



E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2015; 3(4): 371-373
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Received: 06-06-2015
Accepted: 09-07-2015

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Efficacy of a biopesticide and synthetic pesticides against tobacco aphid, *Myzus persicae* Sulz. (Homoptera, Aphididae), on tobacco in Peshawar

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Abstract

Myzus persicae Sulz. (Homoptera, Aphididae) is a major pest of tobacco in Khyber Pakhtunkhwa province, causing heavy losses to it each year. The pest is controlled routinely with synthetic insecticides, which has resulted in resistance and environmental concerns. In the present experiment effectiveness of a biopesticide (BtA) was compared with three synthetic insecticides (Confidor, trend and megamos) against *M. persicae* on tobacco. After 1st and 2nd chemical spray overall mean density of the pest was significantly lower in confidor (9.07, 12.02 aphids leaf⁻¹) and higher in BtA (21.26, 30.89 aphids leaf⁻¹) treatment. In control overall mean density of the pest increased from 21.63 to 37.23 aphids leaf⁻¹ during first 25 days and 40.67 to 77.82 aphids leaf⁻¹ during 2nd 25 days experimental period. Among the treatments mean yield of tobacco green leaf was significantly higher in confidor treatment (2368 Kg ha⁻¹) and lower in BtA (1815 Kg ha⁻¹) treatment. In control mean yield of tobacco leaf was lowest with 1718 Kg ha⁻¹. The results of present experiment might help in better control of *M. persicae* on tobacco in KPK province.

Keywords: BtA, *M. persicae*, synthetic insecticides, tobacco

1. Introduction

Tobacco (*Nicotiana tabacum* L.) (Nicotiana, Poaceae) is an important cash crop of Pakistan. It is cultivated on about 0.27% area of Pakistan, is of great economic importance and a source of revenue, employment and foreign exchange [1, 2]. In KPK province, it is widely grown in Peshawar, Charrsadah, Mardan, Swabi, Swat and Hazara Districts [3]. The tobacco growers of the province do not get the profits which they expect from the sale of their produce due to low yields. A number of factors are responsible for low yield and low quality of tobacco in the country, among which damages caused by the insect pests and the chemicals applied for their control are the serious constraints [4, 5]. Major insect pests of tobacco are cutworms (*Agrotis ipsilon*, *A. segetum*, *A. flammatra*), budworms (*Heliothis virescens* (F.) (Lepidoptera: Noctuidae) and aphids (*Myzus persicae* and *Aphis tabaci*) (Homoptera: Aphididae). These pests adversely affect the crop growth and yield [6]. Insect pest attack starts right from the nursery and continues till crop maturity [7]. *Myzus persicae* causes damage to tobacco crop from sowing of nursery till crop maturity. Both nymph as well as adult *M. persicae* suck sap from green parts of tobacco plants in general and from leaves in particular. As a result plant vigor is decreased. Furthermore, the leaves become curled up, deformed and chlorosis occurs and finally these leaves become vulnerable to the attack of pathogens [8].

Keeping in view the importance of the tobacco crop and the damages caused by *M. persicae* to it, the present study aimed to compare efficacy of a biopesticide and two synthetic pesticides against the aphids on tobacco.

2. Materials and Methods

The present experiments on the comparison of a biopesticide with two synthetic pesticides against *M. persicae* on tobacco were carried out at the New Developmental Farm (NDF) of the University of Agriculture Peshawar (UAP) in 2005.

Tobacco seedling variety "Speight G-28" was sown on raised seed beds under polythene shelter in 2nd week of December, 2004. Seed beds were irrigated twice a day with sprinkler till germination. Proper weeding and thinning were done. Healthy seedlings about 5-6 inches in length with pencil size thickness were selected and transplanted in 1st week of March 2005. The experiment was carried out in randomized complete block design with three replications.

There were four treatments and a control in each replication. The size of each treatment was 3 x 5 m². Standard agronomic practices were given to all treatments and control. Ten plants were randomly selected from each treatment and control for recording pest density. The plants were daily observed for pest incidence after transplantation. Data were taken by counting

aphids on three randomly selected leaves per plant. Four insecticides (Table 1) were applied two times using Knapsack sprayer at 10:00 am. Data on pest population were recorded 24 hr before chemical treatment and then 24, 48 and 72 hrs and at weekly intervals after treatment.

Table 1: List of insecticides applied against *M. persicae* on tobacco in 2005.

Trade Name	Common Name	Recommended dose concentration
Confidor	Imidachloride	0.6m/L
Trend	Methamidophos	4ml/L
Megamos	Acetamprid	1.25ml/L
BtA	Biopesticide cicide	1gm/L

2.3 Data analysis

The data were statistically analyzed by One-way ANOVA and the significance of mean differences was determined by Fisher’s LSD test at P < 0.05 [9].

3. Results and Discussion

3.1 First spray against *M. persicae*

The results showed that mean density of the pest was

significantly lower in confidor treatment with 5.70, 4.30, 6.27, 10.37, 18.73 aphids leaf⁻¹ after 24, 48 and 72h as well as after one week and two week periods, respectively (Table 2). In control density of the pest was 23.83, 27.49, 33.45, 45.78, 55.61 aphids leaf⁻¹ after 24, 48, 72h, one and two weeks period, respectively. Overall density of the pest was significantly lower in Confidor (9.07 aphids leaf⁻¹) and higher in control (37.23 aphids leaf⁻¹).

