EFFECT OF SOME AGRICULTURAL PRACTICES ON THE INFESTATION OF SOYBEAN (*GLYCINE MAX* L.) WITH *TETRANYCHUS URTICAE* (KOCH.) AND *BEMISIA TABACI* (GEN.) IN SOHAG GOVERNORATE

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Abstract

This work was conducted in Shandweel Research Station, Sohag governorate, Upper Egypt during the two successive seasons, 2009 and 2010, to study the effect of some agricultural practices included sowing dates, irrigation intervals, nitrogen as well as phosphorus fertilization levels and row spacings on the infestation levels of soybean caused by sucking pests namely spider mite, *Tetranychus urticae* Koch. (Order: Acariformes Fam: Tranychidae) and whitefly, *Bemisia tabaci* Genn.(Order: Homoptera Fam: Aleyrodidae).

The obtained results revealed that the population density of *T. urticae* was decreased significantly with delayed sowing date, whereas *B. tabaci* population was at their lower populations by earliness of sowing date numbers during the two seasons. Also, Soybean plants when irrigated every 14 and 21 days harboured the lowest numbers of both pests compared with irrigated at weekly intervals during the two seasons. On the other hand, combinede effect of sowing date (1st June) and irrigation intervals (every 14 and 21 days) showed the lowest infestation with *T. urticae*, while, sowing date (1st May) and irrigation intervals (every 14 and 21 days) showed the lowest infestation with *B. tabaci* during the two seasons. However, the population density of the two insects decreased significantly with the decreasing of both nitrogen and phosphorus fertilization levels. The combined effect of nitrogen levels (5 or 15 kg) N/fed and phosphorus levels (15 or 30 kg P_2O_5/fed) exhibited the lowest infestation with the two pests mentioned during the two seasons. Row spacing proved significant effect on both pests. The planting distance of 60, 70 and 80 cm between rows recorded the lowest average population density of the two pests during both seasons.

Keywords: Soybean, Agricultural practices, Spider mite, Whitefly, population.

INTRODUCTION

Soybean (*Glycine max* L.) is considered as one of the most important food legume and oil crops in the world. Because of the multiple utilization of soybean in Egypt, several efforts have been devoted to improve its seed quality and yield through agronomic practices. This crop has been subjected to injurious piercing and sucking

pests such as the two spotted spider mite, *Tetranychus urticae* (Koch.) and the cotton whitefly, *Bemisia tabaci* (Gen.), that cause severe damage levels (El-Khouly *et al.,* 1998). Puspitorini, *et al.* (2011) study the population development of Tetranychid on 5 species and varieties of legume crops, i.e.: mungbean, adzukibean, snapbean and soybean. The researh results show that mungbean was the most suitable host plant for Tetranychid growth and development. Adzukibean crop was the other crop that can be considered as the suitable crop. Hirano, *et al.* (2011) reported That tobacco whitefly, Bemisia tabaci (Gennadius) (Homoptera: Aleyrodidae), is an important pest of a wide range of crops belonging to many different botanical families. Clarify the factors influencing fluctuations in the population density of *B. tabaci* by using data obtained in soybean fields The major factor influencing the population density of *B. tabaci* seems to be spatio-temporal variations in the quantity of host plants in the area. If host plants are cultivated continuously in time and space, there will be more serious damage to fields planted later in the season.

The chemical control of such pests by using pesticides has caused environmental pollution, resulting in serious harmful side effects to humans, animals and natural enemies. Therefore, at present time, all efforts are made to avoid these site effects by applying ecological and agricultural methods through integrated some pest management programme. The effect of agricultural practices in soybean cultivation on the infestation with the most common sucking pests attracted the attention of many entomologists (Mohamed, 2009 and Sanatgar *et al.,* 2011).

The aim of the present work was to establish data base and information that may help in planning for successful IPM program to manage the population of piercing and sucking pests infesting soybean plants.

MATERIALS AND METHODS

Three field experiments were carried out during two consecutive seasons of 2009 and 2010 in Shandaweel Agricultural Research Station, Sohag governorate.

