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Efficacy of newer insecticides against sucking pests of sesame

Neeraj Kumar, ML Sharma, Shivani Suman, Sakshi Saxena and Naveen

Abstract
A field experiment was conducted at the entomological research farm of College of agriculture, Gwalior during *Kharif* season of 2019. An experiment was laid out in Randomized Block Design (RBD), with eight treatments including the untreated control and three replications. The mean percent reduction in jassid population in both first and second insecticidal spray revealed that all the insecticidal treatments proved significantly superior over the control in reducing the pest population. Though, treatment with Acetamiprid 20 SP @ 120 gm/ha (83.83%) has given a significant decline which was at par with Imidacloprid 17.8 SL @ 150 ml/ha (82.00%) followed by Emamectin benzoate 5 SG @ 150 gm/ha (79.82%) which was also at par with Chlorantraniliprole 18.5 SC @ 150 ml/ha (76.76%). The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (60.79%). Further, the mean percent reduction in whitefly population in both the sprays revealed that all the insecticidal treatments were also proved to be significantly superior over the control in reducing the field population. Though, treatment with Acetamiprid 20 SP @ 120 gm/ha (84.18%) has given a significant highest decline which was at par with Imidacloprid 17.8 SL @ 150 ml/ha (82.00%) followed by Emamectin benzoate 5 SG @ 150 gm/ha (79.16%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (73.11%) which was found at par with Thiacloprid 45 SC @ 300 ml/ha (70.63%). The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (60.15%).

Keywords: Acetamiprid, *Bemisia tabaci*, Chlorantraniliprole, Emamectin benzoate, imidacloprid, NSKE, *Orosius albicinctus* and *Sesamum indicum* L.

1. Introduction

Pest management is an imperative attempt to deal with different insect pests with diverse insecticides and novel advances need to be made for fulfilling the existing research gaps. In spite of assorted control measures against pests, farmers are primarily relying on the chemical control (Dhaliwal and Koul, 2010) [8]. The abuse and indiscriminate usage of pesticides has led to problems of pesticide resistance, resurgence and contamination of different components of the environment. Although a series of control measures applied against insect pests, crop losses have consistently escalating (Dhaliwal and Koul, 2010) [8]. Farmers resort to use the pesticides in large quantity, under the adage of "If little is good, a lot more will be better" (Aktar *et al.*, 2009) [2] which grounds detrimental effect on non-target living organism (Cork *et al.*, 2003) [6]. There is always immense demand for safer and more selective insecticides (mostly blue and green labelled) that spare natural enemies and non-target organisms. Consequently new types of insecticides have been developed by agrochemical companies. Although they are mostly synthetic but they are more selective than conventional insecticides. To improve upon this problem, earlier workers recommended novel chemical insecticides to combat insect pests of sesame but due to the toxic nature of chemicals. In order to evolve economically feasible, socially adaptable and ecologically acceptable sound pest management practices. The new insecticides molecules need evaluation on scientific lines. Keeping in view the above thematic areas, this study have been set to manage the major insect- pests of sesame using newer insecticides.

2. Method and Material

A field experiment was conducted at the entomological research farm of College of agriculture, Gwalior during *Kharif* season of 2019. An experiment was laid out in Randomized Block Design (RBD), with eight treatments including the untreated control and three replications. The plot size was taken as 3.0 m x 1.5 m. The healthy seeds of sesame variety TKG- 506 was sown by dibbling method at the rate of 2 seeds per hill.

The row to row distance was 30 cm and plant to plant distance was 10 cm. Measured quantity of insecticides depicted in Table 1 were mixed with required quantity of water and stirred well to obtain the desired concentration of spray fluid. In case of wettable powders and suspension concentrates, required quantities were mixed with a little quantity of water and then the remaining quantity of water was added to obtain desired concentration and stirred well. Insecticidal treatments were applied with hand knapsack sprayer and spraying was done during morning hours with care to prevent the drift of the spray fluid.

