

**POPULATION DYNAMICS OF THE CHRYSANTHEMUM FLY,
Trupanea stellata (F.) ON CHAMOMILE PLANTS AT FAYOUM
GOVERNORATE, EGYPT.**

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ABSTRACT:

Population dynamics of chrysanthemum fly, *Trupanea stellata* (F.) (Diptera: Tephritidae) on chamomile (*Matricaria chamomilla*) *recutita* was carried out in Ibshwai district, Fayoum Governorate, Egypt during 2009/2010 and 2010/2011 seasons. This work showed that both larval and total population had three peaks in the first season, in the second week of Dec., at the end of Jan. and in the second week of Feb. The highest peaks were found by the second week of Feb. Population of the adult stage showed five peaks. The highest was found by the second week of Jan. In the second season the population density was much lower than that in the first season. Larvae and total population had two peaks. Adult flies only had four peaks. The highest peak was in the beginning of April.

Key words: Ecology, Population dynamics; Chrysanthemum fly, *Trupanea stellata* (F.); Chamomile plants, (*Matricaria chamomilla*) *recutita*.

INTRODUCTION

Chamomile (German chamomile) *Matricaria* (*Chamomilla*) *recutita*, belongs to family Asteraceae. It is an annual plant mostly cultivated in Europe, south and north Africa, Asia, north and south America and New Zealand for its flowers that are used after dried or after being distilled for essential oils contained.

As medicinal plants, chamomile has been traditionally considered to be one of the group known to be antispasmodics, carminatives, diaphoretics, emmenagogues, sedatives and stomachic. The plants have been used as human remedy for asthma, colic, fevers, inflammations and cancer.

At least 26 insect pests belonging to 13 families and 5 orders are associated with common chamomile. The majority of the pests result in feeding damage on reproductive or vegetative organs (those under Thysanoptera and Heteroptera, including the Thripidae, Miridae, Pentatomidae and Pseudococcidae families), whereas others cause erosion or tunnels on heads (Noctuidae), leaves (beetles) or roots (Elateridae). *Metopoplax ditomoides*, *Nysius senecionis*, *Lygus rugulipennis* and *L. pratensis*, which are widespread in Italy, have very high population densities. Parasitoids *Telenomus eumicrosomoides* and *Anaphes fuscipennis* are also present. (Conti, 2003).

Knio et. al. (2007) mentioned that *Trupanea bisetosa* females deposited their eggs loosely among the corolla tubes without injuring the host tissues. The percentage of flower heads infested by *Trupanea nigricornis* in the field was higher than the percentage of flower heads infested by *T. bisetosa*. In many cases interspecific competition is low because the population densities of phytopagous insects are kept at low levels as a result of predation and parasitism.

Chamomile is exposed during flowering in the field to attack by the chrysanthemum fly, *Ttupanea stellata* (F.) (Hashem, 2008).

Little data were found on Roman and German chamomiles insect pests. The present study aims to describe the pest symptoms, population dynamics and the percentage of infestation for insect pest on German chamomile.

MATERIALS AND METHODS

The present study on the chrysanthemum fly, *Ttupanea stellata* (F.) was carried out in a private farm in Ibshwai district, Fayoum Governorate, Egypt during two successive seasons 2009/2010 and 2010/2011. Chamomile seedlings were cultivated the second week of October, in an area about one feddan. The experimental area received the usual recommended treatments and no chemical insecticides were applied through the whole study.

The population density of larvae and pupae of chrysanthemum fly was estimated by taking flower samples from chamomile plants. A sample of 100 chamomile flowers was collected randomly at weekly intervals after three weeks of planting to the end of crop.

To count the adult stage of chrysanthemum fly, insect samples were collected with 50 double sweep net using a standard 15 inch diameter sweeping net on weekly basis. All samples were transferred to laboratory for examination and count of larvae, pupae, infested flowers, and adults.

Obtained data were subjected to statistical analysis to estimate simple correlation and regression values between the number of individuals of each stage and weekly means of weather factors (max., min. temperatures and % RH) using correlation and regression analysis (SPSS 2000) version 11.

