

# Effect of Neem Products and Synthetic Insecticides against Sucking Insect Pests of Cauliflower under Field Conditions

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**Abstract:** A field study was carried out during 2015 at Muhammad Bachal farm at Bakrani District Larkana. Four treatments with three replications were applied. The treatments were: T1=Chemical control (Diamond 20SP), T2=Neem oil, T3= Neem kernel, T4= Untreated (Control). Two insect pests were found infesting Cauliflower including white flies and thrips. Pre-treatment- and post-treatment observations were recorded. The results revealed that against thrips, the first spray of chemical control (Diamond) showed highest reduction percent (50.61%) followed by neem oil (43.33%), neem kernel (40.42%), and lowest for untreated control (10.31%); while in the second spray also, chemical control (Diamond) showed highest effect against thrips (58.51%); followed by neem oil (57.88%), neem kernel (52.43%) and least by untreated plot (14.77%). Against white flies chemical control (Diamond) showed highest effect (82.89%) as observed during 1st spray, followed by neem oil (72.47%), neem kernel (72.68%), and untreated control (5.12%), while after second spray also chemical control (Diamond) showed highest reduction percent (85.53%) followed by neem oil (74.34%), neem kernel (72.26%), and the lowest was resulted by untreated control (4.11%). Chemical control (Diamond) showed its superiority in effect to combat sucking insect pests studied in cauliflower, followed by neem oil, neem kernel, and untreated control remained the least.

**Keywords:** Neem products, Synthetic insecticides, Sucking pests of cauliflower.

## INTRODUCTION

Cauliflower, *Brassica oleracea* L. hybrid variety (Shehzadi) is a cole crop belongs to *Cruciferae* family. It is most important vegetable crops worldwide. It contains most of the minerals and vitamins necessary for human diet. In Pakistan cauliflower is cultivated on an area of about 11.350 thousand hectares with annual production of 206.385 thousand tones, however in the province of Sindh in grown 1.65 thousand hectares with the production of 11.385 thousand tones [1]. Among the strategies available, botanical insecticide is one of the promising tactics to control the vegetable pests. Cauliflower is attacked by as many as 24 insect pest species which cause serious economic loss to the crop [2]. Due to hazards of pesticides recently neem bio-pesticides is use for pest control in crops [3]. The main a.i of bio-pesticides based is *azadirachtin* (AZA), a limuloid compound; many phytophagous pests may be controlled by their insecticidal property. *Azadirachtin* has best effects, including IRG, feeding deterrence and reproduction inhibition. Equally neem seed extract has minimal toxicity to non-target organisms such as parasitoids, predators and pollinators and degrades rapidly in the environment [4]. The pesticides have also become a threat to the environment, the human health

and the ecosystem. The indiscriminate use of chemical poisons (pesticides) has destroyed the natural ecosystem and the natural balance ratio of pests and its natural enemies has been disturbed. The pesticides do not kill the pests alone but also destroy the predator; parasites, animals, birds, and some time human being get seriously affected while using the spray material. The pesticides are the only readily available source for destroying pest population in many developing countries like Pakistan [5].

## MATERIALS AND METHODS

Effect of neem products and synthetic pesticide against cauliflower sucking insect pests under the condition of field during the year 2015 at Muhammad Bachal farm at Bakrani District Larkana. There were three replicated Randomized Complete Block Design (RCBD) in a sub-plot size of 3m x 3 (9m<sup>2</sup>). The seed of cauliflower, *Brassica oleracea* L. hybrid variety (Shahzadi) was used throughout the experiment. The recommended distance from row-row and plant-plant is 60 cm and 15 cm was maintained. The extracts of the following (bio-pesticide) botanical plants were used to examine their effect against cauliflower insect pests. There were treatments shown below:

T1 Chemical control (Diamond 20%SP (Acetamiprid))

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T2	Neem oil
T3	Neem kernel
T4	Control (untreated)

For preparation of neem kernel extract, four kgs of neem kernel will be grounded through grinder and soaked for 16 hours. As such, 15 liters of 5% EC suspension will be obtained. The doze of 4kg neem powder and Neem oil 800 ml/acre will be mixed with 25 gm of surf detergent. The cauliflower plants were sprayed. The Pre-treatment will be observed from 20 plants randomly selected from each treatment before spray. Post-treatment observations will be recorded after 3 and 5 days after spray. Treatment will be repeated after interval of 15 days. Recommended pesticide for cauliflower Diamond20%SP @ 250 ml / acre was sprayed. The pest population will also be recorded from pesticide Diamond20%SP (Acetamiprid) treated crop. The reduction percentage by all treatments will be calculated. The collected data were subjected to analysis by using analysis of variance for knowing the significance of differences in the population of various insect pests and infestation at different intervals after treatment, and LSD (Least Significance Difference) test was applied to compare different treatments for their efficacies against these insect pests. At the end, the data will be analyzed through statistical package (Statistix 8.1).