Insecticidal treatments were imposed when the sucking pest population has reached their respective ETL levels. During the period of study, sesame crop was attacked by Jassid, *Orosius albicinctus* (Distant) and Whitefly, *Bemisia tabaci* (Gennadius). The observations on the populations of whitefly and jassid was recorded in randomly selected 10 plants per plot by counting the number of whitefly and jassid on upper, middle and lower leaves of the plant. The data were recorded a day before spray, and 1, 3, 7 and 10 days after spray. Further, second application was done at 15 days after the application of first spray.

3. Result

3.1 Management of jassid, *Orosius albicinctus*

3.1.1. First insecticidal application

The efficacy of novel insecticides on the jassid, *Orosius albicinctus* was recorded after the emergence and the observations were presented in table 2.

3.1.1.1. One day after spraying

One day after first application of insecticide, it was observed that all the treatments were found significantly superior over the untreated control and existed considerable difference in between the different insecticidal treatments. However treatment with Imidacloprid 17.8 SL @ 150 ml/ha (84.16%) given significant reduction followed by Acetamiprid 20 SP @ 120 gm/ha (83.13%), Emamectin benzoate 5 SG @ 150 gm/ha (83.12%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (79.19%), Thiacloprid 45 SC @ 300 ml/ha (74.59%), *Beauveria bassiana* 1.15 WP @ 750 gm/ha (66.16%) and NSKE 5% @ 25 kg/ha (60.12%). Treatments with Acetamiprid 20 SP and Emamectin benzoate 5 SG were on par with Imidacloprid 17.8 SL.

3.1.1.2. Three days after spraying

The per cent reduction in jassid population after insecticidal application was significantly higher in the treatment *i.e.*, Imidacloprid 17.8 SL @ 150 ml/ha (90.52%) followed by Acetamiprid 20 SP @ 120 gm/ha (90.30%), Emamectin benzoate 5 SG @ 150 gm/ha (88.19%) and Chlorantraniliprole 18.5 SC @ 150 ml/ha (82.12%). The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (65.03%) followed by *Beauveria bassiana* 1.15 WP @ 750 gm/ha (70.15%) and Thiacloprid 45 SC @ 300 ml/ha (78.12%). However, treatment with Imidacloprid 17.8 SL was at par with the Acetamiprid 20 SP.

3.1.1.3. Seven days after spraying

After seven days of first insecticidal application, all the insecticidal treatments proved significantly superior over the control in reducing the field population. Though, treatment with Acetamiprid 20 SP @ 120 gm/ha (87.15%) has given a significant decline followed by Imidacloprid 17.8 SL @ 150 ml/ha (84.10%), Emamectin benzoate 5 SG @ 150 gm/ha (80.10%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (75.19%), Thiacloprid 45 SC @ 300 ml/ha (73.12%). The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (62.35%) and *Beauveria bassiana* 1.15 WP @ 750 gm/ha (68.15%).

3.1.1.4. Ten days after spraying

At 10 DAS of first insecticidal application, the maximum reduction of field population was observed in the treatment of Acetamiprid 20 SP @ 120 gm/ha (79. 12%) followed by Imidacloprid 17.8 SL @ 150 ml/ha (75.19%) and Emamectin benzoate 5 SG @ 150 gm/ha (74.12%). The next effective treatments were Thiacloprid 45 SC @ 300 ml/ha (71.12%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (70.07%), *Beauveria bassiana* 1.15 WP @ 750 gm/ha (64.22%) and NSKE 5% @ 25 kg/ha (59.42%). However, treatment with Thiacloprid 45 SC and Chlorantraniliprole 18.5 SC were at par with each other.

3.1.2 Second insecticidal application

The mean per cent reduction of jassid was recorded subsequent to the second insecticidal application which was done after 15 days of first insecticidal application and the efficacy of certain insecticides were critically presented in table 2.

3.1.2.1. One day after spraying

One day after second insecticidal spray all the treatments were found significantly superior over the untreated control and existed considerable difference in between the different insecticidal treatments. Treatment with Acetamiprid 20 SP @ 120 gm/ha should significant reduction (80.72%) has followed by Imidacloprid 17.8 SL @ 150 ml/ha (80.12%) and Emamectin benzoate 5 SG @ 150 gm/ha (79.90%).The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (58.12%) and *Beauveria bassiana* 1.15 WP @ 750 gm/ha (63.22%).