RESULTS AND DISCUSSION

Symptoms of infestation

As shown in fig. (1), adult females lay their eggs on the flowers, and after hatching, larvae bore inside the receptacles of the flowers. Larvae feed on the unripe and developing seeds causing dryness and brown coloration for some receptacles of the flower (3-7 receptacles for first larval instars). With old instars, symptoms appear as tunnels that extend on the head as dark brown line. Larva damage range from 25 to 37 receptacles during the total period of larval development. Larva is creamy or yellowish white in color. Developed larvae pupate either under attacked receptacles or inside flower calyx after making a hole in calyx wall. Pupae are dark brown at the beginning of development and later turn black.

Population dynamics:

In the first season, as shown in table (1) and figs.(2, 3) the larval stage of chamomile fly started to show in samples from the second week of Nov. and lasted to the third week of March. It had three peaks per season; by the second week of Dec, the end of Jan. and the second week of Feb. Also, total individuals populations showed three peaks in the same times of larval stage peaks. The highest peaks were found by second week of Feb and the end of Jan with 104 and 117 individs. / 100 flowers, respectively. Concerning adult stage, five peaks were evident. The first peak was found in the beginning of Dec. with 73 flies / 50 double sweep net, while the second peak (147 flies / 50 double sweep net) was in the end of Dec. the 3rd and highest peak was found by the second week of Jan. with 277 flies / 50 double sweep net. The 4th and 5th peaks were recorded by fourth week of Jan. and the end of Feb., respectively.

