitefly, *Bemisia tabaci* (Genn.) and Mites, *Polyphagotarsonemus latus* (Banks) are the major ones, causing yield losses of 50-90 per cent in chilli (Saini *et al.*, 2017). Recently, an outbreak of invasive thrips, Thrips parvispinusin chilli crops caused a yield loss of 80-100% in the southern states of India (Sridhar *et al.*, 2021). For the management of thrips, farmers rely only on an insecticidal approach. Indiscriminate use of insecticides increases residue issues, even in chilli powder (Pathan *et al.*, 2009). Due to increased pesticide consumption, i.e., 5.13 a.i kg/ha (Kodandaram *et al.*, 2013), insecticidal sprays threaten chilli ecosystems. Moreover, problems, such as pest resistance, resurgence, and pesticide residues, have increased. Pathan *et al.* (2009) concluded that sundried red chilli powder consists of insecticidal residues of ethion (1.41 mg/kg), cypermethrin (0.15 mg/kg), and miticides like dicofol (4.03 mg/kg) which are greater than the Maximum Residual limit (MRL). Nevertheless, natural plant extracts/botanical pesticides are essential in agriculture because they are cheap, safe, non-hazardous, and have no residual effects, yet they greatly affect numerous insect pests. Bio-pesticides have been used to protect vegetables and field crops from pests such as borers, bollworms, aphids, thrips, jassids, and whiteflies. Plant extracts from medicinal plants as bio-pesticides against sucking insect pests of the chilli.

MATERIALS AND METHODS

The efficacy of *Adathoda* leaf extract soap formulation against chilli thrips under field conditions was carried out in July 2023.

A. Study area

The experiment was conducted at the experimental area of TNAU Orchard (Horticultural College& Research Institute) (Location-1) and a village Thondamuthur

(Location-II), Coimbatore for studying the Bio efficacy of *Adathoda* leaf extract soap formulation against invasive thrips in chilli.

B. Treatments

Adathoda leaf extract soap formulation

Treatments	Dose (gm or ml/litre)
T_1 -Adathoda leaf extract soap	1
T_2-Adathoda leaf extract soap	3
T_3-Adathoda leaf extract soap	5
T_4 -Adathoda leaf extract soap	7
T_5 -Fipronil 5% SC	0.5
T_6- Control	Untreated

C. Preparation of Adathoda leaf extract soap

Adathoda leaf extract was prepared by using acetone as a solvent with the help of a Rotatory evaporator (Alim *et al*., 2017). Further, the effective concentration of this leaf extract was used for the development of soap formulation by following the Saponification process.

D. Pest count

Thrips population was recorded during pre-treatment and post-treatment applications of Adathoda leaf extract soap and observations were recorded accordingly.

E. Statistical analysis

The periodic data was recorded in replication-wise, average values were calculated and the ANOVA and LSD tests were performed in line with the replication data. This analysis was conducted to investigate the significance and superiority of treatment methods using SPSS (version 22).

RESULTS AND DISCUSSION

Bio efficacy of *Adathoda* soap formulation against invasive thrips, *T. parvispinus* in chilli. A soap formulation of 20 % adathoda leaf extract was applied at four different doses (1, 3, 5, and 7 gm/litre) and compared with Fipronil 5% SC and with Untreated control

A. Location I

The precount of thrips ranged from 6.26 to 7.65. The results obtained after spraying the treatments with a sequence of observations showed a reduction inthe thrips population. Among the dosages, used for thrips management T_3(5 gm/litre) and T_4(7gm/litre)showed a significant pest reduction of43.91% and 49.32% respectively after the insecticidal check (T_5= Fipronil 5%SC) (Table 1).

B. Location II

The precount of thrips ranged from 7.26 to 7.85. The results obtained after spraying the treatments with a sequence of observations showed a reduction in the thrips population. Among the dosages, used for thrips management T_3 (5 gm/litre) and T_4 (7gm/litre) showed a significant pest reduction of 45.52% and 50.98 % respectively after the Insecticidal check (T_5= Fipronil 5%SC) (Table 2).