3.1.2.2. Three days after spraying

The per cent reduction in jassid population after three days of second insecticidal application was reached peak in all the treatments and significantly finer over the control with the tune of 62.33 to 88.35 per cent. The maximum reduction was observed in the treatment *i.e.*, Imidacloprid 17.8 SL @ 150 ml/ha (88.35%) and Acetamiprid 20 SP @ 120 gm/ha (88.35%) followed by Emamectin benzoate 5 SG @ 150 gm/ha (82.51%) and Chlorantraniliprole 18.5 SC @ 150 ml/ha (81.15%). The least reduction was recorded in NSKE 5% @ 25 kg/ha (62.33%) followed by *Beauveria bassiana* 1.15 WP @ 750 gm/ha (68.97%) and Thiacloprid 45 SC @ 300 ml/ha (77.17%).

3.1.2.3. Seven days after spraying

After seven days of spraying all the insecticidal treatments proved considerably advanced over the control in reducing the field population. Nevertheless, treatment with Acetamiprid 20 SP @ 120 gm/ha (79.15%), Imidacloprid 17.8 SL @ 150 ml/ha (79.13%) Emamectin benzoate 5 SG @ 150 gm/ha (79.12%) has given a significant reduction and on par with each other. The next virtual treatments were Chlorantraniliprole 18.5 SC @ 150 ml/ha (78.45%) and Thiacloprid 45 SC @ 300 ml/ha (73.13%). The minimum per cent reduction was recorded in NSKE 5% @ 25 kg/ha

(61.84%) and *Beauveria bassiana* 1.15 WP @ 750 gm/ha (63.14%).

3.1.2.4. Ten days after spraying

Finally, ten days after spraying of second insecticidal application, the maximum reduction of field population was observed in the range of 57.14 to 76.10 per cent. Despite that, the maximum reduction of jassid was recorded in the treatment of Acetamiprid 20 SP @ 120 gm/ha (76.10%) followed by Imidacloprid 17.8 SL @ 150 ml/ha (74.45%) and Emamectin benzoate 5 SG @ 150 gm/ha (72.17%). The next virtual treatments were Thiacloprid 45 SC @ 300 ml/ha (69.14%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (69.08%), *Beauveria bassiana* 1.15 WP @ 750 gm/ha (60.47%) and NSKE 5% @ 25 kg/ha (57.14%). On the other hand, treatment with Thiacloprid 45 SC and Chlorantraniliprole 18.5 SC were on par with each other.

3.2. Management of whitefly, *Bemisia tabaci*

3.2.1. First insecticidal application

The efficacy of novel insecticides on the whitefly, *Bemisia tabaci* was recorded after the emergence and the observations were presented in table 3.

3.2.1.1. One day after spraying

After one day of application of different treatments in first insecticidal application, it was observed that all the treatments were found significantly superior over the untreated control and existed considerable difference in between the different insecticidal treatments. However treatment with Acetamiprid 20 SP @ 120 gm/ha (86.23%) has given significant reduction followed by Imidacloprid 17.8 SL @ 150 ml/ha (83.76%), Emamectin benzoate 5 SG @ 150 gm/ha (82.52%), Thiacloprid 45 SC @ 300 ml/ha (71.98%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (70.89%), *Beauveria bassiana* 1.15 WP @ 750 gm/ha (60.86%) and NSKE 5% @ 25 kg/ha (60.52%). Treatments with Imidacloprid 17.8 SL and Emamectin benzoate 5 SG, Thiacloprid 45 SC and Chlorantraniliprole 18.5 SC, *Beauveria bassiana* 1.15 WP and NSKE 5% were statistically on par with each other.

3.2.1.2. Three days after spraying

The per cent reduction in whitefly population after three days of first insecticidal application was reached maximum in all the treatments and significantly superior over the control with the tune of 62.53 to 95.12 per cent. The maximum reduction was observed in the treatment *i.e.*, Acetamiprid 20 SP @ 120 gm/ha (95.12%) followed by Imidacloprid 17.8 SL @ 150 ml/ha (92.32%), Emamectin benzoate 5 SG @ 150 gm/ha (85.61%) and Chlorantraniliprole 18.5 SC @ 150 ml/ha (83.82%). The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (62.78%) followed by *Beauveria bassiana* 1.15 WP @ 750 gm/ha (62.53%) and Thiacloprid 45 SC @ 300 ml/ha (75.28%). However, treatment with *Beauveria bassiana* 1.15 WP was on par with the NSKE 5%.

