

EFFECT OF DIFFERENT AGRICULTURAL PRACTICES ON THE COTTON BOLLWORMS INFESTATION LEVELS IN EGYPT .

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Abstract

The objective of this work is consider design programs of integrated bollworms management on cotton . The obtained results regarded that :

- 1 -The cotton seed treatment with Gausho caused the lowest average infestation percentages by pink and spiny bollworms in the green bolls (4 .2 and 4.1 %) and also caused the highest production of cotton seed yield (7.6 and 8.6 Kent . / Fed) during 2000 and 2003 seasons .
- 2 -The effect of planting dates 30 / 3 and 15 / 4 exhibited the lowest infestation by bollworms (7.0 and 7.5 %)in the first season . While, in the second season recorded 3.5 and 3.6 % and produce the highest cotton seed yield (8.1 and 8.5 Kent ./ Fed ., respectively) .
- 3 - The fertilization treatment rate at 150 Kg (NPK) recorded the lowest average percent of infestation (5.3 %) and cotton seed yield (8.3 Kent . / Fed) but lower and higher fertilization recorded the same average percent infestation during the first season . While during the second season the average percent of infestation was 4.6 % and produced the highest cotton seed yield 9.8 Kent. / Fed
- 4 - Planting distance of 80 cm between rows and 20 cm between hill recorded the lowest average percent infestation 4.4 % Also , recorded the highest cotton seed yield 8.6 and 9.4 Kent . / Fed during the two seasons .
- 5 - The results of interaction between the different treatments clarified that the planting date on 30/3 ; fertilization with 200 and 150 KG. NPK /Fed. , 70 and 80 cm between rows , one plant in hill and 10 cm. Between hill recorded low infestation with the the cotton bollworms ranged between 3.4 -5.1 % and highe cotton seed yield ranged between 10 - 11 Kent./Fed.

INTRODUCTION

In Egypt , cotton cultivated in about 0.7 - 1.0 million fed. in Delta and middle Egypt . Cotton infested by many economic pests through the season i.e , Aphid , Thrips , black cutworm , cotton leafworm , Jassids , Whiteflies and cotton bolworms (pink and spiny) . Cotton bollworms , *Pectinophora gossypiella* (Saund) and *Earias insullana* (Boisd) are the most destructive pests of cotton plant .The annual losses suffered by cotton growers , due to the damage caused by these pests amount around twenty millions of pounds . Although agreat deal of effort has been directed towards

their control , these two pests seem to be too difficult to overcome in spite of the various control measures prescribed by scientific researches .The incidence of *P. gossypiella* on flowers and of *E. insullana* on bolls was greater in the early-sown than in the late-sown one (Moawad and Hussein 1980 , Taneja and Dhindwal 1983 and Simwat *et al* 1987) .The distance agriculture between rows and hills and plant density were more effective in reducing the infestation level with cotton bollworm Salama *et al* (2001) showed that sowing cotton plants on 20 cm. Space between hill with two plants in hill (approximately 50000 plants / Fed.) with using herbicides or hand hoeing 3 times as weed control and using the recommended rates of fertilizers were considered the proper agricultural practices which decreased the population of sucking insects and resulted in the highest yield .

MATERIALS AND METHODS

Field expermint

The field experiment has been achieved at Sharkia Governorate during the cotton-growing seasons 2000 & 2003 starting by the March 1st, where the land was selected and prepared .

An area about 6 feddans was classified into 5 catogries of expermint as follows :

