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Bulletin No. 13.

(ENTOMOLOGICAL SECTION.)

THE RATE OF INCREASE

OF

THE PINK BOLL WORM IN GREEN BOLLS

IN THE PERIOD JULY TO NOVEMBER 1916.

BY

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Diagram.

Showing the average number of green bolls and the average number of bolls attacked by Gelechia per thousand cotton plants and the percentage of green bolls attacked by Gelechia in Lower and Middle Egypt.

———— Green bolls per 1000 plants.

----- Attacked green bolls per 1000 plants.

+ + + + + Percentage of bolls attacked.

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THE RATE OF INCREASE
OF THE PINK BOLL WORM IN GREEN BOLLS
IN THE PERIOD
JULY TO NOVEMBER 1916.

An investigation, the results of which are detailed below, was undertaken with the object of ascertaining the frequency of *Gelechia* larvæ during the growing period of cotton, and more especially of obtaining data concerning its increase in numbers relatively to the number of bolls on the cotton plants, and if possible also its absolute rate of increase.

The greater part of the material used was collected by the inspectors, sub-inspectors and *moawinîn* of the Inspectorate Staff, to whom thanks are due for the trouble taken in the collection of the samples, which in some instances must have involved considerable labour.

The majority of samples asked for consisted of 100 green bolls, taken at random and not necessarily from one field. One such sample was required from each cotton-growing Markaz weekly.

The samples, when received at Cairo, were examined in the following manner. Each boll was cut in three slices in order to ascertain whether or not it was attacked by boll worms. Records were kept separately of the number of bolls containing *Gelechia* larvæ, *Earias* larvæ, or of those attacked by other parasites. No attempt was made, however, to ascertain the exact numbers of parasites per boll. This limitation of the scope of the enquiry was necessary owing to the immense numbers of bolls to be examined daily. The total number examined exceeded 106,400 bolls.

TABLE I.—Showing the Increase in the Percentage of Green Bolls attacked by *Gelechia* in the Period July to November 1916.

Locality where Sample was collected.	TIME OF TAKING SAMPLE.																AON
	July.				August.				September.				October.				
	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	30-6	7-13	14-20	21-27	
<i>Bahaira</i> :—																	
Rosetta	—	3	12	7	—	15	8	24	30	97	65	85	—	—	81	—	—
Kafr el Dawâr	—	—	0	5	8	29	11	25	46	10	85	61	68	—	95	83	—
Abu Hommos	—	—	10	4	7	10	46	23	43	53	73	91	—	91	86	—	76
Damanhûr	—	—	5	8	13	12	22	32	10	47	90	64	—	—	74	91	71
Shubrakhût	—	—	5	—	8	23	42	27	45	42	34	80	—	—	86	—	—
Teh el Barûd	—	3	5	—	—	4	16	20	40	62	78	85	—	—	70	—	91
Delingât	—	—	6	6	14	—	19	6	32	14	40	36	—	80	—	—	—
Kôm Hamâda	3	—	—	—	—	2	26	30	69	76	84	88	—	100	91	78	—
<i>Gharbia</i> :—																	
Fûa	—	—	0	—	10	13	12	—	57	20	—	—	—	—	98	—	—
Sherbin	4	—	25	—	10	30	16	31	42	61	58	80	77	—	—	—	—
Desûq	7	6	2	—	30	35	21	30	60	75	95	63	71	96	86	93	78
Kafr el Sheikh	0	3	7	—	14	11	26	23	23	45	70	62	—	85	—	—	96
Talkha	—	—	9	—	—	10	27	70	46	57	37	73	—	75	—	—	—
Mahalla el Kubra	—	10	1	1	8	24	16	17	57	54	59	92	—	—	82	—	—
Kafr el Zayât	—	—	2	—	—	—	13	15	—	64	—	92	—	95	85	—	89
Zifta	—	—	3	—	9	20	20	39	71	65	59	83	—	88	—	92	—
Tanta	24	—	4	—	—	27	34	45	—	77	67	95	99	—	—	98	—
Santa	10	0	6	—	1	4	—	—	31	—	53	—	—	—	96	94	—
<i>Daqahia</i> :—																	
Faraskûr	—	—	—	—	10	—	18	20	46	54	90	80	83	—	—	—	—
Dekernes	—	—	—	—	30	41	56	42	92	90	66	—	89	—	—	—	—
Mansûra	—	2	—	5	11	13	35	40	58	64	67	82	87	—	86	94	85
Aga	8	—	—	—	10	15	18	69	51	53	76	79	80	—	—	—	—
Simbellawein	—	5	2	4	10	14	13	36	63	55	68	72	81	—	—	—	—
Mit Ghmr	2	5	10	1	6	22	35	51	74	54	83	83	90	86	91	—	—
<i>Sharqia</i> :—																	
Kafr Saqr	10	1	2	10	15	12	10	15	47	—	43	—	70	92	66	97	71
Faqûs	3	3	8	5	—	16	14	31	27	46	65	69	73	—	76	—	90