3.2.1.3. Seven days after spraying

After seven days of first insecticidal application, all the insecticidal treatments proved significantly superior over the control in reducing the field population of whitefly. Though, treatment with Acetamiprid 20 SP @ 120 gm/ha (90.45%) has given a significant decline followed by Imidacloprid 17.8 SL @ 150 ml/ha (87.27%), Emamectin benzoate 5 SG @ 150 gm/ha (81.65%), Chlorantraniliprole 18.5 SC @ 150 ml/ha (73.89%), Thiacloprid 45 SC @ 300 ml/ha (68.78%). The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (62.35%) and *Beauveria bassiana* 1.15 WP @ 750 gm/ha (63.89%). On the other hand, treatment with *Beauveria bassiana* 1.15 WP was on par with the NSKE 5%.

3.2.1.4. Ten days after spraying

At 10 DAS of first insecticidal application, the maximum reduction of field population was observed in the treatment of Acetamiprid 20 SP @ 120 gm/ha (80.29%) followed by Imidacloprid 17.8 SL @ 150 ml/ha (78.59%) and Emamectin benzoate 5 SG @ 150 gm/ha (78.24%). The next effective treatments were Chlorantraniliprole 18.5 SC @ 150 ml/ha (69.87%), Thiacloprid 45 SC @ 300 ml/ha (68.78%), *Beauveria bassiana* 1.15 WP @ 750 gm/ha (60.22%) and NSKE 5% @ 25 kg/ha (59.42%). However, treatment with Imidacloprid 17.8 SL and Emamectin benzoate 5 SG, Thiacloprid 45 SC and Chlorantraniliprole 18.5 SC, *Beauveria bassiana* 1.15 WP and NSKE 5% were statistically on par with each other.

3.3. Second insecticidal application

The mean per cent reduction of whitefly was recorded subsequent to the second insecticidal application which was done after 15 days of first insecticidal application and the efficacy of certain insecticides were critically presented in table 3.

3.3.1. One day after spraying

One day after second insecticidal application of novel insecticides, it was observed that considerable difference in between the different insecticidal treatments. Though, treatment with Acetamiprid 20 SP @ 120 gm/ha (82.32%) has given significant reduction followed by Imidacloprid 17.8 SL @ 150 ml/ha (80.77%) and Emamectin benzoate 5 SG @ 150 gm/ha (78.30%). The next virtual treatments were Chlorantraniliprole 18.5 SC @ 150 ml/ha (72.17%), Thiacloprid 45 SC @ 300 ml/ha (69.57%).The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha (58.12%) and *Beauveria bassiana* 1.15 WP @ 750 gm/ha (61.52%).

3.3.2. Three days after spraying

The per cent reduction in whitefly population after three days of second insecticidal application was reached peak in all the treatments and significantly finer over the control with the tune of 60.33 to 86.75 per cent. The maximum reduction was observed in the treatment Acetamiprid 20 SP @ 120 gm/ha (86.75%) followed by Imidacloprid 17.8 SL @ 150 ml/ha (85.50%), Emamectin benzoate 5 SG @ 150 gm/ha (83.15%) and Chlorantraniliprole 18.5 SC @ 150 ml/ha (75.85%). The least per cent reduction was recorded in NSKE 5% @ 25 kg/ha (60.33%) followed by *Beauveria bassiana* 1.15 WP @ 750 gm/ha (64.37%) and Thiacloprid 45 SC @ 300 ml/ha (72.88%). Moreover, treatment with Acetamiprid 20 SP was at par with Imidacloprid 17.8 SL.

