

OCCURRENCE, DISTRIBUTION AND BIOLOGY OF THE PUMPKIN FRUIT FLY, *DACUS CILIATUS* LOEW (DIPTERA: TEPHRITIDAE) AS RE-APPEARING PEST IN EGYPT

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Abstract

Occurrence and distribution of the Pumpkin or cucurbit Fruit Fly, *Dacus ciliatus* Loew as re-appearing pest on Cucurbitaceae were studied in addition to its biology. *D. ciliatus* was found in ten Egyptian governorates from 2002 till 2004, causing serious damage for gourd, marrow, cucumber, cantaloupe, melon and luf. Larvae as well as adults were reared under laboratory conditions of $25 \pm 2^{\circ}\text{C}$ and $65 \pm 5\%$ R. H. on marrow fruits.

The mean durations for eggs, larval and pupal stages were 3.0 ± 0.8 , 7.3 ± 2.7 and 9.3 ± 1.9 days, respectively. Adult insects fed on sugar, protein hydrolyzed and water lasted alive from 14 to 45 days. Copulation occurs with begging of night, female deposited 322.6 eggs, hatched and complete to give adults have sex ratio 1:1 and the total generation lasted 73.6 days.

Key words:

Cucurbitaceae, *Dacus ciliatus*, Occurrence, Biology, Life Cycle.

INTRODUCTION

Occurrence and distribution of the pumpkin or cucurbit fruit fly, *Dacus ciliatus* Loew throughout ten Egyptian governorates represented Lower, Middle and Upper Egypt in addition to its biology and life cycle were studied. *D. ciliatus* was recorded in Egypt in 1947 by Azab and Kira (1954) and Abo-Elnasr and El-Nahal (1967) who described its life cycle, morphology and distribution on cucurbitaceous plants. Fetoh (2004) mentioned that *D. ciliatus* was re-appearing in Egypt after disappearing period nearly about 25 years.

Generally, Weems (2002) mentioned that *D. ciliatus* was recorded recently in Florida, USA and may be caused serious damage to different crops.

MATERIALS AND METHODS

Different infested cucurbitaceous fruits like gourd (*Benincasa hispida*), marrow (*Cucurbita pepo*), cucumber (*Cucumis sativus*), cantaloupe (*Cucumis melo*), melon (*Citrulus lanatus*) and luf (*Luffa cylindrica*) from Kalubiyah, Minufiyah, Bahariya and Sharqiyah represented Lower Egypt, Giza and Fayoum represented Middle Egypt and Bani-Suwf and Aswan represented Upper Egypt in addition to Ismailia represented

Canal region and North-Sinai. Infested fruits were collected during Nili Plantations from August till December in 2002, 2003 and 2004 and placed in plastic post (30x 20x 10cm) containing sand at their bottom.

Full-grown larvae which pupated in the sand were collected and transferred to test tubes covered with cotton till emergence of adults. Some adults were sent to the British museum for identification and affirmation, the rest adults were put in rearing cage (30 x 30 x 30cm) with metallic frames having mesh screen at the sides.

The rearing cage was put partially in sunshine and provided with water and solid food (3 parts sugar and 1 part hydrolyzed protein). For eggs deposition small marrow fruits were used. Some of infested marrow were dissected to detect deposited eggs number and other were kept in the plastic pots for calculation larval and pupal duration, pupae were kept till emergence of adults to detect sex ratio under laboratory condition at $25 \pm 2^{\circ}\text{C}$ and $65 \pm 5\%$ R. H.

RESULTS AND DISCUSSION

Data in Table 1 showed that *D. ciliatus* was found in 3 governorates (Giza, Bani-Sewf and Aswan) on gourd, in 2 governorates (Giza and Fayoum) on marrow and in one governorate (Aswan) on cantaloupe in 2002. On the other hand, melon fruits did not harbored by the pumpkin fly, *D. ciliatus* during this season.

Table 1. Occurrence and distribution of *Dacus ciliatus* on different cucurbitaceous fruits in Egypt during 2002.

