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New chemistry of selected insecticides against onion thrips (*Thrips tabaci* L.)

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Abstract
The experiment was conducted at Khanzada Research Farm Nasarpur, during 2018. The data regarding thrips count before spray revealed that population of thrips was uniform throughout the experimental treatments, since the average pre-treatment population of thrips was statistically non- significant. The post treatment observations recorded on first day after first spray indicated that all the insecticidal treatments were significantly superior over untreated control in reducing thrips population. Among these treatments the plants treated with Cholorphenpyre 5SC@ 50ml recorded lowest thrips population (0.73) which was statistically at par with Cypermethrin 25EC@ 30ml and Profenophose 5SG@ 10ml. Similar trend of results was obtained at 10th day after spray and during second spray there was a slow increase in live count of thrips (nymph and adults) on untreated control plots (17.86 to 21.00) over a period of 14 days. The superiority of Cholorphenpyre in controlling onion thrips was also found at 5 DAS whereas at 10 DAS Cypermethrin, Profenophose and Cholorphenpyre were equally effective in managing this pest.

Keywords: Onion, Profenophose, thrips, efficacy

Introduction
Onion (*Allium cepa* L.) belonging to family Alliaceae is an important commercial vegetable crop in Pakistan. It is used in soups, sauces and for seasoning of foods in culinary purposes. Onion is an important and indispensable item in every kitchen as a condiment and vegetable. It contains 1.0 percent carbohydrate and 1.20 percent protein and traces of minerals like iron and calcium. (Bose and Some 1990) [1]. Onion crop is attacked by a number of insect pests, right from seedling stage to harvest, among the insect pests, onion thrips is the most serious pest which causes 34 - 43 percent loss in yield (Krishna Kumar *et al*., 2001) [2]. Thrips are members of the order Thysanoptera. Onion thrips, *T. tabaci* L. are cosmopolitan in distribution and polyphagous which attack awide range of crops mainly cabbage, cotton, carnation, garlic, onion, cereals especially wheat. Onion thrips go through egg, nymph, and pupal stages of development before reaching adulthood, adult and nymphal stages (immature) of thrips feed by rasping the leaves and other tissues of plants Nymphs do more damage than adults because they are more in number and less mobile (Kawai, 1988) [3].
Thrips of onion are difficult to control because the succulent nature of leaves, which prevent spray solution reaching the pests and also due to hiding habit of thrips in central axis near the bulb, management of thrips in onion worldwide relies heavily on insecticides (Reddy *et al.*, 2005) [4]. Despite their ease of use and availability of numerous classes or modes of action, rapid development of resistance to insecticides has been a key problem (Ravi kumar *et al*., 2016) [5]. Considering these issues, an experiment was undertaken in order to find out the effectiveness of newer insecticides for the control of onion thrips in the onion seed production program. (Pathak, 1994) [6]. Now a day's farmers are adopting seed production because better income can be obtained from seed production as compared to bulb production. Seeds have more demand and assured buy back guarantee from various seed production agencies. It also required minimum irrigation and less cost of cultivation.

Material and Methods
The particular investigation was carried out during Rabi season of 2017-18 at Khanzada Research Farm, Nasarpur. The soil was uniform, heavy black cotton type having good fertility and drainage. The Transplanting was done on June 2018 by using Palkara (Sindh) variety. The material used and methods adopted during the present investigation are presented in this chapter.

Method of recording observations

The seasonal incidence of thrips was studied on randomly selected 5 plants in each replication of the untreated plot in an onion crop from emergence to maturity. The plants were observed early in the morning at each week. First insecticidal application was given as soon as ETL of onion thrips (15 per plant) was reached. The subsequent sprays were given at an interval of 15 days. Spraying was done in the early morning hours to avoid the mid day heat. Total two sprays were given. For recording observations five plants were randomly selected labeled in each experimental plot. The pre count was recorded one day before the application of treatments. After the application of treatments the observations were recorded at 1, 5, 10 and 14 DAS.

