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EFFECT OF WEATHER CONDITIONS OF TEMPERATURE AND RELATIVE HUMIDITY ON THE INFESTATION LEVELS OF SPODOPTERA LITTORALIS BOISD., PECTINOPHORA GOSSYPIELLA AND EARIAS INSULANA ON OKRA AND COTTON PLANTS

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ABSTRACT

These studies were conducted during two successive seasons 1991 & 1992 on cotton and okra plants. In 1991 season , studies were concerned with the population activity of cotton bollworms only (P. gossypiella and E. insulana). The heaviest infestation was recorded on okra while P. gossypiella attacked okra and cotton with higher numbers than E. insulana through two successive years.

The relationship between weekly counts of P. gossypiella and E. insulana in cotton bolls and okra pods and their influence by max. temperature (°C) was negative , while relative humidity (max. & min.) gave positive correlation on both of cotton and okra.

Positive correlations were existed between weekly counts of cotton leafworm S. littoralis and both of RH% & °C.

INTRODUCTION

The cotton leafworm and cotton bollworms are considered as economic and dangerous cotton

pests through the last thirty years. The cotton leafworm, S. littoralis is one of a destructive defoliators pests on cotton and okra. while the cotton bollworms, P. gossypiella and E. insulana attacked the cotton and okra during the flowering and fruitful stages and causing great loss in the yield of cotton and okra in neglected fields.

The effect of the climatic factors on the weekly number of captured moths of cotton leafworm were studied by Abu El-Nasr et al.(1973) , El-Saadany and Rizk (1973) and El-Saadany et al. (1987), while ecological studies on Heliothes armigra and E. insulana using light traps were studied by Ghanim et al. (1979) and El-Zanan (1987) on bollworms.

The aim of present research is to study the population densities of the previous mentioned pests during larval stage on both leaves and fruits on okra and cotton, and record the rate of infestation for each pest. the statistical analysis was used to show these relationships using simple correlation and regression coefficient values.

MATERIALS AND METHODS

About 1 feddan of cotton (Giza 70) and 6 kerats of okra were chosen in designated area to carry out the recent research. The planting date for both of cotton and okra was on April 1st, 1991 and on April 7th,1992. The cotton and okra fields were closed and prepared together for planting in 4 equal plots (reps.) for each crop, then the normal cultural practices were followed. Weekly samples were taken as 25 cotton flowers and bolls/plot;25 okra flowers and pods/plot started on July 1st and continued until September 1st, 1991 , while no examinations were conducted for S. littoralis in first season.

During 1992 season, the examination included 25 plants/plot for S. littoralis and the same previous techniques for P. gossypiella and E. insulana were followed the weekly examination conntinued from July 1st to October 1st, 1992.

As for the cotton bollworms, the samples were taken to the laboratory and examined carefully to record the number of infested cotton bolls and okra pods. The climatic factors represented by temperature degrees(°C) and relative humidity (RH%) during investigation periods (from July until October , `1992) were obtained from the metriological stations at Sakha Agriculture Research Station.

Statistical analysis for the relationship between weekly numbers of each pest to the weekly average of temp., max. & min. of relative humidities were calculated using simple correlation and regression coefficient values. While, the relationship between the rate of infestations on okra and cotton for each tested pest are determined by calculating the simple correlation values.

RESULTS AND DISCUSSION

During 1991 season, the population density of cotton bollworms, P. gossypiella and E. insulana in cotton bolls fluctuated between zero infestation on July 1st and increased to 3 infested bolls / 100 bolls on September 9th. The rate of infestation of both pests was relatively higher on okra than cotton and no infestation was recorded before July 15th for both tested hosts. The weekly counts of P. gossypiella was higher than counts of E. insulana, but no significant variations were existed between the weekly counts of P. gossypiella on cotton and okra and also for E. insulana on both tested hosts (Table 1 and Figs. 1 & 2).

Table (1): Percentage of infestation of P. gossypiella and E. insulana on okra pods and cotton bolls in Kafr El-Sheikh during 1991 season.

