FURTHER ECOLOGICAL AND BIOLOGICAL STUDIES ON CERTAIN CORN PESTS

By

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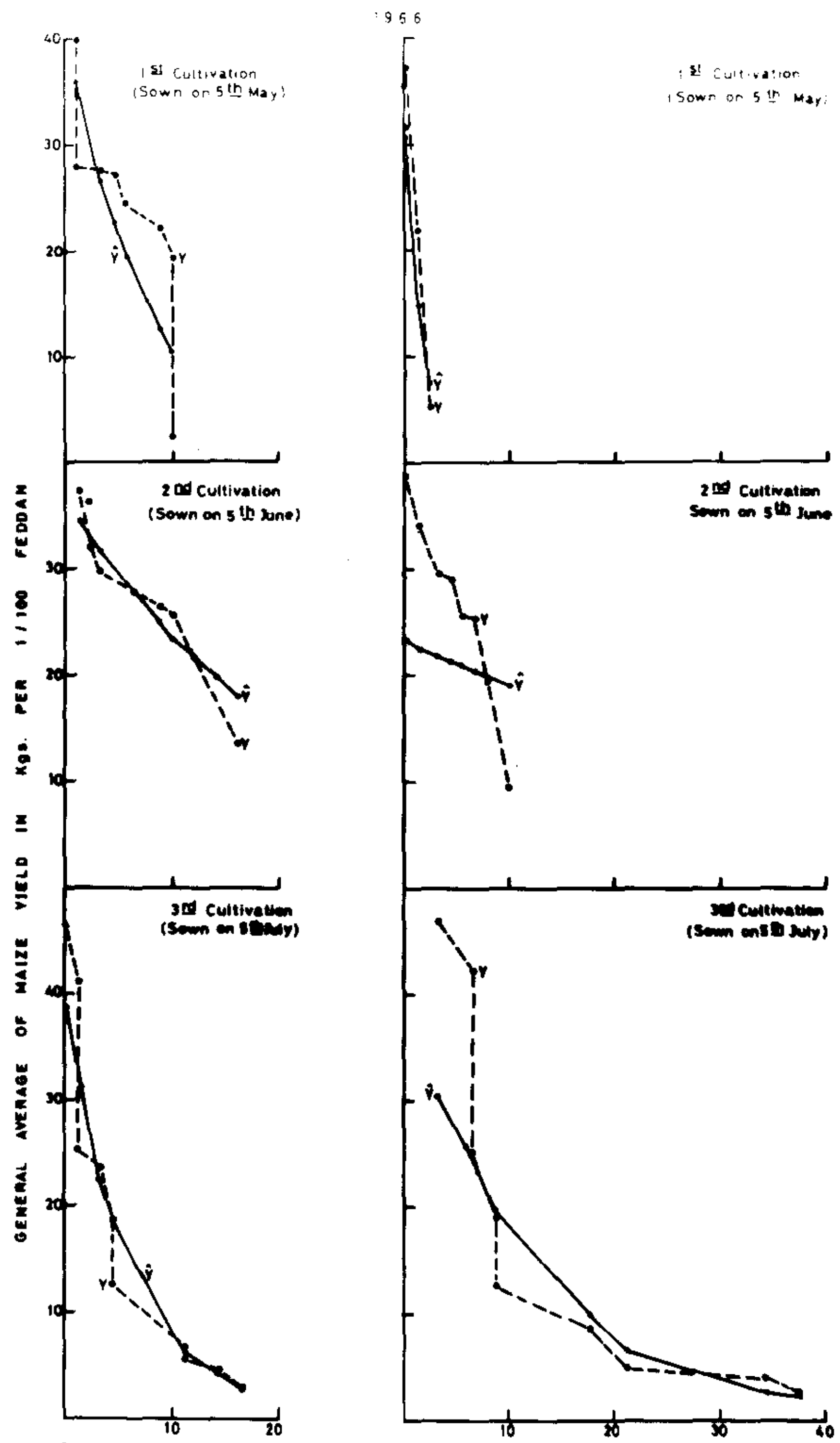