1. Effect of sowing dates and irrigation intervals on *T. urticae* and *B. tabaci* abundance.

A split plot design with three replications was used, where main plots included sowing dates of 1st and 15th May and 1st June and sub-plots were irrigated at 7, 14 and 21 days intervals. Each plot had an area of 3.5 long by 3 m wide. The tested soybean genotype was Giza 111. Nitrogen fertilizer in the form of urea 46.5% N was added to all experimental plots at the recommended rate of 15 kg/fed, at the first

irrigation. Phosphorus fertilizer in the form of calcium superphosphate 15.5% P_2O_5 was added to all plots at rate of 150 kg/fed, before cultivation. Regular conventional agricultural practices were normally performed and no pesticides were applied during the study. Weekly samples of 20 leaflets were randomly picked-up from each plot and examined for infestation with the two pests after plant emergence and continued till the harvest time.

Data obtained were statistically analyzed using the analysis of variance (Split plot design). Means were compared according to Duncan's (1955) Multiple Range Test.

2. Effect of nitrogen and phosphorus fertilization levels on *T. urticae* and *B. tabaci* abundance.

A split plot design with three replications was used, where main plots included: nitrogen fertilization levels at rates of 5, 15 and 25 kg N/feddan and phosphorus fertilization levels at rates of 15, 30 and 45 P_2O_5/feddan. Each plot size was 10.5 m^2 (3x3.5 m^2). Giza 111 soybean genotype was cultivated. The sowing date was 10th May during the two growing seasons. All regular recommended cultural practices were followed. No pesticide treatments were applied. With regard to the sample size and statistical analysis the same previously mentioned methods were followed.

3. Effect of row spacing on *T. urticae* and *B. tabaci* abundance.

The experimental design of the trial was RCBD (randomized complete block design) in three replicates. Each plot size was 10.5 m^2. Three row spacing of 60, 70 and 80 cm were applied. The soybean genotype was Giza 111. The sowing date was 15th May during the two growing seasons. All regular recommended cultural practices were followed and no pesticide treatments were applied. For each treatment, 20 leaflets were randomly at 7 day collected intervals and the numbers of the two studied pests were counted till the harvest. Statistical analysis of the obtained data was performed by using Duncan's (1955) Multiple Range Test.

RESULTS AND DISCUSSION

1. Influence of sowing dates and irrigation intervals on the densities of *T. urticae* and *B. tabaci*.

1.1. Effect of sowing date regardless of irrigation intervals.

In case of *T. urticae* as represented in Table 1**,** it is shown that infestations were increased significantly with the early sowing date during seasons, 2009 and 2010. The lowest population density of *T. urticae* (461.52 and 298.4 individuals/20 leaflets) was recorded during the late sowing date (1st June) throughout the two growing seasons,

respectively. The highest mean of infestation levels (725.5, 619.73 and 419.06, 334.36 individuals/20 leaflets) were recorded during the first and second sowing dates of seasons 2009 and 2010, respectively. The differences between the last two sowing dates was also significant.

As regards of *B. tabaci* as shown in Table 2, the opposite trend was found, since maximum mean of infestation level with *B. tabaci* was obtained in the third sowing date (1st June), reaching 445.33 and 288.13 individuals/20 leaflets during 2009 and 2010 seasons, respectively. Also, the infestation levels of *B. tabaci* was significantly lower at the 1st sowing date compared with the infestation with the 2nd and 3rd sowing dates, the correspondent means of infestation rates were 249.78, 338.02 and 83.39 and 140.48 individuals/20 leaflets, respectively.

1.2. Effect of irrigation intervals regardless of sowing dates.

The occurrence of soybean sucking pests on soybean plants was greatly affected by irrigation intervals (Tables 1 and 2). The effect was significant in the first and second seasons. The prolongation of the interval of irrigation from 14 to 21 days caused a decline in *T. urticae* and *B. tabaci*, i.e. 332.36, 310.71 and 159.2, 143.1 individuals/20 leaflets during 2009 and 2010 seasons, respectively. The highest means of population densities of 655.19, 408.74 and 387.4, 209.7 individuals/20 leaflets were recorded with soybean irrigated every 7 days during the two seasons, respectively.

1.3. Interaction of sowing date and irrigation interval on *T. urticae* and *B. tabaci*.

Data presented in Tables 1 and 2 showed the effect of different interactions among sowing dates and irrigation intervals on *T. urticae* and *B. tabaci* at both seasons. The results exhibited that the lowest infestation with *T. urticae* (418.83 and 260.93 individuals/20 leaflets) was found on plants, which irrigated at 21 days intervals combined with sowing at 1st June during the two seasons, respectively. On the other side, the highest infestation (754.8 and 504.1 individuals/20 leaflets) was noticed on plants, which were irrigated at 7 days intervals and sown on 1st May during 2009 and 2010 seasons, respectively. Statistical analysis proved significant differences between those treatments.