The experimental design

Experimental Design: Randomized Block Design (RBD) Replications: Three Treatments: Eight Spacing: 55x25 cm.

Treatment detail

T1 Cholorphenpyre 5 SC @ 50 ml
T2 Imidacloprid 17.8 SL @ 25 ml
T3 Profenophose 5 SG @ 10 ml
T4 Cypermethrin 25 EC @ 30 ml
T5 Thiamethoxam 25 WG @ 25 ml
T6 Clothionidin 50 WDG @ 100 ml
T7 Flonicamid 50 WG @ 75 ml
T8 Water spray

Statistical analysis

The data obtained on a population of onion thrips (mean no. per plant) was compiled. The data obtained were subjected to $\sqrt{X+0.5}$ transformations before analysis. The analysis of pooled data was carried out to ascertain the relative efficacy of the insecticide treatments against onion thrips.

Results and Discussion

Seasonal incidence of onion thrips

The data on population of thrips infesting onion during 47 week to 11 week 2018 showed that thrips population was ranged from 1.46 (47 week) to 20.86 (08 week) during first five weeks of observations thrips population was very less but from 1st to 11th week the thrips population was continuously rising showing maximum incidence during 8th week (20.86). The present finding is in conformity with the findings of (Haiyder and Sherif 1987) [7] who reported that *Thrips tabaci* on onion crop reached peak during February. Similar results were reported by (Reddy 1976) [8] who revealed that thrips infestation was more on the crop experiencing summer or dry weather condition. During the present course of study the thrips population was very high during summer August to November.

Bioefficacy of newer insecticides against onion thrips

The data regarding thrips count before spray revealed that population of thrips was uniform throughout the experimental treatments, since the average pre-treatment population of thrips was statistically non- significant. Similarly, the average pre-treatment population was more than fifteen nymphs or adults per plant justifying the need of spraying (Table 1).

Performance after first spray

The post treatment observations recorded on first day after first spray indicated that all the insecticidal treatments were significantly superior over untreated control in reducing thrips population. When the threshold of five thrips per plant was exceeded, three to four sprays of cypermethrin were recommended by (Abate and Ayalew 1994) [9]. Different insecticides against *Thrips tabaci* were tested by (Hussain *et al*., 1997) [10] and they found the Cholorphenpyre was the most effective insecticide for its control followed by dicrotophos50 WG @ 75 ml, and thiamethoxam. Inferiority of neem in controlling thrips was suggested by Gupta and Sharma (1998) [11] as compared to chemical insecticides. In the present study next effective treatments were flonicami, clothianidin and imidacloprid5 SC @ 50 ml. On the 5th day after spray the treatment of Cholorphenpyre was most superior (3.00) as compared to other test insecticides, at 14th days after 1st spray thrips population was increased in all experimental plots. (Ramesh babu and Santharam 2000) [12] Reported that Cholorphenpyre effectively checked the population of both thrips and aphids on groundnut. However, highest count was recorded in plots treated with imidacloprid 8.60.

Performance after second spray

During second spray there was a slow increase in live count of thrips (nymph and adults) on untreated control plots 17.86 to 21.00 over a period of 14 days. (Panse 2012) [13] revealed that deltamethrin (8.46) was found to be superior in reducing the incidence of *Thrips tabaci* followed by profenofos 10.58. The highest marketable yield was obtained in the plots treated with deltamethrin (289.92 q/ha) followed by profenofos (278.75 q/ha) (Verma *et al.*, 2012) [14] at Himachal Pradesh, India showed that the spray of imidacloprid at 0.5 ml per litre of water resulted maximum reduction of onion thrips population. The superiority of Cholorphenpyre in controlling onion thrips was also found at 5 DAS whereas at 10 DAS cypermethrin, Profenophose were equally effective in managing this pest respectively. According to (Jadhav *et al.*, 2004) [15] observed that fipronil was found effective against chilli thrips. They evaluated the efficacy of fipronil at different concentrations against sucking pests of chilli in comparison with imidacloprid, phosalone and fipronil recorded lowest population of sucking pests and highest yield. Moreover at 14 DAS Cholorphenpyre emerged as the most effective treatment, since it was found significantly superior over rest of the treatments. (Kordy and Barakat 2014) [16] reported maximum reduction of the thrips after seven days of application using the full recommended dose of spinosad (93.65%), whereas imidacloprid (88.54%) reduced thrips population at half dose. However, present experiment shows Imidacloprid was found least effective amongst all the insecticidal treatments.

