Zagazig J. Agric. Res., Vol. 43 No. (5) 2016

http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

POPULATION FLUCTUATIONS OF AMERICAN BOLLWORM, *Helicoverpa armigera* (Hüb.) INFLUENCED BY SOME WEATHER FACTORS IN PEA, *Pisum sativum* (L.) AND COTTON, *Gossypium barbadens* (L.) FIELDS IN SHARKIA GOVERNORATE, EGYPT

Mohammad E.M.A. Hegab*

Plant Prot. Res. Inst., Agric. Res. Cent., Dokki, Giza, Egypt

ABSTRACT

The present study was conducted in Zagazig Distrcit, Sharkia Governorate, Egypt in pea (*Pisum sativum*) and cotton (*Gossypium barbadens*) fields under environmental conditions during 2013/2014 and 2014/2015 seasons. Results indicated that the population of the American bollworm male moths, *Helicoverpa armigera* (Hübner) had five peaks in the two investigated seasons and it started from the 2nd week of December until the end week of March in the first season and form the end week of Dec. until the 4th week of April in pea fields in the second one. The highest mean number of moths was recorded during the 4th and the 2nd week of March during the aforementioned seasons, respectively. Which being 3.33 and 10.00 moths/trap/week in both seasons, respectively. Statistical analysis showed that the relationship between weekly mean numbers of *H. armigera* male moths on pea plants, mean temperature and mean RH (%) was positive and negative insignificant in the season of 2014; was negative and insignificant with mean temperature, while RH (%) showed positive and significant in the season of 2015. The tested weather factors of mean temperature and mean RH (%) affected the catch male moths of *H. armigera* negatively or positively with significant or insignificant differences as explained variance values of 17.18 and 25.46% were recorded during first and second seasons, respectively. In cotton fields, the population of *H. armigera* male moths was detected in pheromone traps showing 5 and 7 peaks during the period from the 2nd week of May until the end week of August in the first season, while the populations started form the 4th of April until 12th of Sept. in the 2nd season. The highest number of moths was recorded during the 3rd of July and 29th of May in the 1st and 2nd seasons, respectively exhibiting 188.00 and 60.00 moths/trap/week in both seasons, respectively. Also, results indicated negative and insignificant correlation between the weekly mean numbers of *H. armigera* male moths on cotton plants and mean temperature and mean RH (%) in the season of 2014, but it was positive and significant as well as negative and insignificant correlation in the season of 2015, respectively. The total effect of the tested factors was 15.99 and 24.88% during the seasons of 2014 and 2015, respectively.

Key words: American bollworm, *Helicoverpa armigera*, *Pisum sativum*, *Gossypium barbadens.*

INTRODUCTION

Pea, *Pisum sativum* (L.) is one of the most important and popular legume vegetable crops grown in Egypt and many countries allover the world. It has many nutritional values such as high content of protein, carbohydrates, phosphorus, iron, calcium and vitamins A and B. In Pakistan more than 1000 host plants including tomato, maize, gram, tobacco, cotton and okra were recorded for *H. armigera* (Aheer *et al.,* 2000). By using pheromone traps in peas (*P. sativum), H. armigera* moth appeared through April and recorded four peaks of infestation throught whole growth season. Cotton crop, *Gossypium barbadens* (L.) is one

*** Corresponding author. Tel. :** +201277316499
Email address: drmhegab@yahoo.com

of the most important economical crops in Egypt and allover the world. In Egypt, *H. armigera* is polyphagous and causes substantial losses to various crops. In case of cotton, larvae attack flowers, squares and bolls (Abdel-Salam and Negm, 2009). The cotton bollworm feeds on most plant parts including, leaves, flower buds, and fruits at different larval development instars (Moral, 2006). In India, where *H. armigera* commonly destroys more than half the yield crop, losses were estimated at over $300 millions per annum (Reed and Pawar, 1981). The eggs and /or larvae of this polyphagous pest were recorded on more than 60 plant species belonging to 47 families including maize, sorghum, tomato, lucerne, tobacco, cotton, clover and cowpea (Fitt, 1989). The effect of both mean air temperature and relative humidity were positively correlated with insect infestation (Sadanny *et al.*, 1999). *H. armigera* and *Pectinophora gossypiella* are major pests of cotton, *G. hirsutum*, throughout the cotton production areas of the world (Henneberry and Naranjo, 1998; Williams, 2002; Gozè *et al*. 2003).

The main objective of the present study was for monitoring of *H. armigera* male moths in pheromone traps in pea and cotton fields and its seasonal activity, and study the effect of some weather factors on *H. armigera* population in the two host plants studied during the two successive seasons.

MATERIALS AND METHODS

Sex Pheromones

Used materials and tools

Sex pheromone

(Z)-11-hexadecenal 90-99%+(Z)-9-hexadecenal 10-1% **(**Zhang *et al.*, 2012).

Plastic traps

Trap dimensions were 33 cm in length, 22 cm in width and 11 cm in height.

The concentration of each pheromone is 2 mg/lure. Capsules were obtained from Plant Protection Research Institute, Agricultural Research Center (ARC), Ministry of Agriculture, Dokki, Giza, Egypt.

In the winter season, the surrounding areas were planted to experience several crops (bean, Egyptian clover, garlic, onion, cabbage, pepper and tomato). In the summer season, the surrounding areas were planted to experience several crops (rice, maize, eggplant, tomato and squash).