TABLE I (continued).

Locality where Sample was collected.	TIME OF TAKING SAMPLE.														
	July.					August.					September.				
	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	30-6	7-13	14-20
															21-27
<i>Assiut</i> :—															
Mallawi ...	—	2	2	1	2	2	20	7	40	26	49	—	61	—	72
Deirût ...	—	0	—	—	7	2	14	—	33	—	56	—	—	—	—
Maufalût ...	—	—	—	—	0	3	15	11	29	—	—	—	—	—	—
Abnûb ...	—	—	—	—	—	—	11	3	—	17	48	—	45	72	—
Assiût ...	0	0	—	—	—	9	—	—	14	31	40	—	57	76	—
Abu Tig ...	—	—	—	—	—	6	1	6	—	39	—	—	—	—	65
Badâri ...	—	—	—	—	—	1	—	26	—	60	54	—	—	—	—
<i>Girga</i> :—															
Tahta ...	—	—	0	—	—	—	11	5	3	41	17	23	—	—	77
Akhîmîm ...	—	—	—	—	—	0	—	—	23	—	—	—	—	—	—
Sohâg ...	—	—	—	0	1	—	3	—	—	—	8	—	—	58	—
Girga ...	—	—	—	—	—	—	3	5	8	15	26	—	15	42	63
Balâna ...	—	—	—	—	—	—	—	5	—	—	47	33	28	—	59
<i>Qena</i> :—															
Nag' Hamâdi ...	—	0	—	—	—	—	—	1	—	—	—	—	—	—	75
Luxor ...	—	—	—	—	—	—	—	—	14	—	—	—	—	59	—
Esna... ..	—	—	—	—	—	—	1	—	—	—	18	—	—	—	—
<i>Asuân</i> :—															
Edfu... ..	—	—	—	—	—	—	0	—	—	—	—	—	—	—	20
Aswân ...	—	—	—	—	—	—	12	—	—	18	—	—	—	—	35

TABLE II.—Showing the Increase in the Percentage of Green Bolls attacked by *Gelechia* in the Period July to November 1916. Results arranged by Mudirias.