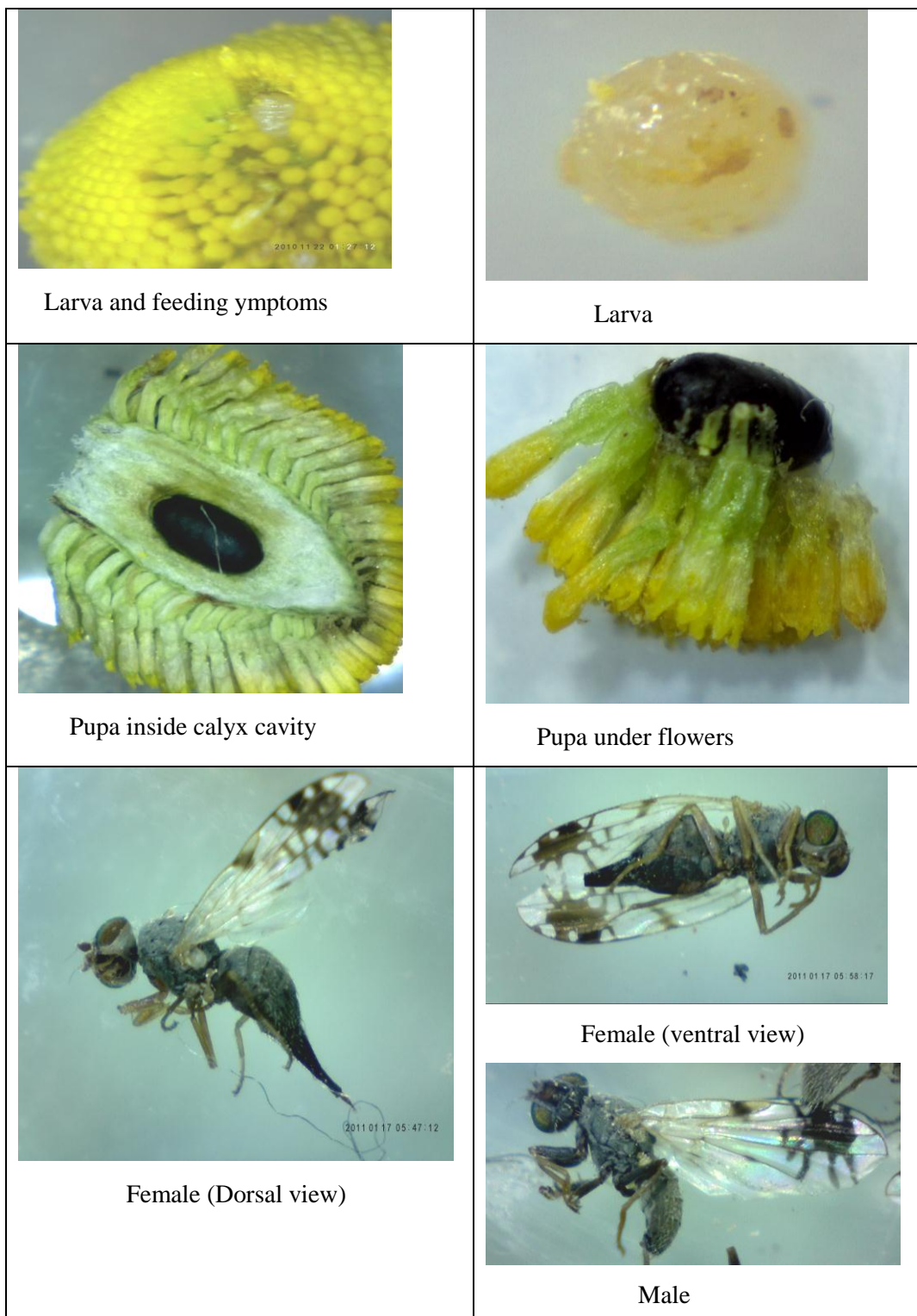


Fig. 1. Larval, Pupal, and adult stages of the chrysanthemum fly, *Trupanea stellata*.

Table 1: Population dynamic of the chrysanthemum fly, *Trupanea stellata* on chamomile flowers at Ibshwai, Fayoum governorate during 2009 / 2010 season.

Date of inspection	No. of chrysanthemum fly individs./ 100 flowers				No. of adults/50 D. S.N.*	Weather factors		
	Larvae	pupae	Total	% infestation		Temp. °C		% RH
						Max.	Min.	
16/10/2009	00	00	00	00	00	32.6	19.6	49
23/10	00	00	00	00	00	34.3	18.8	47
30/10	00	00	00	00	00	28.1	15.8	49
6/11	00	00	00	00	00	26.1	12.6	47
13/11	00	00	00	00	00	28.9	12.5	48
20/11	02	00	02	07	03	23.3	11.5	56
27/11	07	00	07	05	31	23.9	11.5	55
4/12	11	00	11	25	73	23.2	10.3	54
11/12	29	00	34	8	66	21.6	9.5	54
18/12	13	01	30	25	40	21.7	8.3	49
25/12	10	00	10	26	147	22.5	8.2	54
2/1/2010	19	01	21	27	117	23.4	9.3	57
8/1	26	02	30	30	277	22.4	8.0	57
15/1	41	02	51	36	93	23.2	7.1	54
22/1	60	05	75	58	99	22.0	7.9	52
29/1	97	20	117	76	65	20.1	6.8	53
5/2	23	23	46	17	38	22.8	7.8	48
12/2	104	03	107	68	20	21.0	5.1	45
19/2	49	17	56	63	44	29.3	9.7	49
26/2	18	16	34	29	107	27.0	10.0	50
5/3	06	04	10	07	77	24.7	9.0	53
12/3	03	03	05	03	61	31.0	13.5	49
19/3	01	02	03	03	55	28.9	13.2	51
26/3	00	00	00	00	11	24.0	9.8	51
2/4	00	00	00	00	00	26.5	10.5	41