FIG. 5: THE CORRECTED AVERAGE CHANGE IN THE MAIZE YIELD (Y) PER UNIT CHANGE IN S. CRETICA INFESTATION PERCENTAGE (X_1)

FIG. 6: THE CORRECTED AVERAGE CHANGE IN THE MAIZE YIELD (Y) PER UNIT CHANGE IN C. AGAMEMNON INFESTATION PERCENTAGE (X_3)

[illegible]

A- [illegible] first cultivation (5th May 1966)

i) Up to 8.88% infestation (comprising the 1st [illegible] pairs of the xs and $\hat{y}$s in Table 49) the x^2 value (10.[illegible]70) was insignificant (denoting that all reductions in the yield from 39 to 22 kg./plot, apparently as a result of the infestation increasing from 1.11% to 8.88%, could be due to chance.

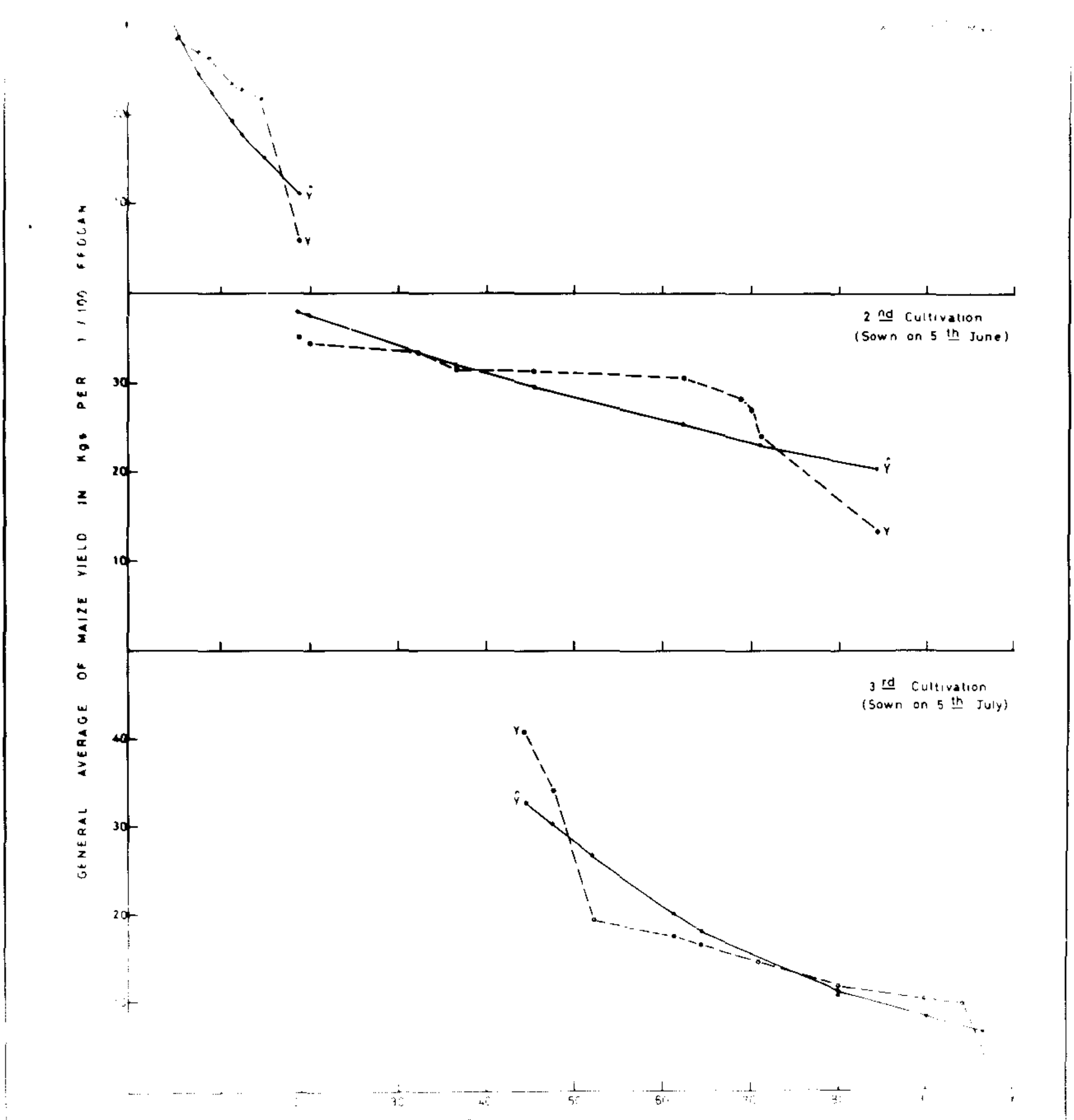
ii) At 11.11% infestation (comprising the 1st 7 pairs of xs and $\hat{y}$s in Table 49) the x^2 value (15.338) became significant, thus denoting that for this cultivation, the damage-threshold of *O. nubilalis* infestation lies somewhere between 9 and 11%.