Locality.	July.												August.				September.				October.				Average.
	July.				August.				September.				October.												
	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	30-6	7-13	14-20	21-27	28-3								
Beheira	3	3	6	6	10	16	22	24	41	53	69	73	68	90	80	85	78								
Gharbia	9	5	7	1	13	23	21	34	36	57	57	78	81	89	90	94	88								
Daqahlia	5	4	8	4	11	21	28	42	66	61	76	80	86	86	89	94	85								
Sharqia	8	4	4	10	7	17	17	28	45	53	62	78	81	78	74	84	78								
Menufia	5	3	5	8	8	16	20	28	40	42	76	75	—	94	86	92	83								
Qaliubia	1	8	3	1	7	13	19	34	46	68	85	73	87	85	93	79	92								
Giza	1	2	2	0	9	5	16	13	31	35	50	51	73	98	78	71	89								
Beni Suef	—	2	1	1	3	6	11	14	37	29	35	51	66	81	81	78	74								
Fayûm	0	1	0	1	3	3	8	6	19	34	43	55	62	76	76	84	64								
Minia	0	0	3	1	3	3	3	10	15	38	55	49	61	64	70	58	62								
Assiût	0	1	2	1	3	4	12	11	24	34	49	65	57	74	61	65	65								
Girga	—	—	0	0	1	0	4	5	11	21	21	28	20	50	49	62	—								
Qena	—	0	—	—	—	—	1	1	14	—	18	—	—	59	—	75	—								
Aswân	—	—	—	—	—	—	8	—	—	18	—	—	—	—	—	26	—								

TABLE III.—Showing the Increase in the Percentage of Green Bolls attacked by *Gelechia* in the Period July to November 1916, in Lower, Middle and Upper Egypt.

Locality.	Nov.																			
	July.						August.						September.				October.			
	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	30-6	7-13	14-20	21-27	28-3			
Lower Egypt... ..	6	4	6	6	11	19	21	32	42	49	65	76	83	87	83	87	81			
Middle Egypt... ..	0	1	1	1	3	5	12	13	32	35	37	52	65	82	79	78	75			
Lower and Middle Egypt ...	5	4	5	5	9	16	19	27	40	47	60	68	74	86	82	84	80			
Upper Egypt... ..	0	0	2	1	3	3	7	8	17	32	36	45	51	60	62	60	64			
All Egypt	5	3	5	4	8	14	17	23	37	46	56	64	70	79	76	75	76			

On Table I is found tabularized the weekly results per Markaz given in percentages of bolls attacked by *Gelechia*.

Examination of this table at once shows that samples of 100 bolls only are not sufficient to base any conclusions on.

On Table II these weekly records have been condensed to give percentages of the attacks for each Mudiria. It will be seen that the weekly results are now based on bigger figures, that the bolls have been taken over a more extended area, and that the ratio of increase from week to week no longer shows the same big fluctuations as appeared in the results based on the smaller Markaz figures of Table I.

On Table III these results have again been recalculated under the divisions Lower, Middle, and Upper Egypt. For this purpose Lower Egypt consists of the Mudirias of Beheira, Gharbîa, Daqahlia, Sharqîa, Menufîa, Qaliubîa and the Markaz Embaba. Middle Egypt is considered as being Giza Mudiria (after deduction of Embaba), Beni Suef and Fayûm Mudirias. All Egypt south of and including Minia Mudiria has been considered as being Upper Egypt.

The figures from which the percentages have been calculated are naturally largest for Lower Egypt, and probably approximate fairly closely to the actual state of the attack. The figures given for Upper Egypt are based on the smallest numbers of figures and are naturally least reliable, besides which no great similarity of results need be expected from the widely separated localities composing the district in question.

In the course of the examination it was soon recognized that 100 bolls was too small a number to base any record on, and, in order to find out what variation might be expected, four larger tests were made, which will be found tabularized in Tables IV, V, VI, and VII. For the first three tests the bolls were all taken from one field, for the last test the bolls were taken in small numbers from many places scattered over a large area.

Fifteen samples of 100 green bolls, taken from one field at Gemmeiza Farm, September 2, 1916. The figures given are the number of attacked bolls.

TABLE IV.

Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.
1	38	6	30	11	25
2	35	7	30	12	24
3	33	8	29	13	23
4	33	9	28	14	22
5	32	10	28	15	17

Average : 28.5.

Thirty-one samples of 100 green bolls, taken from one field at Giza, September 14, 1916. The figures given are the number of attacked bolls.

TABLE V.

Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.
1	41	12	33	22	31
2	39	13	33	23	30
3	38	14	33	24	30
4	38	15	33	25	30
5	37	16	33	26	28
6	37	17	32	27	28
7	35	18	32	28	28
8	35	19	32	29	25
9	35	20	31	30	24
10	34	21	31	31	22
11	34				

Average : 32.3.