*Double sweep net

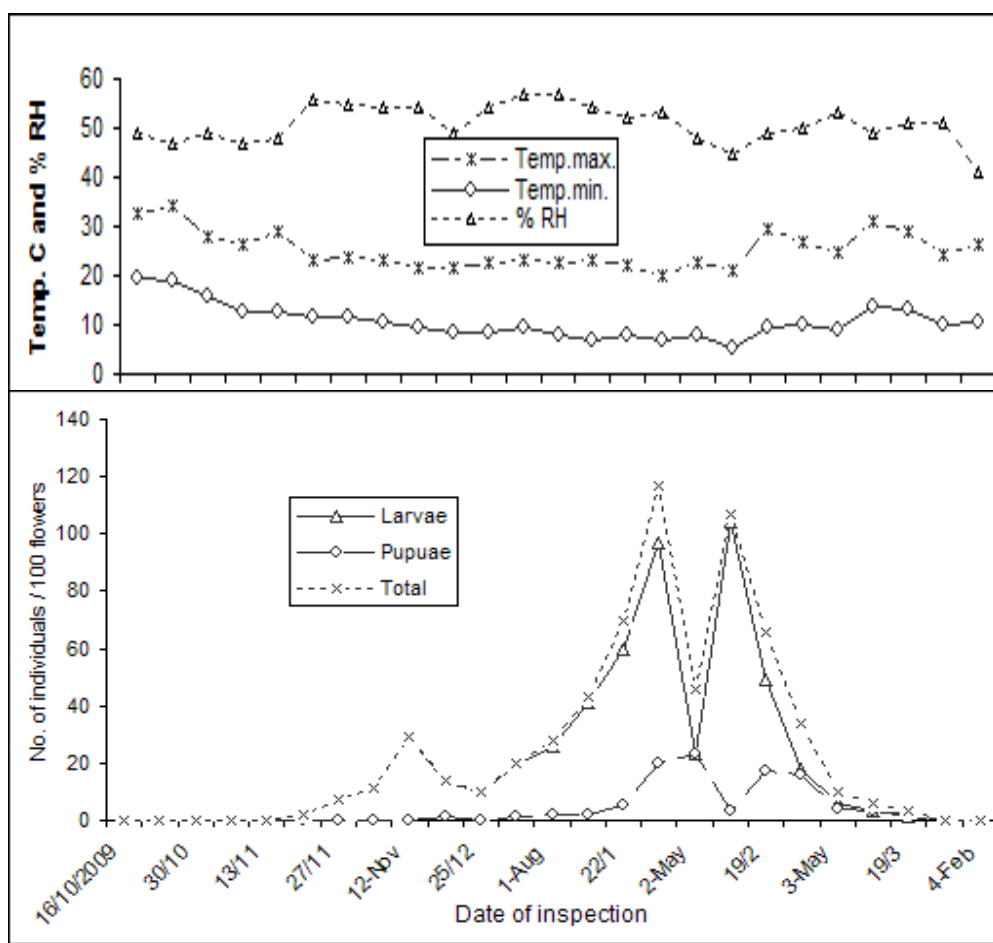


Fig.2. Weekly counts of the chrysanthemum fly, *Trupanea stellata* larval and pupal stages at Fayoum Governorate during 2009 / 2010 season