On the contrary, for *B. tabaci*, the lowest infestation (200.53 and 72.13 individuals/20 leaflets) was found on plants, which irrigated at 21 days intervals combined with sowing at 1st May during 2009 and 2010 seasons, respectively. Also, statistical analysis revealed a significant difference between those treatments.

The above mentioned results are in agreement with those of Rizk *et al* (1990), Chandel and Gupta (1995) and Gad Elrab (1997) they found that the soybeans, which were planted earliest had the largest infestations of *T. urticae*, whereas, infestations of *B. tabaci* increased with the later planting date. Regarding irrigation interval Leigh *et al.* (1970) stated that nymphs and adults of *Tetranychus spp* on cotton plants were much numerous in plots, which received water and nitrogen. Watson *et al.* (1992) stated that the interval of irrigation followed in cotton fields had an obvious effect on the degree of infestation with *B. tabaci*

2. Effect of nitrogen and phosphorus fertilization levels on densities of *T. urticae* and *B. tabaci*.

2.1. Effect of nitrogen fertilization levels.

Results in Tables (3 and 4) show that the infestation of soybean plants by *T. urticae* and *B. tabaci* was increased with the coincide increase of nitrogen supply during both seasons.

Table 1. Influence of sowing date and irrigation intervals on the population densities of *T. urticae* during seasons of 2009 and 2010.

Sowing date	Avg. no. of individuals/20 leaflets			Means
	Irrigation intervals			
	7 days	14 days	21 days	
	Season, 2009			
1st May	754.80^{a}	714.70^{b}	707.27^{bc}	725.59^{a}
15th May	677.17^{c}	604.53^{d}	577.50^{d}	619.73^{b}
1st June	533.60^{e}	432.13^{f}	418.83^{f}	461.52^{c}
Means	655.19^{a}	583.79^{b}	567.87^{b}	
	Season, 2010			
1st May	504.13^{a}	382.90^{b}	370.13^{b}	419.06^{a}
15th May	376.47^{b}	325.53^{c}	301.07^{d}	334.36^{b}
1st June	345.63^{c}	288.63^{d}	260.93^{e}	298.40^{c}
Means	408.74^{a}	332.36^{b}	310.71^{c}	

Means for each season and each column followed by the same letter are not significantly different at the 0.05 level of probability.

Table 2. Influence of sowing date and irrigation intervals on the population densities of *B. tabaci* during seasons of 2009 and 2010.

Sowing date	Avg. no. of individuals/20 leaflets			Means
	Irrigation intervals			
	7 days	14 days	21 days	
	Season, 2009			
1st May	301.67^{f}	247.13^{g}	200.53^{h}	249.78^{c}
15th May	364.63^{d}	342.63^{e}	306.80^{f}	338.02^{b}
1st June	495.90^{a}	435.96^{b}	404.13^{c}	445.33^{a}
Means	387.40^{a}	341.91^{b}	303.82^{c}	
	Season, 2010			
1st May	94.03^{ef}	84.00^{ef}	72.13^{f}	83.39^{c}
15th May	189.77^{c}	127.93^{d}	103.73^{def}	140.48^{b}
1st June	345.30^{a}	265.73^{b}	253.37^{b}	288.13^{a}
Means	209.70^{a}	159.22^{b}	143.08^{b}	

Means for each season and each column followed by the same letter are not significantly different at the 0.05 level of probability.

2.2. Effect of phosphorus regardless of nitrogen fertilization levels.

Response of *T. urticae* and *B. tabaci* to phosphorus fertilization levels was obvious as shown in Tables (3 and 4) during both seasons, in which the infestation was significantly increased with the coincide excess in phosphorus fertilization.

Table 3. Influence of nitrogen and phosphorus fertilization levels on population densities of *T. urticae* during seasons of 2009 and 2010.