## RESULTS

The experiments were conducted during 2015 at the experimental area of Muhammad Bachal farm at Bakrani District Larkana to examine the effect of neem products and synthetic pesticide against cauliflower insect pests under field conditions. Four treatments were formed including a control such as: T1=Chemical

control (Diamond20%SP), T2= Neem oil, T3=Neem kernel and T4=Control (untreated). We monitor two insect pests in cauliflower that is thrips and whiteflies. The data were observed on these insect pests after treatment and pre-treatment insect count were also recorded.

## THRIPS

### First Spray

The (Table 1) showed that statistically, differences in thrips population on cauliflower plantation were non-significant for pre-treatment ( $F=0.02$ ;  $DF=14$ ;  $P>0.05$ ) and 3 days after first spray ( $F=2.02$ ;  $DF=14$ ;  $P>0.05$ ); while thrips population decreased significantly after 5 days of first spray ( $F=2.92$ ;  $DF=14$ ;  $P<0.05$ ). The effect of bio-pesticides (Table 1) showed that in cauliflower plantation sprayed with chemical (Diamond), the thrips population reduced from 12.21/leaf to 6.03/leaf after 5 days of spray indicating the highest efficacy of 50.61%; while the crop sprayed with neem oil ranked 2nd, where pre-treatment thrips population was 12.37/leaf decreased to 7.56/leaf after 5 days of spray showing efficacy of 43.33 percent. The crop sprayed with synthetic pesticide (Neem kernel) ranked 3rd, where pre-treatment thrips population was 12.69/leaf decreased to 7.56/leaf 5 days of spray showing efficacy of 40.42 percent. Similarly, the untreated (Control) ranked 4th, where pre-treatment thrips population was 13.48/leaf decreased to 12.09/leaf after 5 days of spray with lowest efficacy of 10.31 percent.

### 2<sup>nd</sup> Spray

The data (Table 2) showed that the thrips population after second spray of chemical control reduced from 7.69/leaf to 3.19/leaf after 5 days of spray showing the highest efficacy of 58.51%; and the crop

**Table 1: Effect of Various Bio-Pesticides against Thrips Infestation on Cauliflower as Compared to Chemical Control (Diamond20%SP (Acetamiprid) at Different Intervals after First Spray**

Plant extracts	Pre-treat.	Pest population/plant after:		Pest Reduction /plant	Efficacy %
		3 days	5days		
Chemical control	12.21	7.01	6.03	6.18	50.61
Neem oil	12.37	7.32	7.01	5.36	43.33
Neem kernel	12.69	7.79	7.56	5.13	40.42
Untreated	13.48	12.21	12.09	1.39	10.31
S.E.±	0.2148	0.1842	0.1902	-	-
LSD 0.05	0.4423	0.4013	0.4144	-	-
LSD 0.01	1.2185	0.5626	0.5810	-	-

**Table 2: Effect of Various Bio-Pesticides against Thrips Infestation on Cauliflower as Compared Chemical Control (Diamond20%SP (Acetamiprid) at Different Intervals after Second Spray**

Plant extracts	Pre-treat.	Pest population/plant after:		Pest Reduction /plant	Efficacy %
		3 days	5days		
Chemical control	7.69	4.09	3.19	4.50	58.51
Neem oil	7.93	4.24	3.34	4.59	57.88
Neem kernel	8.01	3.71	3.81	4.20	52.43
Untreated	8.39	7.19	7.15	1.24	14.77
S.E.±	1.0981	0.5812	0.5438	-	-
LSD 0.05	2.3825	1.2663	1.1848	-	-
LSD 0.01	3.3541	1.7753	1.6610	-	-