Cucurbitaceous fruits Governorate	Gourd	Marrow	Cucumber	Cantaloupe	Melon	Luf
Ismalia	-	-	+	-	-	-
Kalubia	-	-	-	-	-	-
Sharkiya	-	-	-	-	-	-
Minufiya	-	-	-	-	-	-
Behaira	-	-	-	-	-	-
Giza	+	+	+	-	-	-
Fayoum	-	+	-	-	-	-
Bani-Swef	+	-	-	-	-	-
Aswan	+	-	-	+	-	-
North-Sinai	-	-	-	-	-	-

+ Present, - absent.

Data in Table 2 indicated that *D. ciliatus* was found on gourd in 4 governorates (kalubiya, Giza, Bani-Swef and Aswan), on marrow in 4 governorates (Kalubiya, Sharkiya, Giza and Fayoum), on cucumber in 2 governorates (Behaira and Giza), on cantaloupe in 2 governorates (Fayoum and Aswan), on melon in another 2 governorates (Behaira and Sinia, Finally on Luf in one Governorate (Minufiya).

Table 2. Occurrence and distribution of *Dacus ciliatus* on different cucurbitaceous fruits in Egypt during 2003.

Cucurbitaceous fruits \ Governorate	Gourd	Marrow	Cucumber	Cantaloupe	Melon	Luf
Ismalia	-	-	+	-	-	-
Kalubia	+	+	-	-	-	-
Sharkiya	-	+	-	-	-	-
Minufiya	-	-	-	-	-	+
Behaira	-	-	+	-	+	-
Giza	+	+	+	-	-	-
Fayoum	-	+	-	+	-	-
Bani-Sewf	+	-	-	-	-	-
Aswan	+	-	-	+	-	-
North-Sinai	-	-	-	-	+	-

+ Present, - absent.

The obtained results were confirmed in 2004 with further more spread as showed in Table 3, where *D. ciliatus* was recorded on gourd in 4 governorates (Kalubiya, Giza, Bani-Sewf and Aswan), on marrow in 4 governorates (Kalubiya, Sharkiya, Giza and Fayoum), on cucumber in 3 governorates (Sharkiya, Giza and Fayoum), on cantaloupe in 2 governorates (Fayoum and Aswan), on melon in 2 governorates (Behaira and Sinia) and on luf in one governorate only (Minufiya). Generally the obtained results were summarized in Table 4. Similar finding was given by Fetoh (2004) who recorded *D. ciliatus* on cucumber, marrow and gourd in Giza governorate only during 2000 and in Giza, Fayoum and Ismailia governorates during 2001.

Table 3. Occurrence and distribution of *Dacus ciliatus* on different cucurbitaceous fruits in Egypt during 2004.

Cucurbitaceous fruits \ Governorate	Gourd	Marrow	Cucumber	Cantaloupe	Melon	Luf
Ismalia	-	-	-	-	-	-
Kalubia	+	+	-	-	-	-
Sharkiya	-	+	+	-	-	-
Minufiya	-	-	-	-	-	+
Behaira	-	-	-	-	+	-
Giza	+	+	+	-	-	-
Fayoum	-	+	+	+	-	-
Bani-Sewf	+	-	-	-	-	-
Aswan	+	-	-	+	-	-
North-Sinai	-	-	-	-	+	-

+ Present, - absent.

Table 4. Number of Egyptian governorates endemic by *Daccus ciliatus* during 2002, 2003 and 2004.

Cucurbitaceous Fruits	Governorates Number		
	2002	2003	2004
Gourd	3	4	4
Marrow	2	4	5
Cucumber	2	3	3
Cantaloupe	1	2	2
Melon	0	2	2
Luf	0	1	1

Adults reared in rearing cages were ready to mate after about 3 days from emergence. Mating usually occurs at the starting of night, this process took place 60 minutes on the average and ranges among 30-120 minutes. Female deposited their eggs either single or in a cluster about 8 eggs in a pit under the epidermis of the fruits and closed it by pale-brown secretion from outer side by its needle like ovipositor.

