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Relative Toxicity of Biopesiticide and Insecticide against Sucking Insect Pest on Sunflower

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Abstract:

The field experiment was conducted to determine the efficacy of conventional insecticide Novastar 56 EC and leaf extracts of tobacco varieties Hazropattar and Balkhi as bio-pesticides against sucking insect pests of sunflower. The experiment was laid out on a Randomized Complete Block Design (RCBD) with three replications.

Pre-treatment population of sucking insect pests was recoded one day before application and post-treatment after 1st,4th, 7th and 10th day after application. The reduction % in the populations of Amarasca bigutulla bigutulla (Ishida), Bemisia tabaci (Genn.) and Thrip tabaci were calculated for post- treatment intervals. Maximum reduction in the population of A. b. biguttula was recorded as (73.86 %) at 7 DAS in the plot treated with insecticide Novastar 56 EC as compared to bio-pesticides Hazropattar (40.15 %) and Balkhi (34.09 %) leaf extracts at 4 DAS, respectively. The population of Bemisia tabacii was reduced to (76.74 %) at 7 DAS by Novastar. Whereas, leaf extracts of Hazropattar and Balkhi reduced B. tabaci population to (46.32 %) and (38.95 %), respectively at 7 DAS. The population of Thrip was reduced to (71.17 %) at 7 DAS by Novastar followed leaf extracts of Hazropattar (46.40 %) at 4 DAS and Balkhi (18.99 %) at 7 DAS. Similar trend of reduction in the population of sucking insect pests was recorded after 2nd spray. Maximum reduction in the population of A. b. biguttula was observed as (70.69 %) in the plot treated with Novastar followed Hazropattar (45.52 %) and Balkhi (39.07 %), respectively. Maximum reduction (77.67%) in the population of whitefly was recorded in the plots treated with Novastar followed by Hazropattar (44.95 %) and Balkhi (38.87 %). The population of Thrip was reduced to (76.39 %) by Novastar followed Hazropattar (46.44 %) and Balkhi (22.31 %), respectively. The analysis of variance showed significant difference in the efficacy of insecticide and Bio-pesticides at ($P<0.05$). The maximum yield of sunflower was obtained from the plots treated with insecticide Novastar 56 EC followed leaf extracts of Hazropattar and Balkhi, respectively. It is concluded that insecticide and bio-pesticides significantly reduced the population of sucking insect pests. It is suggested that bio-pesticides are environmentally safe and should be sprayed with a gap of short intervals to avoid the infestation of sucking insect pests on sunflower.

Key words: Toxicity, Insecticide, Bio-pesticide, Sucking insect Pests, Sunflower

INTRODUCTION

Sunflower (*Helianthus annus. L*), related to the family composite and grown as eat able oil producing crop; and Pakistan cultivated sunflower since 1960 [9] [4]. It is a significant crop that is high yielding, small period and oil seed crop; and it adapts well in subsisting cropping systems and can be grown without replacing any other particular crop [1]. Sunflower oil is fairly delightful and contains soluble vitamins A, D, E and K. It used in production of margarine; and sunflower cake is consumed by castles as cattle feed [7]. Sucking pests serve as vector for virus and other infectious diseases and sucking pest are main risk which effect on the production of sunflower. For instance, infestation of *Jassid (Amrasca devestons)* may lead to leaf curling, chlorosis and pre-mature senescence [13]. Throughout, the dominant sucking insect pest of sunflower are Jassids. The insect pest spectrum of sunflower is quite complex which damaged the successful production Sunflower. More of these insect pests eventually results in a vast reduction of yield concerns in sunflower production throughout the world [5]. The use of synthetic chemical insecticides has produced many problems, such as secondary pests' livestock, beneficial insects, fish, pollinators and 2 Most of chemical synthetic insecticides are harmful to health, and environment [11]. Within these conditions, it became important to discover actual eco-friendly alternate for management of different insect pests of Sunflower (*Helianthus annus*). [14]. Bio-pesticides or Botanical extracts are plant-based insecticides, which are naturally slow acting elements and habitually harmless to non-target organisms and to environment as compared to conventional chemical pesticides. Botanical insecticides have been recorded with low residual consequences. Plant-based pesticides have biologically active elements due to which resistance is not build up in directed

