J. Plant Prot. and Path., Mansoura Univ., Vol. 10(8): 401 - 402 , 2019

Evaluation of Ethephon Application on Bollworms, *Pectinophora gossvpiella* (Saund.) and *Earias insulana* (Bois.) Infestation and Boll Opening in Cotton Fields

Ghanim, A. A.[1]; G. A. El-Mezayyen[2] and A. E. Hatem[2]

[1]Economic Entomology Department, Faculty of Agriculture , Mansoura University.

[2]Plant Protection Research Institute, Agric. Res. Center, Dokki, Giza.

ABSTRACT

The present study was conducted at Sakha Agricultural Research Station, Kafr El—Sheikh governorate, Egypt during 2016 and 2017 late cotton seasons. Results showed that Ethephon (plant growth regulator) treatment gave the highest reduction percentage, 56.68 and 37.60% of pink bollworm infestation, *Pectinophora gossvpiella* (Saund.) with 3 cm3/L, while they were 50.66 and 43.75% of spiny bollworm infestation, *Earias insulana* (Bois.) with 1.5 cm^3/L in 20l6 and 2017 cotton growing seasons, respectively. On the other hand, concentration of Ethephon, 2.5 cm^3/L gave the highest increasing of percentages of mature boll opening recording 36.68 arid 22.57% in the two tested seasons respectively, It could be concluded that using Ethephon with 3.0 cm^3/L to accelerate mature boll opening in late cotton season.

Keywords: Ethephon, bollworms, *Pectinophora gossypiella, Earias insulana*, boll opening.

INTRODUCTION

Cotton plants are subjected to attack by wide range of insect pests throughout growing stages until maturity. Among the main insect pests are bollworms, pink bollworm (PBW), *P. gossypiella* and *spiny bollworm* (SBW), *E. insulana* usually cause severe damage to cotton plants, squares, flowers and green bolls. Plant growth regulators PGR's) regulate phases of plant growth which use to promote Pre – harvest ripening in many crops. Ethephon is a plant growth regulator which registered for use on cotton to accelerate mature boll opening (Henneberry *et al*., 1992). In addition, Ethephon reduced the number of green bolls remaining after harvest and reduction percentages of diaphausing pink boliworm larvae (Kittock *et al*., 1973). Before applying plant growth regulators., variety, soil type, fertility, irrigation potential and field history must be taken into consideration (Wilson, 2014). Some investigators studied the effect of Ethephon on certain insect pests such as Hennerberry *et al.* (1988), King et at. (1990); Bariola *et al,*. (1990); Ahmed *et al,*. (2003); Peter *et al,*. (2012); Sanal *et al,*. (2013) and Osman *et al,*. (2015).

The aim of the present work is to evaluate the efficacy of Ethephon (PGR) on the pink and spiny bollworm and mature boll opening during 2016 and 20l7 late cotton seasons at Kafr El-Sheikh region.

MATERIALS AND METHODS

To test the efficacy of Ethephon, an experiment was conducted at Sakha Agriculturall Research Station, Kafr El - Sheikh governorate, Egypt during 2016 and 20l7 late cotton seasons. Cotton, *Gossypiuin barbadense* L. namely Giza 86 was cultivated on April 27th and 30th in , 2016 and 2017 seasons, respectively. Plot size measured 42 m^2 (1/100 feddan) with four replicates for Ethephon treatment including check treatment.

1- Examination of green and opening bolls:

Weekly random samples of 25 green bolls were collected from each plot (100 green bolls as total) and then examined from the second week of September until the second week of November. Percentages of infestation for each and spiny bollworms were determined. In addition, at the same previous period, weekly samples of 25 plants were examined from each plot (100 plants as total) to record the number of boll open on each plant.

2- Tested material:

Ethephon ® was sprayed on September 8th and 10th of 2015 and 2016 seasons, respectively with hand sprayer (7 L volume). Ethephon 48% SL is a plant growth regulator, **common name:** Ethephon and trade name Sunephon which produced by Sun Dat company, Singapore.

Cheniical Structure: 2-chloroethylphosphonicacid.

Ethephon ® was sprayed at three concentrations: 1 .5, 2.5 and 3 cm^3/L, respectively. Ethephon ® was used on cotton plants in the first time at this experiment.

3- Statistical analysis:

Data were subjected to analysis of variance and means were separated using Duncan's (1955) multiple range test ($P<0.05$).