The Adathoda leaf extract is found to be having antifeedant and toxicity effects against insects (Sadek, 2003). Similar research revealed that *Adathoda vasica* leaves containing alkaloids like Adhatodine, Vasicinone and Vasicine were found to havetoxicity effects (Shoaib, 2021). The toxic effects of *A. vasica* leaf extract observed in the present study and other studies (Bhaduri *et al.,* 1985; Hiremath *et al.,* 1997), can be attributed to one or more of the many bioactive compounds contained in the plant leaves.

The present study shows that the Adathoda leaf extract formulation has a strong toxic effect on chilli thrips. But whether a single compound or several compounds in the plant leaves are responsible for the toxic effects obtained remains to be discovered. However, a field assessment of the toxicity of Adathoda leaf extract soap formulation provides a better dose as well as for the development of botanical entomotoxic materials from the plant.

Table 1: Effects of Adathoda plant extract soap formulation against *Thrips parvispinus* at Location-I.

Adathoda leaf extract soap Dosages (gm/litre)	No. of thrips/plant					Pest reduction /Plant	Pest reduction % over control
	Pre-treatment	Post-treatment Count					
		1DAS	3DAS	5DAS	7DAS		
T_1 – 1 gm / litre	6.26	5.56	5.10	4.82	4.36	0.13	20.77%.
T_2 – 3 gm / litre	6.57	5.32	4.28	3.95	3.25	0.22	30.72%
T_3 – 5 gm / Litre	6.38	5.21	4.34	3.44	3.09	0.34	43.91%.
T_4 – 7 gm /Litre	7.39	5.18	4.02	3.75	3.00	0.45	49.32%
T_5 – Fipronil 5%SC (0.5ml)	7.65	3.05	2.05	1.95	1.25	0.72	71.50%
T_6– Control (Untreated)	7.50	7.25	7.05	7.55	7.85	0.04	1.25%
S.E ±	1.8202	1.694	1.570	1.798	1.703	-	-
LSD (0.05)	-	4.209	3.872	3.026	2.867	-	-
LSD (0.01)	-	5.307	4.108	3.785	3.125	-	-
Significant	NS	*	*	*	*		

T= Treatment, LSD= Least significant difference, DAS= Days after spraying, S.E = Standard error, NS= Significant

Table 2: Effects of Adathoda plant extract soap formulation against *Thrips parvispinus* at Location-II.

Adathoda leaf extract soap Dosages (gm/litre)	No. of thrips/plant					Pest reduction /Plant	Pest reduction % over control
	Pre-treatment	Post-treatment Count					
		1DAS	3DAS	5DAS	7DAS		
T_1 – 1 gm dose/ Liter	7.26	6.77	5.85	5.23	4.76	0.11	21.50%
T_2 – 3 gm dose/ Liter	7.52	6.26	4.65	3.95	3.15	0.22	34.77%
T_3 – 5 gm dose/ Liter	7.25	5.55	4.14	3.57	3.01	0.31	45.52%.
T_4 – 7 gm dose/Liter	7.65	5.25	4.05	3.15	2.55	0.41	50.98%.
T_5 – Fipronil 5%SC (0.5ml)	7.85	3.55	2.85	1.85	1.02	0.56	70.43%
T_6– Control (Untreated)	7.45	7.15	7.55	7.65	7.30	0.01	0.67%.
S.E ±	0.322	0.615	0.716	0.935	1.02	-	-
LSD (0.05)	-	1.131	1.055	0.892	0.567	-	-
LSD (0.01)	-	1.252	1.782	2.123	2.458	-	-
Significant	NS	*	*	*	*		

T= Treatment, LSD= Least significant difference, DAS= Days after spraying, S.E = Standard error, NS= Non-significant

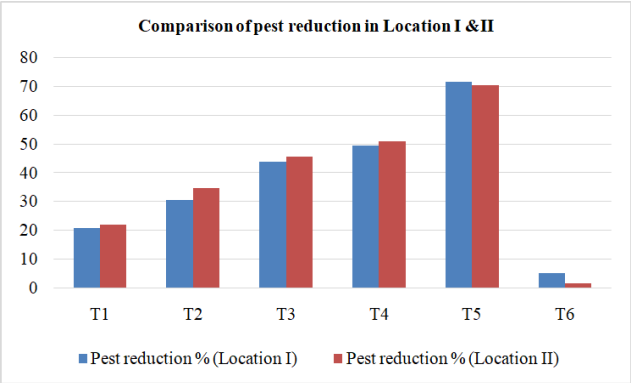

Fig. 1. Overall performance of Adathoda leaf extract soap formulation against Chilli thrips at Location I &II.