sprayed with neem oil ranked 2<sup>nd</sup>, where the thrips population decreased from 7.93/leaf to 3.34/leaf after 5 days of spray showing efficacy of 57.88 percent. The synthetic pesticide (Neem kernel) ranked 3<sup>rd</sup>, where the thrips population decreased from 8.01/leaf to 3.81/leaf after 5 days of spray, showing efficacy of 52.43 percent. Similarly, untreated (Control) ranked 4<sup>th</sup>, where thrips population decreased from 8.39/leaf to 7.15/leaf after 5 days of spray showing lowest efficacy of 14.77 percent. According to the efficacy the treatments ranked as: chemical control ranked 1<sup>st</sup>, neem oil ranked 2<sup>nd</sup>, neem kernel ranked 3<sup>rd</sup> and untreated ranked 4<sup>th</sup> (Natural control). Thrips population on cauliflower after second spray of bio-pesticides showed non-significant variation for pre-treatment (F=0.44; DF=14; P>0.05) while the thrips population declined significantly when monitored after 3 days of spray (F=9.69; DF=14; P<0.05) and 5 days after spray (F=12.81; DF=14; P<0.05).

## WHITEFLIES

### First Spray

Whiteflies population on cauliflower in response to application of bio-pesticides showed non-significant

variation for pre-treatment insect count (F=0.35; DF=14; P>0.05); while the whiteflies population declined significantly when observed 3 days after spray (F=59.32; DF=14; P<0.05), 5 days after spray (F=60.30; DF=14; P<0.05); The data (Table 3) revealed that on the basis of efficacy against the target insect, the chemical control ranked 1<sup>st</sup> reducing whiteflies population from 3.39/leaf to 0.58/leaf after 5 days of spray showing the highest efficacy of 82.89%; and the crop sprayed with neem oil ranked 2<sup>nd</sup>, where the whiteflies population decreased from 3.56/leaf to 0.98/leaf after 5 days of spray showing efficacy of 72.47 percent. Similarly, synthetic pesticide (Neem kernel) ranked 3<sup>rd</sup> by effectiveness against whiteflies decreasing its population from 3.88/leaf to 1.06/leaf showing efficacy of 72.68 percent. Untreated ranked 4<sup>th</sup>, decreasing whitefly population from 4.10/leaf to 3.89/leaf after 5 day of spray showing lowest efficacy of 5.12 percent. According to the efficacy the treatments ranked as: chemical control, neem oil, neem kernel and untreated.

### Second Spray

The results indicated that whiteflies population on cauliflower in response to application of second spray

**Table 3: Effect of Various Bio-Pesticides against Whiteflies Infestation on Cauliflower as Compared to Chemical Control (Diamond20%SP (Acetamiprid) at Different Intervals after First Spray**

Plant extracts	Pre-treat.	Pest population/plant after:		Pest Reduction /plant	Efficacy %
		3 days	5days		
Chemical control	3.39	0.89	0.58	2.81	82.89
Neem oil	3.56	1.31	0.98	2.58	72.47
Neem kernel	3.88	1.16	1.06	2.82	72.68
Untreated	4.10	3.86	3.89	0.21	5.12
S.E.±	0.3989	0.1842	0.1902	-	-
LSD 0.05	0.8691	0.4013	0.4144	-	-
LSD 0.01	1.2185	0.5626	0.5810	-	-

**Table 4: Effect of Various Bio-Pesticides against Whiteflies Infestation on Cauliflower as Compared to Chemical Control (Diamond20%SP (Acetamiprid) at Different Intervals after Second Spray**

Plant extracts	Pre-treat.	Pest population/plant after:		Pest Reduction /plant	Efficacy %
		3 days	5days		
Chemical control	2.42	0.47	0.35	2.07	85.53
Neem oil	3.04	0.83	0.78	2.26	74.34
Neem kernel	2.38	0.70	0.66	1.72	72.26
Untreated	2.43	2.34	2.33	0.10	04.11
S.E.±	0.3297	0.1648	0.1550	-	-
LSD 0.05	0.7183	0.3591	0.3377	-	-
LSD 0.01	1.0071	0.5035	0.4735	-	-

of bio-pesticides showed non-significant variation for pre-treatment insect count ( $F=1.40$ ;  $DF=14$ ;  $P>0.05$ ); while the whitefly population declined significantly when observed after 3 days spray ( $F=28.47$ ;  $DF=14$ ;  $P<0.05$ ), and 5 days after spray ( $F=35.14$ ;  $DF=14$ ;  $P<0.05$ ).