For practical reasons the 9% level should better be considered, for the time being, as the damage threshold of this borer species in plants sown on 5th May.

B- The second cultivation (15th June 1966)

i) The x^2 value (8.315) was insignificant up to 6.88% infestation (comprising the 1st 9 pairs of xs and $\hat{y}$s in Table 50), denoting that any reduction in the yield from 38 to 23 kg (per plot) could be due to chance and not necessarily to the infestation increasing from 18% to 68%.

ii) At 70.00% level of infestation (comprising the 1st 8 pairs of xs and $\hat{y}$s in Table 50) the x^2 value (12.626) became significant, thus denoting the occurrence of a significant drop in the yield at this level of infestation. It would thus be


GENERAL AVERAGE OF MAIZE YIELD IN Kgs PER
2 nd Cultivation
(Sown on 5 th June)
3 rd Cultivation
(Sown on 5 th July)
30
20
10
40
30
20
50
60

practical to consider the [illegible] level of O. *nubilalis* within maize plant sown on 5th June, as the damage threshold for this cultivation (Fig. 7).

C- The third cultivation (sown on 5th July 1966)

i) Up to the 61% level of infestation (comprising the 1st 4 pairs of xs and ŷs shown in Table 51) the x^2 value (8.415) was insignificant, denoting that any reduction in the yield from 32 to 20 kg/plot, apparently as a result of the infestation increasing from 44% to 61%, could have been due to chance.

ii) When adding the 5th pair of xs and ŷs to the analysis (Table 51) the x^2 value (24.369) became significant, thus denoting that for this 3rd cultivation the damage threshold of O. *nubilalis* infestation lies somewhere between 61 and 64%. Fro the time being the 60% level may be safely regarded as that threshold (Fig. 7).

Table (50)

The average change in the maize yield with the increase in *O. nubilalis* infestation during the 2nd cultivation (sown on 5th May 1966)

Treatment No.	X %	y kg.	Log. y	X^2	Log. $\hat{y}$.X	$y=e^{a+bx}$
I	18.88	35.15	1.5453	356.45	29.1753	38.1
II	20.00	34.41	1.5366	400.00	30.7320	37.6
III	32.22	33.51	1.5251	1038.13	49.1387	33.5
IV	36.66	31.57	1.4996	1343.95	54.9753	32.2
V	45.55	31.54	1.4983	2074.80	68.2476	29.5
VI	62.22	30.39	1.4843	3871.33	92.3531	25.3
VII	68.88	28.19	1.4502	4744.45	99.8898	23.7
VIII	70.00	27.09	1.4329	4900.00	100.3030	23.4
IX	71.11	24.02	1.3802	5056.63	98.1460	23.2
X	84.44	13.50	1.1303	7130.11	95.4425	20.4
Total	509.96	289.37	14.4828	30915.85	718.4033	

Table (51)

The average change in the maize yield with the increase in *O. nubilalis* infestation during the 3rd cultivation (sown on 5th July 1966)