Flight Activity of Male Moths Caught in Pea Fields

Three scattered areas were selected to set up traps and it was hung in the nave of the field for each area in Zagazig District, Sharkia, Governorate, Egypt. The experimental plots were cultivated with pea variety (Little Marvel) seeds on the 8th of Dec. during the two successive seasons of 2013/2014 and 2014/2015. Pea plants were subjected to normal agricultural practices and were maintained far from any pesticide treatments. Pan yellow traps full with soapy water were mounted on four wooden stands of 30 cm in height, adjusted above the canopy by about 20-30 cm through the whole season. Three traps were allocated randomly in each area. The traps were baited with the sex pheromone capsules of American bollworm (capsule/trap). The caught numbers of male moths in each trap were recorded weekly and soapy water was also changed at the same date. The pheromone capsules were replaced biweekly.

Flight Activity of Male Moths Caught in Cotton Fields

Three scattered areas were selected to set up traps and it was hung in the nave of the field for each area, in Zagazig District, Sharkia Governorate, Egypt. The plots were cultivated with cotton cultivar (Giza 86) on 15th of March and on 20th of April during the two successive cotton growing seasons of 2014 and 2015, respectively. Cotton plants were subjected to normal agricultural practices as recommended by the Ministry of Agriculture in the experiment areas in respect of the control program. Pan yellow trap was full with soapy water and mounted on four wooden stand of 100 cm in height and it was placed within 30 cm in height early in the season and above the canopy by about 20-30 cm later in the season (Flint and Markle, 1983). Three traps were allocated randomly in each area and it was baited with the

sex pheromone capsules of American bollworm (capsule/trap). The moths were recorded weekly per trap and the soapy water was also changed. The pheromone capsules were also replaced biweekly.

Data Analysis

The captured mean numbers of *H. armigera* males were recorded and tabulated. The weather factors, means of maximum and minimum temperature and relative humidity were provided by the Meteorological Department at Zagazig region to represent the weather conditions prevailing in the field during the whole period of the two investigated seasons 2013/2014 and 2014/2015 in pea fields and 2014 and 2015 in cotton fields. To show the effects of the tested factors on the population of captured males of American bollworm, the statistical analysis was carried out to calculate the simple correlation coefficient (r) and multiple regression expressed as explained variance (E.V. %) according to Little and Hills (1978).

RESULTS AND DISCUSSION

Field observations proved that the *H. armigera* (ABW) moths were harboured pea, *P. sativum* and cotton, *G. barbadens* fields just after plants emergence. The ABW moths caught in the pheromone trap were firstly recorded on the 2nd week of Dec. in pea fields and on the first and end week of April in cotton fields. The mean number that caught of *H. armigera* can be presented and discussed as follows:

Monitoring of *H. armigera* Moth Population on Pea Plants

Seasonal Population fluctuations of male moths

Illustrated results in Fig. 1 indicate that the population fluctuations of male moths of ABW figured 5 distinct peaks during both 2013/2014 and 2014/2015 seasons. The population of *H. armigera* started in moderately low numbers in 2013/2014 season and recorded the 1st peak (1.33 moths/ trap) on the 3rd week of December. The followed moth highest peak occurred on the 3rd week of January (2.00 moths/trap). The population of ABW was decreased and noticed at the 3rd peak with a mean number of 2.67 moths/trap/week on the 2nd week of February, after that the mean number of population fluctuated and decreased to show the 4th peak (3.00 moths/trap) on the 1st week of March. The fifth peaks of ABW male moth (3.33 moths/ trap) occurred on the 4th week of March.

In 2014/2015 season, Fig. 2 show that the population of captured moths of ABW by pheromone traps revealed 5 peaks for ABW male moths, the 1st peak appeared moderately with a mean number of 5.00 moths/ trap on the 3rd week of December. After this peak the population of ABW moth fluctuated and recorded the 2nd peak (2.67 moths/ trap) on the 1st week of January, the 3rd peak (6.00 moths/ trap) was reported on the beginning of the 3rd week of February and the 4th peak with a mean number of 4 moths/trap was noted on the 1st week of March, then the population of male moths increased gradually to record the highest mean number of ABW as the fifth peak and recorded 10.00 moths/trap on the beginning of the 3rd week of March.

Correlation between male moths population on pea plants and some weather factors

Statistical analysis of the results presented in Table 1 show that the correlation relationship between weekly mean numbers of *H. armigera* male moths on pea plants and each of mean temperature and mean RH (%) was positive and negative insignificant, respectively (r_1 and r_2=0.4142 and-0.1759) in the season of 2013/ 2014; as well their was negative and insignificant relationship (r_1=-0.1743) with mean temperature, while RH (%) showed positive and significant correlation (r_2= 0.4960*) in 2014/2015 season. The impact of tested weather factors on catching ABW as partial regression (b) values in pheromone traps were b_1 and b_2 = 0.2217 and -0.0243 for mean temperature and RH (%) in 2013/ 2014 season, respectively; where the total effect of the tested factors was 17.18%. During 2014/ 2015 season, the impact of tested weather factors the catching ABW as partial regression (b) values in pheromone trap were b_1 and b_2 = -0.1535 and 0.1459 recorded for mean temperature and RH (%), respectively; where the total effect of these tested factors was 25.46%.