insect pests and pathogens. Many scientists have suggested the application of botanical pesticides or biopesticides with minimum ill effects [8] [12]. Insect pests are major threat in the Indian subcontinent. Sunflower (*Helianthus annus*), more than fifty insect species have been recorded on sunflower, sucking pests, jassid (*Amrasca biguttula biguttula ishida*), cutworms (*Agrotis* spp.), thrips (*Thrips tabaci*), White fly (*Bemisia tabaci*), capitulum borer (*Helicoverpa armigera*) and defoliators are major pests of economic concern [3]. So in this sense there will be a great need to work on "Relative toxicity of Bio-pesticide and insecticide against sucking insect pests on sunflower." The findings of present results will be useful for growers to manage arthropod insect pests without using of agrochemicals. This will make the environment safe for human and animals as well.

MATERIAL AND METHODS

A field study was conducted at the experiment area of Agronomy Section, SAU, Tando jam during 2015. The field was prepared according to Randomized Complete Block Design (RCBD) with four replicates. The sub plot was (3×4 ft.). Synthetic insecticide Novastar 56 EC (Product of FMC) and extract of two varieties of Tobacco Hazropattar and Balhi 500g was applied. The leaves of each variety was grinded in powder separately. The powder was soaked overnight in 5 liters of distilled water. The soaked materials was sieved in muslin cloth to have leaf extract of each tobacco variety separately. Sunflower variety HO-I was cultivated by drilling method. When insect pests was appeared and reached to ETL level, the crop was sprayed with synthetic insecticide as T1=Novstar (15ml/3lit water), T2= Hazropattar tobacco extract (3 lit./Plot) T3= Balhi tobacco extract (3 lit./Plot) and the data of each treatment was compared with T4= Control plot. The data was obtained by selected 5 plants from each replication 3 leaves per

plant, one leaf each from top, middle and bottom of the ected plant was examined for insect pest population. Pre-treatment observation was taken 24 hours before application of insecticides and Post treatment data was recorded at 1 DAS (Days after spray), 4 DAS, 7 DAS and 10 DAS. The crop was sprayed twice at the intervals of 10 days. The reduction percent of insect population was calculated by using Abbott's formula (Abbott, 1925).

$$\text{Reduction \%} = \left(\frac{\text{1- n in T after treatment}}{\text{n in Co after treatment}}\right) \times 100$$

RESULTS

Effect of insecticide and Bio-pesticide on sucking insect pests after first spray Sunflower.

Jassid, *Amrasca biguttula biguttula*

The result presented in Table 1 indicated that maximum reduction in the population of *A. b. biguttula* was recorded 3.45/ leaf (73.86 %) after 7 DAS (Days After Spray) in the plot treated with insecticide Novastar 56 EC followed 4.7/leaf (68.67 %), 3.8/leaf (68.60 %) and 6.45 /leaf(42.92 %) after 10 DAS, 4 DAS and 1 DAS, respectively. In the plot treated with bio-pesticides (Tobacco extracts) showed that the maximum population reduction was recoded 6.5/leaf (46.20 %) after 4 DAS (Days After Spray) in the plot treated with Hazropattar followed 7.9/leaf (40.15 %), 7.8/leaf (30.97 %) and 8.3 (44.67 %) after 7 DAS, 1 DAS and 10 DAS, respectively. Similarly, another bio pesticides were tested that indicated that the maximum reduction in population was observed 7.9/leaf (34.71 %) after 4 DAS (Days After Spray) in the plot treated with Balkhi followed, 8.7/leaf (34.09 %), 10.3 (31.33 %) and after 8.4/leaf (25.66 %) after 7 DAS, 10 DAS and 1DAS, respectively. In the light of above findings it was observed that the maximum

reduction in the population was observed when plot treated with insecticide Novastar 56 EC after 7 DAS. Whereas, in plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts effectively reduced the maximum population after 4 DAS exposure. Similarly, Balkhi (Tobacco variety) gradually reduced the population and reached to its maximum level after 4 DAS exposure interval. The analysis of variance indicated that there is significant difference in between Novastar and Biopesticides and exposure intervals of foliar application on respective host crop ($P<0.05$).