Fifteen samples of 100 green bolls taken from one field at Gemmeiza, September 19, 1916. The figures given are the number of attacked bolls.

TABLE VI.

Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.
1	63	6	59	11	47
2	63	7	59	12	46
3	60	8	57	13	44
4	60	9	54	14	43
5	60	10	53	15	42

Average : 54.0.

Twenty-one samples of 100 green bolls taken in small quantities from many places in Beni Mazar Markaz, November 6, 1916.

TABLE VII.

Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.	Number of Sample.	Per Cent attacked.
1	95	8	89	15	82
2	94	9	87	16	82
3	93	10	87	17	81
4	93	11	87	18	77
5	93	12	84	19	77
6	92	13	84	20	76
7	91	14	84	21	76

Average.: 85.9.

From the above four tables, in which the numbers of attacked bolls have been arranged in sequence, it will be seen that any single sample of 100 green bolls taken at random may vary from the average for the field or district to the extent of ten above or twelve below.

TABLE VIII.—Showing the Distribution around the Average of the attacked Bolls recorded on
Tables IV, V, VI, and VII.

	Below.												Average.	Above.												Totals.	
	12	11	10	9	8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8	9	10	11	12		
Table IV...	1	0	0	0	1	1	1	1	1	0	2	0	1	2	0	1	2	0	1	0	0	1	0	0	= 15		
" V...	0	1	0	1	1	0	0	3	0	3	3	0	5	2	3	0	2	2	1	0	1	0	0	0	= 31		
" VI...	1	1	1	0	1	1	0	0	0	0	1	1	0	0	1	0	2	3	0	0	2	0	0	0	= 15		
" VII...	0	0	2	2	0	0	0	1	2	0	3	0	0	3	0	1	0	1	1	3	1	1	0	0	= 21		
Total...	2	2	3	3	2	2	1	5	3	3	6	1	6	7	4	2	6	6	3	3	4	2	0	0	= 82		
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On Table VIII the figures obtained on Tables IV, V, VI, and VII are re-arranged to show the distribution around the average of the numbers of attacked bolls. It will be seen that it is a one to three chance for any sample being within two places above or below the average, a three to two chance that it will lie within five places above or below the average, and a three to one chance that it will lie within the seven places above or below the average.

An attempt was made to estimate the influence of the neighbourhood to the cotton fields of (1) a ginnery, (2) a large village, samples being taken north, east, south, and west, in the immediate vicinity and also at a distance. The figures obtained were neither significant nor consistent and we refrain from publishing them.

The figures obtained this year will be of special use as material for comparison in future years, and especially they should afford information at any early date as to the prospects of damage to the cotton crop. They will also help to show whether the methods employed to cope with *Gelechia* are giving the results hoped of them, and whether the methods have been applied equally well everywhere.

This year's work has been of additional value in indicating certain modifications which will be necessary in carrying out similar work in the future. Chiefly it is apparent that if weekly figures for each Markaz are desired, larger samples will have to be taken, and that about 1,000 bolls weekly will be required from each locality. The method of taking a few bolls here and a few there throughout each district ought to be adhered to, in order to obtain really average results.

Having shown in the foregoing the method of obtaining the samples, and the value of a single observation, it now remains to see what general conclusions can be drawn from the material available.

On account of the dissimilarity of conditions in the Delta and Middle Egypt as compared to Upper Egypt, it is proposed in the following to leave Upper Egypt unconsidered and to confine ourselves to the examination of the mean curve for the Delta and Middle Egypt. (See Diagram.)

Disregarding small irregularities, it will be seen that the percentage of bolls attacked was fairly stationary during the whole of July. Increase began to be evident in the first week of August, and the rate of increase was almost uniform until the second week of October, when the maximum was reached. This curve chiefly shows how quickly *Gelechia* can utilize the available food supply.

