

HOST PREFERENCE OF THE CUCURBIT FLY, *DACUS CILIATUS* LOEW

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ABSTRACT

The cucurbit fly *Dacus ciliatus* Loew (Diptera: Tephritidae) is one of the most destructive pests, causes an economic loss on different cucurbitaceous fruits. Host preference of the cucurbit fly, *D. ciliatus* on the cucurbitaceous fruits like white gourd, striped gourd, zucchini, cucumber and cantaloupe was studied. When these fruits exposed to *D. ciliatus* separately in non choice test there are significant difference occurred, the most fruit attacked by *D. ciliatus* was the white gourd, while the lowest fruit attacked was the cucumber. The ability of the cucurbit fly to infest different cucurbits can be arranged as following: white gourd, cantaloupe, zucchini, striped gourd and cucumber. When, the tested fruits exposed together in choice test, the cucurbitaceous fruits can be arranged according to the infestation rate as following: white gourd, striped gourd, zucchini, cucumber, cantaloupe while the last cucurbit fruit (cantaloupe) showed no stings by *D. ciliatus* this observation help to protect exporting fruits like cantaloupe by using cheap fruits like gourd as plant traps. Also chemical analysis of different tested cucurbitaceous fruits was evaluated.

INTRODUCTION

The cucurbit fruit fly, *Dacus ciliatus* Loew (Diptera: Tephritidae) increases in Egypt day after day and its population became established as a result of favorable climatic conditions, continuous source of alternative hosts and lack of the actual control measures after disappearing period lasted 25 years (Fetoh 2004). *D. ciliatus* is a serious pest of cucurbitaceous fruits in many parts of the world and widely distributed in Tropical Asia, also found in North America, Africa and Egypt (Azab and Kira 1954, Weems 2002 & Fetoh 2006). The objective of the present work was testing the ability of the cucurbit fruit fly, *D. ciliatus* to attack and infest some of the cucurbitaceous fruits and study its biological parameters and life cycle.

MATERIAL AND METHODS

To study host preference of the cucurbit fly, *D. ciliatus* to cucurbitaceous fruits, its biological parameters and life cycle 50 pairs of newly emerged adults of *D. ciliatus* were caged in a 30x30x120 cm under laboratory conditions (12 hours photoperiod, 25±1°C and 70±5 % RH) and provided with sugar and enzymatic yeast hydrolyze as a food and water as a drink till maturation. After 7 days five fresh cucurbitaceous fruits like Striped and white gourd (*Cucumis melo dudiam elongate* L.) Zucchini (*Cucurbita pepo* L.), Cucumber (*Cucumis sativus* L.), Cantaloupe (*Cucumis melo* L.), these fruits were exposed separately in non-choice test and together in choice test, using three replicates. The fruits were removed from flies' cages after 24 hours and examined for detection the oviposition sites, eggs deposition and punctures, then incubated separately in plastic cups containing sand for pupation. The obtained pupae were kept till adult emergence to study life cycle and host preference level.

Chemical analysis of different cucurbitaceous fruits to detect protein, sugar and water carried out according to Birk *et al.*, (1962) and Michel *et al.*, (1956).

Statistical methods

Infestation indices and biological parameters were transformed to $\log x+1$ before analysis of variance (ANOVA). The means were separated by Duncan's multiple Range Test ($P \leq 0.05$).

RESULTS AND DISSCUSSION

Results in Table (1) show that some fruits of Cucurbitaceae infested in severe case like white gourd which received the highest mean number of stings occurred by *D. ciliatus* (16.33), while the cucumber showed the lowest mean number of stings (7.00) and there are significant differences appeared among the various cucurbitaceous fruits. The highest mean number of the obtained pupae per one kilogram of the cucurbitaceous fruits found also with white gourd (860.00), while the lowest mean number was belonged to cucumber (137.67). Pupal viability indicated no significant differences occurred among white gourd, striped gourd, zucchini and cantaloupe and significant difference among the previous tested cucurbitaceous fruits and cucumber when offered separately in non-choice test. The tested fruits can be arranged significantly in ascending manner as following: white gourd, cantaloupe, zucchini, striped gourd and cucumber in non-choice test.

TABLE (I)

Infestation indices by the cucurbit fly, *D. ciliatus* on different cucurbitaceous fruits in non-choice test.

Fruits	Mean No. of Stings/ Fruit	Range of Stings/ Fruit	Mean No. of Pupae/ 1Kg of Fruits	Range No. of Pupae/ 1Kg of Fruits	Pupal viability	Range of Pupal viability
White gourd	16.33a	(15-18)	860.00a	(840-885)	99.27 a	(98.7 -100.0)
Striped gourd	10.00b	(9-11)	787.00ab	(773-800)	95.67a	(89.5-99.3)
Zucchini	10.67b	(8-15)	704.33b	(600-770)	98.27a	(97.9-98.7)
Cucumber	7.00b	(4-10)	137.67 d	(120-155)	82.50b	(79.0-852)
Cantaloupe	12.00ab	(8-16)	596.33c	(500-677)	99.60a	(98.8-100.0)

The same letter(s) in the same column are not significantly different. ($P > 0.05$). Numbers between brackets refer to the range.