Nitrogen levels / feddan	Avg. no. of individuals/20 leaflets			Means
	Phosphorus levels			
	15	30	45	
	Season, 2009			
5	58.4^{i}	86.4^{h}	99.6^{g}	81.5^{c}
15	165.7^{f}	241.9^{e}	396.4^{d}	234.7^{b}
25	311.6^{c}	392.9^{b}	491.1^{a}	398.5^{a}
Means	178.6^{c}	240.4^{b}	295.7^{a}	
	Season, 2010			
5	26.9^{i}	34.4^{h}	45.7^{g}	35.6^{c}
15	55.6^{f}	87.6^{e}	106.4^{d}	83.2^{b}
25	198.5^{c}	264.2^{b}	298.1^{a}	253.6^{a}
Means	93.6^{c}	128.7^{b}	150.1^{a}	

Means for each season and each column followed by the same letter are not significantly different at the 0.05 level of probability.

Table 4. Influence of nitrogen and phosphorus fertilization levels population on densities of *B. tabaci* during seasons of 2009 and 2010.

Nitrogen levels/ feddan	Avg. no. of individuals/20 leaflets			Means
	Phosphorus levels			
	15	30	45	
	Season, 2009			
5	28.7^{h}	44.7^{g}	55.3^{f}	42.9^{c}
15	78.3^{e}	88.9^{d}	118.3^{b}	95.2^{b}
25	91.9^{d}	104.4^{c}	131.1^{a}	109.1^{a}
Means	66.3^{c}	79.3^{b}	101.5^{a}	
	Season, 2010			
5	20.7^{f}	28.8^{e}	40.6^{d}	30.0^{c}
15	40.8^{d}	51.5^{c}	64.5^{b}	52.3^{b}
25	53.8^{c}	69.1^{b}	78.3^{a}	67.1^{a}
Means	38.4^{c}	49.8^{b}	61.1^{a}	

Means for each season and each column followed by the same letter are not significantly different at the 0.05 level of probability.

2.3. Interaction between nitrogen and phosphorus fertilization levels.

As shown in Tables (3 and 4), soybean plants fertilized with 25 kg N/fed. and 45 kg P_2O_5/fed. harboured the highest numbers of *T. urticae* (491.1 and 298.1 individuals/20 leaflets) and *B. tabaci* (131.1 and 78.3 individuals/20 leaflets) during both seasons 2009 and 2010, respectively. Statistical analysis revealed that there was a significant interaction between nitrogen and phosphorus fertilization levels during both seasons of 2009 and 2010. The obtained results are in agreement with those of El-Halawany *et al* (1988). They found that population of *T. arabicus*, which infested apple increased as nitrogen and phosphorus rates increased, Sawires (1990) stated that there was a relation between mite infestation and adding fertilizers, when increasing rates of fertilizers there is a significant increase in mite infestation, Yanni *et al* (1991) found that population of spider mite *T. cucucrbitacearum*, which infested soybean plants increased by increasing nitrogen fertilizer, Rote and Puri (1992), revealed that the highest population of *B. tabaci* was occurred on cotton plants that received the highest rate of fertilizer. Soliman (1995), reported that *T. arabicus* on peanut and sesame increased with the increase of adding nitrogen singular, El-Rafie (1999), found that the use of P_2O_5 fertilizer improved the development of tomato

plants, that leads to encouragement whitefly *B. tabaci* to infest the healthy plants, and found that *Aphis gossypii* population on cotton plants attained significantly higher densities on plants fertilized with high rates of P_2O_5 as compared with low nitrogen levels.

3. Influence of row distances on the incidence of both *T. urticae* and *B. tabaci*.

Data given in Table (5) show the effect of three different row distances on the incidence of *T. urticae* and *B. tabaci* during seasons, 2009 and 2010. In both seasons, row distances had a highly significant influence on the incidence of *T. urticae* and *B. tabaci*. The first space (60 cm) and the normal one (70 cm) in both seasons favored the suitable environmental conditions for two sucking pests development and reproduction to show the highest averages of 425.6, 392.8 and 360.2, 276.7 individuals/20 leaflets and 154.9, 121.1 and 107.2, 85.7 individuals/20 leaflets for *T. urticae* and *B. tabaci* in seasons, 2009 and 2010, respectively.

Table 5. Influence of row distances on the incidence of *T. urticae* and *B. tabaci* during seasons of 2009 and 2010.