Date of examination		Cotton % of infested bolls		Okra % of infested pods	
		+ P. gossypiella	++ E. insulana	P. gossypiella	E. insulana
July	1st	0	0	0	0
	8	0	0	0	0
	15	1	1	1	0
	22	2	1	1	0
	29	1	2	2	1
Aug.	5	2	1	1	2
	12	2	1	3	2
	19	1	2	2	1
	26	2	0	4	3
Sep.	2	2	1	3	3
	9	3	3	4	3
Total		16	12	21	15

+ The simple correlation between weekly counts of P. gossypiella on cotton and okra is a positive and significant (r = 0.773).

++ No significant correlation between weekly counts of E. insulana on both of okra and cotton.

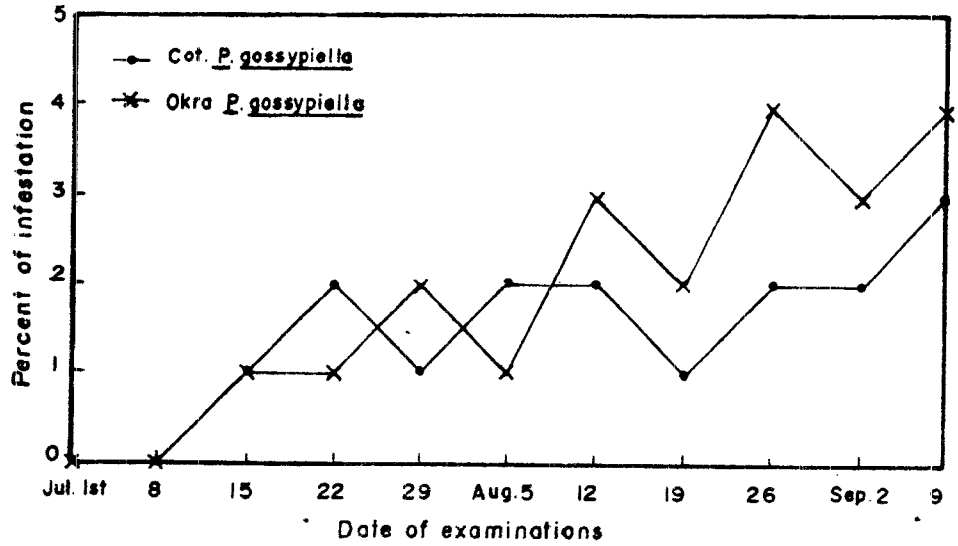

Fig. 1 : The population fluctuation of P. gossypiella on Cotton and Okra during 1991.

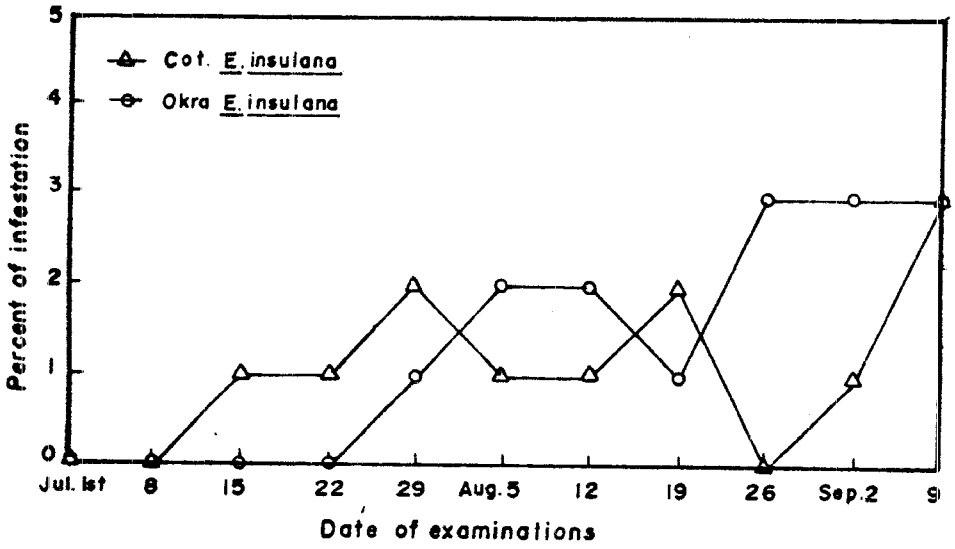

Fig. 2 : The population fluctuation of E. insulana on Cotton and Okra during 1991.