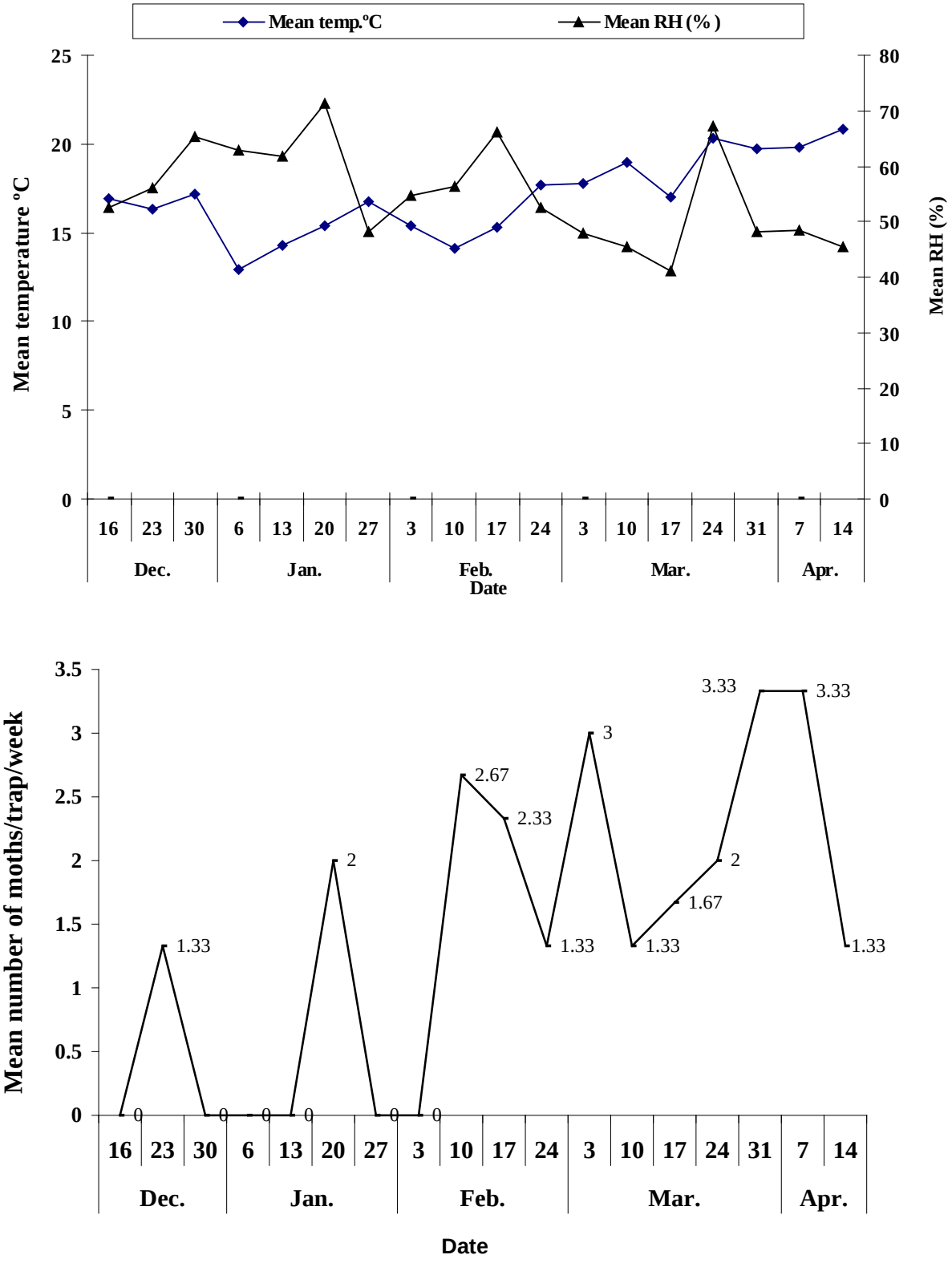

Fig. 1. Seasonal population fluctuations of *H. armigera* on pea plants using sex pheromone traps during 2013/2014 season