Table 1 Effect of insecticide and bio-pesticides on the population build-up of Jassid, *Amrasca biguttula biguttula* in sunflower field after 1st spray.

Treatments	Pre-treatment/leaf	Post-treatment/leaf				
		1 DAS	4 DAS	7 DAS	10 DAS	Max. Reduction %
Novastar	7.9	6.45 h (42.92)	3.8 j (98.60)	3.45 jk (73.86)	4.7 i (68.67)	73.86
Hazropattar	8.6	7.8 g (30.97)	6.5 gh (46.20)	7.3 g (44.70)	8.3 f (44.67)	44.67
Balkhi	9.2	8.4 f (25.66)	7.9 g (34.71)	8.7 f (34.09)	10.3 de (31.33)	34.71
Control	8.8	11.3 d	12.1 c	13.2 b	15.0 a	

Whitefly, *Bemisia tabacii*

The result depicted in Table 2 showed that the population of *Bemisia tabacii* reduced significantly and reached its maximum after application of insecticide and bio-pesticide. The maximum reduction in population was seen 2.21/ leaf (76.74 %) after 7 DAS (Days After Spray) exposures of insecticide Novastar 56 EC followed 2.8/leaf (72.55 %), 3.2/leaf (64.04 %) and 4.5/leaf (42.31 %) after 10 DAS, 4 DAS and 1 DAS, respectively. The result further revealed that the plot treated with bio-pesticide Hazropattar (Tobacco extracts) displayed the maximum

population reduction 5.1/leaf (46.32 %) after 7 DAS (Days After Spray) followed by 5.9/leaf (42.16 %), 5.3/leaf (40.45 %) and 6.2 (20.51 %) after 10 DAS, 4 DAS and 1 DAS, respectively. Similarly, bio-pesticide Balkhi (Tobacoo extract) was exposed that the maximum reduction in population was obtained 5.8/leaf (38.95 %) after 7 DAS (Days After Spray) in the plot treated with Balkhi followed, 6.4/leaf (37.25 %), 5.9 (33.71 %) and after 6.6/leaf (15.38 %) after 10 DAS, 4 DAS and 1 DAS, respectively.

It is observed that the findings of present study showed that the maximum reduction in the population was obtained when plot treated with insecticide Novastar 56 EC after 7 DAS. However the plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts indicated the maximum reduction in population was seen after 7 DAS exposure. The result further revealed that when crop treated with Balkhi (Tobacco variety) it showed that population gradually reduced and reached its maximum level after 7 DAS interval. The analysis of variance displayed that there is significant difference between insecticide and Bio-pesticides and exposure intervals of foliar application on respective host crop ($P<0.05$).

Table 2 Effect of insecticide and bio-pesticides on the population build-up of Whitefly, Bemisia tabacci in sunflower field after 1st spray.

Treatments	Pre-treatment/leaf	Post-treatment/leaf				
		1 DAS	4 DAS	7 DAS	10 DAS	Max. Reduction %
Novastar	7.4	4.5 i (42.31)	3.2 j (64.04)	2.21 k (76.74)	2.8 jk (72.55)	76.74
Hazropattar	6.8	6.2 ef (20.51)	5.3 gh (40.45)	5.1 g (46.32)	5.9 ef (42.16)	46.32
Balkhi	7.2	6.6 e (15.38)	5.9 ef (33.71)	5.8 fg (38.95)	6.4 ef (37.25)	38.95
Control	6.7	7.8 d	8.9 c	9.5 ab	10.2 a	

Thrip, *Thrip tabacii*

The result described in Table 3 revealed that the population of *Thrip tabacii* gradually declined after the exposure of both insecticide as well as bio-pesticides after different interval periods. The population significantly reduced and reached at maximum level 5.8/leaf (71.17 %) after 7 DAS (Days After Spray) when crop treated with insecticide Novastar 56 EC followed 7.6/leaf (66.67 %), 7.1/leaf (62.43 %) and 9.91/leaf (43.05 %) after 10 DAS, 4 DAS and 1 DAS, respectively. The data further depicted that the foliar application of bio-pesticide Hazropattar (Tobacco extracts) reduced maximum population 10.13/leaf (46.40 %) after 4 DAS (Days After Spray) followed by 11.16/leaf (44.53 %), 13.88/leaf (39.12 %) and 12.56 (27.82 %) after 7 DAS, 10 DAS and 1 DAS, respectively. The plot treated with bio-pesticide Balkhi (Tobacco extract) was showed that the population gradually reduced and reached it maximum limit 14.02/leaf (25.82 %) after 4 DAS (Days After Spray) followed, 17.75/leaf (22.15 %), 16.3 (18.99 %) and 14.3/leaf (17.82 %) after 10 DAS, 7 DAS and 1 DAS, respectively.