3.3.3. Seven days after spraying

After seven days of second insecticidal application, all the insecticidal treatments proved considerably advanced over the control in reducing the field population. Nevertheless, treatment with Acetamiprid 20 SP @ 120 gm/ha (79.15%), Imidacloprid 17.8 SL @ 150 ml/ha (75.35%) Emamectin benzoate 5 SG @ 150 gm/ha (74.23%) has given a significant reduction followed by Chlorantraniliprole 18.5 SC @ 150 ml/ha (70.28%) and Thiacloprid 45 SC @ 300 ml/ha (68.43%). The minimum per cent reduction was recorded in *Beauveria bassiana* 1.15 WP @ 750 gm/ha (60.14%) and NSKE 5% @ 25 kg/ha (60.84%).%). However, treatment with Imidacloprid 17.8 SL and Emamectin benzoate 5 SG, *Beauveria bassiana* 1.15 WP and NSKE 5% were statistically on par with each other.

3.3.4. Ten days after spraying

Finally, ten days after spraying of second insecticidal application, the maximum reduction of field population was observed in the range of 56.87 to 73.10 per cent. Despite that, the maximum reduction of whitefly was recorded in the treatment of Acetamiprid 20 SP @ 120 gm/ha (73.10%) followed by Imidacloprid 17.8 SL @ 150 ml/ha (72.41%) and Emamectin benzoate 5 SG @ 150 gm/ha (69.57%). The next virtual treatments were Chlorantraniliprole 18.5 SC @ 150 ml/ha (68.08%), Thiacloprid 45 SC @ 300 ml/ha (67.84%), *Beauveria bassiana* 1.15 WP @ 750 gm/ha (59.37%) and NSKE 5% @ 25 kg/ha (56.87%). On the other hand, treatment with Acetamiprid 20 SP and Imidacloprid 17.8 SL, Thiacloprid 45 SC and Chlorantraniliprole 18.5 SC were on par with each other.

4. Discussion

4.1. Management of jassid, *Orosius albicinctus*

In the present investigation, the maximum reduction of jassid was recorded in the treatment of Acetamiprid 20 SP @ 120 gm/ha as well as Imidacloprid 17.8 SL @ 150 ml/ha followed by Emamectin benzoate 5 SG @ 150 gm/ha. The next treatments were Chlorantraniliprole 18.5 SC @ 150 ml/ha and Thiacloprid 45 SC @ 300 ml/ha. The minimum per cent reduction was recorded in NSKE 5% @ 25 kg/ha and *Beauveria bassiana* 1.15 WP @ 750 gm/ha.

The present findings are in agreement with that of Choudhary (2009) [4] reported that the imidacloprid 17.8 SL (0.005%) was the most effective insecticide in suppression of jassid population on sesame crop. Preetha and Nadarajan (2007) [12] and Preetha *et al.,* (2009) [13] revealed that the Imidacloprid 17.8 SL (25g a.i. /ha) was also proved superior in reduction of leaf hopper population on okra crop are in agreement with present findings. Pachundkar *et al.,* (2013) [10] and Das and Islam (2014) [7] observed that the efficacy of imidacloprid 70 WG (0.015% and 0.2g/ lit, respectively) was found effective in reduction of jassid population on cluster bean and brinjal crop, respectively, also support the present findings.

Panday *et al*., (2018) [11] also reported the lowest population of leaf hopper (0.17 leaf hopper/ three leaves/ plant) was recorded in treatment with Imidacloprid 70 WS (7.5g/kg seed) and foliar spray of Imidacloprid 17.8 SL (0.25 ml/l). These results are in agreement with the application of Imidacloprid 70 WS as a seed treatment (5 g/kg seed) + Imidacloprid 200 SL (0.01%) as a foliar spray drastically reduced leafhopper (*Empoasca kerri* Pruthi) population and increased the pod yield of groundnut. Sujay *et al.,* (2013) reported that the lowest mean leafhopper population in okra was recorded from Acetamiprid. These results are also supported by Choudhary *et al.,* (2015) [5] who reported that Leafhopper, *Empoasca kerri* population recorded minimum (0.97 hopper/leaf) numbers in plots sprayed with imidacloprid followed by Acetamiprid (1.12 hoppers/leaf).