Treatment No.	X %	y kg.	Log. y	X^2	Log. $\hat{y}$.x	$y=e^{a+bx}$
I	44.44	40.75	1.6096	1974.91	71.5306	32.7
II	47.77	34.09	1.5328	2281.97	73.2218	30.3
III	52.22	19.34	1.2856	2726.93	67.1340	26.4
IV	61.11	17.55	1.2430	3734.43	75.9597	20.0
V	64.44	16.51	1.2175	4152.51	78.4557	18.0
VI	80.00	11.80	1.1072	6400.00	88.5760	11.1
VII	80.00	10.70	1.0681	6400.00	85.4480	11.1
VIII	90.00	10.24	1.0085	8100.00	90.7740	8.1
IX	94.44	9.88	0.9948	6918.91	93.9489	7.2
X	96.66	3.78	0.5775	9343.15	55.8211	6.5
Total	711.08	174.64	11.6447	54032.81	780.8698	

Table (32)

The average change in the maize yield with the increase in *C. agamemnon* infestation during the 1st cultivation (sown on 5th May 1966)

Treatment No.	X %	y kg.	Log. y	X^2	Log. $\hat{y}$.X	$y=e^{a+bx}$
I	0.00	37.18	1.5694	0.00	0.0000	30.7
II	0.00	35.37	1.5478	0.00	0.0000	30.7
III	0.00	31.51	1.4983	0.00	0.0000	30.7
IV	0.00	28.51	1.4548	0.00	0.0000	30.7
V	0.00	26.29	1.4199	0.00	0.0000	30.7
VI	0.00	26.28	1.4184	0.00	0.0000	30.7
VII	0.00	22.32	1.3485	0.00	0.0000	30.7
VIII	1.11	21.86	1.3385	1.23	1.4857	14.9
IX	1.11	20.95	1.3201	1.23	1.4653	14.9
X	2.22	5.01	0.6998	4.93	1.5536	7.2
Total	4.44	255.28	13.6153	7.39	4.5046	

The average change in the maize yield with the increase in *C. agamemnon* infestation during the 2nd cultivation (sown on 5th June)

Treatment No.	X %	Y kg.	Log. y	X^2	Log. y.X	$\hat{y}=e^{a+bx}$
I	0.00	38.86	1.5888	0.00	0.0000	23.2
II	0.00	38.01	1.5798	0.00	0.0000	23.2
III	1.11	34.08	1.5315	1.23	1.6999	22.7
IV	1.11	33.68	1.5276	1.23	1.6956	22.7
V	3.33	29.65	1.4713	11.09	4.8994	21.9
VI	4.44	29.00	1.4624	19.71	6.4930	21.4
VII	5.55	25.72	1.4099	30.80	7.8249	21.0
VIII	6.66	25.40	1.4046	44.35	9.3559	20.6
IX	6.66	24.87	1.3945	44.35	9.2874	20.6
X	10.00	9.65	0.9845	100.00	9.8450	19.0
T o t a l	38.86	288.92	13.3551	252.76	51.1011	

Table (54)

The average change in the maize yield with the increase in *C. agamemnon* infestation during the 3rd cultivation (sown on 5th August 1966)

Treatment No.	X %	y kg.	Log. y	X^2	Log. $\hat{y}$.X	$\hat{y}=e^{a+bx}$
I	3.33	46.93	1.6711	11.09	5.5647	30.2
II	6.66	42.05	1.6233	44.35	10.8111	24.4
III	6.66	24.92	1.3962	44.35	9.2987	24.4
IV	8.88	18.92	1.2742	78.85	11.3149	19.7
V	8.88	13.21	1.1206	78.85	9.9509	19.7
VI	8.88	12.62	1.1004	78.85	9.7715	19.7
VII	17.77	8.54	0.9314	315.58	16.5509	9.9
VIII	21.11	4.93	0.6928	445.63	14.6250	6.4
IX	34.33	3.92	0.5933	1178.55	20.3679	2.3
X	37.77	2.32	0.3655	1426.57	13.8049	2.1
Total	154.27	178.33	10.7688	3702.67	122.0605	

The high level of the damage thresholds for O. nubilalis ([illegible]%) and C. agamemnon (1[illegible]%) in the 3rd cultivation sown on 5th July denoting the relatively low effect by O. nubilalis or or C. agamemnon could be explained in the light of :

1. The yield of this cultivation is normally low, it would thus be expected that only a high infestation could produce a significant drop in the yield.