- 1 - The 1st catogry (Seed treatments). The experimental areas (6 kir ates / treatment) were sown with cotton seeds previously treated with Geusho, Thrioxin and Rizolix at the rate of 5 gm, 6 cm and 59 ml. / kg cotton seed for each, respectively, whereas the fourth area was sown with untreated cotton seed to be used as a check .
- 2 - The 2nd catogry (planting dates) :was divided into four equal areas and prepared to carry out the date of sowing experiment where the four areas were planted prom the mid of March to the end of April with 15 days intervals, i. e the sowing date were 15/3, 30/3, 15/4 and 30/4.
- 3 - The 3rd catogry (plant density) : Was divided into three equal parts to study the effect of plant density on the infestation levels by bollworms which carried out through three experiment, the 1st part prepared and designed at the space of 60 , 70 and 80 cm between rows ; the 2nd one was designed at the space of 10 & 20 cm between cotton hills (one plant/ hill). And the 3rd part was prepared and designed by the same space between hills (2 plants / hill). The experiments that carried out in part 2 and 3 were designed to the recommended rate between rows (about 65- 67 cm between rows and two plants in hill) .
- 4 - The 4th catogry (Fertilization) was prepared and planted according to the recommended rates of cotton sowing, and was divided into there equal plots to study the different rates of fertilizations included complex fertilizer, (NPK) at the rate of 100, 150 & 200 Kg / fed;
- 5 - The 5th catogry: Was prepared to study the interaction between the best treatments in the first season was added to the second season . This interaction includes the planting dates and the other treatments as follows :

A- Planting date 30/3 with four treatments .:

- 1 - The first treatment included 80 cm between rows , 10 cm between hill , one plant / hill and 150 Kg. NPK/ Fed .
- 2 - The second treatment included 70 cm between rows , 10 cm between hill , one plant / hill and 150 Kg. NPK/ Fed .

- 3 - The third treatment was 80 cm between rows , 10 cm between hill , one plant / hill and 200 Kg. NPK/Fed.
- 4 - The fourth treatment 70 cm between rows , 10 cm between hill , one plant / hill and 200 Kg. NPK/ Fed.
- B - Planting date 15/4 with the same treatments mentioned in the proposed (A).

Sampling techniques and evaluation measurements :

Weekly samples of green cotton bolls (100 bolls) were randomly collected from each treatment dissected and the infestation rates by bollworms as well as the larval contents were recorded .ten inspections were achieved and the average percent of infestation could be easily calculated from which the effects of each treatment on the infestation levels of bollworms could be separately estimated . The final cotton yield was taken into consideration as measurement evaluation for the effects of different treatments on the infestation levels by bollworms in addition to the cotton seed yield determination .

RESULTS AND DISCUSSION

1 - The 1st experiment:

Effect of seed treatments on the infestation levels of bollworms :

Data represented in Table (1) elucidated that the lowest average of infestation percentages by bollworms in the first season was occurred in the cotton plants resulted from seed treatments with Gausho. The average of infestation percentages reached 4. 2% (with both pink and spiny bollworms) , while the highest average of boll infestation (7.1 %) were achieved in plants treated the seeds with Rizolix as well as untreated seeds .In the second season , there is non - significant difference between the treatments where the averaged infestation percentages reached 4 . 1 and 4.2%% for Gausho and Rizolex , respectively. The corresponding cotton yields were 7.6, 7.1, 7.2 and 6. 9 Kent. / Fed. for the treatment of Gausho, Thiroxin , Rizllix and untreated seeds , respectively. On the other hand, the cotton yields in the second season were 8.6 , 8.4 , 8.2 and 6.3 Kent . / Fed . for Gausho , Thiroxin , Rizolix and untreated , respectively .

2. The 2nd experiment :

Effect of planting date on the infestation levels by the cotton bollworms:

Data summarised in Table (2) showed that the best sowing date was occurred on March, 30 th in relation to the infestation percentages by bollworms . The mean average rate of infestation was 7.0 and 3.5 % during the cotton seasons of 2000 and 2003 ; respectively ; whereas the infestation rates ranged between 7.5 -9.2 and 3.7 %when the cotton seed planted on the other sowing dates during the cotton seasons of 2000 and 2003 ; respectively. With the exception of planting date carried out on March, 15 during the cotton season of 2000 ; the sowing date on March, 30th gave the highest yield production ; where the cotton yield production weighted 7.5 and 8.5 Kent./Fed.during the two cotton seasons of 2000 and 2003; respectively.On the other hand , the late sowing date on April, 30th produced the lowest cotton yield where the cotton production recorded 6.1 and 7.3 Kent./Fed.during the cotton seasons of 2000 and 2003 ; respectively. .It could be concluded that the obtained results in the present were study agreed with those recorded by Abdalla (1992) and Taneja and Dhindwal (1983) they reported that the early sowing dates gave the lowest infestation and higher seed cotton yield . on the other hand, Kostandy (1990),

Hennedry *et al.*, (1992); Moawad and Hussein (1980) reported that the incidence of cotton bollworms on the flowers and green bolls was greater in the early season crop than in the late sown one .

