

Evaluation of JH Biotech, Inc. Products under Egyptian environment

Product Name: 5- Biorepel (Natural Insect Repellent)

Supervisor: Dr. Mohamad Ibrahim

Plant Protection Res. Institute, Sharkia Research Station.

INTRODUCTION

In Egypt, cotton is subject to be attacked by several pests. Pest species present on cotton plants at different plant stages. Pest species also attack different parts of the cotton plants such as: seedlings, leaves and green bolls. Several predatory and parasitoid species are found in cotton fields associated with all the cotton pests such as the coccinellids, chrysopids, staphylinds and true spiders. Their role is highly significant. In Egypt, cotton fields receive 70 % of the total amount of pesticides used annually.

The application of simple extracts from plants in several cases, as alternatives of pesticides, proved to be highly effective against susceptible pests. Garlic crude was used against *Aphis craccivora* infested *Vicia faba* plants in Egypt **Hala (2000)**. Generally, a few works has been done on using the plant extracts on cotton plants.

The present study was planned to evaluate the product BIOREPEL against principal cotton pests and associated predators in cotton fields under Egyptian environmental conditions.

MATERIALS AND METHODS

Location: Sharkia Governorate (East-northern Egypt)

Host Plant: Cotton

Target Pests: Aphids (*Aphis gossypii*), Thrips (*Thrips tabaci*), whitefly (*Bemesia tabaci*), Spider mites (*Tetranychus urticae*), leafhoppers (*Empoasca* spp.), Cotton leaf worm (*Spodoptera littoralis*), Pink bollworm (*Pectinophora gossypiella*) and Green stink bug (*Nezara veridula*).

Field experiments

Design: Field experiments were conducted in cotton field at Zagazig district (Sharkia Governorate) during 2000 season. Planting date was 10th April. Experimental plots were (1/100 fed. = 42 m²) each. Number of replicates per treatment was 3 reps. Plots received usual agricultural practices during the course of study. A complete randomized block design was used.

Procedures:

Timing of Application

- 1- Just after emergence.
- 2- after 10 days of emergence.
- 3- ,, 20 ,, ,, ,, ,,

Three BIOREPEL sprays were applied in weekly intervals. **BIOREPEL** was used at the rate of 1 liter/100 liter water.

Sampling technique

Sampling: Numbers of considered pests were counted just before application and after 2, 5, 10, 15 and 20 days after application. Initial effect of the product was estimated 5 days after application. Accumulated residual effect was also estimated for the counting carried out after 10, 15 and 20 days from application.

Sample size:

- ◆ Incidence of aphids, whitefly, thrips, spider mites was counted on 10 randomly selected seedling/replicate (30 seedling/treatment, early in the season until true leaves formation, then 10 leaves/rep were taken.
- ◆ Population of leafhoppers and green stink bug was estimated by counting insects obtained by 10 sweeps from the central rows of each plot using 38-cm diameter sweeping net.
- ◆ Incidence of associated predators, numbers were estimated by visual count technique on 10 plants/rep.
- ◆ Incidence of cotton leaf worm, picking up of egg masses was stopped after 5 days. Numbers of larvae/100 plants were counted before application and after 3, 5, 7 and 9 days of application in treated and control plots.
- ◆ Incidence of pink bollworm: A sample of 100 green bolls was taken randomly and examined before application and weekly after application.

Percentages of population reduction for each pest species and total numbers of associated predators were calculated according to Henderson's formula (*Henderson and Tilton, 1955*), as follows: Percent reduction in infestation = $(1 - C_b \times T_a / C_a \times T_b) \times 100$.

Where:

Cb = No. of insects in control plots before spraying.

Ca = " " " " " " after spraying.

Ta = " " " " treated " " "

Tb = " " " " " " before "

Obtained results were subjected to analyses of variances.