It is examined that the findings of present result displayed that the population of Thrip gradually declined when plot treated with insecticide Novastar 56 EC and reached its maximum reduction position after 7 DAS exposure intervals. Therefore, the plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts showed the population gradually reduced and reached maximum level after 4 DAS exposure. The data further revealed that the population of Thrip gradually reduced and reached its maximum level after 7 DAS exposure of bio-pesticide Balkhi (Tobacco variety) in sunflower crop. The analysis of variance showed that there is significant difference between insecticide and Bio-pesticides at different intervals ($P<0.05$).

Table 3 Effect of insecticide and bio-pesticides on the population build-up of Thrip, *Thrip tabacii* in sunflower field after 1st spray.

Treatments	Pre-treatment/leaf	Post-treatment/leaf				
		1 DAS	4 DAS	7 DAS	10 DAS	Max. Reduction %
Novastar	9.91	9.91 i (43.05)	7.1 jk (62.43)	5.8 l (71.17)	7.6 j (66.67)	71.17
Hazropattar	17.2	12.56 gh (27.82)	10.13 g (46.40)	11.16 g (44.53)	13.88 f (39.12)	46.40
Balkhi	17.2	14.3 ef (17.82)	14.02 e (25.82)	16.3 d (18.99)	17.75 cd (22.15)	22.15
Control	15.2	17.4 cd	18.9 c	20.12 b	22.8 a	

Effect of insecticide and bio-pesticides on sucking insect pests after second spray in Sunflower.

Jassid, *Amrasca biguttula biguttula*

The data depicted in Table 4 displayed that after 2nd spray maximum reduction in the population of *A. b. biguttula* was observed 4.22/leaf (70.69 %) after 7 DAS (Days After Spray) exposure of insecticide Novastar 56 EC followed by 4.21/leaf (69.82 %), 5.2/leaf (64.75 %) and 7.12/leaf (47.65 %) after 4 DAS, 10 DAS and 1 DAS, respectively. The plot treated with bio-pesticides Hazropattar (Tobacco extracts) exposed the maximum reduction in the population was observed 7.6/leaf (45.52 %) after 4 DAS (Days After Spray) followed by 8.2/leaf (43.06 %), 9.4/leaf (36.27 %) and 9.35 (31.25 %) after 7 DAS, 10 DAS and 1 DAS, respectively. Therefore, another bio pesticide Balkhi was tested that displayed maximum reduction in population was 8.5/leaf (39.07 %) after 4 DAS (Days After Spray) followed by 9.91/leaf (31.18 %), 9.75 (28.31 %) and 11.2/leaf (24.07 %) after 7 DAS, 1 DAS and 10 DAS, respectively.

The result presented above it was observed that the population of Jassid gradually reduced and reached its maximum limit when plot sprayed with insecticide Novastar 56 EC after 7 DAS exposure intervals. The bio-pesticide Hazropattar (Tobacoo variety) extracts significantly reduced population after 4 DAS exposure and reached at maximum level of reduction. The plot treated with bio-pesticide Balkhi (Tobacco variety) gradually declined the population and reached to its maximum level after 4 DAS exposure interval. The analysis of variance indicated that there is significant difference between insecticide and bio-pesticides and interval periods. ($P<0.05$).

Table 4 Effect of insecticide and bio-pesticides on the population build-up of Jassid, *Amrasca biguttula biguttula* in sunflower field after 2nd spray.