2. The infestations by O. nubilalis and C. agamemnon are usually common in full grown plants (90-120 days old), i.e. after the yield has been practically ready for harvesting.

Section 2

Review of Literature

The literature on the annual generations reveal that owing to the great variability in the environmental factors the number of annual generations in each of the three corn-borers *S. cretica*, *C. agamemnon* and *O. nubilalis* varies greatly in the different parts of the world.

S. cretica :

Malenotti (1938) in Italy, Lepes and Jaurdan (1940) in Morocco, Chirramonti (1948) in Somaliland and Nepveu (1954) in France, reported 1 to 4 generations of *S. cretica* every year.

In Egypt, Willcocks (1925) stated that *S. cretica* has four generations and a partial fifth under laboratory conditions. Wiltshire (1948) reported that *S. cretica* has two broods annually in Egypt, a main brood between February and early summer, and another small one in the autumn. Ahmed and Kirah (1960) observed two broods of *S. cretica* annually, of which the second is partial.

El-Saadany (1965) found that at the South of the Nile Delta *S. cretica* has five larval generations between April and December. In the Alexandria area, El-Sherif (1965) concluded that *S. cretica* completes four overlapping generations every year [illegible] El-Naggar (1957) [illegible] conditions, in Assiut, [illegible] S. cretica are of common occurrence annually.

C. agamemnon :

The works of Kaburaki (1932) in Formosa and Hokkaido Islands, Chu (1936) in China, and Kuwayama (1940) in Japan pointed out that in most rice-growing areas in Asia, C. agamemnon commonly undergoes 2-3 generations annually. A partial fourth or even a fifth generation might occur in areas where rice is cultivated twice annually.

In Egypt Willcocks (1925) stated that under the laboratory conditions C. agamemnon (= C. simplex) has eight generations every year. Hassanein (1956), using light traps at Shebin El-Kom, found that C. agamemnon (= C. simplex) has two main broods yearly. The first starts early in June and ends by late August, while the second starts about September and continues until November. Hassanein and Badawy (1959) reported that in the U.A.R. C. agamemnon (= C. simplex) has two broods in some years while in others only one brood occurs. Ahmed and Kirah (1960) found that at Bahteem (near Cairo) C. agamemnon (= C. suppressalis) has two annual broods, the first of which occurs from late May to early September, while the second takes place between September and the following May. El-Saadany (1965) pointed out that under agamemnon and [illegible] have [illegible] generations yearly. El-Sherif (1965), said that under field conditions in Alexandria C. agamemnon had four overlapping generations whereas under laboratory conditions six generations could be raised in one year.

O. nubilalis :

According to the works of Botteger and Kent (1931), Dicke (1932), Clark (1934), Caffrey (1935), Walker et al (1936), Schlosberg and Mathes (1937), Vance (1939), Jones et al (1939), Arbuthnot (1944) and Neiswander (1947), O. nubilalis usually undergoes 2-3 generations in the different parts of U.S.A. Zowolfer (1928) in Germany, Delgado (1930) in Spain, Sachtleben (1930) in Northern Bulgaria, Hergula (1932) in Jugoslavia, Pieprzyk and Romankow (1960) and Mustea (1965) in Rumania recorded one complete brood and occasionally a partial second brood of O. nubilalis every year. In Ontario, Canada Arnott (1942) concluded that only one brood of O. nubilalis (= P. nubilalis) is of common occurrence. Parker (1931), Cartwright (1933), Clark (1935), Matsumota and Shimazaki (1958) and Young (1958) concluded that the number of annual generations of O. nubilalis in Japan, Korea, Manchuria, Indu-China and China varied from 1 to 3; and that number appeared to depend on the climatic factors.

In Egypt, Fahmy (1936) recorded 3 to 4 generations of O. nubilalis (= P. nubilalis) per year. Hassanein (1956), reported that O. nubilalis completes two distinct broods annually, the