Table 5. Duration of different stages of *Dacus ciliatus* reared on marrow in the laboratory at $25 \pm 2^{\circ}\text{C}$ and $65 \pm 5\%$ R.H.

Stage	Duration (days) mean \pm S. D.
Egg	3.0 ± 0.8 (2 - 4)
Larva	7.3 ± 2.7 (5 - 10)
Pupa	9.3 ± 1.9 (8 - 12)
Adult Female	34.3 ± 7.6 (28 - 45)
Adult Male	19.7 ± 4.5 (14 - 25)
Sex ratio	1: 1
Total generation	73.6

Numbers between the brackets refer to range.

The preoviposition, oviposition and postoviposition periods ranged from (2-3), (7-10) and (3-4) days, respectively. Total mean eggs laid by female was 322.6 egg with range (200-450). Eggs hatched after 3.0 ± 0.8 days to give creamy white larvae which has 3 larval instars with duration 7.3 ± 2.7 days. The 3rd larval instars puncture the infested fruit and jumped to pupate in the soil or sand.

Pupation period took place within 9.3 ± 1.9 days. Emerged adults has sex ratio nearly 1:1 (female numbers were 162, while male numbers were 161 in average). Female lived long till 45 days and lived less till 28 days with mean longevity was 34.3 ± 7.6 days, while male lived long till 25 days and less till 14 days with mean longevity was 19.7 ± 4.5 days.

Total generation lasted for 73.6 days. All previous information were mentioned in Table 5. This nearly in agreement with Patel and Patel (1998) who reared *D. ciliatus* on little gourd in room temperature during August-September, December-January and April-May, respectively, in India and found that the average longevity of males was 13.41 ± 5.03 , 24.80 ± 8.67 and 12.15 ± 3.84 days, whereas that of females was 15.12 ± 6.27 , 26.76 ± 10.05 and 14.35 ± 4.35 days. The duration of the total life span for males was 19.05 ± 1.43 , 31.58 ± 4.07 and 16.50 ± 1.13 days, and for females was 19.98 ± 2.00 , 33.84 ± 4.82 and 18.48 ± 1.79 days, respectively. The average number of eggs oviposited by female was 25.79 ± 13.30 , 19.33 ± 12.28 and 35.32 ± 16.94 , respectively. The sex ratio (male: female) was 1:0.98. Furthermore, Weems (2002) indicated that the complete life cycle required from 19 till 22 days under laboratory conditions in Southern India. The egg stage lasted from 2 till 4 days, the larval stage occurred between 4 and 6 days and the pupal stage took place after 8-10 days.

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تواجد وتوزع وبيولوجي لذبابة المقات *Dacus ciliatus* (Loew) كافة أعادت الظهور في مصر

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تم دراسة تواجد وتوزع ذبابة المقات *Dacus ciliatus* كافة أعادت الظهور مرة أخرى على نباتات العائلة القرعية Cucurbitaceae بالإضافة إلى دراسة المظاهر البيولوجية الخاصة بها ، ظهرت وسُجّلت في عشر محافظات مصرية خلال الفترة من ٢٠٠٢ حتى ٢٠٠٤ محدثة أضراراً خطيرة على القناء والكوسة والخيار والكنتالوب والبطيخ بالإضافة إلي اللوف ، تم تربية اليرقات والحشرات الكاملة في المعمل عند درجة حرارة 25 ± 2 درجة مئوية ورطوبة نسبية $65 \pm 5\%$ على ثمار الكوسة ، وكان متوسط أعمار البيض واليرقات والعدوى . 3 ± 0.8 يوماً و $3, 7 \pm 7$ و $9, 3 \pm 1, 9$ يوماً على التوالي ، واستمرت الأفراد الكاملة حية لمدة ترواحت بين ١٤ و ٤٥ يوماً بعد تغذيتها على السكر والبروتين المتحلل والماء، ويحدث التزاوج ليلاً وتضع الأنثى الملقحة حوالي ٦ ، ٣٢٢ بيضة طوال فترة حياتها، والنسبة الجنسية بين الذكور والإناث ١:١ ويستغرق الجيل الواحد مدة ٦ ، ٣ ٧ يوم.