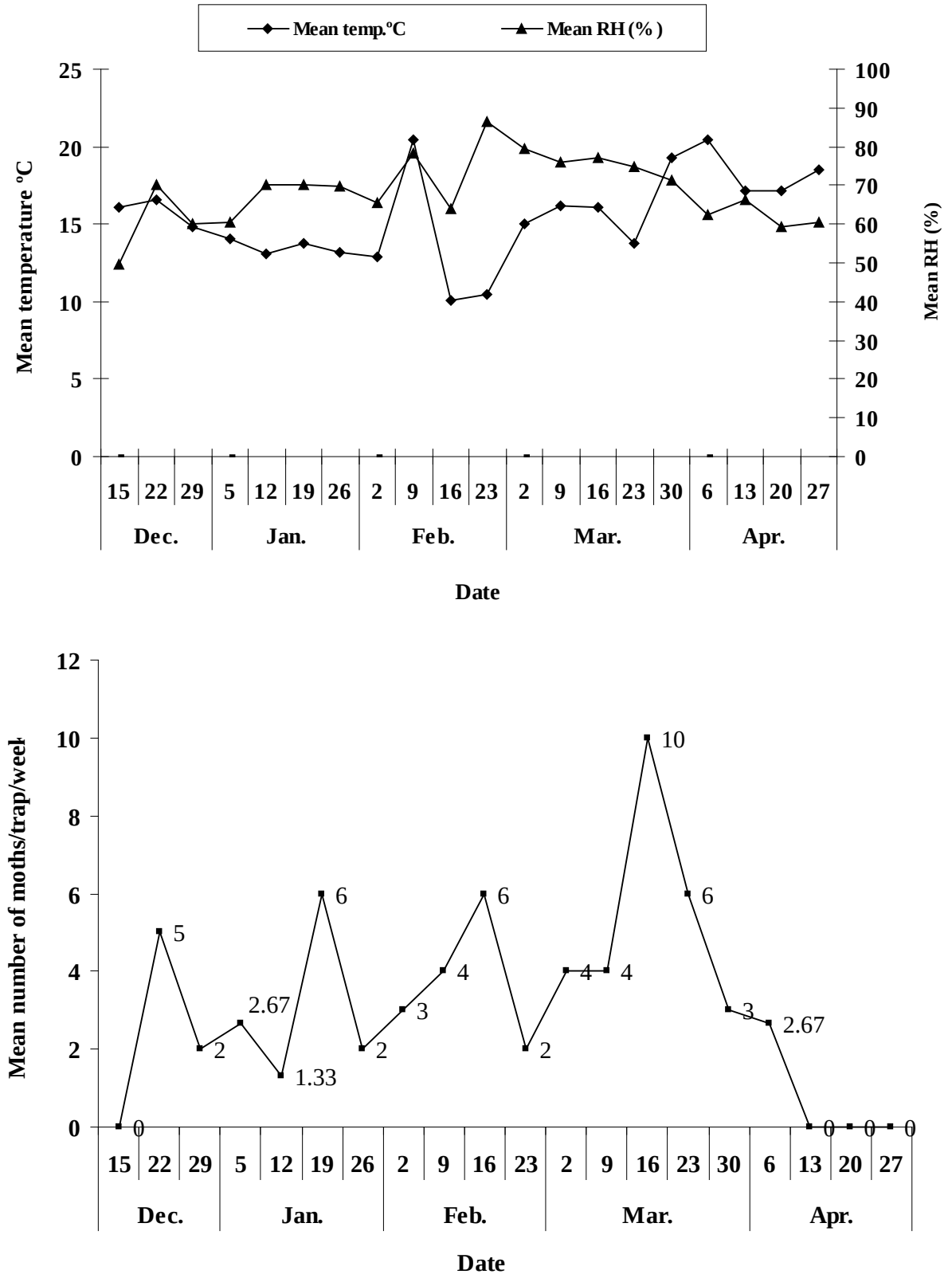

Fig. 2. Seasonal population fluctuations of *H. armigera* on pea plants using sex pheromone traps during 2014/2015 season

Table 1. Simple correlation (r), partial regression (b) and explained variance (E.V.) between the means of temperature and relative humidity and the captured mean numbers of *H. armigera* using sex pheromone traps in pea and cotton fields during 2013/2014 and 2014/2015 seasons

Crop	Simple correlation				Partial regression				Explained variance (%)	
	2013/2014		2014/2015		2013/2014		2014/2015		2013/	2014/
	r_1	r_2	r_1	r_2	b_1	b_2	b_1	b_2	2014	2015
	Mean temperature	Mean RH (%)	Mean temperature	Mean RH (%)	Mean temperature	Mean RH (%)	Mean temperature	Mean RH (%)		
Pea	0.4142NS	-0.1759 NS	-0.1743 NS	0.4960*	0.2217	-0.0243	-0.1535	0.1459	17.18	25.46
Cotton	-0.3565 NS	-0.03047 NS	0.4599*	-0.2519NS	-9.4713	-4.4425	2.5732	-0.5238	15.99	24.88

r_1 and b_1= Coefficients of simple correlation and partial regression between mean temperature and the numbers of ABW, respectively.
r_2 and b_2 = Coefficients of simple correlation and partial regression between mean relative humidity and the numbers of ABW, respectively.
* =significant. NS =insignificant

Generally the obtained results cleared that the tested weather factors affected the catch male moths of ABW in pea fields negatively or positively with significant or insignificant differences as explained variance of 17.18 and 25.46% during 2013/2014 and 2014/2015 seasons, respectively.

Seasonal Population Fluctuations of *H. armigera* Male Moths Caught on Cotton Plants

During 2014 and 2015 seasons, the illustrated data in Figs 3 and 4 cleared that the population of ABW figured 5 distinct peaks during 2014 season and 7 peaks during 2015 season. The population of *H. armigera* started in moderately low numbers at April oscillated and increased till 28th of May. The moths appeared in relatively low mean number in traps (15 moths/trap) on the 4th week of April. Male moths fluctuated and increased gradually to record the 1st peak with mean numbers of 82.00 moths/ trap on the 2nd week of May then the moths fluctuated to show the 2nd peak on the 4th week of May with a mean numbers of 107.67 moths/ trap. The population of ABW decreased and fluctuated indicating the 3rd peak with a high mean numbers of 188.00 moths/trap on the 4th week of June. The male moths decreased gradually to record moderately mean moth numbers in traps as the 4th and 5th peaks (47.00 and 51.00 moths/trap, respectively).

In the second season of 2015, the ABW moths appeared in relatively low mean number in traps (14.00 moths/trap), after that the population increased and recorded the 1st peak of the moth on the 3rd week of April with mean number of 55.33 moths/trap. The 2nd one occurred with a high density on the 4th week of May (60.00 moths/trap). The other five peaks were recorded on the 3rd week of June, the 1st week of July, the 4th weeks of July and the 1st week of August with means number of 45.00, 47.00, 39.00, 41.00 and 42.00 moths/trap, respectively.

