



MANAGEMENT OF ONION THRIPS *THRIPS TABACI* LINDEMAN

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ABSTRACT

Field efficacy studies of three insecticides at different doses (fipronil 80WG @ 50, 75, 100 g; dimethoate 30EC @ 500, 625, 750 ml and malathion 50EC @ 625 ml/ ha) were carried out against thrips *Thrips tabaci* Lindeman and their natural enemies on onion crop during two consecutive rabi seasons of 2018-19 and 2019-20. The experiments were done at farmer's field near Regional Research Station Gurdaspur. Results revealed that insecticidal treatments significantly reduced thrips incidence (45.12- 79.34% over control), of which dimethoate 30EC and fipronil 80WG were the best. The maximum bulb yield (292.87 q/ ha) was obtained with application of dimethoate 30EC @ 750 ml/ ha which was on par with fipronil 80WG @ 100 g/ ha (287.23 q/ ha). The cost: benefit ratio revealed that highest dose of dimethoate 30EC was superior giving maximum net returns with C: B of Rs. 1: 43. The evaluated insecticides did not have any effect on the natural enemies of onion insect pests.

Key words: Onion, *Thrips tabaci*, fipronil 80WG, dimethoate 30EC, malathion 50EC, efficacy, cost bulb yield, benefits, natural enemies, lady bird beetles, lace wings

Onion (*Allium cepa* L.) is one of the most important commercial vegetable and condiment crop grown in India. It is rich in flavonoids and alkenyl cysteine sulphoxides which play a vital part in preventing heart disease and other ailments (Javadzadeh et al., 2009). Several factors such as low quality of seeds or varieties, excessive use of fertilizers, weeds and deficiency of micronutrients are responsible for its lower quality and productivity (Anonymous, 2020). Insect pests are the main constraints for the production, and of these onion thrips *Thrips tabaci* Lindeman is an important pest causing 25-50% reduction in bulb yield (Muhammad et al., 2018). It is active throughout the year and both adults and larvae of thrips prefer to feed on young leaves in the inner necks of onion plants and its feeding on leaves may aid in development of purple blotch disease. It also acts as a major vector of viral diseases (Alston and Drost, 2008; Anonymous, 2020). The pest status of onion thrips can be attributed to its polyphagous nature, high reproductive rate, short generation time, high survival of cryptic instars, transmit plant pathogens and development of resistance to insecticides (Diaz-Montano et al., 2011). Despite its importance, scanty literature is available for its management in northern part of India. Therefore, present study was formulated to evaluate the influence of certain insecticides on the management of *T. tabaci* in submountainous zone of Punjab.

MATERIALS AND METHODS

The field experiment was carried out in onion crop during rabi seasons of 2018-19 and 2019-20 at farmer's fields near Punjab Agricultural University (PAU) Regional Research Station, Gurdaspur. The onion (Cv. Punjab White) planting was done in November with a spacing of 15x 7.5 cm. The experiment was laid out in 30 m² plots in a complete randomized block design with three replication and eight treatments. The paths were maintained at 1.0 and 0.5 m between replication and treatment plots as buffer, respectively. Crop was raised following the recommended agronomic practices except plant protection measures (Anonymous, 2020). The three insecticides with doses viz. fipronil 80WG (50, 75, and 100 g); dimethoate 30EC (500, 625 and 750 ml) and malathion 50EC (check) @ 625 ml were applied as foliar spray, additionally the control treatment was maintained by spraying water @ 250 l/ ha using manually operated knapsack sprayer with flat fan nozzle (Anonymous, 2020). Observations on thrips incidence was observed on 20 plants which were randomly selected in each treatment through visual counting by opening leaf sheath at the base of the plants. Counts were made before and at three, seven and ten days after each spray. The occurrence of natural enemies/ plot was also observed similarly. The bulbs were dug out with spade and khurpa and properly cleaned before weighing. The bulb yield/ plot

Table 1. Efficacy of insecticides against *T. tabaci* and its natural enemies, and on bulb yield and economics in onion (2018-19, 2019-20, pooled)

