

Efficacy of Bio Pesticides against the Cauliflower White Fly In the Local Condition of Tandojam, Sindh Pakistan

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Abstract

A field study in the experimental area of Entomology Section, Agriculture Research Institute, (ARI) Tandojam Sindh Pakistan was carried out so as to examine the efficacy of different biopesticides against the cauliflower white fly. Seven treatments with three replications that: T1=chemical control (confidor), T2=Neem (*Azadirachta indica*), T3=Akk (*Calotropis procera* Alton. F.), T4=Tooh (*Citrullus colocynthus* Schrad. L.), T5=Datura (*Datura stramonium*) T6=Tabacco (*Nicotiana tabacum*) and T7=Control (untreated) were applied and white fly infesting in cauliflower plant was found. In this regard, the pre and post-treatment observations were also recorded. Against whitefly, chemical control (confidor) showed highest efficacy (95.75%) as observed during 1st spray, followed chemical control (confidor) (91.89%), Tooh extract (83.81%) and least efficacy for Datura extract (78.14%); while after second spray also, chemical control (confidor) showed highest efficacy (86.36%), followed by Neem extract (73.58%), Tobacco extract (75.11%), Tooh extract (70.67%), Akk extract (70.05%) and the lowest efficacy was resulted by Datura extract (66.63%). According to the overall efficacy of biopesticides against whitefly after first and second spray, the treatments ranked as: chemical control (confidor), neem extract, tobacco extract, tooh extract, akk extract and datura extract respectively

Keywords: Bio-pesticides, Efficacy, Cauliflower, White fly, Sindh, Pakistan.

Overview

Cauliflower, *Brassica oleracea* L. have its place to the family Cruciferae, is an annual plant that replicates through seed. Characteristically, only the head (the white curd) of terminated floral meristems is eaten, however the stalk and nearby thick, green leaves are castoff in vegetal bisque or thrown out. Cauliflower is low in fat, low in carbs but high in dietary fibre, folate, water, and vitamin-C, possessing a high nutritional density. Cauliflower contains several phytochemicals, common in the cabbage family that may be beneficial to human health (Kirsh *et al.* 2007; USDA, 2011).

Biopesticides are natural control of crop insect pests (Nzanza and Mashela, 2012) and these naturally occurring substances control pests by non-toxic mechanisms (Bardin *et al.* 2008); while synthetic pesticides may adversely affect the organisms such as birds, beneficial insects and mammals (Knott, 1998). However, for achieving high results from biopesticides effectively, users need to know a great deal about managing pests (Adalbert *et al.* 2013; Adalbert *et al.* 2007). Among insect pests, bollworms, fruit borers, aphids, jassids, thrips, whitefly, leaf hopper, diamond back moth found to be infest safflower and the it has been proved that botanical pesticides effectively control these insect pests. Apart from the killing of the insect pests, some of the plant extracts act as repellent, anti-feedant and contains certain chemicals, which inhibits insect population (Bardin *et al.* 2008; Nzanza and Mashela, 2012; Adalbert *et al.* 2013). Prasad and Devappa (2006) reported that the biopesticides was found to be effective in suppressing the larval population of the *P. xylostella* as compared to other insecticides with higher yield of cabbage per hectare. Jeyarani and Kennedy (2004) reported that biopesticides being highly effective in reducing larval population of diamondback moth with highest yield in cauliflower.

The present research was conducted in order to determine the efficacy of biopesticides against the cauliflower white fly under the local condition of Tandojam Sindh Pakistan.

Keeping in the view importance of research following objectives were developed:

Objectives of study

1. To observe the efficacy of different biopesticides against the cauliflower white fly.

2. To propose the best effective biopesticide against the cauliflower white fly.

Methods and Materials

An experimental field survey so as to determine the biopesticides (plant extracts) efficacy as well as confidor against the cauliflower white fly was conducted during the year 2018. RCBD (Randomized Complete Block Design) was designed with three replicated with the term of sub-plot size of 3m² (9m²). The propagating methods and dates were observed according to the plan of work. The 5.0 kg ha⁻¹ was applied; whereas row to row space of sixty 60 cm and plant to plant distance of 15 cm was kept. The Thori-78 (cauliflower variety) was used. There were seven treatments show below:

T1 Chemical control (confidor); T2 Neem (*Azadirachta indica*); T3 Akk (*Calotropis procera* Alton. F.); T4 Tooh (*Citrullus colocynthus* Schrad. L.); T5 Datura (*Datura stramonium*); T6 Tobacco (*Nicotiana tabacum*) and T7 Control (untreated).

In this regard, the Neem (*Azadirachta indica*), Tobacco (*Nicotiana tabacum*), Akk (*Calotropis procera* Alton. F.), Tooh (*Citrullus colocyanthus* Schrad. L.) and Datura (*Datura stramonium*) 10 kg leaves for each plant were collected and extract. Every single treatments stock weight was 10 kg boiled in 10 liters of water. Then leaves of plant species were taken distinctly as well as strained through muslin cloth. While water continued 5 liters stock solution was prepared for spray. In two sprays were conducted, and the effectiveness was observed subsequently 24, 48, 72, 96 hours 1 week and 2 weeks of spray and linked through control. In this regard, the recommended pesticide for cauliflower was also squirted for chemical control (confider) @ 250 ml / acre (0.56ml/plot) and bio pesticide 5liter/Acr (12ml/plot) was sprayed. Thus the data were subjected to analysis. The ANOVA test was used so as to detect the significance differences of different parameters at different intervals. Least Significance Difference (LSD) test was likewise applied so that compares the different treatments for their efficacies against the white fly.