RESULTS AND DISCUSSION

Obtained results showed that all the examined pests were affected positively by different BIOREPEL treatments. The effect of BIOREPEL varied from one pest to another Tables (1-3) and Fig. (1). As shown in the tables, the efficacy of BIOREPEL against certain cotton pests and associated predators on cotton plants was summarized as follows:

◆ Cotton aphids (*Aphis gossypii*)

Numbers of aphids were significantly reduced in treated plots after BIOREPEL application. Initial % reduction ranged between 72 and 91.9 % with an average of 84.9 %. Residual % reduction ranged between 43.3 and 60.8 % with an average of 59.5 %.

◆ Whitefly (*Bimisa tabaci*)

The numbers of whitefly were also significantly reduced in treated plots after application. Initial % reduction ranged between 39.8 and 76 % with an average of 68.4 %. Residual % reduction ranged between 18 and 55 % with an average of 36.1 %.

◆ Leafhopper (*Empoasca* spp.)

The numbers of leafhopper were significantly reduced in treated plots after application. Initial % reduction ranged between 56.1 and 87.4 % with an average of 78 %. Residual % reduction ranged between 19.5 and 69.2 % with an average of 49 %.

◆ Cotton thrips (*Thrips tabaci*)

The numbers of thrips were significantly reduced in treated plots after application. Initial % reduction ranged between 70.7 and 88.6 % with an average of 78 %. Residual % reduction ranged between 5 and 63.4 % with an average of 32.9 %.

◆ Spider mites (*Tetranychus* spp.)

The numbers of spider mites were significantly reduced in treated plots after application. Initial % reduction ranged between 49.7 and 75.8 % with an average of 67 %. Residual % reduction ranged between 13.8 and 59.8 % with an average of 36.6 %.

◆ Associated predators (total numbers)

Predators were affected by BIOREPEL in different programs in both early and late season experiments. Initial % reduction ranged between 17 and 49 % with an average of 40.8 %. Residual % reduction ranged between 5.9 and 41.6 % with an average of 14.2 %.

◆ Green stink bug (*Nezara viridula*)

The green bug was observed only in late season experiment and found affected by BIOREPEL. Initial % reduction ranged between 49 – 76.5 %. The residual % reduction ranged between 18.6 and 47.93.

◆ Pink bollworm (*Pectinophora gossypiella*):

Table (2) summarizes the efficacy of BIOREPEL compound against the pink bollworm on cotton plants. The efficacy was assessed as % reduction of boll infestation. The reduction ranged between 27.9 - 61.5 % - 25.0 - 47.8% and 28.6 - 38.5% under the three spraying programs, respectively. Therefore, the 1st program (3 sprays with one week interval) was the relatively high effective program.

◆ Cotton leaf worm (*Spodoptera littoralis*):

Table (3) summarizes the efficacy of BIOREPEL against the cotton leaf worm. The % reduction of BIOREPEL on cotton leaf worm was the least among other examined pests. The reduction ranged between 23.3 -25.8 %. The evaluation was stopped when the larvae damaged the cotton plants.

Obtained results were in agreement with the findings of **Venkaietan, et al (1987), Butler, et al (1988), Stein and Klingauf (1990), Sengonca and Brueggen (1991), Digilio, et al (1993) and Lowery and Isman (1994).**

Statistical analysis revealed that significant differences were found in % reduction for different spraying program ($P < 0.01$). Also, there were significant differences in % percentages among different target pests and associated predators. The differences were insignificant for the timing of application.

CONCLUSION

It could be concluded that the BIOREPEL compound at the rate of 100ml/10 litter water showed relatively higher efficiency against aphids, leafhopper, thrips and pink bollworm, moderate efficiency against whitefly, spider mites, green stinkbug and predators, while it was less effective against the cotton leaf worm.

Finally, BIOREPEL could be recommended to be used effectively against cotton aphids, leafhoppers, cotton thrips and pink bollworm on cotton plants.