CONCLUSIONS

It is very common for farmers to use pesticides indiscriminately to combat insect pests with immediate effect and obtain more benefits. They are sometimes using large quantities of pesticides to control insect pests on vegetables such as chilli. As a result, pesticide residues accumulate in vegetable crops, posing health risks and environmental pollution.

Natural plant extracts/botanical pesticides are essential in agriculture because they are cheap and inexpensive. They are safe, do not pose a danger to the environment and therefore have no residual effect on many insect pests**.** Therefore, Adathoda leaf extract soap formulation of @5 to 7gm /litre was found to be effectively against chilli thrips. This can be included in the IPM package for the management of chilli thrips in future.

Acknowledgement. The authors acknowledge the facilities provided by the Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore. The authors express their sincere gratitude to Mr. Thangaraj, Farmer, Thondamuthur, Coimbatore for coordinating the field trails in the farmer's field.

Conflict of Interest. None.

REFERENCES

Alim, M. A., Song, J., Lim, U. T., Choi, J. J., & Hossain, M. A. (2017). Bioassay of plant extracts against *Aleurodicus dispersus* (Hemiptera: Aleyrodidae). *Florida Entomologist*, *100*(2), 350-357.

Bhaduri, N., Ram, S., & Patil, B. D. (1985). Evaluation of some plant extracts as protectants against the pulse beetle, *Callosobruchus maculatus* (Fabricius) infesting cowpea seed. *Journal of Entomological Research*.

Hiremath, G. I., Ahn, Y. J., & Kim, S. I. (1997). Insecticidal activity of Indian plant extracts against *Nilaparvata lugens* (Homoptera: Delphacidae). *Applied Entomology and Zoology*, *32*(1), 159-166.

Kodandaram, M. H., Saha, S., Rai, A. B., & Naik, P. S. (2013). Compendium on pesticide use in vegetables. *IIVR Extension Bulletin*, *50*, 133.

Pathan, A. R. K., Parihar, N. S., & Sharma, B. N. (2009). Short note effect of drying on the residues of Dicofol, Ethion, and Cypermethrin in Chilli (*Capsicum annum* L.). *Pest Management in Horticultural Ecosystems*, *15*(2), 167-169.

Sadek, M. M. (2003). Antifeedant and toxic activity of *Adhatoda vasica* leaf extract against *Spodoptera littoralis* (Lep., Noctuidae). *Journal of applied entomology*, *127*(7), 396-404.

Saini, A., Ahir, K. C., Rana, B. S., & Kumar, R. (2017). Population dynamics of sucking pests infesting chilli (*Capsicum annum* L.). *Journal of Entomology and Zoology Studies*, *5*(2), 250-252.

Shoaib, A. (2021). A systematic ethnobotanical review of *Adhatoda vasica* (L.), Nees. *Cellularand Molecular Biology*, *67*(4), 248-263.

Sridhar, V., Rachana, R. R., Prasannakumar, N. R., Venkataravanappa, V., Sireesha, K., Kumari, D. A., & Reddy, M. K. (2021). dominance of invasive species, *Thrips parvispinus* (Karny) over the existing chilli thrips, *Scirtothrips dorsalis* hood on chilli in the Southern states of India with a note on its host range: a likely case of species displacement. *Pest Management in Horticultural Ecosystems*, *27*(2), 132-136.

How to cite this article: Talapala Sai Kumar, T. Elaiyabharathi, A. Suganthi, C. Kavitha and N. Sritharan (2023). Bio efficacy of Adathoda Leaf extract Soap against invasive Thrips *Thrips parvispinus* (Karny) (Thysanoptera: Thripidae) in Chilli. *Biological Forum – An International Journal*, *15*(8): 508-510.