



Research Article

Efficacy of Different Coloured Sticky Traps Against Thrips of Chilli

M.M. Hossain^{1*}, K.M. Khalequzzaman¹, M.S. Alam², M.T.R. Mondal³, M.M. Islam⁴

¹Spices Research Centre, BARI, Shibganj, Bogura, Bangladesh

²Kaunia, Rangpur, Bangladesh

³BINA, Mymensingh, Bangladesh

⁴Plant Pathology Division, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh.

Article Information

Received: 08 October 2019

Revised version received: 05 May 2020

Accepted: 11 May 2020

Published: 25 June 2020

Cite this article as:

M.M. Hossain et al. (2020) Int. J. Appl. Sci. Biotechnol. Vol 8(2): 187-190. DOI: [10.3126/ijasbt.v8i2.29580](https://doi.org/10.3126/ijasbt.v8i2.29580)

*Corresponding author

Md. Motaher Hossain,

Scientific Officer, Spices Research Centre, BARI, Shibganj, Bogura, Bangladesh

Email: ripon01_src@yahoo.com

Peer reviewed under authority of IJASBT

© 2020 International Journal of Applied Sciences and Biotechnology

OPEN ACCESS



This is an open access article & it is licensed under a Creative Commons Attribution Non-Commercial 4.0 International (<https://creativecommons.org/licenses/by-nc/4.0/>)

Keywords: Efficacy; Sticky trap; Thrips; Chilli

Abstract

The field experiment was conducted at Spices Research Centre, Shibganj, Bogura, Bangladesh during Rabi season of 2017-18 to study the color preference of *Scirtothrips dorsalis* in chilli. The treatments were T₁= Blue trap @40 trap/ha; T₂= Yellow trap @40 trap/ha; T₃= White trap @40 trap/ha; T₄= Green trap @40 trap/ha and T₅= Pink trap @40 trap/ha. Among the color traps used, at 35 days after installation (DAI) of trap blue color attracted highest (8.44 thrips/ sq. inch area of trap) number of *S. dorsalis* adults followed by white (5.43 thrips/ sq. inch area of trap), yellow (4.30 thrips/ sq. inch area of trap), green (3.52 thrips/ sq. inch area of trap) and pink (3.40 thrips/ sq. inch area of trap) color. Blue coloured sticky trap also attracted comparatively a smaller number of beneficial insects and can be used for relative estimate of *S. dorsalis* population and also for monitoring and mass trapping as a component of IPM program.

Introduction

Chilli (*Capsicum frutescens* L.) is considered as one of the most important commercial spice crops and is widely used universal spice, named as wonder spice in Bangladesh. It is an important condiment used for imparting pungency and colour to the food being rich in vitamin C, A, B, oleoresin and red pigment. In Bangladesh, the area of chilli is 0.92 lakh hectare and the total production is 1.23 lakh metric tons (dry chilli) with average yield of dry chilli is 1.34 t/ha (BBS, 2015). The crop is known to harbour more than 50 insect

and 2 mite pests of which, thrips, *Scirtothrips dorsalis* Hood is the major constraints for higher yields (Reddy and Puttaswamy, 1984). These sucking pests attack the crop at seedling stage itself and continue until 1st harvest, causing severe crop losses up to 34 per cent (Ahmed *et al.*, 1987). Adults and nymphs of *S. dorsalis* inhibit tender leaves, buds and flower and suck sap from them causing deformities in leaves with brown or silvery patches or with burnt margins and browning and drying of flower buds and flowers (Bose