Hitherto we have only been dealing with the percentage of green bolls affected. It is clear that percentages cannot afford any evidence of direct increase or decrease of the pest, unless something is known of the actual numbers of green bolls on the cotton plants at the time of each observation.

For example, it is possible that with a rapidly increasing number of bolls per tree, a fall in the percentage of attacked bolls may mean : (1) a reduction in the number of worms ; (2) no reduction and no increase of the number of worms ; (3) an actual increase in the number of worms. With the number of green bolls stationary, rise or fall of the percentage of worms evidently corresponds to increase or decrease in the actual *Gelechia* population. With the number of bolls per tree falling, decrease of the percentage or stability of the percentage will both mean decrease of the *Gelechia* population, whilst a rise in the percentage may mean decrease, stability, or increase of *Gelechia*.

As no record has been kept this year of the average number of green bolls on cotton plants, it has been necessary to approach the problem of the weekly average number of green bolls per unit (one plant or any other multiple) by an indirect method.

In connection with the cotton breeding a very large number of flower counts have been made by Mr. G. C. Bolland, Botanist to the Ministry of Agriculture. From these flower counts it is possible to obtain figures to show the weekly average number of green bolls per tree. The method adopted in calculation has been as follows. The average number of flowers observed per day in any week was multiplied by seven to give the weekly average. From this twenty per cent is deducted to allow for boll-shedding. The figure obtained is supposed to represent the number of bolls set during that week. Allowing that it requires six weeks for a boll to mature, by placing the figures representing each weekly average in the column for the six following weeks one obtains for each week of the growing season six figures which, when added, show the number of green bolls on the tree during each week. As in the material from which my percentages were made no bolls from 0 to 8 days old were used, the number of flowers was not entered for the week immediately following the flowering. The totals used were consequently weekly average numbers of green bolls of one week or older present on the plants. For the last week of September, the curve is based on the total number of green bolls

TABLE IX.—Showing the Average Number of Green and of attacked Bolls per 1,000 Cotton Plants in Middle Egypt and the Delta.

	July.					August.				September.			
	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	
Green bolls	5,472	7,366	7,900	8,271	8,787	8,732	9,253	10,024	10,168	8,818	7,480	5,156	
Bolls attacked by <i>Gelechia</i>	274	295	395	414	791	1,397	1,758	2,706	4,067	4,144	4,488	3,506	
Bolls attacked by <i>Exarias</i>	0	0	0	0	0	0	93	100	102	265	150	206	

TABLE X.—Showing the Number of *Gelechia* Moths which emerged weekly in the Insectarium of the Entomological Section from Bolls and Seeds collected in 1915.

1916.																				
April.			May.			June.			July.			August.			September.					
22-28	29-5		6-12	13-19	20-26	27-2	3-9	10-16	17-23	24-30	1-7	8-14	15-21	22-28	29-5	6-11	12-18	19-25	26-1	2
0	0		13	28	83	120	193	310	255	247	172	110	100	166	52	189	63	42	19	2

obtained by calculation for the previous week, minus the bolls matured during the week.

On the diagram the average number of bolls per thousand plants, obtained in the manner just described, has been plotted in, and connected by the upper curve, the lower curve shows the number of the bolls present containing *Gelechia* larvæ calculated from the percentage given in Table III. These two curves are representative of the conditions in the Delta and Middle Egypt. (See also Table IX.)

Before drawing any conclusions, it may be permitted to draw attention to the remarkably smooth curve obtained, not only for green bolls, but also for bolls attacked by *Gelechia*. In the opinion of the author this fact seems to justify the hope that as approximation the green boll curve does not exhibit any great error and that the following conclusions may be considered as approaching the truth.

During July the *Gelechia* population remained fairly level.