3. The 3rd experiment:

Effect of fertilizer rates and types on the infestation levels of cotton bollworms:

To facilitate the result exposure, it could be divided to three parts:

The results presented in Table (3) showed that the lowest number of bollworms larvae, i . e boll infestation percent (5.3%) was recorded when plants treated with NPK at rate of 150 Kg./ fed. The corresponding yield was 8.3 Kent. /fed.It was clearly noticed that the 100 kg . & 200 kg . NPK treatments resulted in nearly noticed that cotton seed production, i.e 7.9 & 7.8 kent. / fed . for both rates, respectively ,with the same average of bollinfestation (5.9%) . In the second season , it was clearly show that the highest fertilization on rate 200 Kg. NPK increased the percent infestation to 6.4% While the fertilization rate 100 Kg . and 150 Kg . NPK decreased the percent infestation to 4. 3% and 4.6 % The corresponding cotton seed yield 9.8 Kent . /Fed.. But , the fertilization rate 100 Kg . and 200 Kg. Recorded the lowest cotton seed yield 8.6 and 8.4 Kent. Fed., respectively .

Generally, the results recorded in this work show the same results with Simwat *et al.*, (1987) and sharma *et al.*, (1989) They reported that the infestation level increased by increasing the rate of fertilizer. on the other hand, Hango and Uthamasamy (1989) and Jai- Singh *et al.*, (1997) stated that the fertilizer balance decreased the infestation level for the cotton bollworms.

4. The 4th experiment:

Effect of plant distance between rows and hills on the infestation levels of cotton boll worms :

The obtained results in Table (4) indicated that the infestation rate(4.4%) of bolls by bollworms reached its minimized percentage when the distance between rows was 80 cm and the corresponding yield was 8.6 Kent./ Fed. . Decreasing the distance between rows (i.e. increasing the plant density / fed.) , caused slightly increased in green boll infestation , while the corresponding cotton seed yield showed an opposite trend .

On the other hand , the distance between hills and the number of plants / hills are influenced to both the bollworms infestation percentages and the produced yield . The average of the lowest infestation levels was 4.9% and the highest of cotton seed production was achieved when the distance between rows ranged between 65 - 67 cm (the recommended rate) and the distance between hill 20 cm with having one plant although the low plant numbers , hence in the green bolls the represented the source of yield production . This result may be due to the highest boll weight (3 gm /boll .). The maximum infestation (9.7 %) resulted when the distance between hills was 10 cm with two plants / hill (that means a heavy plant density gave the lowest production of cotton seed yield . In the second season , the experiments was carried out addition treatments between row and hills (3 distance between rows 60, 70 and 80 cm and two distance between hill 10 and 20 cm) and two treatments for the number of plants in hill (one and two plants /hill) were evaluated. The number of treatments became 12 treatment compared with 7treatments in the first season .The obtained results show that there is significant difference between the infestation percentages and the cotton seed yield.

A - Distance 60 cm between rows:

The results show that the distance 60 cm between hills with one plant or tow plants /hill increased the plant density /feddan. This treatment caused an increased the infestation level and decrease in the cotton seed yield .The distance 60 x 20 cm and one plant recorded the lowest percent of infestation (3.3 %) and 7.5 kent . / Fed .,while the distance 60 x 20 cm and tow plants recorded 4.6% and 8.1 Kent. / Fed . The highest plant density with distance 60 x 10 cm having tow plants recorded the highest plant density than distance 60 x 10 cm having tow plants which recorded the highest infestation level (8.6 %) and the lowest cotton seed yield .(5.6 Kent . /Fed).