Table 1: Performance of newer insecticides against onion thrips

Treatments	Dose g.a.i/ha	Average no. of thrips/plant								
		1st Spray 2nd Spray								
		Pre-count	1-DAS	5-DAS	10-DAS	14-DAS	1-DAS	5-DAS	10-DAS	14-DAS
T1	50	3.85	1.12	1.85	2.10	2.30	1.13	1.81	2.05	2.16
T2	25	3.94	2.13	2.46	2.83	3.03	2.27	2.50	2.84	3.06
T3	10	3.91	1.39	2.04	2.24	2.49	1.46	2.00	2.22	2.49
T4	30	3.90	1.37	1.93	2.22	2.48	1.44	1.92	2.16	2.48
T5	25	3.91	1.42	2.24	2.32	2.56	1.39	2.28	2.37	2.50
T6	100	3.93	1.64	2.37	2.52	2.83	1.76	2.40	2.57	2.83
T7	75	3.92	1.49	2.28	2.45	2.77	1.55	2.30	2.50	2.77
T8	_	3.95	4.16	4.37	4.53	4.60	4.13	4.30	4.58	4.73

Overall bioefficacy of newer insecticides against onion thrips

The data recorded during 1st and 2nd spray was pooled and presented in (Figure 1). It indicated that the average pre count of thrips population was in the range of 14.33 to 15.26 respectively. Cholorphenpyre was found most consistant treatment throughout the experimental period *i.e*. 0.76, 2.90, 3.99 and 4.80 at 1, 5, 10 and 14 DAS, respectively. However, the newer neonicotinoids thiamethoxam, imidacloprid, clothionidin and flonicamid were comparatively least effective against thrips infesting onion. The present results are in conformity with the findings of (Jayaramappa *et al.*, 2001) [17] who observed that Cholorphenpyre was found effective at 50 g a.i. ha-1 against chilli thrips as compared to imidacloprid and phosalone. (Ravikumar *et al.*, 2016) [18] Reported that Profenophose 5 SG @ 0.4 g l-1 was found to be superior to the standard check dimethoate 30 EC @ 2ml l-1 registering the least thrips population. (Shaikh *et al.*, 2015) [19] Concluded that cypermethrin (0.025%) emerged as the most effective insecticide by recording significantly higher thrips mortality and bulb yield. (Rajkumar *et al.*, 2005) [20] Found that Cholorphenpyre (0.01%) was the most effective chemical and protected the crop against thrips whereas imidacloprid (0.1%) were least effective against the thrips. In the present investigation Cholorphenpyre recorded maximum thrips mortality followed by cypermethrin and Profenophose whereas neonicotinoides were found comparatively less effective.