Table (2): Percentage of infestation of P. gossypiella and E. insulana on okra pods and cotton bolls in Kafr El-Sheikh during 1992 season.

Date of examination		Cotton % of infested bolls		Okra % of infested pods	
		+ P. gossypiella	++ E. insulana	P. gossypiella	E. insulana
July	1st	0	0	0	0
	8	0	0	0	0
	15	1	0	0	0
	22	2	1	1	0
	29	3	2	2	0
Aug.	5	3	2	2	1
	12	1	6	1	1
	19	5	2	1	2
	26	5	3	3	3
Sep.	2	6	5	1	4
	9	4	10	4	2
	16	8	7	4	3
	23	9	9	3	4
Oct.	1st	11	8	5	3
Total		58	55	27	23

+ A significant correlation(r=0.812) calculated between the weekly counts of P. gossypiella on cotton and okra.

++ A Significant correlation (r=0.728) was estited between weekly counts of E. insulana on cotton and okra.

From Table (2), data represented the population activity for the previous mentioned pests during the second season.1992. The percentage of infestation was higher than in the first season and the highest percentage of infestation of P. gossypiella was 5% and 11% on cotton bolls and okra pods, respectively. While E. insulana infestation rate was recorded with fewer number (4% and 10%) on both hosts, respectively. So, a positive correlation(0.812) was recorded between the weekly distribution of P. gossypiella larvae on cotton and okra, while it was 0.728 for E. insulana on both hosts. Generally, both of pests moved from okra to cotton to cause a great damage through September and October (Figs.3&4).

The population activity of cotton leafworm, S. littoralis on okra and cotton (Table 3) clearly indicating that weekly counts of larvae were fluctuated to record the first peak on July 22nd, the second peak on August 12th and the third peak on Sep. 2nd. The positive correlation (0.811) reveals that the rate of infestation of S. littoralis on cotton and okra were synchronized during the activity season (Fig.5).Generally, cotton was attacked by higher number of larvae (av. 63.85 larvae/100 plants) than okra (av. 43 larvae / 100 plants). Table (4) indicated the relationship between weekly counts of previous mentioned pests and its influence by maximum temperature , maximum and minimum relative humidities by using simple correlation and regression coefficient values.

The maximum and minimum relative humidity had positive correlation effects for P. gossypiella and E. insulana on cotton and okra while the max. temperature revealed negative correlation effects with the same pests for both hosts. The weekly counts of cotton leafworm showed positive correlation effects with max. temperature, max. and min. relative humidity for both tested hosts. The regression equations for

Table (3): The weekly counts of cotton leafworm S. littoralis on cotton and okra. and average of maximum & minimum relative humidity , and maximum temperature during 1992 season.

Date of investigations		Total No. of larvae per 100 plants *		Climatic factors		
		Okra	Cotton	°C	R.H% Max.	R.H% Min.
July	1st	30	66	33.8	89.5	47.0
	8	38	70	31.5	93.4	56.0
	15	52	81	33.2	93.3	63.6
	22	70	86	30.7	97.7	65.7
	29	29	57	31.34	93.8	64.1
Aug.	5	46	72	31.8	95.8	65.3
	12	63	90	31.64	94.3	72.9
	19	46	71	32.57	93.9	70.7
	26	49	41	31.5	93.9	74.9
Sep.	2	61	93	28.07	94.9	71.6
	9	42	56	29.2	96.5	75.6
	16	28	42	28.9	92.3	62.7
	23	26	37	28.6	96.0	60.9
Oct.	1st	22	32	25.14	94.2	58.0
Total		602	894			
Average		43	63.85			

* A significant correlation was existed between weekly number of S. littoralis larvae on okra and cotton.