Treatments	Pre-treatment/leaf	Post-treatment/leaf				
		1 DAS	4 DAS	7 DAS	10 DAS	Max. Reduction %
Novastar	8	7.12 g (47.65)	4.21 ij (69.82)	4.22 i (70.69)	5.2 h (64.75)	70.69
Hazropattar	11.9	9.35 de (31.25)	7.6 fg (45.52)	8.2 f (43.06)	9.4 de (36.27)	45.52
Balkhi	12.14	9.75 d (28.31)	8.5 (39.07)	9.91 d (31.18)	11.2 c (24.07)	39.07
Control	16.78	13.6 ab	13.95 ab	14.4 a	14.75 a	

Whitefly, *Bemisia tabacii*

The result prescribed in Table 5 indicated that the *Bemisia tabacii* gradually reduced after foliar application of insecticide and bio-pesticide. The maximum population reduction 3.55/leaf (77.67 %) was found after 7 DAS (Days After Spray) in the plot treated with insecticide Novastar 56 EC followed by 4.05/leaf (74.45 %), 5.8/leaf (62.21 %) and 7.82/leaf (48.04 %) after 10 DAS, 4 DAS and 1 DAS, respectively. The result further depicted that the plot treated with bio-pesticide Hazropattar (Tobacco extract) showed the maximum reduction in population was recorded 8.45/leaf (44.95 %) after 4 DAS (Days After Spray)

exposure intervals followed by 8.91/leaf (43.96 %), 9.45/leaf (40.38 %) and 10.19 (27.51 %) after 7 DAS, 10 DAS and 1 DAS, respectively. Another exposure of bio-pesticide Balkhi (Tobacoo extract) displayed the maximum reduction in population was 9.2/leaf (38.87 %) after 1 DAS (Days After Spray) in the plot treated with Balkhi followed by 11.05/leaf (28.01 %), 11.6 (27.04 %) and after 12.65/leaf (20.19 %) after 4 DAS, 7 DAS and 10 DAS, respectively.

The findings of present study indicated that the population of whitefly gradually declined after exposure of insecticide Novastar 56 EC and reached its maximum reduction level after 7 DAS interval periods. The plot treated with bio-pesticide Hazropattar (Tobacco variety) extracts indicated the maximum reduction in population was seen after 7 DAS exposure intervals. The result further depicted that that when crop treated with Balkhi (Tobacco variety) it showed that population gradually reduced and reached its maximum level after 1 DAS interval periods. The analysis of variance showed that there is significant difference between insecticide and Bio-pesticides and exposure intervals of foliar application on respective host crop ($P<0.05$).

Table 5 Effect of insecticide and bio-pesticides on the population build-up of Whitefly, Bemisia tabaccii in sunflower field after 2nd spray.

Treatments	Pre-treatment/leaf	Post-treatment/leaf				
		1 DAS	4 DAS	7 DAS	10 DAS	Max. Reduction %
Novastar	9.1	7.82 f (48.04)	5.8 g (62.21)	3.55 hi (43.96)	4.05 h (74.45)	74.45
Hazropattar	12.3	10.91 cd (27.51)	8.45 de (44.95)	8.91 de (43.96)	9.45 d (40.38)	44.95
Balkhi	10.2	9.2 d (38.87)	11.05 bc (28.01)	11.6 bc (27.04)	12.65 b (20.19)	38.87
Control	14.88	15.05 a	15.35 a	15.9 a	15.85 a	

Thrip, *Thrip tabacii*

The data presented in Table 6 showed that the *Thrip tabacii* reduced gradually after the foliar application of insecticide and bio-pesticides at varying interval periods. The population effectively reduced after exposure of insecticide Novastar 56 EC and reached at maximum level 5.1/leaf (76.39 %) after 7 DAS (Days After Spray) interval period followed by 6.2/leaf (72.07 %), 6.5/leaf (68.97 %) and 10.23/leaf (50.46 %) after 10 DAS, 4 DAS and 1 DAS, respectively. The result further revealed that the foliar application of bio-pesticide Hazropattar (Tobacco extracts) reduced population gradually and reached its maximum level 11.22/leaf (46.44 %) after 4 DAS (Days After Spray) followed by 12.34/leaf (42.87 %), 13.21/leaf (40.50 %) and 14.4 (30.27 %) after 7 DAS, 10 DAS and 1 DAS, respectively. The result further depicted that plot treated with bio-pesticide Balkhi (Tobacoo extract) showed that the population significantly declined and reached its maximum level 16.78/leaf (22.31 %) after 7 DAS (Days After Spray) followed by 16.33/leaf (22.05 %), 17.78/leaf (19.91 %) and 17.4 (15.74 %) after 4 DAS, 10 DAS and 1 DAS, respectively.