Row distances (cm)	Avg. no. of individuals/20 leaflets	
	T. urticae	*B. tabaci*
	Season, 2009	
60	425.6[a]	154.9[a]
70	392.8[b]	121.1[b]
80	200.7[c]	70.1[c]
	Season, 2010	
60	360.2[a]	107.2[a]
70	276.7[b]	85.7[b]
80	196.4[c]	62.5[c]

Means for each season and each column followed by the same letter are not significantly different at the 0.05 level of probability.

The lowest average numbers of *T. urticae* and *B. tabaci* was recorded with row distance 80 cm during 2009 and 2010 seasons, respectively. These results are in agreement with those obtained by Kumar and Bhattacharya (1988), they found that average abundance of *B. tabaci* in soybean was greater in plots with 0.6 and 0.8

million plants/ha than in those with 0.3 and 0.4 million plants/ha. Also, Kumar and Bhattacharya (1989), they recorded that the highest populations of *B. tabaci* on soybean was recorded in plots with a 30 cm row spacing compared with 45, 60 and 75 cm apart. Badulin and Lomtev (1975), found that the greater density of wheat plants, the greater the infestation by the wheat blossom mite, *Steneotaarsonemus panshini* (Vainshtein & Beglyarov).

REFERENCES

1. Badulin, A.V. and A.V. Lomtev. 1975. The role of cultural measures in reducing the numbers of wheat blossom mite. Zashchita Rastenii, No. 2: 31-32.
2. Chandel, Y.S. and R.K. Gupta. 1995. Effect of sowing date on incidence of insect pests of soybean (*Glycine max*). Indian J. Agric. 65 (8): 624-625.
3. Duncan, D.B. 1955. Multiple range and multiple-F-Tests. Biometrics, 11: 1-42.
4. El-Halawany, M.E., R.G. Abou El-Ela, A.F. El-Sherif and H.M. Ismail. 1988. Effect of macro and micronutrients in apple and apricot leaves on biology of *Tetranychus arabicus*. Agric. Res. Rev., 67 (1): 63-67.
5. El-Khouly, A.S., E.M.E. Khalafalla, M.M. Metwally, H.A. Helal and A.B. El-Mezaien 1998. Seasonal abundance and population dynamics of certain sucking insects on soybean in Kafr El-Sheikh Governorate, Egypt. J. Agric. Res., 76 (1): 141-151.
6. El-Rafie, K.K. 1999. Effect of different rates of (N, P, K) fertilizers on *Bemisia tabaci* (Genn.) infestation on tomato and its effect on the yield. Egypt J. Agric. Res., 77 (3): 1067-1072.
7. Gad-Elrab, M.L.E. 1997. Entomological Studies on Soybean, Maize and Sorghum under Different Intercropping Systems in Upper Egypt. Ph.D. Thesis Fac. Agric. Minia Univ., Egypt, 178-181.
8. Hirano, K., E. Budiyanto, P. Minggu and S. Winarni. 2011. Biological characteristics and forecasting outbreaks of the whitefly, *Bemisia tabac*i, a vector of virus diseases in soybean fields. *Academic Journal of Entomology*, 4 (2): 1-13.
9. Kumar, S. and A.K. Bhattacharya. 1988. Effect of plant density on the incidence of insects associated with soybean. Indian J. Entomol., 50 (2): 185-192.
10. Kumar, S. and A.K. Bhattacharya. 1989. Influence of different row spacing on the incidence of some insects of soybean. Indian J. Entomol., 51 (1): 1-7.