Table (4) The simple correlation and regression coefficient values between weekly fluctuation of infestation by some noctuid species and influence by maximum and minimum of relative humidities during, 1992.

Insect pests	Climatic factors	Cotton		Okra	
		Simple correlation	Regression equation	Simple correlation	Regression equation
P. gossypiella	max. rh%	0.253	-34.06+0.4x	0.237	-15.24+0.18x
	min. rh%	0.1	1.14+0.45x	0.218	-0.99+0.04x
	max. c°	-0.83	42.6-1.25x	-0.75	18.24-0.53x
E. insulana	max. rh%	0.37	-57.4+0.65x	0.26	-16.12+0.18x
	min. rh%	0.33	-5.6+0.15x	0.337	-2.6+0.06x
	max. c°	-0.766	39.3-1.58x	-0.69	15.83-0.64x
S. littoralis	max. rh%	0.04	24.1+0.42x	0.371	-202.6+2.6x
	min. rh%	0.212	29.09+0.5x	0.572	-27.0+1.07x
	max. c°	0.46	-60.37+4.0x	0.295	-15.3+1.91x

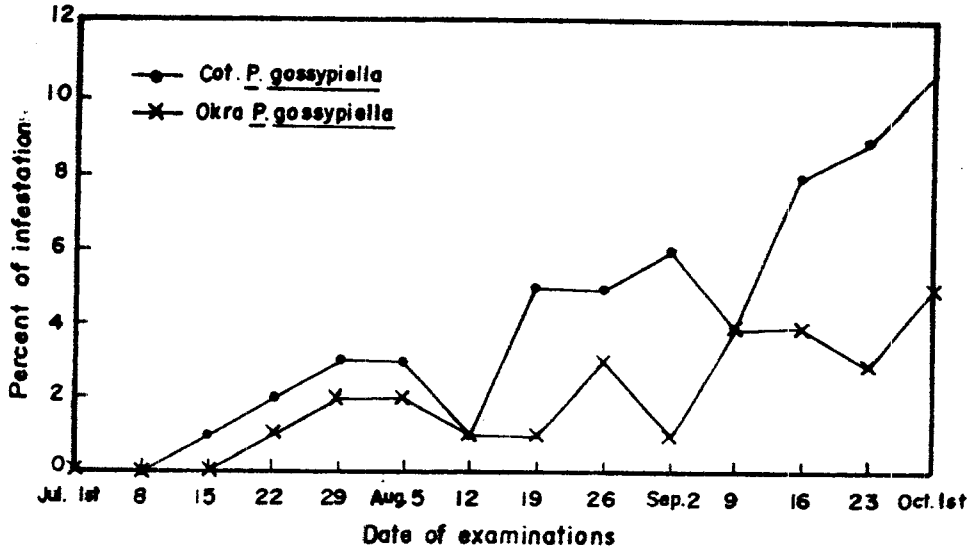

Fig. 3: The population fluctuation of P. gossypiella on Cotton and Okra during 1992.