B - Distance 70 cm between rows :

The result show that distance 70 x 20 cm and having one plant recorded the lowest percent of infestation 3.0 % . The distance 70 x 10 cm and one plant recorded the average infestation level 3.9 %; whereas 70 x 20 cm and two plants recorded The average infestation level (4.3 %) . while, the distance 70 x 10 cm and two plants recorded the highest infestation level (7.3 %) .The distance 70 x 10 cm and one plant gave the highest cotton seed yield 9.0 Kent . / Fed . followed by 70 x 20 cm and two plants, 70 x 20 cm and one plant and 70 x 10 cm and tow plants where the corrsponding cotton seed yield were 8.8 , 8.3 and 6.2 Kent . /Fed., respectively .

C - Distance 80 cm between rows :

The data show that the distance 80 x 20 cm and one plant recorded the lowest infestation level (2.7%) followed by 80 x 20 cm and one plant , 80 x 10 cm and one plant and 80 x 20 cm and tow plants . These treatments recorded the average infestation level 3.2 , 3.2 and 5.0 % . On the other hand , the obtained data showed that there is significant difference between the treatments 80 x 20 cm and two plants. These treatments recorded the highest cotton seed yield 9.4 Kent . / Fed . followed by 80 x10 cm and one plant , 80 x 10 cm and tow plants and 80 x 20 cm and one plant where the averages cotton seed yield were 9.1 , 8.1 and 6.9 Kent . /Fed .; respectively .

5- The 5th experiment**Effect of interaction between the different treatments .**

The aim of this experiment is to select the best results of the pervious treatments and to study the interaction between the different treatments .

The experimental area was designed according to spilt / spilt and the results were statistically analysis by using Duncan,s test. These treatments selected the agricultural dates 30/3 and 15/4 , fertilization rates 150 Kg and 200 Kg (NPK) , as well as the agricultural distance between rows (70 cm and 80 cm) , the distance between hills 10 cm ; one plant in hill and 20 cm between hills ; tow plants in hill .

The results demonstrated that there is significant difference between treatments and the average percent of infestation . The result showed that the agricultural date 30/3 was more effective than the agricultural date 15/4 in decreasing the average percent of infestation and produce a highly production in the cotton seed yield .

The agricultural date 30/3, 80 cm between rows and interact with 150 Kg (NPK) recorded the lowest percent of infestation (3.4%) followed by 70 cm between rows and 150 Kg (NPK) (3.7 %).The agricultural date 30/3 and fertilization rate 200 Kg exhibited the lowest infestation rats by bollworms as compared with the agricultural date of 15/4 .While the planting date 30/3 with 200 Kg (NPK) and 80 cm between

rows caused the average percent of infestation 5.1% as compared with planting date of 15 / 4 with 200 kg - NPK and 70 cm between rows which recorded infestation rate of 7.4% but planting date 15/4 with 200 Kg (NPK) and 80 cm between rows recorded 6.0% of infestation by bollworms .

According to the cotton seed yield , the planting date 30/3 with treatment 200 Kg (NPK) , 80 cm between rows , 10 cm between hill and one plant / hill recorded 11.0 Kent . /Fed . followed by the treatment 70 cm between rows with the same treatment where the cotton yield recorded 10.6 Kent . /Fed . while, the same planting date with 150 Kg (NPK), 80 cm between rows recorded 10.4 Kent . / Fed . Then, the treatment 70 cm between rows, 10 cm between hill and one plant in hill recorded 10.0 Kent . / Fed .

The obtained results indicated that the cotton seed yield on the planting date 15/4 with 70 cm between rows and 150 Kg NPK recorded the lowest yield (9 . 2 Kent . /Fed) followed by the same date and 80 cm between rows and 150 Kg NPK where the cotton yield was 8.5 Kent . / Fed . , whereas , the same planting date with 200 Kg (NPK), 80 cm between rows recorded 8 . 2 Kent . / Fed . The n , the same planting date with 200 Kg (NPK), 70 cm between rows recorded the lowest cotton seed yield (8 . 0 Kent . / Fed .).