and Yadav, 1989; Duraimurugan and Jagadish, 2011). They can damage the crop indirectly through transmission of certain lethal plant viruses. It is difficult to control this pest with insecticides because of its small size and cryptic habits. Farmers are extensively using different types of insecticides for controlling the pest. However, a repeated application of chemicals is not a desirable practice, as this could lead to undesirable resistance problems. To avoid further resistance in this pest, different non chemical methods need to be evaluated. Thus, sticky traps, a cultural control method can be used as a component of integrated pest management. Determination of colour preference of crop pests may help develop pest traps using such attractive colors, thus providing opportunities for pest control by integrating specific colors into crop management methods. This helps either to reduce or avoid the use of synthetic pesticides and hence helping to avoid the buildup of pesticide residues in the environment and food. Coloured sticky traps could be a simple and low-cost method for determining the relative abundance of insects. It is needed for the determination of colour preference of thrips to get maximum catches of the insect. Broadsgaard (1993) reported that thrips were attracted to blue as well as to white colour. Generally yellow traps are particularly used for catching coleopteran, hemipteran, hymenopteran and thysanopteran insects (Riley and Schuster, 1994; Kersting and Baspinar, 1995). Ranamukhaarachchi and Wickramarachchi (2007) reported that blue and white colours were more effective in trapping the thrips, *Ceratothripoides claratris* followed by purple in tomato. Atakan and Pehlivan (2015) also reported that blue and green coloured trap was observed to be less attractive to pollinating hoverfly and honey bees. This type of experiment has not so far been conducted in Bangladesh. So this type of research work is needed. With these view in mind, the present study was designed to determine the preference of *S. dorsalis* on various coloured sticky traps.

Materials and Methods

The study was conducted at Spices Research Centre, Shibganj, Bogura, Bangladesh (geographic coordinates 25.0167° N, 89.3167° E) during Rabi season of 2016-17. The experimental plot was prepared with five ploughings and cross ploughings followed by laddering to break the clods as well as to level the soil. The weeds and stubbles of previous crops were collected and removed from the soil. The unit plot size was 3 m × 1.5 m and spacing was 50 cm × 50 cm. The treatments were T₁= Blue trap @40 trap/ha; T₂= Yellow trap @40 trap/ha; T₃= White trap @40 trap/ha; T₄= Green trap @40 trap/ha and T₅= Pink trap @40 trap/ha. Treatments were assigned in a randomized complete block design with three replications. BARI Morich-3 was used as test crop for this trial. Thirty-five days old seedlings were transplanted on 02 November 2017. In addition to 5 t/ha of cow dung, the crop was fertilized with N₁₂₀ P₆₀ K₁₀₀ S₂₀ B₂ kg/ha. The entire amount of cow dung, P, S, B and 1/3 of K was applied during final land preparation. The N and rest K

were applied in 3 equal splits at 25, 50 and 70 days after sowing (DAS) (Anonymous, 2010). Three weeding were done at 25, 50 and 75 days after sowing and three irrigations were done at 10-20 days interval during vegetative growth stage. To control Anthracnose of chilli, the crop was sprayed with Tilt 250EC @ 0.5ml/L of water at 65 DAS. Depending on the maturity, the red ripe chilli was harvested from February, 2017 and completed on 02 May, 2018. The whole experimental plot was kept free from spraying of any insecticide. Thrips which were stuck on coloured sticky traps were counted from ten square grids measuring 1 square inch per grid by using hand held magnifying glass. Observation on the beneficial insects like coccinellid predators and honey bees that stuck on the traps was also counted. Observations were taken at seven days interval commencing from 7 DAI (days after installation) till 35 DAI. The recorded data were analyzed and mean values were adjusted and separated by Duncan's Multiple Range Test (DMRT) according to Gomez and Gomez (1984).

Results and Discussion

Efficacy of Different Coloured Sticky Trap Against Thrips of Chilli

Efficacy of different coloured sticky trap against thrips of chilli is presented in Table 1. At 7 days after installation of trap (DAI), significantly maximum number of thrips (4.50/sq. inch area) was recorded on blue trap followed by white (2.22/sq. inch area) and yellow trap (1.92/sq. inch area). The minimum catch was observed on pink trap being, 1.54 thrips/sq. inch area. Likewise, at 14 DAI, the blue trap had maximum catches of thrips followed by white colour. The minimum catch was observed on yellow, green and pink colour trap with 2.90, 2.38 and 2.10 thrips/sq. inch area, respectively. Similar trend was also observed at 21, 28 and 35 DAI. Performance of coloured traps with regard to the catching of *S. dorsalis* was in the order of blue>white>yellow> green>pink. Broadsgaard (1993) reported that thrips were attracted to blue as well as to white colour. Ranamukhaarachchi and Wickramarachchi (2007) also reported that blue and white colours were reported to be more effective in trapping the thrips, *Ceratothripoides claratris* followed by purple in tomato.