Results

The experiments were conducted during the year of 2018 at the experimental area of Entomology Section, Agriculture Research Institute (ARI) Tandojam Sindh Pakistan so as to examine the efficacy of different biopesticides against the cauliflower white fly. Seven treatments were formed including a control such as: T1= Chemical control (confidor) T2=Neem (*Azadirachta indica*), T3=Akk (*Calotropis procera* Alton. F.), T4=Tooh (*Citrullus colocynthus* Schrad. L.), T5=Datura (*Datura stramonium*), T6= Tobacco (*Nicotiana tabacum*) and T7=Control (untreated). One pest was found that infesting the cauliflower including whitefly. The data were observed on white fly after treatment and pre-treatment insect count were also recorded.

Whitefly first spray

Whitefly population on cauliflower in response to application of biopesticides showed non-significant variation for pre-treatment insect count (F=0.35; DF=20; P>0.05); while the whitefly population declined significantly when observed 24 hours of spray (F=7.80; DF=20; P<0.05), after 48 hours of spray (F=28.35; DF=20; P<0.05), 72 hours after spray (F=59.32; DF=20; P<0.05), 96 hours after spray (F=60.30; DF=20; P<0.05); one week after spray (F=261.89; DF=20; P<0.05) and two weeks after spray (F=180.92; DF=20; P<0.05).

The data (Table-1) exhibited that on the basis of efficacy against the target insect, the synthetic pesticide chemical control (onfidor) 1st reducing whitefly population from 3.44/leaf to 0.17/leaf after two weeks of spray showing the highest efficacy of 95.75%; and the crop sprayed with neem extract ranked 2nd, where the whitefly population decreased from 3.53/leaf to 0.33/leaf after 2 weeks of spray showing efficacy of 91.89 %. Similarly, tobacco extract ranked 3rd by effectiveness against whitefly decreasing its population from 3.75/leaf to 0.48/leaf showing efficacy of 88.83 %. Tooh extract ranked 4th, decreasing whitefly population from 3.57/leaf to 0.66/leaf after two weeks of spray showing efficacy of 83.81 %. Akk extract ranked 5th, decreasing whitefly population from 3.84/leaf to 0.66/leaf after 2 weeks of spray showing efficacy of 84.88 %. Dhatura extract ranked 6th, causing minimum decrease in whitefly population from 3.79/leaf to 0.95/leaf after 2 weeks of spray with lowest efficacy of 78.14 %.

Table-1 Efficacy of various biopesticides against whitefly infestation on cauliflower as compared to chemical control (Confidor) at different intervals after first spray.

Plant extracts	Pre-treatment	Post treatment observation/plant after:						Pest Reduction /plant	Reduction %
		24hrs	48hrs	72hrs	96hrs	1week	2week		
Chemical Control (confidor)	3.44	2.24	1.48	0.89	0.58	0.15	0.17	3.29	95.75
Neem extract	3.53	2.37	1.63	1.06	0.95	0.29	0.33	3.24	91.89
Akk extract	3.84	2.77	2.02	1.70	1.45	0.58	0.66	3.26	84.88
Tooh extract	3.57	2.53	1.82	1.61	1.48	0.58	0.66	2.99	83.81
Dhatura extract	3.79	3.14	2.83	2.43	1.97	0.83	0.95	2.96	78.14
Tobacco extract	3.75	2.59	1.84	1.43	1.13	0.42	0.48	3.33	88.83
Untreated	3.86	3.90	3.86	3.82	3.77	3.73	3.72	0.13	3.33
S.E.±	0.3989	0.2887	0.2250	0.1842	0.1902	0.1093	0.1291		
LSD 0.05	0.8691	0.6290	0.4903	0.4013	0.4144	0.2381	0.2813		
LSD 0.01	1.2185	0.8818	0.6873	0.5626	0.5810	0.3338	0.3943		

According to the efficacy the treatments ranked as: chemical control, neem extract, tobacco extract, tooh extract, akk extract and dhatura extract.

White fly second spray

Whitefly population on cauliflower in response to application of second spray of biopesticides showed non-significant variation for pre-treatment insect count ($F=1.40$; $DF=20$; $P>0.05$); while the whitefly population declined significantly when observed after 24 hours of spray ($F=5.39$; $DF=20$; $P<0.05$), after 48 hours of spray ($F=21.21$; $DF=20$; $P<0.05$), 72 hours after spray ($F=28.47$; $DF=20$; $P<0.05$), 96 hours after spray ($F=35.14$; $DF=20$; $P<0.05$); one week after spray ($F=35.72$; $DF=20$; $P<0.05$) and two weeks after spray ($F=25.75$; $DF=20$; $P<0.05$).