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Table (1) : Effect of seed treatments on the rates of the bollworms infestation during the two seasons of 2000 & 2003

Treatments	Average No. of larvae / 100 bolls in the whole season of 2000	Yield (Kent./ Fed.2000	Average No. of larvae / 100 bolls in the whole season of 2003	Yield (Kent./ Fed.2003
Geusho	4.2	7.6	4.1	8.6
Thiroxin	6	7.1	4.2	8.4
Rizolix	7.1	7.2	4.2	8.2
Control	7.1	6.9	5.7	6.3
P	0.0031**	0.6983 ns	0.7674 ns	0.3664 ns
LSD 0.05	1.4723	1.3012	0.353	0.6032

Table (2): Effect of planting date on the rates of the bollworms infestation during the two seasons of 2000&2003

Planting Date	Average No. of larvae / 100 bolls in the whole season of 2000	Yield (Kent./Fed. (2000))	Average No. of larvae / 100 bolls in the whole season of 2003	Yield (Kent./Fed. (2003))
15- Mar	7.5	8.2	3.7	7.9
30-Mar.	7.0	7.5	3.5	8.5
15-Apr.	7.5	6.4	3.6	8.1
30-Apr.	9.2	6.1	3.7	7.3

P	0.0000***	0.0000***	0.8015 ns	0.0010**
L.S.D. 0.05	0.5109	0.8005	0.6832	0.4706

Table (3) :Effect of fertilizer rates on the infestation levels of cotton bollworms (Season 2000 & 2003)

Treatments	Average No. of larvae / 100 bolls in the whole season of 2000	Yield Kent./ Fed (2000)	Average No. of larvae / 100 bolls in the whole season of 2003	Yield Kent./ Fed. (2003)
100 Kg./Fed. NPK	5.9	7.9	4.3	8.6
150 Kg./Fed. NPK	5.3	8.5	4.6	9.8
200 Kg./Fed. NPK	5.9	7.8	6.4	8.4

P	0.0000***	0.0000***	0.0000***	0.0012**
LSD 0.05	0.5856	0.6193	0.5937	0.5224

Table (4) : Effect of planting distance on the infestation levels of cotton bollworms (Season 2000 & 2003)

Treatments			Average No. of larvae / 100 bolls in the whole season of 2000	Yield Kent./ Fed (2000)	Average No. of larvae / 100 bolls in the whole season of 2003	Yield Kent./ Fed. (2003)
Distance between rows cm.	Distance between hills cm	No. of plants in hill				
60	20	1	0	0	3.3	7.4
70	20	1	4.9	6.7	3	8.3
80	20	1	0	0	2.7	6.9
60	20	2	5.2	8.1	4	7.3
70	20	2	5.1	8.2	4.3	8.8
80	20	2	4.4	8.6	3.2	9.4
60	10	1	0	0	4.6	8.1
70	10	1	5.6	7.8	3.9	9
80	10	1	0	0	3.2	9.1
60	10	2	0	0	8.6	5.6
70	10	2	9.7	6.1	7.6	6.2
80	10	1	6.4	7.4	5	8.1
P	0.000***	0.000***	0.000***	0.0000	**	
LSD	0.2607	0.3161	0.4446	1.0815		

Table (5) : The impact of the agricultural practices and the infestation rates caused by bollworms as well as the cotton seed yield (Season 2003)

Planting date	Fertilization	Distance between rows	Distance between hills	No.of plants in hill	Infestation level	Yield Kent./Fed
30- Mar.	150 kg. NPK	70 cm	10 cm	1	3.7	10
		80 cm	10 cm	1	3.4	10.4
	200 kg. NPK	70 cm	10 cm	1	5.1	10.5
		80 cm	10 cm	1	4.8	11
15-Apr.	150 kg. NPK	70 cm	10 cm	1	4.7	9.2
		80 cm	10 cm	1	4.4	8.5
	200 kg. NPK	70 cm	10 cm	1	7.4	8
		80 cm	10 cm	1	6	8.2
P	0.6386 ns	0.3069*	0.4448			
LS D	1.4389					