REFERENCES

- Butler, G. D., Jr.; Coudriet, D.L. and Henneberry, T.J. 1988.** Toxicity and repellency of soybean and cotton seed oil to sweet potato whitefly and the cotton aphid in green house studies. South western Entomologist, 13 (2): 81 - 86.
- Digilo, M.C.; De-Feo, V.; Langellotli, R.R. and De-Simon, F. 1993.** Insecticide activity of *Guiera senegalensis* J. F. Gmeline extracts. Boll. Lab. Ent. Agric. Filippa. Sivistri, Portici, 50: 147 – 156
- Hala, M.I.M. 2000.** New approaches in the control of legumes aphids, *Aphis craccivora* Koch (Homoptera: Aphididae) Msc. Thesis, Ins. Env. Studies and research, Ain Shams Uni. Egypt.
- Henderson, D.F. and E.W. Tilton 1955.** Tests with acaricides against the brown wheat mite J. Econ. Entomol, 48: 157-161.
- Lowery, D.T. and Isman, M.B.1994.** Insect growth regulating effects of Neem extract and *Azadirachtin* on aphids. Ent. Exp. Appl., 72(1): 77-84.

Sengonca, C. and Brueggen, K.U. 1991. The influence of aqueous extracts of *Guassia amara* L. on cereal aphids. J. Appl. Entomol., 112(2): 211-215.

Stein, V. and Klingauf, F. 1990. Insecticidal effect of plant extracts from tropical and subtropical species. Traditional methods are good as long as they are effective J. Appl. Entomol., 110(2):160-166.

Venkaietan, S.; Bat- Ashbeamanian, G.; Jayari, S. and Gopalan, M. 1987. Studies on the efficacy of Neem products against the aphid, *Aphis gossypii* (Glov.) on cotton. Madras Agri, J., 74(4-5): 255-257.

Table (1) Ranges of reduction % using BIOREPEL against certain cotton pests and associated predators in different spraying programs in cotton fields in Egypt, season 2000.

<u>Program</u>	1st program		2nd program		3rd program		Late season program	
	Initial	Residual	Initial	Residual	Initial	Residual	Initial	Residual
Aphids	84.13-91.92	53.73-60.85	76.96-86.52	43.31-59.16	86.6-87.02	45.53-53.62	72.59-86.95	50.11-69.63
Whitefly	70.44-76.0	32.53-55.0	62.59-73.32	23.15-38.23	78.65-79.98	29.11-42.09	39.85-66.45	18.03-50.49
Leafhoppers	69.12-84.21	48.89-59.7	79.43-87.38	48.29-59.75	77.81-83.8	31.99-55.03	56.11-85.88	19.46-69.18
Thrips	70.67-88.59	42.31-63.43	70.87-83.55	5.45-43.71	71.31-82.69	5.0-37.67	Found in very low number	
Spider mites	54.16-75.82	13.81-37.34	67.87-72.93	40.89-55.86	70.76-74.72	28.4-34.81	49.73-69.96	21.98-59.77
Green stink bug	Found in very low number						49.03-76.46	8.88-47.93
Predators	48.95-66.88	10.26-41.57	47.05-50.19	2.29-13.96	19.53-30.76	1.59-7.56	17.0-46.09	5.92-30.07

Initial = Initial effect after 5 days from spraying

Residual = Accumulated effect for 20 days after spraying

Table (2): Percentages of infestation with *P. gossypilla* in green bolls and reduction % using BIOREPEL in cotton fields in Egypt, season 2000

Dates	Pre-count	Indicated weeks after application						
Programs		1	2	3	4	5	6	7
No	2.0	4.0	5.0	9.0	15.0	23.0	36.0	46.0
1 st program R%	-	33.3	61.5	60.9	55.9	47.7	36.8	26.9
No	2.0	4.0	8.0	12.0	21.0	33.0	39.0	43
2 nd program R%	-	33.3	38.5	47.8	38.2	25.0	31.6	31.7
No	2.0	4.0	8.0	15.0	22.0	30.0	37.0	45.0
3 rd program R%	-	33.3	38.5	34.8	35.3	31.8	35.1	28.60
Control No	2.0	6.0	13.0	23.0	34.0	44.0	57.0	63.0

Table (3) Numbers of cotton leaf worm larvae before and after application of BIOREPEL and reduction % in cotton fields in Egypt, season 2000.

Observation.	Pre-count	Indicated days after application			
Treatment		3	5	7	9
No	4230	4500	4810	4690	3980
Treatment R%		24.6	25.8	24.4	23.3
Control No	3000	4230	4600	4400	3680