Efficacy of Different Coloured Sticky Trap Against Coccinellid Predator of Chilli

Efficacy of different coloured sticky trap against coccinellid predator of chilli is presented in Table 2. Regarding catch of beneficial insects like coccinellid predator, no significant differences were observed among the colour sticky traps. However, the maximum catch of coccinellid predators at 7 DAI (0.98/sq. inch area) was recorded with yellow sticky trap followed by pink trap with coccinellid population of 0.87/sq. inch area of trap. The minimum number of coccinellid predators was attracted to blue (0.71/sq. inch area of trap) followed by pink sticky trap (0.81/sq. inch area

of trap). Similar trend was also observed at 21, 28 and 35 DAI. Riley and Schuster (1994) reported that yellow traps are particularly used for catching coleopteran, hemipteran, hymenopteran and thysanopteran insects.

Efficacy of Different Coloured Sticky Trap Against Honey Bees of Chilli

Efficacy of different coloured sticky trap against honey bees of chilli is presented in Table 3. Similarly, at 7 days after installation of trap (DAI), significantly maximum number of honey bees (1.29/sq. inch area) was recorded on white trap followed by yellow trap (1.09/sq. inch area). The

minimum catches were observed on pink trap (0.81/sq. inch area) which was statistically similar with blue (0.91/sq. inch area) and green trap (0.91/sq. inch area). Likewise, at 14 DAI, the white coloured trap had maximum catches of honey bees (1.39/sq. inch area) followed by yellow sticky trap with honey bee population of 1.19/sq. inch area. The minimum catch was observed on blue, pink and green colour trap with 0.99, 0.99 and 1.09 honey bees/sq. inch area, respectively. Similar trend was observed at 21, 28 and 35 DAI. Atakan and Pehlivan (2015) reported that blue and green coloured trap was observed to be less attractive to pollinating hoverfly and honey bees.

Table 1: Efficacy of different coloured sticky trap against thrips of chilli

Treatments	Mean no. of thrips per square inch area of trap at				
	7 DAI	14 DAI	21 DAI	28 DAI	35 DAI
Blue trap	4.50a	9.82a	5.42a	7.40a	8.44a
Yellow trap	1.92bc	2.90c	2.64c	2.98c	4.30c
White trap	2.22b	8.00b	4.01b	4.83b	5.43b
Green trap	1.60c	2.38c	1.98d	2.28c	3.52cd
Pink trap	1.54c	2.10c	1.84d	2.20c	3.40d
CV (%)	6.00	8.53	3.15	7.92	5.88
Level of sigf.	**	**	**	**	**

Data represent mean of three observations, DAI= Days after installation, Mean followed by the same letter (s) in the same column did not differ significantly from each other at 1% level by DMRT.

Table 2: Efficacy of different coloured sticky trap against coccinellid predator of chilli

Treatments	Mean no. of coccinellid predator per square inch area of trap at				
	7 DAI	14 DAI	21 DAI	28 DAI	35 DAI
Blue trap	0.71	0.81	0.89	0.99	1.09
Yellow trap	0.98	1.19	1.09	1.39	1.49
White trap	0.74	0.79	0.81	0.99	0.99
Green trap	0.81	0.81	0.91	1.09	0.99
Pink trap	0.87	0.86	0.99	1.19	1.09
CV (%)	15.86	20.05	20.78	14.38	12.39
Level of sigf.	NS	NS	NS	NS	NS

Data represent mean of three observations, DAI= Days after installation, Mean followed by the same letter (s) in the same column did not differ significantly from each other at 1% level by DMRT.