The infestation in July was probably due mostly to the progeny of *Gelechia* moths which had survived from the year before as hibernating larvæ (see Table X). In August the new short generation insects made themselves evident, with the result that the available food supply became more and more completely occupied by *Gelechia* larvæ. The increase in actual numbers, as well as in percentage of available bolls attacked, when once commenced, went forward at a very uniform rate, showing that breeding was continuous and unchecked, and that *Gelechia* does not produce distinct broods, separated by intervals of time in the same way as *Prodenia* or other well known lepidopterous cotton pests.

Although the highest percentage of bolls attacked was found in the second week of October, the largest number of bolls attacked must have existed during the third week of September. If the figures on which our calculations have been based are accepted as sufficiently accurate, it can be estimated that when at its maximum the *Gelechia* population reached at least 4,500 individuals per thousand cotton plants (500 holes). Supposing 26,000 plants to the feddân, this gives the alarming total of about 120,000 worms to the feddân.

On Tables XI, XII, XIII, the percentage for *Earias* by Markaz, by Mudiria, and by larger units of space, have been recorded in a similar manner.

Earias was relatively unimportant during 1916. Until the third week of August less than one per cent of the bolls were attacked by this pest. The maximum percentage was reached in the last week of October.

In actual numbers *Earias* reached, at its maximum, less than 300 bolls per thousand trees in the second week of September, having risen slowly since the third week of August.

Considering that *Gelechia* is an imported pest, which has been in Egypt less than ten years, its increase has been enormous. It now occurs everywhere, where cotton is grown in Egypt; in the last week of October, eighty-seven per cent of the green bolls in Lower, seventy-eight per cent in Middle, and sixty per cent in Upper Egypt were attacked by it; and we have received specimens of the adult from the desert at Romani. As to *Earias* it appears to have sunk to the position of a minor pest, not only relatively to the Pink Boll Worm but probably also absolutely.

Literature : WILLCOCKS. "The Pink Boll Worm," 1916, pp. 127-131.

TABLE XI.—Showing the Increase in the Percentage of Green Bolls attacked by *Earias* in the Period July to November 1916, in Green Bolls, arranged by Markazes.

Locality where Sample was collected.	TIME OF TAKING SAMPLE.															
	July.				August.				September.				October.			
	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	30-6	7-13	14-20	21-27
<i>Beheira</i> :—																
Rosetta	—	0	—	—	—	0	0	2	1	0	0	5	—	—	5	—
Kafr el Dawâr	—	—	0	0	—	0	1	1	0	1	5	4	0	—	5	2
Abu Hommos	—	—	0	1	0	0	0	1	1	5	3	0	—	6	1	—
Damanhûr	—	—	0	0	0	0	3	0	0	2	3	5	—	—	6	5
Shubrakhît	—	—	0	0	0	0	2	0	0	2	6	1	—	—	12	—
Itâi el Barûd	—	0	0	—	1	0	0	0	1	0	0	4	—	—	11	—
Delingât	—	—	—	—	—	—	—	—	—	—	2	11	—	0	—	—
Kôm Hamâda	0	—	0	0	1	0	1	0	1	2	0	0	—	0	3	4
<i>Gharbia</i> :—																
Fûa	—	—	0	—	0	1	3	—	1	0	—	—	—	—	1	—
Sherbin	—	—	0	—	0	1	1	0	3	2	2	0	1	—	—	—
Desûq	0	0	0	—	1	0	0	0	0	0	0	0	1	4	2	3
Kafr el Sheikh	—	—	0	—	0	0	0	1	2	0	0	3	—	6	—	—
Talkha	—	—	0	—	—	0	0	2	0	1	5	4	—	15	—	—
Maballa el Kubra	—	—	0	0	—	0	0	0	0	4	—	4	—	—	9	—
Kafr el Zayât	—	—	0	—	—	—	3	1	—	3	0	4	—	2	3	—
Zifta	—	—	1	—	—	0	0	0	—	3	0	—	0	3	—	6
Tanta	—	—	0	—	—	0	0	0	—	—	—	—	—	—	—	—
Santa	1	0	0	—	—	0	—	—	1	—	1	—	—	—	3	2
<i>Duqahlia</i> :—																
Faraskûr	—	—	—	—	1	—	0	1	0	11	2	5	2	—	—	—
Dekernes	—	—	—	—	0	0	2	1	1	1	7	—	2	—	—	—
Mansûra	—	0	—	0	6	0	0	5	1	0	3	3	1	—	7	4
Aga	—	—	—	—	0	0	0	0	1	1	0	4	4	—	—	—
Simbellawein	—	0	0	0	0	0	1	0	2	12	0	15	13	—	—	—
Mit Ghamr	—	0	0	0	0	0	1	3	1	3	7	4	5	9	5	—
<i>Sharqia</i> :—																
Kafr Saqr	1	0	0	0	0	0	0	0	2	—	3	—	6	3	3	2
Faûs	0	0	0	0	—	0	1	3	0	5	2	21	23	—	0	—