Treatment No.	Insecticide	Dose/ha	Mean thrips counts/ plant				Mean natural enemies/ plot				Cost benefit ratio							
			BT	3 DAT	7 DAT	10 DAT	ROC (%)	Lady bird beetles	Lacewings	10 DAT	BT	3 DAT	7 DAT	10 DAT	Yield (Q)	Income (Rs.)	Cost of treatment (Rs.)	Net Profit (Rs)
T1	Fipronil 80 WG	50 g	6.12	2.25 (1.79)	3.28 (2.09)	3.83 (2.20)	52.06	0.00	1.98	0.69	0.00	0.32	0.00	0.69	561210	1106.25	24221	1:22
T2	Fipronil 80 WG	75 g	6.49	1.62 (1.63)	2.15 (1.79)	2.37 (1.81)	70.40	0.33	0.32	0.33	0.00	0.33	0.00	0.33	570614	1344.25	33388	1:25
T3	Fipronil 80 WG	100 g	6.45	1.28 (1.49)	1.49 (1.56)	2.18 (1.76)	72.78	0.33	0.33	0.33	0.00	0.33	0.00	0.00	584536	1581.25	47073	1:30
T4	Dimethoate 30 EC	500 ml	5.84	2.13 (1.74)	1.70 (1.66)	3.14 (2.02)	60.70	1.00	0.33	1.00	0.17	0.00	0.67	0.33	564432	1041.25	27508	1:26
T5	Dimethoate 30 EC	625 ml	6.25	1.47 (1.60)	1.54 (1.60)	2.22 (1.78)	72.28	0.00	0.33	0.33	0.33	0.17	0.67	0.67	553638	1146.25	40435	1:35
T6	Dimethoate 30 EC	750 ml	6.62	1.03 (1.38)	0.57 (1.28)	1.70 (1.61)	79.34	0.64	0.33	0.33	0.33	0.33	0.00	0.33	591059	1246.25	53931	1:43
T7	Malathion 50 EC	625 ml	6.13	2.69 (1.93)	3.62 (1.91)	4.39 (2.33)	45.12	0.33	0.00	0.33	0.17	0.67	0.00	1.00	559726	981.25	22862	1:23
T8	Control (Untreated)	-	6.15	5.73 (2.65)	7.23 (2.78)	7.99 (3.03)	-	1.00	1.67	1.00	0.33	0.67	0.50	0.00	541282	-	-	-
CD (p=0.5)			NS	0.16	0.31	0.18		NS	NS	NS	NS	NS	NS	NS	-	-	-	-

BT: Before Treatment; DAT: Days after treatment; ROC: Reduction over control; C: B: Cost Benefit ratio; Figures in parentheses square root transformed

was measured separately and converted into q/ ha. The data were subjected to statistical analysis by ANOVA after square root transformations following Gomez and Gomez (1984). In order to know the economics of insecticidal treatments, the incremental cost benefit ratio (ICBR) was worked out.

RESULTS AND DISCUSSION

The observations revealed that there was uniform distribution of thrips in all the plots before the treatment, and all insecticidal treatments were found effective in reducing incidence of thrips. The data revealed that least thrips counts (1.03, 0.57 and 1.70/ plant) were observed with dimethoate 30EC @ 750 ml/ ha and it was at par with that of fipronil 80WG @ 100 g/ ha (1.28, 1.49, 2.18/ plant at three, seven, ten days after insecticidal application, respectively). Analysis revealed that the insecticidal doses in the decreasing order for their efficacy is as follows- dimethoate 30EC @ 750 ml> fipronil 80WG @ 100g> dimethoate 30EC @ 625 ml> fipronil 80WG @ 75 g> dimethoate 30EC @ 500 ml> fipronil 80WG @ 50 g> malathion 50EC @ 625 ml/ ha. The reduction in thrips incidence with 10 days after treatment varied from 79.34 to 45.12%; dimethoate 30 EC (750 ml/ ha) led to maximum reduction (79.34 %) followed by fipronil 80WG (100 g/ ha- 72.28%). On the basis of reduction in thrips incidence, the insecticidal treatments were observed in descending order of their efficacy as- dimethoate 30EC> fipronil 80WG> dimethoate 30EC> fipronil 80WG> dimethoate 30EC> fipronil 80WG> malathion 50EC @ 750 ml> 100 g > 625 ml> 75 g > 500 ml> 50 g >625 ml/ ha. The natural enemies (ladybird beetle and lacewing) was noticed to be very less. There was no significant effect on natural enemies of insecticidal treatments, however, the maximum occurrence of lady bird beetle and lacewings (1.98 and 1.00/ plot) was noticed at 7 and 10 DAT, respectively. It was concluded that all tested insecticides were safe towards natural enemies. The bulb yield significantly increased with treatments (268.42 to 292.87 q/ ha) as compared to untreated control (258.94 q/ ha), with maximum being with dimethoate 30EC @ 750 ml/ ha at par with that of 100 g/ ha of fipronil 80WG (287.23 q/ ha). Economics of treatments revealed that the maximum net returns of Rs 53931/ ha was achieved with dimethoate 30EC @ 750 ml/ ha (C: B @ Rs. 1:43) (Table 1).

Verma et al. (2012) and Das et al. (2017) observed that imidacloprid 17.8SL decreased incidence of onion thrips and increased bulb yield with highest C:

B ratio; and thiamethoxam 25WG and imidacloprid 70WG were significantly superior and gave higher B: C ratio. Similarly, Zaman (1989), observed that bifenthrin, carbosulfan, cypermethrin, deltamethrin+ triazophos and dimethoate reduced thrips incidence for more than 2 weeks. Shelton et al. (2008) showed that acetamiprid, dimethoate, spinosad and imidacloprid performed better than lambda-cyhalothrin against thrips on cabbage. Dimethoate proved to be the best against thrips followed by bifenthrin 10 EC (Muhammad et al., 2018); and application of carbosulfan 20EC and spinetoram 120SC greatly reduced the *T. tabaci* infesting garlic and increased the bulb yield (Hussein et al., 2015). Significantly higher bulb yield with high returns was achieved with application of Rynaxypyr 20 SC @ 0.15 ml/l followed by spinosad 48SC @ 0.12 ml/l (Sreenivas et al., 2013). The present study concluded that the treatments with dimethoate 30EC (750 ml/ ha) and fipronil 80WG (100g/ ha) can be recommended against onion thrips.

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