تأثير بعض المعاملات الزراعية على درجة الإصابة بديدان اللوز

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تعتبر النتائج المتحصل عليها خلال موسم الدراسة مقدمة لتطبيق وتصميم بعض برامج مكافحة المتكاملة لديدان اللوز على القطن وقد أشارت النتائج إلى :

١ - وجد من خلال دراسة معاملة البذور ببعض المركبات قبل الزراعة أن معاملة البذور بالجاوشو سجلت اقل تعداد لديدان اللوز على مدار الموسمين بمتوسط قدره ٤,٢ و ٤,١ يرقة / ١٠٠ لوزة كما سجلت أعلى إنتاجية ٧,٦ و ٨,٦ قنطار / ف على الترتيب.

٢- سجلت النتائج المتحصل عليها من تجربة تأثير مواعيد الزراعة أن الزراعة فى ٣/٣٠ و ٤/١٥ قد سجلت اقل متوسط تعداد يرقي خلال الموسم الأول ٧,٠ يرقة / ١٠٠ لوزة . وقد سجلت أيضا مواعيد الزراعة فى الميعادين السابقين فى الموسم الثانى اقل متوسط حيث بلغ ٣,٥ و ٣,٦ يرقة / ١٠٠ لوزة على الترتيب. بينما كان المحصول فى الموسم الأول أعلى فى الزراعة المبكرة حيث بلغ ٨,١ قنطار / ف يليه الزراعة فى ٣/٣٠ و ٤/١٥ بمتوسط ٧,٥ و ٦,٤ قنطار ف / بينما سجلت مواعيد الزراعة فى ٣/٣٠ و ٤/١٥ اعلى محصول فى الموسم الثانى بمتوسط ٨,٥ و ٨,١ قنطار / ف على الترتيب.

٣- يتضح من تأثير التسميد على درجة الإصابة بديدان اللوز أن معدل التسميد ١٥٠ كم NPK . قد سجل اقل متوسط تعداد فى الموسم الأول ٥,٣ يرقة / ١٠٠ لوزة واعلى محصول ٨,٣ قنطار / ف . وتساوى التسميد المنخفض والعالى فى متوسط الإصابة والمحصول - أما فى الموسم الثانى فى فقد سجلت معاملة التسميد ١٥٠ كم NPK معدل إصابة ٤,٦ يرقة / ١٠٠ لوزة أعلى محصول ٩,٨ قنطار / ف .

٤ - سجلت تجربة الزراعة على مسافات فى الموسم الأول أن الزراعة على مسافة ٨٠ سم بين الخطوط و ٢٠ سم بين الجور ونباتين فى الجورة اقل متوسط للإصابة (٤,٤ و ٣,٢ يرقة / ١٠٠ لوزة) فى الموسمين وأعلى محصول (٨,٦ و ٩,٤ قنطار / ف).

٥ - سجلت تجربة التفاعل بين المعاملات المختلفة أن ميعاد الزراعة فى ٣/٣٠ مع التخطيط ٧٠ و ٨٠ سم بين الخطوط ومسافة ١٠ سم بين الجور ونبات واحد فى الجورة مع معدلات التسميد ١٥٠ و ٢٠٠ كم NPK متوسطات اقل فى الإصابة بديدان اللوز تراوحت بين ٣,٧ - ٤,٨ يرقة / ١٠٠ لوزة كما سجلت محصول أعلى من ١٠,٠ - ١١,٠ قنطار / ف . بينما سجل الميعاد الثانى ٤/١٥ بنفس المعاملات السابقة متوسط إصابة أعلى حيث تراوحت الإصابة بين ٤,٤ - ٧,٤ يرقة / ١٠٠ لوزة ومحصول تراوح بين ٨,٠ - ٩,٢ قنطار / ف .