Data in Table (2) Show that the highest mean number of stings occurred when the fruits exposed together in choice test in case of white gourd (15.33), while the cucumber showed the lowest mean number of stings (5.33), furthermore cantaloupe showed no sting (0.00). The highest mean number of pupae per one kilogram of the cucurbitaceous fruits obtained after choice test was in white gourd (191.00), followed by striped gourd (147.33), followed by zucchini (95.00), followed by cucumber (37.67), followed by cantaloupe (0.00). Pupal viability showed significant differences among the tested cucurbitaceous fruits the tested fruits in choice test can be arranged significantly in ascending manner as following: white gourd, stripped gourd, zucchini, cucumber, and cantaloupe. The result in Table (3) showed that no significant differences occurred in different biological parameters and life cycle of the cucurbit fly although there were numerical differences among different means of egg -larval duration, pupal period and life cycle. The white gourd showed lowest egg -larval duration was 9.3 days while the cucumber showed highest egg -larval duration was 12.6 days. The zucchini showed lowest pupal period was 7.0 days while the cucumber showed highest pupal period was 8.0 days. The total life cycle of *D. ciliatus* ranged between 16.6 and 20.6 days with no significant difference among the tested fruits. The adult viability can be arranged in various fruits as following: cantaloupe, striped gourd, white gourd, zucchini and cucumber. Finally, sex ratio between females and males nearly about 50%. Data in Table (4) reveal that the chemical analysis for sugar in the different tested fruits had significant differences where the cantaloupe showed higher value and the cucumber showed lower value of sugar. The white gourd showed higher level of proteins, while the cantaloupe

revealed lower value. The cucumber showed higher level of water followed by the white gourd, the striped gourd, zucchini which have nearly the same amount of water and finally, the cantaloupe, which has little amount of water. This chemical analysis reveal that the cucumber with high amount of water has low infestation, while the white gourd and striped gourd have high amount of protein and moderate amount of water have high infestation. Furthermore the cantaloupe which had high infestation when exposed separately to *D. ciliatus* and no infestation occurred when exposed with other cucurbitaceous fruits has high amount of sugar, low amount of protein and moderate amount of water. There is no previous searches in this trend found, but in the same direction other searches found on the host preference of the Medfly, *Ceratitis capitata* Weid. Among vegetables like Back and Pemberton (1915) who mentioned that tomato and pepper attacked in Palestine by Medfly in non-choice test and no attack occurred on eggplant. Draz (1985) found that the most attractive vegetables to rearing Medfly were tomato, squash, hot pepper and cold pepper, while no pupation occurred in strawberry. Finally, Foda et al., (1989) mentioned that host preference of the Medfly among vegetables was arranged as: zucchini, tomato, pepper and no eggs deposited in eggplant.

TABLE (II)

Infestation indices by the cucurbit fly, *D. ciliatus* on different cucurbitaceous fruits in choice test.

Fruits	Mean No. of Stings/ Fruit	Range of Stings/ Fruit	Mean No. of Pupae/ 1Kg of Fruits	Range No. of Pupae/ 1Kg of Fruits	Pupal viability	Range of Pupal viability
White gourd	15.33a	(11-22)	191.00a	(185-200)	97.67a	(95.7-100.0)
Striped gourd	10.00ab	(7-12)	147.33b	(140-158)	94.53ab	(92.9-95.8)
Zucchini	9.67ab	(7-13)	95.00c	(90-100)	89.47b	(88.4-90.0)
Cucumber	5.33bc	(3-8)	37.67d	(31-44)	77.90c	(68.2-83.9)
Cantaloupe	0.00c	(0-0)	0.00e	(0-0)	0.00d	(0.0-0.0)

The same letter(s) in the same column are not significantly different. ($P > 0.05$). Numbers between brackets refer to the range.

TABLE (III)

Biological parameters of the cucurbit fly, *D. ciliatus* reared on cucurbitaceous fruits under laboratory conditions were 12 hours photoperiod, $25 \pm 1^\circ\text{C}$ and $70 \pm 5\%$ RH.

Fruits	Mean egg-larval Duration in days ^{Ns}	Pupal period in days ^{Ns}	Total life cycle ^{Ns}	Adult viability ^{Ns}	Sex ratio ^{Ns}	
					♀	♂
White gourd	9.3 (9-10)	7.3 (7-8)	17.0 (17-17)	96.67	50.05	49.95
Striped gourd	9.7 (9-10)	7.3 (7-8)	16.6 (16-18)	98.40	50.00	50.00
Zucchini	10.0 (9-11)	7.0 (6-8)	17.0 (17-17)	93.87	50.12	49.88
Cucumber	12.6 (12-14)	8.0 (7-9)	20.6 (19-23)	80.20	51.15	48.85
Cantaloupe	10.0 (9-11)	7.7 (6-9)	17.7 (16-19)	99.60	50.13	49.87

^{Ns} non significant ($P > 0.05$).

Numbers between brackets refer to the range.

TABLE (IV)

Chemical analysis of different cucurbitaceous fruits infested by the cucurbit fly, *D. ciliatus*.

Fruits	Sugar	Protein	Water
White gourd	5.53b (5.2-5.8)	2.77a (2.5-2.9)	93.97b (93.8-94.3)
Striped gourd	5.13b (4.9-5.5)	2.10b (1.9-2.3)	94.20b (94.0-94.4)
Zucchini	4.10c (3.9-4.2)	1.07c (1.0-1.1)	93.87b (93.6-94.0)
Cucumber	3.13d (2.9-3.4)	0.87cd (0.8-0.9)	95.23a (95.0-95.6)
Cantaloupe	7.63a (7.5-7.9)	0.67d (0.6-0.7)	91.57c (91.2-92.0)

The same letter(s) in the same column are not significantly different. ($P > 0.05$).

Numbers between brackets refer to the range.

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