It is observed that that the findings of present result showed that the maximum reduction in the population was obtained when plot treated with insecticide Novastar 56 EC and reached its maximum reduction limit after 7 DAS interval periods. Therefore, the plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts showed the population gradually reduced and reached maximum reduction level after 4 DAS exposure of foliar application. The plot treated with bio-pesticide Balkhi (Tobacco variety) showed maximum population reduction after 7 DAS interval period. The analysis of variance showed that there is significant difference between insecticide and Bio-pesticides at different intervals ($P<0.05$).

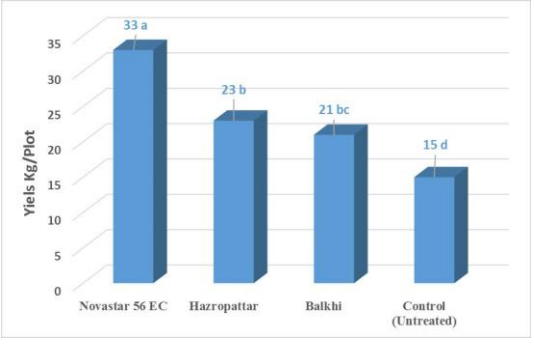
Table 6 Effect of insecticide and bio-pesticides on the population build-up of Thrip, *Thrip tabacii* in sunflower field after 2nd spray.

Treatments	Pre-treatment/leaf	Post-treatment/leaf				
		1 DAS	4 DAS	7 DAS	10 DAS	Max. Reduction %
Novastar	14.5	10.23 e (50.46)	6.5 f (68.97)	5.1 h (76.39)	6.2 fg (72.07)	76.39
Hazropattar	17.45	14.4 c (30.27)	11.22 de (46.44)	12.34 d (42.87)	13.21 cd (40.50)	46.44
Balkhi	19.22	17.4 a (15.74)	16.33 ab (22.05)	16.78 ab (22.31)	17.78 a (19.91)	22.31
Control	24.23	20.65	20.95	21.6	22.2	

Crop yield

The yield of sunflower obtained in the plots treated with insecticide and bio-pesticides after first and 2nd spray (Fig. I). The maximum average yield obtained 33 Kg/ plot in the plot treated with insecticide Novastar 56 EC followed by 23, 21 and 15 kg/plot treated with bio-pesticide Hazropattar (Tobacco variety) and Balkhi (Tobacco variety) and Control (Untreated), respectively. The analysis of variance showed that there is significant difference in yield obtained from plot treated with insecticide and bio-pesticides ($P<0.05$).

Figure I Effect of insecticide and bio-pesticides on yield kg/plot after spry in Sunflower.



DISCUSSION

After first foliar application of insecticide and bio-pesticide against insect pest of Sunflower crop. The result revealed that the maximum reduction in the population of jassid was observed when plot treated with insecticide Novastar 56 EC after 7 DAS. Whereas, in plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts effectively reduced the maximum population after 4 DAS exposure. Similarly, Balkhi (Tobacco variety) gradually reduced the population and reached to its maximum level after 4 DAS exposure interval. It is observed that the findings of present study showed that the maximum reduction in the population of whitefly was obtained when plot treated with insecticide Novastar 56 EC after 7 DAS. However the plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts indicated the maximum reduction in population was seen after 7 DAS exposure. The result further revealed that when crop treated with Balkhi (Tobacco variety) it showed that population gradually reduced and reached its maximum level after 7 DAS interval. It is examined that the findings of present result displayed that the population of Thrip gradually declined when plot treated with insecticide Novastar 56 EC and reached its maximum reduction position after 7 DAS exposure intervals. Therefore, the plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts showed the population gradually reduced and reached maximum level after 4 DAS exposure. The data further revealed that the population of Thrip gradually reduced and reached its maximum level after 7 DAS exposure of bio-pesticide Balkhi (Tobacco variety) in sunflower crop. After Second foliar application of insecticide and bio-pesticide against insect pest of Sunflower crop. The result presented above it was observed that the population of Jassid gradually reduced and reached its maximum limit when plot sprayed with insecticide Novastar 56 EC after 7 DAS