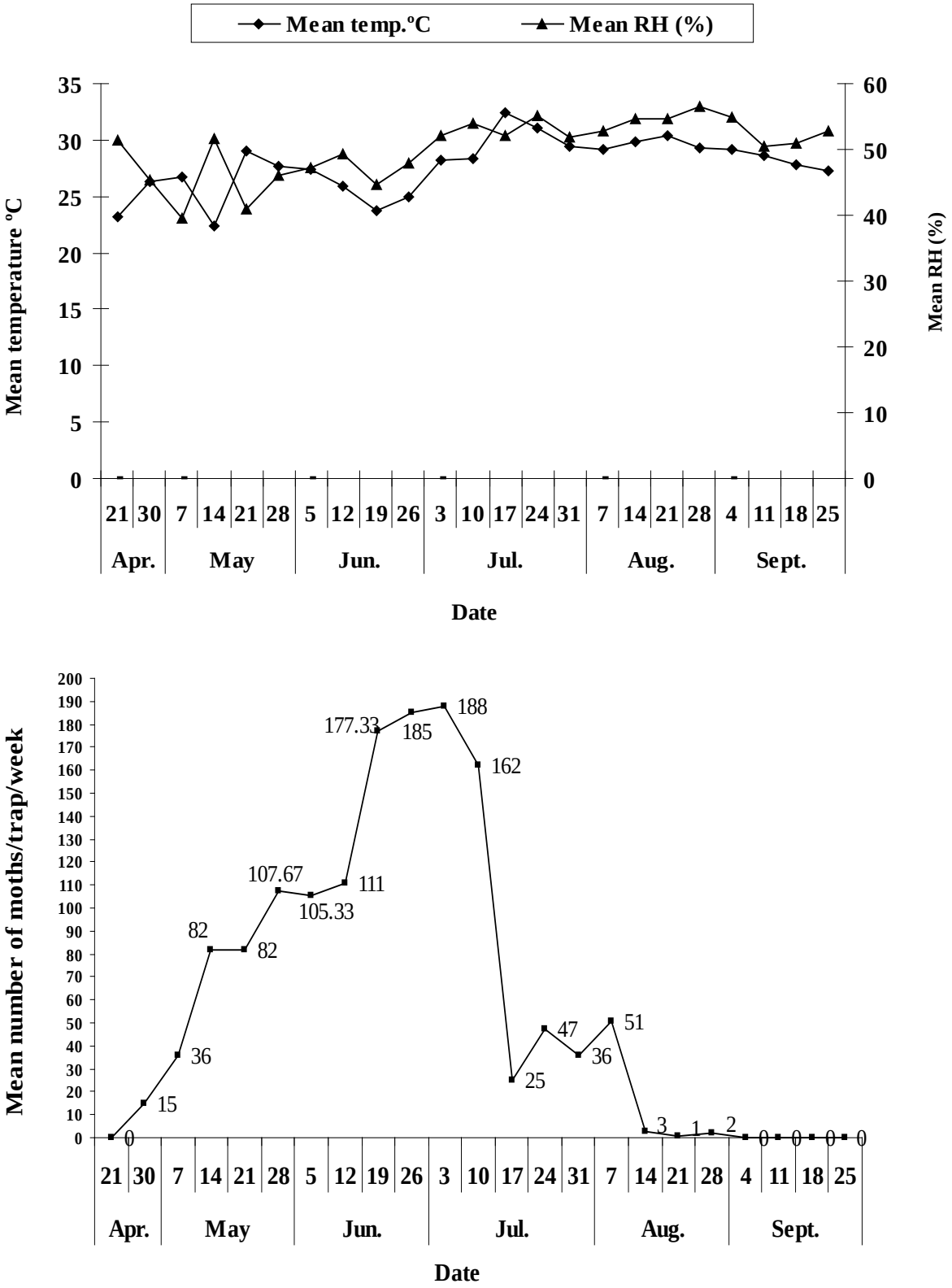

Fig. 3. Seasonal population fluctuations of *H. armigera* on cotton plants using sex pheromone traps during 2014 season