Table 2: Mean density of aphids leaf⁻¹ of tobacco after 1st chemical spray during 2005.

Treatment	Mean density of aphids leaf ⁻¹ of tobacco						
	Pre -treatment	Post-treatment					Overall mean density
		24h	48h	72h	1 week	2 weeks	
Confidor	23.97	5.70e	4.30e	6.27e	10.37d	18.73d	9.07e
BtA	22.40	19.43b	20.10b	21.97b	22.40b	22.40bc	21.26b
Trend	24.50	11.87c	13.40c	16.67c	22.43b	24.50b	17.77c
Megamos	20.73	8.10d	9.40d	12.87d	17.73c	20.23cd	13.66d
Control	21.63	23.83a	27.49a	33.45a	45.78a	55.61a	37.23a
LSD	N.S	1.814	3.251	3.154	2.134	3.514	2.417

Means in columns followed by different letters are significantly different at 5% level of significance (LSD test).

3.2 Second spray against aphids

Mean density of the pest was significantly lower in Confidor 24h, 48h, 72h, one week, two weeks with 5.35, 5.80, 7.90, 14.53, 26.37 aphids leaf⁻¹, respectively. In control density of the pest was 43.73, 48.67, 55.64, 69.34 aphids leaf⁻¹ after 24,

48, 72h as well as after one and two weeks period, respectively. Overall mean density of the pest was significantly lower in Confidor (12.02 aphids leaf⁻¹) and higher in control (58.97 aphids leaf⁻¹).

Table 3: Mean density of aphids leaf⁻¹ of tobacco after 2nd chemical spray during 2005.

Treatment	Mean density of aphids leaf ⁻¹ of tobacco						
	Pre- treatment	Post treatment					Overall mean density
		24h	48h	72h	1 week	2 week	
Confidor	30.57c	5.53e	5.80d	7.90e	14.53d	26.37c	12.02e
BtA	36.17b	26.17b	27.47b	29.77b	34.90b	36.17b	30.89b
Trend	33.43bc	12.57c	12.77c	15.20c	20.47c	33.43b	18.88c
Megamos	31.20c	8.40d	8.03d	11.97d	17.43cd	28.93c	14.95d
Control	40.67a	43.37a	48.67a	55.64a	69.34a	77.82a	58.97a
LSD	3.315	1.245	2.487	2.324	3.482	3.541	2.215

Means in columns followed by different letters are significantly different at 5% level of significance (LSD test).

In our experiments Confidor yielded highest mortality of *M. persicae* than the other treatments and all the chemicals yielded higher mortalities than the control. Our results are comparable to those of some earlier researchers. Among the different pesticides tested, Confidor and actara gave the lowest *M. persicae* population per leaf after 1, 2, 3, 4 and 7 days of pesticide application, as compared to the other pesticides [10]. Confidor effectively controlled *M. persicae* population throughout the year [11]. Commercial formulation imidacloprid (Confidor) was efficient in the control of *M. persicae* [12]. Confidor was highly effective against *M. persicae* as compared to acephate and endosulfan [13]. Studies were conducted on the efficacy of different chemical insecticides against *M. persicae*

on tobacco crop at Pakistan Tobacco research station, Khan Ghari, Mardan, NWFP-Pakistan showed that lowest mean pupation of *M. persicae* leaf⁻¹ was recorded with confidor (20 aphid leaf⁻¹) and actara (18 aphid leaf⁻¹) treated plots, while highest mean population of aphid per leaf was recorded with methoxyl (42 aphid leaf⁻¹) and tracer (39 aphid leaf⁻¹) [14].

3.3 Yield of tobacco

The yield data of tobacco green leaf taken at the end of the experiment showed significant differences among the different treatments as shown in Fig 1. Among the treatments mean yield of tobacco was significantly higher in Confidor treatment (2368 Kg ha⁻¹) and lower in control (1718 Kg ha⁻¹).

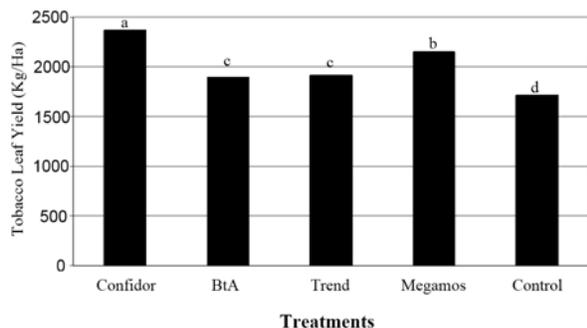


Fig 1: Mean yield of tobacco green leaf ha⁻¹ during 2005. Bars with different letters are significantly different at 5% level of significance (LSD test).

M. persicae populations greatest effect was measured on the yield of leaves from the middle portion of the plant. The leaves on which the population of *M. persicae* was greater had significantly greater reduction in price because of lower grade index [15].

Some researchers had reported higher yield with confidor like ours, e.g. yield of tobacco was highest (2253.0 kg ha⁻¹) with Confidor application, while lowest (1732.0 kg ha⁻¹) in sundaphos treatment [14].

4. Conclusion

Confidor yielded highest mortalities of *M. persicae* on tobacco than the other insecticides and control. Confidor also resulted in highest yield of tobacco. The results of present experiments might help in better control of *M. persicae* on tobacco.

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