The data (Table-2) showed that on the basis of efficacy against whitefly after second spray, the synthetic pesticide chemical control (confidor) ranked 1st reducing whitefly population from 2.42/leaf to 0.38/leaf after two weeks of spray showing the highest efficacy of 86.36%; and the crop sprayed with neem extract ranked 2nd, decreasing whitefly population from 2.38/leaf to 0.72/leaf after 2 weeks of spray showing efficacy of 73.58 percent.

Table-2 Efficacy of various biopesticides against whitefly infestation on cauliflower as compared to chemical control (Confidor) at different intervals after second spray.

Plant extracts	Pre-treatment	Post treatment observation/plant after:						Pest Reduction /plant	Reduction %
		24hrs	48hrs	72hrs	96hrs	1week	2week		
Chemical Control (Confidor)	2.42	1.33	0.68	0.47	0.35	0.33	0.38	0.09	86.36
Neem extract	2.38	1.41	0.77	0.70	0.66	0.63	0.72	1.75	73.58
Akk extract	2.49	1.49	0.94	0.83	0.76	0.74	0.85	1.74	70.05
Tooh extract	2.15	1.33	0.80	0.68	0.64	0.63	0.72	1.52	70.67
Dhatura extract	2.34	1.59	1.11	0.96	0.79	0.78	0.89	1.56	66.63
Tobacco extract	3.04	1.79	1.04	0.83	0.78	0.76	0.87	2.28	75.11
Untreated	2.43	2.41	2.38	2.34	2.33	2.31	2.30	0.12	5.01
S.E.±	0.3297	0.2330	0.1804	0.1648	0.1550	0.1531	0.1720		
LSD 0.05	0.7183	0.5077	0.3931	0.3591	0.3377	0.3335	0.3747		
LSD 0.01	1.0071	0.7117	0.5511	0.5035	0.4735	0.4675	0.5253		

Similarly, tobacco extract ranked 3rd by effectiveness against whitefly decreasing its population from 3.04/leaf to 0.87/leaf showing efficacy of 75.11 percent; while the Tooh extract ranked 4th, decreasing whitefly population from 2.15/leaf to 0.72/leaf after two weeks of spray showing efficacy of 70.67 percent. Akk extract ranked 5th, decreasing whitefly population from 2.49/leaf to 0.85/leaf after 2 weeks of spray showing efficacy of 70.05 percent. Dhatura extract ranked 6th, causing minimum decrease in whitefly population from 2.34/leaf to 0.89/leaf after 2 weeks of spray with lowest efficacy of 66.63 percent. According to the efficacy of biopesticides against whitefly after second spray, the treatments ranked as: chemical control, neem extract, tobacco extract, tooh extract, akk extract and dhatura extract.

Discussion

Against whitefly, chemical control showed highest efficacy 95.75% as observed after 1st spray, followed neem extract 91.89%, Tooh extract 83.81% and least efficacy for Dhatura extract 78.14%; while after second spray also, chemical control showed highest efficacy 86.36%, followed by neem extract 73.58%, tobacco extract 75.11%, Tooh extract 70.67%, Akk extract 70.05% and the lowest efficacy was resulted by Dhatura extract 66.63%. According to the overall efficacy of biopesticides against whitefly after first and second spray, the treatments ranked as: chemical control, neem extract, tobacco extract, tooh extract, akk extract and dhatura extract. Gupta (2013) suggested combination of biopesticides and synthetic pesticides application against whitefly, thrips and other common insect pests of cauliflower.

Conclusions and suggestions

The research was carried out during the year of 2018 at the experimental area of the Entomology Section, Agriculture Research Institute (ARI) Tandojam Pakistan in an attempt to examine the efficacy of different biopesticides against the white fly of cauliflower. Seven treatments were formed including a control such as: T1= Chemical control (confidor), T2= Neem (*Azadirachta indica*), T3=Akk (*Calotropis procera* Alton. F.),

T4=Tooh (*Citrullus colocynthus* Schrad.L), T5=Datura (*Datura stramonium*), T6= Tobacco (*Nicotiana tabacum*) and T7=Control (untreated). ONE insect was found infesting cauliflower including whitefly. The pre and post-treatment data were observed on insect. Against whitefly population on cauliflower, the first spray results showed that chemical control showed highest efficacy 95.75% against whitefly, followed neem extract 91.89%, Tooh extract 83.81% and least efficacy was resulted by Dhatura extract 78.14%. After second spray also, chemical control showed highest efficacy 86.36%, followed by neem extract 73.58%, tobacco extract 75.11%, Tooh extract 70.67%, Akk extract 70.05% and the lowest efficacy was resulted by Dhatura extract 66.63% against whitefly after second spray. By overall efficacy of biopesticides against whitefly after first and second spray, the treatments ranked as: chemical control, neem extract, tobacco extract, tooh extract, akk extract and dhatura extract. While, the chemical control were effective against the cauliflower white fly, but on the based-on of effectiveness, neem extract, shows virtually effect followed by tobacco extract and tooh extract are suggested for safe control on cauliflower pest.

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