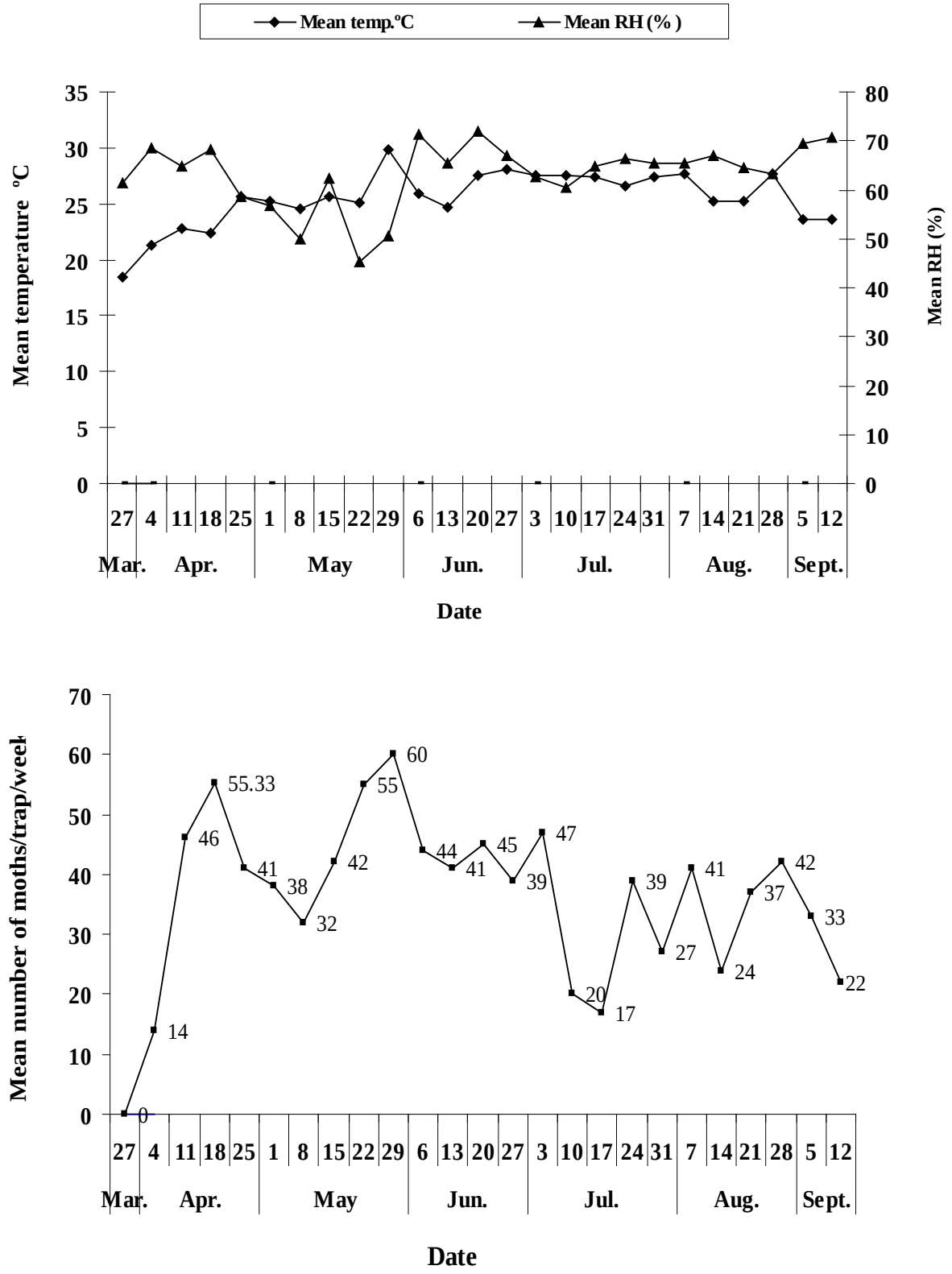

Fig. 4. Seasonal population fluctuations of *H. armigera* on cotton plants using sex pheromone traps during 2015 season

Correlation between male moths population of *H. armigera* on cotton plants and some weather factors

The results of statistical analysis in Table 1 showed that the correlation between the weekly mean numbers of *H. armigera* male moths on cotton plants and mean temperature was negative and insignificant (r_1= -0.3565) in 2014 season, but it was positive and significant (r_1=0.4599*) in 2015 season. While the RH (%) showed insignificant and negative correlation (r_2 =-0.03047 and -0.2519) in 2014 and 2015 seasons, respectively with weekly mean numbers of male moths.

The impact of the tested weather factors on catching ABW as partial regression (b) values in pheromone traps were b_1 and b_2 = -9.4713 and -4.4425 for mean temperature and RH (%) in 2014 season, respectively; where the total effect of the tested factors was 15.99%. During 2015 season, the effects of the tested weather factors on the catching. ABW as partial regression (b) values in pheromone traps were b_1 and b_2 = 2.5732 and -0.5238 recorded for mean temperature and RH (%), respectively; where the total effect of these tested factors was 24.88%.

Generally the obtained results cleared that the tested weather factors affected the male moths catch of ABW negatively or positively with significant or insignificant differences as explained variance of 15.99 and 24.88% during the two study seasons, respectively.

The present results agree with those of Hazara *et al*. (2000) who found that the *H. armigera* appeared first in peas, tomato and apple orchards when used pheromone traps. *H. armigera* moths caught in pheromone traps at the end week of April in cotton fields and the population figured 4 peaks through the season (Malik *et al*., 2003). Pheromone traps in peas (*P. sativum), H. armigera* moth appeared through April and recorded four peaks of infestation through whole growth season. The highest *H. armigera* moths population was recorded on April and August in cotton fields. This population decreased thereafter and reached to zero on the 3rd week of June. The population again appeared during the 3rd week of September and reached to its 2nd peak (0.62 moth/trap). The relative humidity contributed trapped population of *H. armigera* by (8.93%) followed by maximum temperature (5.7%), average temperature (0.74%) and minimum temperature (0.56%) under vegetable site (Mustafa, 2004). In pea fields the moth of *H. armigera* appeared from February to July and October to December with a peak on April 3 in cotton field. The minimum temperature was found affected in population of trapped moths of *H. armigera* by (4.69%) followed by relative humidity (2.46%) and maximum temperature (1.91%) (Aheer *et al*., 2009). Pheromone traps have often been used to caught two major noctuid pests in Australia, *H. armigera* and *H. punctigera* in cotton fields. Results showed a major peak in (male) numbers of *H. punctigera* in early spring, with relatively few moths caught later in the summer cropping season. In contrast, *H. armigera* moths were most abundant in late summer, but both sexes of *H. punctigera* were mostly caught in mid-summer for both species. Our results highlight the variability in trap catches of these two species (Baker *et al*., 2011). The larvae of *H. armigera* feed on a wide range of the economically important crops including cotton, corn, tomato, sunflower, legumes, tobacco and several cucurbitous and citrus crops (Xiulian *et al*., 2004). Traps containing a pheromone had significantly greater number of insects trapped. Fluctuation of insect population was different from year to year. Correlations on data between years revealed that, when cotton production was low, the number of adult male insects of *H. armigera* captured in pheromone traps was high (r = -0.69). There were no significant correlations between cotton production and number of trapped insects (Deligeorgidis *et al*., 2008). *H. armigera* increased on late July and maintained at high levels for one month and declined on the end of August. Trap captures increased sharply by the end of June and remained at relatively high levels until August and September for *H. armigera* (Milonas *et al*., 2016). Patile *et al*. (1992) reported that pheromone traps offer one of the best sampling tools for flying adult insects and can be used for monitoring insect pests of vegetables and fruit orchards for applying control strategy. Also, they found significant negative correlation between *H. armigera* trap catches and maximum and minimum