In the present investigation, the next treatments were Emamectin benzoate 5 SG @ 150 gm/ha, Chlorantraniliprole 18.5 SC @ 150 ml/ha and Thiacloprid 45 SC @ 300 ml/ha. The present findings are in agreement with Premdas, 2017, who revealed that chlorantraniliprole @ 0.3 ml/L, Emamectin benzoate @ 0.2 g/L and Thiacloprid @ 0.3 ml/L were found moderately against jassid, *Orosius albicinctus*. Pachundkar *et al.,* (2013) [10] also reported that Thiacloprid 48 SC (0.012%) was found moderately effective against jassid on cluster bean crop.

However in the present investigation, the minimum per cent reduction was recorded in NSKE 5% @ 25 kg/ha and *Beauveria bassiana* 1.15 WP @ 750 gm/ha. These findings are in agreement with Panday *et al*., (2018) [11] who reported that minimum per cent reduction was recorded in NSKE 5% against jassid, *Orosius albicinctus*. Present findings are also in conformity with the findings of Ahirwar *et al*., (2010) [1], who reported that the incidence of nymph and adults of leaf hopper decreased significantly by natural and indigenous products.

4.2. Management of whitefly, *Bemisia tabaci*

In the present investigation, the maximum reduction of field population was observed in the treatment of Acetamiprid 20 SP @ 120 gm/ha and Imidacloprid 17.8 SL @ 150 ml/ha. The next effective treatments were Emamectin benzoate 5 SG @ 150 gm/ha, Chlorantraniliprole 18.5 SC @ 150 ml/ha and Thiacloprid 45 SC @ 300 ml/ha. The lowest per cent reduction was recorded in NSKE 5% @ 25 kg/ha and *Beauveria bassiana* 1.15 WP @ 750 gm/ha.

Panday *et al*., (2018) [11] reported the significant reduction of whitefly was recorded in treatment with Imidacloprid 70 WS (7.5g/kg seed) and foliar spray of Acetamiprid 20 SP. Mahalakshmi *et al.,* (2015) [9] also revealed the significant reduction of whitefly was recorded in the treatment of Acetamiprid 20 SP @ 0.2 g/ lit against whiteflies in urd bean. Choudhary (2009) [4] revealed that the Imidacloprid 17.8 SL (0.005%) was superior in reduction of whitefly population in sesame crop are in agreement with present investigation. The present findings are also in agreement with that of Preetha and Nadarajan (2007) [12] and Preetha *et al.,* (2009) [13] reported that Imidacloprid 17.8 SL (25g a.i. /ha) was proved to be most effective insecticides in reduction of whitefly population on okra crop.

In the present investigation, the next effective treatments were Emamectin benzoate 5 SG @ 150 gm/ha, Chlorantraniliprole 18.5 SC @ 150 ml/ha and Thiacloprid 45 SC @ 300 ml/ha. The present finding are corroborate with those of Pandey *et al*., (2018) [11], who reported that the treatment imidacloprid 70 WS (seed treatment) + foliar spray of Thiacloprid (1.0 ml/ lit) were moderately effective treatments against whitefly on sesame crop. The present results are in agreement with that of Pachundkar *et al.,* (2013) [10], who reported that Thiacloprid 48 SC (0.012%) was found moderately effective against whitefly on cluster bean crop. Chaitra (2016) [3] found that the treatment Emamectin benzoate 0.002 per cent was medium in their effectiveness against whitefly on sesame crop also got support the present results.

However in the present investigation, the minimum per cent reduction was recorded in NSKE 5% @ 25 kg/ha and *Beauveria bassiana* 1.15 WP @ 750 gm/ha. These findings are in agreement with Panday *et al*., (2018) [11] who reported that minimum per cent reduction was recorded in NSKE 5% against whitefly. Present findings are also in conformity with the findings of Ahirwar *et al*., (2010) [1], who reported that the incidence of whitefly decreased significantly by natural and indigenous products.