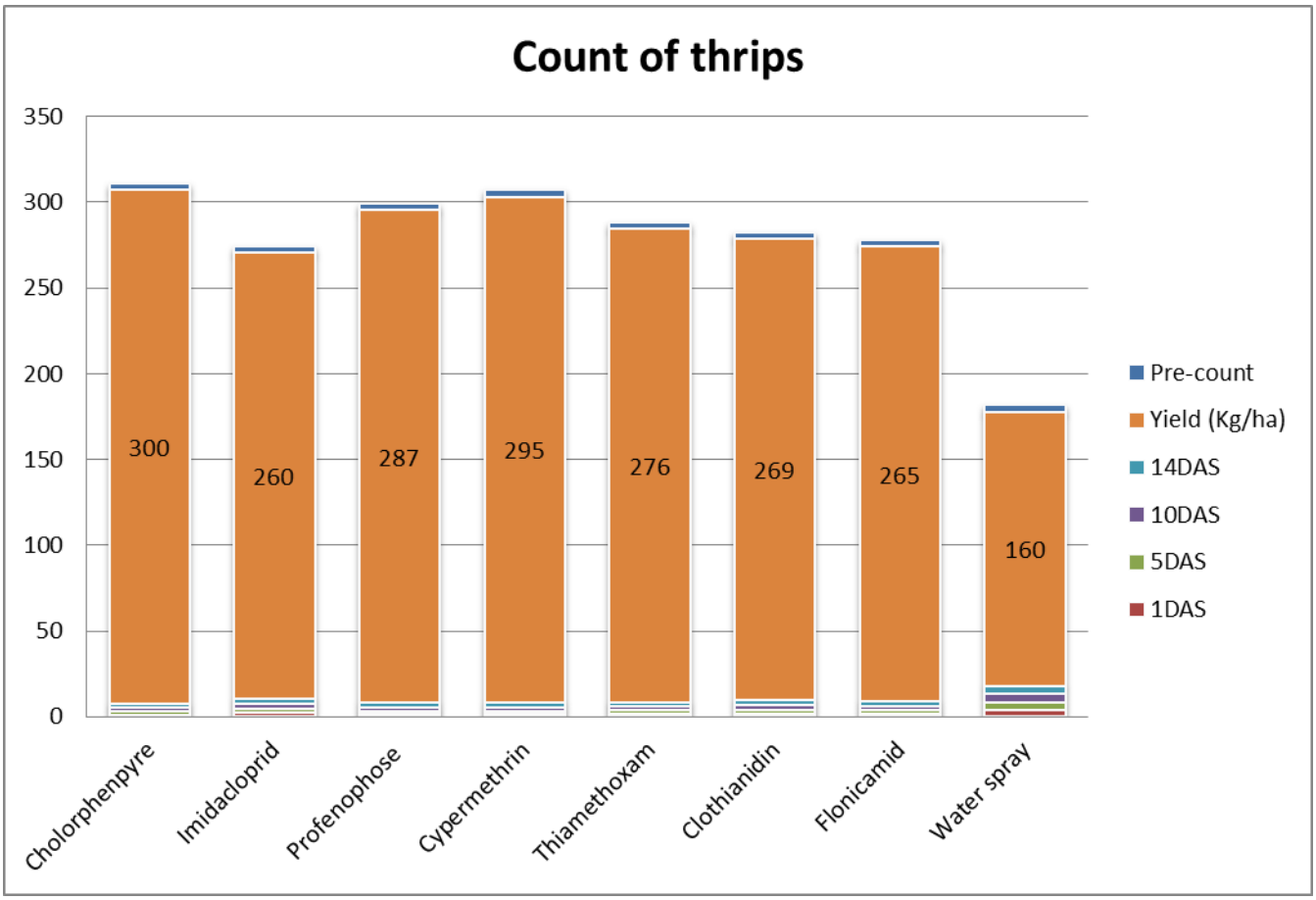

Fig 1: Effect of insecticides against onion thrips on different days

Conclusion

Cholorphenpyre 5 SC @ 50 g a.i. ha-1 was the most effective treatment in controlling thrips. Moreover, cypermethrin 25 EC @ 30 g a.i. ha-1 can be used effectively in the management of thrips infesting onion. Similarly, other evaluated insecticides can also be incorporated in the rotational sprays for management of thrips as they have also proved their bioefficacy against thrips but their interval should be spray.

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