temperature in pea crop. *H. armigera* was adversely affected by minimum temperature and rainfall in pea crop due to variation in weather parameters (Bijjur and Verma, 1996). *H. armigera* affected with mean air temperature and relative humidity which positively correlated with infestation (Sadanny *et al.*, 1999). The relative humidity contributed trapped population of *H. armigera* followed by maximum temperature and minimum temperature under vegetable site in pea plants (Ali *et al*., 2008). The Minimum temperature showed significantly positive correlation with moth population. Minimum temperature recorded positive impact and maximum temperature gave negative impact with maximum contribution (15.6%) in population of *H. armigera* followed by (1.74%) and relative humidity (0.27%) (Ali and Aheer, 2011).

REFERENCES

Abdel-Salam, M.E. and M.A.M.E. Negm (2009). The Egyptian Cotton; Current Constraints and Future Opportunities: Publisher: Textile Industries Holding Co. Modern Press- Alex., Egypt. Agric. Res. Serv., USDA. Hand Book, 8 : 190.

Aheer, G.M.A., R. Ahmed and M. Ramzan (2000). Development of American bollworm *Helicoverpa armigera* (Hubn.) in different host plants. J. Agric. Res., 38 : 229-232.

Aheer, G.M., A. Ali and M. Akram (2009). Effect of weather factors on populations of *Helicoverpa armigera* moths at cotton based agro-ecological sites (Bahawalpur). Entomol. Res., 39 (1): 36-42.

Ali, A. and G.M. Aheer (2011). Effect of weather factors on capture of *Helicoverpa armigera* adults in various cotton-based agro-ecosystems. J. Agric. Res., 49 (1): 37-49.

Ali, A., G.M. Aheer, M. Ashfaq and M. Akram (2008). Influence of weather on the moth catches of *Helicoverpa armigera* at various cotton based agro-ecological sites (Faisalabad). Pak. Entomol., 30 (1): 65-72.

Baker, G.H.I., C.R. Tann and G.P. Fitt (2011). A tale of two trapping methods: *Helicoverpa* spp. (Lepidoptera, Noctuidae) in pheromone and light traps in Australian cotton production systems. Bull. Entomol. Res., 101 (1): 9-23.

Bijjur, S. and S. Verma (1996). Effect of a biotic factors on the pests of pea and natural enemies. Indian J. Entomol., 51 : 233-239.

Deligeorgidis, N.P., C.G. Ipsilandis, D.G.I. Stavridis, A. Gliatis, P.N. Deligeorgidis, C. Giatropoulos and A. Giatropoulos (2008). Cotton production in the presence of *Helicoverpa armigera* (Hb.) in Central Greece. Pak. J. Biol. Sci., 11 (21): 2490-2494.

Fitt, G.P. (1989). The ecology of *Heliothis* in relation to agro-ecosystems. Ann. Rev. Ent., 34:17-52.

Flint, H.M. and J.R. Markle (1983). Methods for efficient use of the delta trap in the capture of the pink bollworm moths *Pectinophora gossypiella.* Southwest. Entomol., 8 (2): 140-144.

Gozè, E., S. Nibouche and J.P. Deguine (2003). Spatial and probability distribution of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) in cotton: systematic sampling, exact confidence intervals and sequential test. Environ. Entomol., 32: 1203–1210.

Hazara, A.H., J.S. Khan, M. Iqbal and A.H. Bajoi (2000). Population dynamics and control of *Helicoverpa* (*Heliothis*) *armigera,* Hübner (Lepidoptera: Noctuitidae) on different crops in Balochistan [Pakistan]. Agric. Sci., 1: 52-62.

Henneberry, T.J. and S.E. Naranjo (1998). Integrated management approaches for pink bollworm in the South Western United States. Integr. Pest Manag. Rev., 3 : 31–52.

Little, T.M. and F.J. Hills (1978). Agricultural Experimentation: Design and Analysis. John Wiley, New York (TA).

Malik, M.F., U.R. Daud, M.A. Bajwa, N.L. Lodhi, L. Ali and S.N. Shah (2003). Monitoring and control of *Helicoverpa armigera* by synthetic pheromone traps in peas, *Pisum sativum*. J. Biol. Sci., 39 (10): 926-931.

Milonas, P., C. Gogou, A. Papadopoulou, S. Fountas, V. Liakos and N.T. Papadopoulos (2016). Spatio-temporal distribution of *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) and *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae) in a cotton production Area. Neotrop. Entomol., 45 (3): 240-251

Moral, G.F.J. (2006). Analysis of the spatio-temporal distribution of *Helicoverpa armigera* Hübner in a tomato field using a stochastic approach. Biosystems Eng., 93: 253-259.

Mustafa, G. (2004). Monitoring and management of *Helicoverpa armigera* (Hübner) in some cotton based cropping system. Ph.D. Thesis, Agric. Entomol. Dept., Agric. Univ., Faisalabad. Pakistan.

Patil, B.V., S. Nandihalli, B.S. Hugar and P. Somashekar (1992). Influence of weather parameters on pheromone trap catches of cotton bollworms. Karnataka J. Agric. Sci., 5: 346-350.

Reed, W. and C.S. Pawar (1981). *Heliothis* a global problem. Proceedings of the Int. Workshop on *Heliothis* Manag. CRISAT Cent., India Res., 38: 229-232.