[illegible]

TABLE XII.—Showing the Increase in the Percentage of Green Bolls attacked by *Earias* in the Period July to November 1916, arranged by Mudirias.

Locality.	1907																	
	July.					August.					September.					October.		No.
	8-16	16-21	22-28	29-4	5-11	12-18	19-25	26-1	2-8	9-15	16-22	23-29	30-6	7-13	14-20	21-27	28-3	
Beheira	0	0	0	0	0	0	1	0	1	2	2	3	0	2	6	4	7	
Gharbiâ	0	0	0	0	0	0	1	0	1	2	1	2	1	5	3	3	8	
Daqahlia	0	0	0	0	1	0	1	1	1	4	4	6	5	9	6	4	3	
Sharqia	1	0	0	0	0	0	1	1	2	4	2	5	7	5	4	6	6	
Menufia	0	0	0	0	0	0	1	0	2	0	1	2	—	4	3	8	13	
Qaliubia	0	0	0	0	0	0	1	2	2	2	1	8	4	5	7	5	5	
Giza	1	0	0	0	0	0	1	0	3	4	8	7	4	1	6	2	3	
Beni Suef	—	0	0	0	1	1	1	1	3	7	2	3	4	7	2	3	12	
Fayûm	0	0	0	0	0	0	0	0	2	3	2	6	3	5	5	6	18	
Minia	0	0	0	0	1	0	1	1	1	2	3	5	2	7	3	3	5	
Assiût	0	0	0	0	1	1	1	3	5	7	4	7	8	2	7	4	9	
Girga	—	—	0	0	0	0	1	0	4	2	2	0	3	4	2	1	—	
Qena	—	0	—	—	—	—	0	0	0	—	7	—	—	5	—	2	—	
Aswân	—	—	—	—	—	—	1	—	—	0	—	—	—	—	—	8	—	

TABLE XIII.—Showing the Increase in the Percentage of Green Bolls attacked by *Earias* in the Period July to November 1916, in Lower, Middle, and Upper Egypt.

Locality.	July.								August.				September.				October.				No.												
	15-21		22-28		29-6		5-11		12-18		19-25		26-1		2-8		9-15		16-22			23-29		30-6		7-13		14-20		21-27		28-3	
Lower Egypt	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	2	4	4	5	5	5	5	5	4	4	5	5	4	4	5	7		
Middle Egypt...	1	0	0	0	0	0	1	0	0	1	1	1	1	3	5	3	5	4	5	4	4	5	4	4	4	5	4	4	4	11	8		
Lower and Middle Egypt ...	0	0	0	0	0	0	0	0	0	0	1	1	1	1	3	2	4	4	5	5	5	5	4	4	4	5	4	4	4	8	7		
Upper Egypt	0	0	0	0	0	0	1	0	0	1	1	1	1	3	3	3	4	5	4	4	4	4	5	4	3	4	3	3	3	7	8		
All Egypt	0	0	0	0	0	0	0	0	0	0	1	1	1	2	3	2	4	4	5	4	4	5	4	4	4	5	4	4	4	8	8		

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