exposure intervals. The bio-pesticide Hazropattar (Tobacoo variety) extracts significantly reduced population after 4 DAS exposure and reached at maximum level of reduction. The plot treated with bio-pesticide Balkhi (Tobacco variety) gradually declined the population and reached to its maximum level after 4 DAS exposure interval. The findings of present study indicated that the population of whitefly gradually declined after exposure of insecticide Novastar 56 EC and reached its maximum reduction level after 7 DAS interval periods. The plot treated with bio-pesticide Hazropattar (Tobacco variety) extracts indicated the maximum reduction in population was seen after 7 DAS exposure intervals. The result further depicted that that when crop treated with Balkhi (Tobacco variety) it showed that population gradually reduced and reached its maximum level after 1 DAS interval periods. It is observed that that the findings of present result showed that the maximum reduction in the population was obtained when plot treated with insecticide Novastar 56 EC and reached its maximum reduction limit after 7 DAS interval periods. Therefore, the plot treated with Bio-pesticide Hazropattar (Tobacoo variety) extracts showed the population gradually reduced and reached maximum reduction level after 4 DAS exposure of foliar application. The plot treated with bio-pesticide Balkhi (Tobacco variety) showed maximum population reduction after 7 DAS interval period. The yield of sunflower obtained in the plots treated with insecticide and bio-pesticides after first and 2nd spray. The maximum average yield obtained in the plot treated with insecticide Novastar 56 EC followed by bio-pesticide Hazropattar (Tobacco variety) and Balkhi (Tobacco variety) and Control (Untreated), respectively.

Our findings have more or less agreements with [10] who reported that Neem seed water extract concentration was 3% and Neem oil at 2% against sucking complex on cotton. Population of *Bemisia tabaci*, *Amrasca biguttula biguttula*

ishida and *Thrips tabaci* was reduced up to 168 hours after spray but their efficacy vanished up to 336 hours after spray. In this experiment the chemical Baythroid TM was most effective in 1st day and also remained effective up to 336 hours in this experiment. [6] tested Garlic, Neem oil Datura and Eucalyptus, against *Amrasca biguttula biguttula* Ishida, *Thrips tabaci* and *Bemisia tabci*. These plants extracts were tested in Bt cotton and result was checked after treatment in 24hr, 72hr, 168hr, and 240 hours. Among all extracts Datura gave successful results against sucking complex pest on cotton crop. Garlic, Neem oil and Eucalyptus also gave better results which compared to untreated plots. In this experiment, when two intervals of spray of plant material Datura and neem were used it showed very effective results against White fly, Jassid and Thrips as compared to Eucalyptus and Garlic. [2] reported that his experiment two botanical extracts were used Parthenium hystophorous 5% and Datura alba 5% which were compared with synthetic insecticide imidaclorprid (250 g/acre i.e.,). After treatment *Bemisia tabaci* was minimum recorded on leaf/plant in imidaclorprid plots. Where P. hystophorous and D. alba also gave an effective control against *Bemisia tabci*. The study recommends the use of *P. hystophorous* and *D. alba* extracts for the better management of *Bemisia tabaci* in cotton crop.

CONCLUSION

The maximum reduction in the population of Jassid, Whitefly and Thrip was recorded in the plot treated with insecticide after 7 DAS, 4 DAS, 10 DAS and 1 DAS interval periods, respectively.

The maximum reduction in the population of Jassid, Whitefly and Thrip was recorded in the plot treated with bio-pesticides Hazropattar (Tobacco variety) after 7 DAS, 4 DAS, 10 DAS and 1 DAS interval periods, respectively.

The maximum reduction in the population of Jassid, Whitefly and Thrip was recorded in the plot treated with bio-pesticides Balkhi (Tobacco variety) after 7 DAS, 4 DAS, 10 DAS and 1 DAS interval periods, respectively.

The maximum sunflower yield was obtained in the plot treated with insecticide Novastar 56 EC followed by bio-pesticide Hazropattar and Balkhi tobacco varieties.

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