Sadanny, E.L., A.M. Hossain, R.S.M. El-Fateh and M.A. Romeilah (1999). The simultaneous effect of physical environmental factors governing the population activity of cotton bollworm moths. Egypt. J. Agric. Res., 77: 591-609.

Williams, M.R. (2002). Cotton insect losses. In Proceedings, Beltwide Cotton Conf., Atlanta, GA, January 9-13. Nat. Cotton Council, Memphis.

Xiulian, S., W. Hualin, S. Xincheng, C. Xinwen, P. Chaomei, P. Dengming and A.J. Johannes (2004). Biological activity and field efficacy of a genetically modified *Helicoverpa armigera* single-nucleocapsid nucleopolyhedrovirus expressing an insect-selective toxin from a chimeric promoter. Biol. Control, 29 : 124-137.

Zhang, J.P.I., C. Salcedo, Y.L. Fang, R.J. Zhang and Z.N. Zhang (2012). An overlooked component: (Z)-9-tetradecenal as a sex pheromone in *Helicoverpa armigera*. J. Insect Physiol., 58 (9): 1209-1216

تقلبات المجموع لحشرة دودة اللوز الأمريكية وتأثير بعض عوامل الطقس في حقول البازلاء والقطن في محافظة الشرقية – مصر

محمد السيد محمد علي حجاب

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – دقي – جيزة – مصر

أُجريت هذه الدراسة في منطقة الزقازيق بمحافظة الشرقية، مصر في حقول البازلاء والقطن تحت ظروف الحقل خلال موسمي ٢٠١٤/٢٠١٣ و ٢٠١٥/٢٠١٤ مستخدمًا المصائد الفيرمونية في جذب ذكور فراشات دودة اللوز الأمريكية في حقول البازلاء أشارت النتائج إلى أن تعداد ذكور فراشات دودة اللوز الأمريكية (هليكوفيربا أرميجيرا) أظهرت خمسة قمم للنشاط في موسمي الدراسة بداية من الأسبوع الثاني من شهر ديسمبر حتى نهاية مارس في الموسم الأول، بينما في الموسم الثاني بدأ تعداد الفراشات في الظهور في الأسبوع الأخير من شهر ديسمبر حتى الأسبوع الرابع من أبريل، وسجلت أعلى تعداد من الفراشات خلال الأسبوع الأخير والثاني من مارس حيث كانت ٣.٣٣ و ١٠.٠٠ فراشة / مصيدة/أسبوع في كلا الموسمين على التوالي، أوضحت نتائج التحليل الإحصائي وجود علاقة ارتباط موجبة وغير معنويه وسالبة وغير معنوية بين متوسط تعداد فراشات دودة اللوز الأمريكية ومتوسط درجة الحرارة ومتوسط درجة الرطوبة النسبية على نباتات البازلاء في الموسم الأول، بينما في الموسم الثاني كانت تلك العلاقة سالبه وغير معنوية بالنسبة لمتوسط درجة الحرارة وموجبه ومعنوية لمتوسط الرطوبة النسبية فى موسم ٢٠١٥/٢٠١٤ على التوالي أظهرت النتائج أن عوامل الطقس المختبرة أثرت على تعداد ذكور فراشات دودة اللوز الأمريكية سلبا أو بشكل إيجابي مع وجود إختلافات كبيرة أو ضئيلة وتراوح تأثير العوامل المختبرة مجتمعة (معامل التباين) بين ١٧.١٨ و٢٥.٤٦% خلال موسمي ٢٠١٤ و ٢٠١٥ على التوالي، بالنسبة لتقلبات تعداد الفراشات في حقول القطن تشير النتائج إلي أن تعداد ذكور الفراشات المصادة بالفيرمون الجنسي الجاذب قد سجلت ٥ و ٧ قمم للنشاط بدءاً من الأسبوع الثاني من مايو حتى الأسبوع الأخير من أغسطس في الموسم الأول، بينما بدأ التعداد في الظهور في الأسبوع الأول من أبريل حتى الأسبوع الثاني من سبتمبر في الموسم الثاني، وسُجل أعلى تعداد من الفراشات في ٣ يوليو و٢٩ مايو في موسمي الدراسة على التوالي حيث كانت ١٨٨.٠٠ و ٦٠.٠٠ فراشة/ مصيدة/ أسبوع في كلا الموسمين على التوالي، كما أشارت النتائج إلى وجود علاقة ارتباط سالبة وغير معنوية بين متوسط التعداد الأسبوعي لذكور الفراشات على نباتات القطن ومتوسط درجات الحرارة والرطوبة النسبية في الموسم الأول، وكانت تلك العلاقة موجبة ومعنوية وسالبة وغيرمعنوية في الموسم الثاني، أيضاً أشارت النتائج إلي أن عوامل الطقس المختبرة أثرت على تعداد ذكور فراشات دودة اللوز الأمريكية سلبا أو بشكل إيجابي مع وجود اختلافات كبيرة أو ضئيلة وتراوح تأثير العوامل المختبرة مجتمعه (معامل التباين) بين ١٥.٩٩و٢٤.٨٨% خلال موسمي ٢٠١٤ و ٢٠١٥ على التوالي.

المحكمون :

١- **أ.د. محمـــد أحمـــد محمـــد نـدا** أستاذ المبيدات المتفرغ - معهد بحوث وقاية النباتات- مركز البحوث الزراعية.

٢- **أ.د. علي مرسي سليمان حجاب** أستاذ الحشرات الاقتصادية المتفرغ - كلية الزراعة - جامعة الزقازيق.