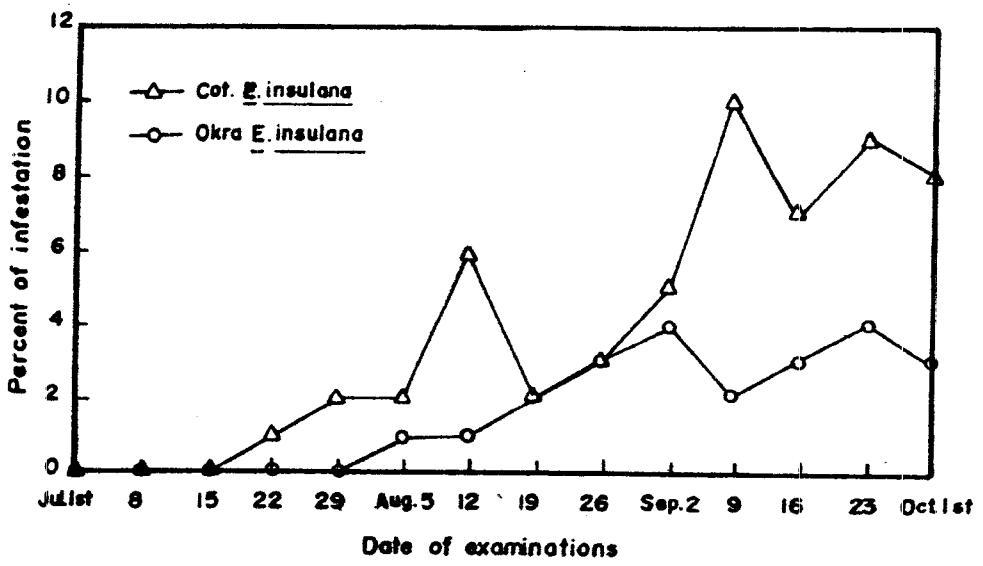

Fig. 4: The population fluctuation of E. insulana on Cotton and Okra during 1992.

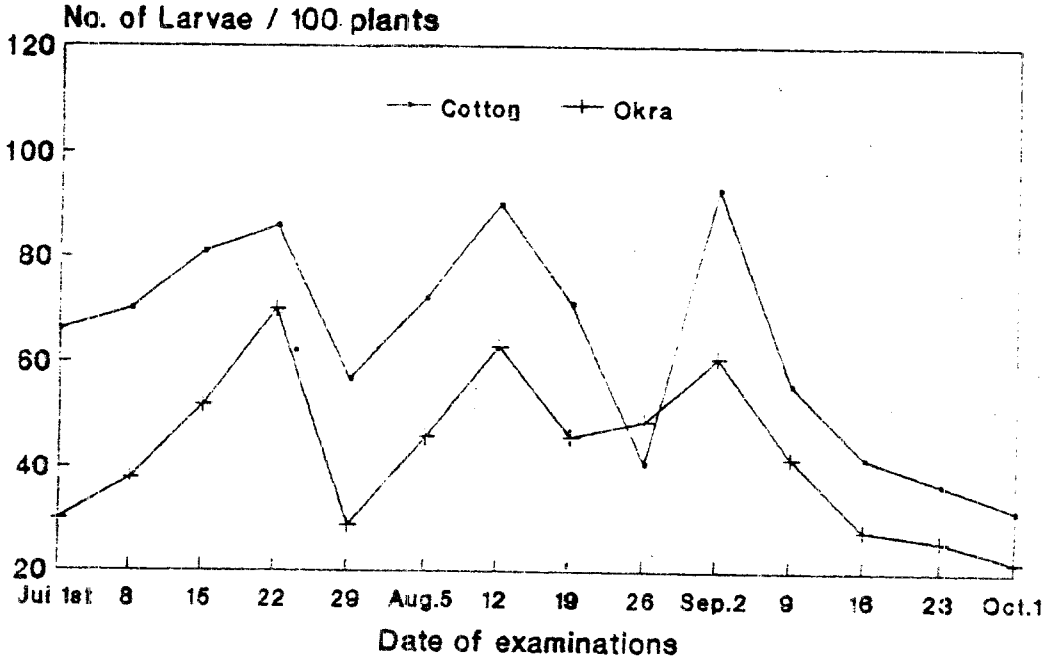

Fig. 5. The population fluctuation of S.littoralis on cotton and okra plants during 1992

the relationship beween weekly counts of the previous mentioned pests and its influence by the previous mentioned weather factors are clearly shown from Table(4). In fact.the population fluctuation of E. insulana using field observation was studied by El-Deeb et al. (1968) in Alexandria district, while other studies using light traps and different ecological studies were recorded by Assem et al.(1973), Taher (1983) and El-Zanan (1987) for cotton bollworms. While the cotton leafworm and its seasonal fluctuations were studied by El-Saadany and Rizk (1973), Ali and Darwish (1984) and El-Saadany et al.(1987).

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