RESULTS AND DISCUSSION

1- Efficacy of Ethephon treatment on bollworms infestation:

Results in Tables (1 and 2) indicated that the Ethephon ® treatments significantly reduced percentages of mean PBW and SBW infestation relative to check. The lowest significantly percentage of mean PBW infestation recorded 15.64 and 15.60% in Ethephon ® with 3.0 cm^3/L, while they were 6.73 and 3.60 of mean SBW infestation with 1 .5 and 3.0 cm^3/L in 2016 and 2017 late cotton seasons, respectively.

Table 1. Effects of late season Ethephon treatments on mean number of boll opening and percentages of each PBW and SBW infestation in 2016 season.

Ethephon rate (cm^3/L)	Mean no of boll opening/ 100 plant	% of mean PBW infestation	% of mean SBW infestation
1.5	1236.65ab	28.36 ab	6.73 a
2.5	1276.45 a	29.72 ab	8.18 ab
3.0	966.64 ab	15.64 a	9.73 ab
Check	933.91 b	36.10 b	13.64 b

Means with the same letter in the same column are not significantly different at (P<O.05) by DMRT

PBW = Pink bollworm SBW= Spiny bollworm

Table 2. Effects of late season Ethephon treatments on mean number of boll opening and percentages of eachPBWand SBWinfestation in2017 season.

Ethephon rate (cm^3/L)	Mean no of boll opening/ 100 plant	% of mean PBW infestation	% of mean SBW infestation
1.5	1473.20 ab	18.80 ab	4.10 ab
2.5	1744.40 a	17.60 ab	4.80 ab
3.0	1582.40	15.60 a	3.60
Check	1423.20 b	25.0 b	6.4 b

Means with the latter in the same column are not significantly different at (P<O05) by DMRT

PBW= Pink bollworm SBW= Spiny bollworm

This means as indicated in Tables (3 and 4), Ethephon ® treatment gave the highest reduction percentages, 56.68 and 37.60% of PBW infestation with 3 cm^3/L, while, they were 50.66 and 43.75% of SBW infestation with 1.5 and 3.0 cm3/L in the first and second season, respectively. Results are confirmed with those obtained by Kittock *et al*. (1973) who mentioned that they found 87 to 96% reduction in diapausing PBW larvae as they sprayed Ethephone on cotton late in August and early in September. In addition, in Arizona, USA, late season applications to cotton reduce late season fruiting forms as a source of host material for development of diapause PBW larvae (Bariola *et al*., 1990).

Table 3. Effects of late season Ethephon ® treatments on percentage of boll opening and each PBW and SBW infestation in 2016 season.

Ethephon rate (cm^3/L)	Percentages of boll opening	% Reduction of PBW infestation	% Reduction of SBW infestation
1.5	32.42	21.44	50.66
2.5	36.68	17.67	40.03
3.0	3.51	56.68	28.67

Table 4. Effects of late season Ethephon ® treatments on percentage of boll opening and each PBW and SBW infestation in 20l7 season.

Ethephon rate (cm^3/L)	Percentages of boll opening	% Reduction of PBW infestation	% Reduction of SBW infestation
1.5	3.51	24.80	35.94
2.5	22.57	29.60	25.00
3.0	11.19	37.60	43.75

2- Efficacy of Ethephon ® treatment on percentage of bollopening:

As indicated in Tables (1 and 2), the highest significantly mean number of boll opening/100 plant was 1276.45 and 1744.40 with 2.5 cm^3/L of Ethephon ® in the first and second season, respectively. At the same trend, in tables (3 and 4) concentration of Ethephon ®, 2.5 cm3/L gave the highest increasing of percentages of boll opening recording 36.68 and 22.58% in the two tested seasons, respectively. The results are in conformity with those of *Kittock et al. (1973)* who reported that Ethephon ® prevent of new cotton bolls (*Gossypium* ssp.) late in the season, but do not affect development of existing bolls or vegetation, since most of the late season bolls do not mature, the effect on lint yield would be minimal, also, Ethephon ® is registered for use in cotton to accelerate mature boll opening (Henneberry *et al*., 1992).

However, Ahmed *et al*. (2003) in Pakistan, confirmed that plant growth regulators such as atonic and cytoplex did not prove effective against cotton bollworms and for the enhancement of seed cotton yield.

Ethephon could be used with 3.0 cm^3/L to accelerate mature boll opening in late cotton season.

REFERENCES

Ahmad, N.; S.M.M.S. Rashdi and A.A. Rajput (2003). Efficacy of plant growth regulators to manage the insect pests of cotton. Asian J. Plant Sci.,2:544-547.

Bariola, L.A.; T.J. Henneberry and C.C. Chu (1990). Timing applications of plant growth regulators and last irrigation for pink boliworm (Lepidoptera: Gelechiidae) check.J.Econ.Entomol.,83:1070-1074.