Table 3: Efficacy of different coloured sticky trap against honey bees of chilli

Treatments	Mean no. of honey bees per square inch area of trap at				
	7 DAI	14 DAI	21 DAI	28 DAI	35 DAI
Blue trap	0.91b	0.99b	1.09bc	0.99b	0.91d
Yellow trap	1.09ab	1.19ab	1.29ab	1.09b	1.29b
White trap	1.29a	1.39a	1.49a	1.49a	1.59a
Green trap	0.91b	1.09b	1.09bc	1.01b	1.09c
Pink trap	0.81b	0.99b	0.91c	0.99b	0.99cd
CV (%)	14.95	7.92	7.77	4.13	4.67
Level of sigf.	*	**	**	**	**

Data represent mean of three observations, DAI= Days after installation, Mean followed by the same letter (s) in the same column did not differ significantly from each other at 1% level by DMRT.

Conclusion

Blue coloured traps were found more effective in trapping *Scirtothrips dorsalis* as compared to yellow, white and green and pink trap. Use of blue coloured sticky traps may not be solely able to restrict the buildup of thrips population during the entire crop growing period. However, they can be integrated with other components of IPM program where detection and monitoring of thrips population is an integral part to decide upon commencement of pesticide application.

Authors' Contribution

All authors contributed equally in every step. Final form of manuscript was approved by all authors.

Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

References

- Ahmed K, Mohammed GM and Murthy NSR (1987) Yield loss due to pests in hot pepper. *Caps Newslet* **6**: 83-84.
- Anonymous (2010) Chilli Production Technology. Spices Production Technolog Manual. Spices Research Centre, BARI, Shibganj, Bogra, p. 42-43.
- Atakan E and Pehlivan S (2015) Attractiveness of various colored sticky traps to some pollinating insects in apple. *Turkish Journal of Zoology* **39**: 474-481. DOI: [10.3906/zoo-1403-62](https://doi.org/10.3906/zoo-1403-62)
- BBS (2015) Year Book of Agricultural Statistics. Bangladesh Bureau of Statistics. p. 37.
- Bose TK and Yadav LP (1989) Commercial flowers. Naya prakash publishers Calcutta, India, pp. 487-544.
- Broadsgaard FH (1993) Coloured sticky traps for Thrips (Thysanoptera: Thripidae) monitoring on glass-house cucumbers. *Bulletin of OILB SROP*, **16**: 19-22.
- Duraimurugan P and Jagadish A (2011) Preliminary studies on the biology of *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) as a pest of rose in India. *Archives of Phytopathology and Plant Protection*, **44**(1): 37-45. DOI: [10.1080/03235400902831141](https://doi.org/10.1080/03235400902831141)
- Gomez KA and Gomez AA (1984) Statistical Procedures for Agricultural Research. 2nd ed., Intl. Rice Res. Inst., John Willy and Sons, New York, Chichester, Brisbane, Toronto, Singapore, pp. 187-240.
- Kersting and Baspinar (1995) Seasonal and diurnal flight activity of *Circulifer haematoceps* (Hom. Cicadellidae), an important leaf hopper vector in the Mediterranean Area and the Near East. *Journal of Applied Entomology* **119**: 533-537. DOI: [10.1111/j.1439-0418.1995.tb01331.x](https://doi.org/10.1111/j.1439-0418.1995.tb01331.x)
- Ranamukhaarachchi SL and Wickramarachchi KS (2007) Color preference and sticky traps for field management of thrips *Ceratothripoides claratris* (Shumsher) (Thysanoptera: Thripidae) in Tomato in Central Thailand. *International Journal of Agriculture & Biology* **9**(3): 392-397.
- Reddy DNR and Puttaswamy (1984) Pest infesting chilli (*Capsicum annum* L.) in the transplanted crop. *Mysore J Agric Sci* **19**: 236-237.
- Riley and Schuster (1994) Pepper weevil adult response to colored sticky traps in pepper fields. *Southwestern Entomologist* **19**: 93-107.