11. Leigh, T.F., D.W. Greemes, H. Yanabo, D. Bassett and J.R. Stockton. 1970. Insects in cotton as affected by irrigation and fertilization practices. California Agric. J., 24 (3): 12-14.
12. Mohamed, S.M.A. 2009. Ecological Studies on Some Pests Infesting Soybean and Peanut Crops with Special Reference to Mite Control. Ph.D. Thesis Fac. Agric. Assiut Univ., 130-169.
13. Puspitorini, R.D., N. Qomariah and A. Afandi. 2011. Evaluation of *Tetranychus* SP on various legume crops for their mass rearing. *INTERNATIONAL JOURNAL Of ACADEMIC RESEARCH* Vol. 3 (5), 133-136.
14. Rizk, G.A., E.A. Moftah, G.A. Karaman and A.A. Abdel-Naby. 1990. Effectiveness of different planting dates on the population density of soybean plants in Minia Region. Assiut J. Agric. Sci., 21 (3): 141-151.
15. Rote, N.B. and S.N. Puri. 1992. Effect of fertilizer application on incidence of whitefly on different cotton cultivars. J. Maharashtra Agric. Univ., 17: 45-48.
16. Sanatgar, E., 1. V. Shoushtari, A. A. Zamani, M. Arbabi and E. S. Nejadian. 2011. Effect of frequent application of hexythiazox on predatory mite phytoseiulus persimilis Athias-Henriot (Acari: Phytoseiidae). *Academic Journal of Entomology*, 4 (3): 94-101.
17. Sawires, Z.R. 1990. General studied on mite associated with maize in Egypt. Agric. Res. Review.
18. Soliman, S.M. 1995. Ecological Studied on Some Mites Associated with Some Kinds of Field Crops. Ph. D. Thesis, Fac. Agric. Al-Azhar Univ. Cairo 118-120.
19. Watson, T.F., J.C. Silvertooth, A. Tellez and L. Lastra. 1992. Seasonal dynamics of sweet potato whitefly in Arizona, Southwestern Entomologist, 17 (2): 149-167.
20. Yanni, Y.G., A.A. Hassan, M.M. El-Beheiry and M.E. Hassan. 1991. Relation between soybean nodulation by *Bradyrhizobium jabanicum* and intensity of infestation with the spider mite *Tetranychus cucurbitacearum* (Sayed) under different sowing dates and increasing amounts of nitrogenous fertilizer. World J. Microbiology and Biotechnology, 7 (1): 37-42.

تأثير بعض المعاملات الزراعية على إصابة فول الصويا بالعنكبوت الأحمر العادى والذبابة البيضاء بمحافظة سوهاج

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إستخدمت الدراسة معرفة تأثير بعض العمليات الزراعية الشائعة وهى تشمل ميعاد الزراعة (أول مايو ، نصف مايو و أول يونيو) ، فترات الرى (7 ، 14 ، 21 يوم) ، التسميد النتروجينى (5 ، 15 ، 25 كجم نتروجين/فدان) ، التسميد الفوسفورى (15 ، 30 ، 45 كجم فو2أ5/فدان) والمسافات بين الخطوط (60 ، 70 ، 80 سم) على كل من أكاروس العنكبوت الأحمر والذبابة البيضاء واللتان تصيبان نباتات فول الصويا بالمزرعة البحثية لمحطة البحوث الزراعية بجزيرة شندويل – محافظة سوهاج عامى 2009 ، 2010م.

أظهرت النتائج المتحصل حدوث انخفاض معنوى فى كثافة تعداد العنكبوت الأحمر العادى مع التأخير فى ميعاد الزراعة بينما أدى التبكيرإلى حدوث خفض معنوى فى الكثافة العددية للذبابة البيضاء خلال موسمى الدراسة. أصيبت نباتات فول الصويا التى تم ريها كل 14 ، 21 يوم بأقل كثافة عددية من الآفتين بالمقارنة بالنباتات التى تم ريها كل 7 أيام وذلك خلال الموسمين. سجل التأثير المشترك لميعاد الزراعة (أول يونيو) و فترات الرى (كل 14 أو 21 يوم) أقل إصابة بأكاروس العنكبوت الأحمر العادى بينما سجل ميعاد الزراعة الأول (أول مايو) وفترات الرى (كل 14 أو 21) يوم أقل إصابة الذبابة البيضاء خلال الموسمين على التوالى. إنخفضت الكثافة العددية للآفتين إنخفاضاً معنوياً مع تقليل معدل كل من التسميد النتروجينى والفوسفورى خلال الموسمين. أدى التأثير المشترك للمعدل 5 أو 15 كجم نتروجين/فدان بالإضافة إلى المعدل 15 أو 30 كجم فو2أ5/فدان إلى إنخفاض ملحوظ فى الإصابة بكل من الآفتين خلال موسمى الدراسة على التوالى. كان للمسافة بين الخطوط تأثير معنوى على الآفتين حيث وجد أن الزراعة على المسافة 80 سم أدت إلى أعلى إنخفاض فى الكثافة العددية للآفتين خلال موسمى الدراسة على التوالى. يمكن استخدام هذه المخرجات فى وضع برنامج ادارة متكاملة للسيطرة على هذه الآفات فى زراعات فول الصويا.