Table 1: Details of treatments

Treatment No.	Insecticides	Formulation	Doses/ha.
1.	Imidacloprid	17.8 SL	150 ml
2.	Emamectin benzoate	5 SG	150 gm
3.	Chlorantraniliprole	18.5 SC	150 ml
4.	Thiacloprid	45 SC	300 ml
5.	Acetamiprid	20 SP	120 gm
6.	*Beauveria bassiana*	1.15 WP	750 gm
7.	NSKE	5%	25 kg.
8.	Control (Untreated)	-	-

Table 2: Efficacy of insecticides against jassid, *Orosius albicinctus* on sesame crop during *Kharif* 2019.

S. No	Insecticides	Mean per cent Reduction							
		1st spray				2nd spray			
		1st day	3rd day	7th day	10th day	1st day	3rd day	7th day	10th day
1	Imidacloprid	84.16 (66.55)	90.52 (72.07)	84.10 (66.50)	75.19 (60.13)	80.12 (63.52)	88.35 (70.04)	79.13 (62.82)	74.45 (59.64)
2	Emamectin benzoate	83.12 (65.74)	88.19 (69.90)	80.10 (63.51)	74.12 (59.42)	79.90 (63.36)	82.51 (62.58)	78.45 (62.34)	72.17 (58.16)
3	Chlorantraniliprole	79.19 (62.86)	82.12 (64.99)	75.19 (60.13)	70.07 (56.83)	78.17 (62.15)	81.15 (64.27)	79.12 (62.81)	69.08 (56.22)
4	Thiacloprid	74.59 (59.73)	78.12 (62.11)	73.12 (58.77)	71.12 (57.49)	72.58 (58.42)	77.17 (61.46)	73.13 (58.78)	69.14 (56.52)
5	Acetamiprid	83.13 (65.75)	90.30 (71.85)	87.15 (68.99)	79.12 (62.81)	80.72 (63.95)	88.35 (70.04)	79.15 (62.83)	76.10 (60.73)
6	*Beauveria bassiana*	66.16 (54.43)	70.15 (56.88)	68.15 (55.64)	64.22 (53.26)	63.22 (52.67)	68.97 (56.15)	63.14 (52.62)	60.47 (51.04)
7	NSKE	60.12 (50.84)	65.03 (53.73)	62.35 (52.15)	59.42 (50.43)	58.12 (49.67)	62.33 (52.14)	61.84 (51.85)	57.14 (49.10)
8	Control (Untreated)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	SEm (±)	1.10	1.27	1.32	1.19	1.30	1.55	1.22	1.35
	C.D (p=0.05)	3.20	3.80	4.10	3.90	3.93	4.60	3.70	4.05

*Figures in parenthesis are angular transformed values

Table 3: Efficacy of insecticides against whitefly, *Bemisia tabaci* on sesame crop during *Kharif* 2019

S. No	Insecticides	Mean per cent Reduction							
		1st spray				2nd spray			
		1st day	3rd day	7th day	10th day	1st day	3rd day	7th day	10th day
1	Imidacloprid	83.76 (66.23)	92.32 (73.91)	87.27 (69.10)	78.59 (62.44)	80.77 (63.99)	85.50 (67.62)	75.35 (60.23)	72.41 (58.31)
2	Emamectin benzoate	82.52 (65.29)	85.61 (67.71)	81.65 (64.64)	78.24 (62.19)	78.30 (62.24)	83.15 (65.76)	74.23 (59.49)	69.57 (56.46)
3	Chlorantraniliprole	70.89 (57.35)	83.82 (66.28)	73.89 (59.27)	69.87 (56.71)	72.17 (58.16)	75.85 (60.57)	70.28 (56.96)	68.08 (55.60)
4	Thiacloprid	71.98 (58.04)	75.28 (60.19)	70.28 (56.96)	68.78 (56.03)	69.57 (56.52)	72.88 (58.62)	68.43 (55.81)	67.84 (55.45)
5	Acetamiprid	86.23 (68.22)	95.12 (77.24)	90.45 (72.00)	80.29 (63.56)	82.32 (65.14)	86.75 (68.65)	79.15 (62.83)	73.10 (58.76)
6	*Beauveria bassiana*	60.86 (51.27)	62.53 (52.26)	63.89 (53.06)	60.22 (50.90)	61.52 (51.66)	64.37 (53.35)	60.14 (50.85)	59.37 (50.40)
7	NSKE	60.52 (51.07)	62.78 (52.40)	62.35 (52.15)	59.42 (50.43)	58.12 (49.67)	60.33 (50.96)	60.84 (51.26)	56.87 (48.95)
8	Control (Untreated)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	SEm (±)	1.36	1.72	1.42	1.59	1.30	1.85	1.31	1.29
	C.D (p=0.05)	4.02	5.00	4.29	4.90	3.90	4.70	3.89	3.82