Duncan, D.B. (1955). Multiple range and multiple F. test. Biometrics, 11: 1-42.

Edmisten, K.L. (2014). Growth regulators for cotton, chapter VIII- Plant growth regulators, North Carolina Agricultural Chemicals Manual, USA.

Henneberry, T.1.; L.A. Bariola; C.C. Chu;T Meng; Jr. B. Deeter and L. Forlow Jeck (1992). Early season Ethephon applications: Effect on cotton fruiting and initiation of pink bollworms infestations and cotton yield. Southwest. Entomol., 17(2): 135-147.

Ilenneberry, T.I.; T. Meng; W.D. Hutchinson; L.A. Bariola and B. Deeter (1988). Effects of Ethephon on boll weevil (Coleoptera: Curculionidae) population development, cotton fruiting and boll opening. J. Econ. Entomol., 81: 628-633.

King, E.G.; R.J. Coleman; D.R. Reed and J.1. Hayes (1990). Problem Ethephon applications: Effect on cotton yield, maturation date, quality and the boll weevil: 290-295. In Proc.1990 Beltwide Cotton Prod. Res. Conf. Las Vegas, NV National Cotton Council, Memphis Tenn.

Kittock, D.L.; J.R. Mauney; HF. Arle and L.A. Bariola (1973).Termination of late season cotton fruiting with growth regulators as an insect control technique. J, Environ. Quality, 2(3): 405-408.

Osman, H.H.; G.A. El-Mezayyen; A.E. Hatem and A.T. Hassan (2015). Potency of esrel and reldan on some biological and biochemical aspects of cotton leaf worm, *Spodoptera littoralis* (Boisd.). Egypt J. Agric. Res., 93(l): (B): 5 17-528.

Peter, M. Eure; D.L. Jordan; J.S. Bacheler; AC. York; L.R. Fisher and R. Wells (2012). Performance of cotton agrochemicals when spray solution application is delayed. J. Cotton Sci., 15: 215-223.

Sanal, N.S.; H. Alatuntas and E. Duman (2013). Insecticidal effects of Ethephon on the greater wax moth, *Galleria mellonella* L. (Lepidoptera: Pyralidae). 2nd Global Conference on Entomology, Kuching, Sarawak, Malaysia.

Wilson, H.P. (2014). Field crops, plant regulators: cotton growth regulators 6-1, Eastern Shore AREC, USA.

تقييم استخدام الإثيفون علي الإصابة بديدان اللوز وتفتيح لوز القطن في حقول القطن

عبد البديع عبد الحميد غانم [1]، جمال علي المزين[2] و عبد الخالق السيد عبد الرازق حاتم[2]

[1] قسم الحشرات الاقتصادية- كلية الزراعة – جامعة المنصورة.

[2] معهد بحوث وقاية النباتات – مركز البحوث الزراعية – دقى - جيزة

أجرى هذا البحث بمزرعة محطة البحوث الزراعية بسخا – كفرالشيخ –جمهورية مصر العربية لدراسة تاثير منظم نمو نباتي (الإثيفون) علي الاصابة بدودتي اللوز القرنفلية والشوكية وتفتيح لوز القطن خلال موسمي ٢٠١٦ ، ٢٠١٧م علي نباتات القطن.اوضحت النتائج المتحصل عليها أن الإثيفون بتركيز ٣سم٣/لتر ماء اعطي اعلي انخفاض في النسبة المئوية لدودة اللوز القرنفلية بنسبة ٥٦.٦٨ ، ٣٧.٦٠ % خلال موسمي الدراسة بينما اعطي الاثيفون بتركيز ١.٥ سم٣ ، ٣سم٣/لتر ماء اعطي انخفاض في النسبة المئوية لدودة اللوز الشوكية بنسبة ٥٠.٦٦ ، ٤٣.٧٥ % خلال موسمي الدراسة علي الترتيب. من ناحية اخري اعطي الاثيفون بتركيز ٢.٥سم٣ / لتر ماء أعلي زيادة في النسبة المئوية لتفتيح لوز القطن مسجلاً ٣٦.٦٨ ، ٢٢.٥٧ % خلال موسمي الدراسة مقارنة بالكنترول علي الترتيب. نستنتج من هذه الدراسة انه يمكن استخدام الاثيفون بتركيز ٣سم٣/ لتر ماء للإسراع من تفتيح لوز القطن الناضج في اخر الموسم، ومن ثم يمكن تقليل الاصابة بدودتي اللوز القرنفلية والشوكية.