The data (Table 4) further exhibited that on the basis of effect against whiteflies after second spray, the chemical control ranked 1<sup>st</sup> reducing whiteflies population from 2.42/leaf to 0.35/leaf after 5days of spray showing the highest efficacy of 85.53%; and the crop sprayed with neem oil ranked 2<sup>nd</sup>, decreasing whiteflies population from 2.38/leaf to 0.66/leaf after 5 days of spray showing efficacy of 72.26 percent. Similarly, synthetic pesticide (Neem kernel) ranked 3<sup>rd</sup> by effectiveness against white flies. Decreasing its population from 3.04/leaf to 0.78/leaf showing efficacy of 74.34 percent; while the untreated ranked 4<sup>th</sup>, decreasing whiteflies population from 2.43/leaf to 2.33/leaf after 5 days of spray showing efficacy of 04.11 percent. According to the efficacy of bio-pesticides against whiteflies after second spray, the treatments ranked as: chemical control, neem oil, neem kernel and untreated.

## DISCUSSION

Recent research has proved that safe and long lasting solution of the insect pest's problem is associated with the use of natural substances for their control, because the nature has a balanced ecosystem that keeps the population of all the biological organisms within the specific limits being useful or harmful for other organisms on earth. This study entitles the result of neem products and synthetic insecticide against insect pests of cauliflower. The products will be compared with Diamond 20%SP pesticide for

comparison. The proposed IPM strategy will be useful information for the management of cauliflower sucking complex.

The present research indicated that the 1<sup>st</sup> spray of chemical control showed maximum efficacy (50.61%), against thrips followed by neem oil (43.33%), neem kernel (40.42%) and lowest for untreated (10.31%). While second spray of, chemical control showed highest efficacy against thrips (58.51%); followed by neem oil (57.88%), neem kernel (52.43%), and least by untreated (14.77%). Against whitefly, chemical control showed highest efficacy (82.89%) as observed after 1<sup>st</sup> spray, followed by neem oil (72.47%), neem kernel (72.68%) and least efficacy for untreated (5.12%); while after second spray also, chemical control showed highest efficacy (85.53%), followed by neem oil (74.34%), neem kernel (72.26%) and the lowest efficacy was resulted by untreated (4.11%). These results are similar with [6] found that neem based bio-pesticides control the sucking complex population in cotton; while [7] examined that neem seed extract have good effect on minimizing population of jassid, whitefly, aphid and thrips on cotton. Moreover, [8] used neem, dhatura, Sufaidda and cow urine for the control of cotton insect pests; and [9] sprayed bio-pesticides and found good control of sucking complex by neem based pesticides [10]. Revealed that treatment of neem formulation with azadirachtin at fifteen days interval for controlling the population of jassid. Similarly, [11] reported that extracts of *Azadirachta indica* (Neem), and *Allium sativum* (garlic) at the concentration of 0.015% were effective to control insect pests. Similarly, [12] examined Chemical control, Neem, Garlic and Tobacco extract and good control was observed in extract of tobacco is (98.60%) mortality of mealy bug, and also good control on others insect pests [13] stated that safflower aphid, *Uroleucon compositae* (Theobald) is a

major pest which causes 30 to 80 per cent yield loss based upon the weather conditions and for its effective control integrated management practices have been suggested including use of bio-pesticides [14]. Reported that plant extracts significantly reduced pest numbers ( $P < 0.05$ ) in both experiments. Dimethoate reduced aphid by 96 % while amitraz reduced red spider mite by 72% [15] suggested implementation of integrated pest and disease management programme in irrigated cauliflower crop led to reduction in number of conventional pesticide sprays by 50-60 % [16] suggested that efficacy of *A. indicabased* pesticides against various pests of both crop fields as well as stored grains of India [17] found that the bio-pesticides showed better insect pest control than the synthetic pesticides on safflower [18] reported that the mixture of neem and wild garlic was more effective in reducing population densities of whitefly and aphid than either plant extract applied alone. In conclusion, results of this study suggested a synergistic effect of fermented plant extracts of neem and wild garlic as a bio-pesticide [17] suggested combination of bio-pesticides and synthetic pesticides application against whiteflies, thrips, jassids and other common insect pests of cauliflower.

## CONCLUSIONS

1. The bio-pesticides were highly effective to control whiteflies and thrips, on cauliflower;
2. Neem products (Neem oil and neem kernel) showed significantly higher effect against the target insect pests when compared with control.
3. By overall efficacy of bio-pesticides against whiteflies and thrips, after first and second spray, the treatments ranked as: chemical control, neem oil, neem kernel and untreated.

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