*Figures in parenthesis are angular transformed values

5. Conclusion

The present investigation was conducted to evaluate the efficacy of certain insecticides against insect pests of sesame at College of agriculture, Gwalior farm during *Kharif* 2019. The results revealed that efficacy of newer insecticides against major insect pests of sesame revealed that the chemical treatment with Acetamiprid 20 SP @ 120 gm/ha as well as Imidacloprid 17.8 SL @ 150 ml/ha was found to be effectively against jassid, *Orosius albicinctus* and whitefly, *Bemisia tabaci*.

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6. References

1. Ahirwar RM, Gupta MP, Banerjee S. Field efficacy of natural and indigenous products on sucking pests of sesame. Indian J of Natural Product Resources. 2010;1(2):221-226.
2. Aktar MW, Sengupta D, Chowdhury A. Im-pact of pesticide use in Indian agriculture - Their benefits and hazards. Interdisciplinary Toxicology. 2009;2(1):1-12.
3. Chaitra HS. Bionomics of sesame leaf webber, *Antigastra catalaunalis* (Dup.) and management of pest complex of sesame. M.Sc. (Ag.) thesis, submitted to Department of

Agricultural Entomology, Anand Agriculture University, Gujrat, 2016.
4. Choudhary S. Seasonal incidence and management of major insect pests of sesame, *Sesamum indicum* (Linn.). M.Sc. (Ag.) thesis, submitted to Department of Entomology, SKNAU. Jobner, 2009
5. Choudhary S, Kumawat KC, Yadav SR. Seasonal incidence of insect pests of sesame in relation to environmental factors. Indian J of Pl. Prot. 2015;43(2):231-232.
6. Cork A, Kamal NQ, Alam SN, Choudhury JCS, Talekar NS. Pheromone and their applications to insect pest control. Bangladesh J Ent. 2003;13:1-13.
7. Das G, Islam T. Relative efficacy of some newer insecticides on the mortality of jassid and white fly in brinjal. International J of Res. in Biological Sci. 2014;4(3):89-93.
8. Dhaliwal GS, Koul O. Quest for Pest Management: From Green Revolution to Gene Revolution. Kalyani Publishers, New Delhi, 2010.
9. Mahalakshmi MS, Sreekanth M, Adinarayana M, Rao YK. Efficacy of some novel insecticide molecules against incidence of whiteflies (*Bemisia tabaci* Genn.) and occurrence of Yellow Mosaic Virus (YMV) disease in urdbean. International J of Pure and Applied Bioscience. 2015;3(5):101-106.
10. Pachundkar NN, Borad PK, Patil PA. Evaluation of various synthetic insecticides against sucking insect pests of cluster bean. International J of Scientific and Res. Publications. 2013;3(8):1-6.
11. Panday AK, Bisen R, Jain S, Ranganatha ARG. Efficacy and economics of different insecticidal treatments for the management of major sucking insect pests of sesame. J of Ent. and Zoology Studies. 2018;6(2):1247-1252.
12. Preetha G, Nadarajan L. Validation of IPM modules against sucking pests of okra in Karaikal. Indian J of Ent. 2007;69(3):210- 214.
13. Preetha G, Manoharan T, Stanley J, Kuttalam S. Evaluation of imidacloprid against okra jassid, *Amrasca biguttula biguttula* (Ishida) and whitefly, *Bemisia tabaci* (Gennadius). Indian J of Ento. 2009;71(3):209-214.
14. Premdas ICM. Seasonal Incidence, Distribution Patterns of Insect Pest Complex of Sesame and Their Management with Certain Insecticides. M.Sc. (Ag.) thesis, submitted to Department of Entomology, ANGRAU, Guntur, 2017.