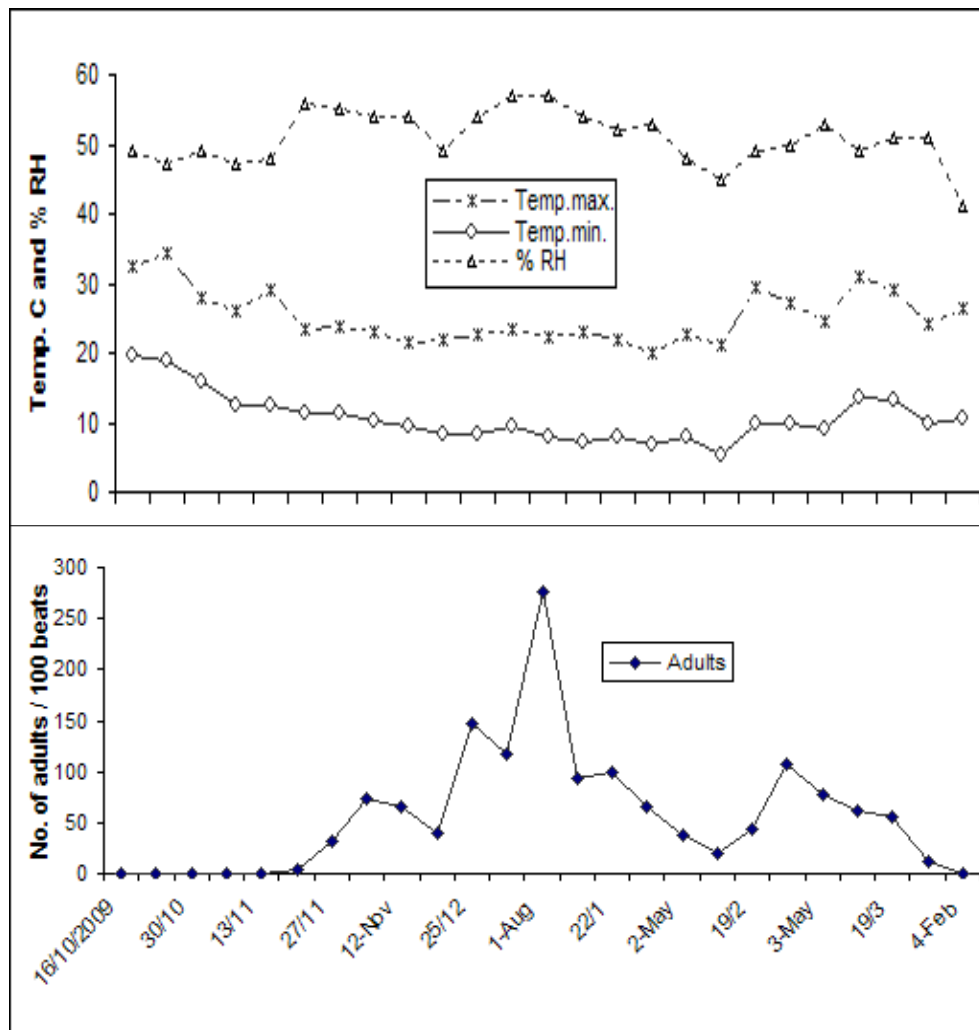


Fig.3. Weekly counts of the chrysanthemum fly, *Trupanea stellata* adult stage at Fayoum Governorate during 2009 / 2010 season

Table 2. Population dynamic of the chrysanthemum fly, *Trupanea stellata* on chamomile flowers at Ibshwai, Fayoum governorate during 2010/2011 season.

Date of inspection	No. of chrysanthemum fly individs./ 100 flowers				No. of adults/50 D.S.N.	Weather factors		
	Larvae	Pupae	Total	% infestation		Temp. °C		% RH
						Max.	Min.	
15/10/2010	00	00	00	00	00	37.3	20.9	48
22/10	00	00	00	00	00	40.5	24.	51
29/10	00	00	00	00	00	34.0	20.5	52
05/11	00	00	00	00	00	30.5	17.5	51
12/11	00	00	00	00	00	32.0	17.3	54
19/11	00	00	00	00	04	30.3	17.0	55
26/11	05	00	05	05	07	29.0	17.0	57
03/12	09	02	11	09	17	29.6	13.3	52
10/12	16	02	18	12	07	29.4	13.0	52
17/12	08	04	12	09	01	20.8	08.9	49
24/12	05	05	10	06	03	21.9	08.8	56
31/12	03	00	03	05	03	24.2	09.2	54
07/01/2011	03	00	03	03	02	20.7	09.3	58
14/01	00	00	00	01	08	20.9	07.4	57
21/01	00	00	00	00	00	18.9	07.7	62
28/01	02	00	02	03	01	20.7	07.2	51
04/02	03	00	03	04	03	23.4	10.1	51
11/02	05	00	05	06	14	21.6	11.5	57
18/02	10	00	10	12	19	20.5	08.4	50
25/02	13	06	19	16	08	23.9	09.0	45
04/03	20	08	28	29	13	22.2	08.8	49
11/03	08	04	12	11	14	24.2	10.2	49
18/03	03	00	03	05	19	25.2	07.5	51
25/03	01	00	01	02	25	27.3	10.2	50
01/04	03	00	03	18	28	26.3	10.0	49
08/04	09	00	09	10	05	28.0	12.5	49

*Double sweep net

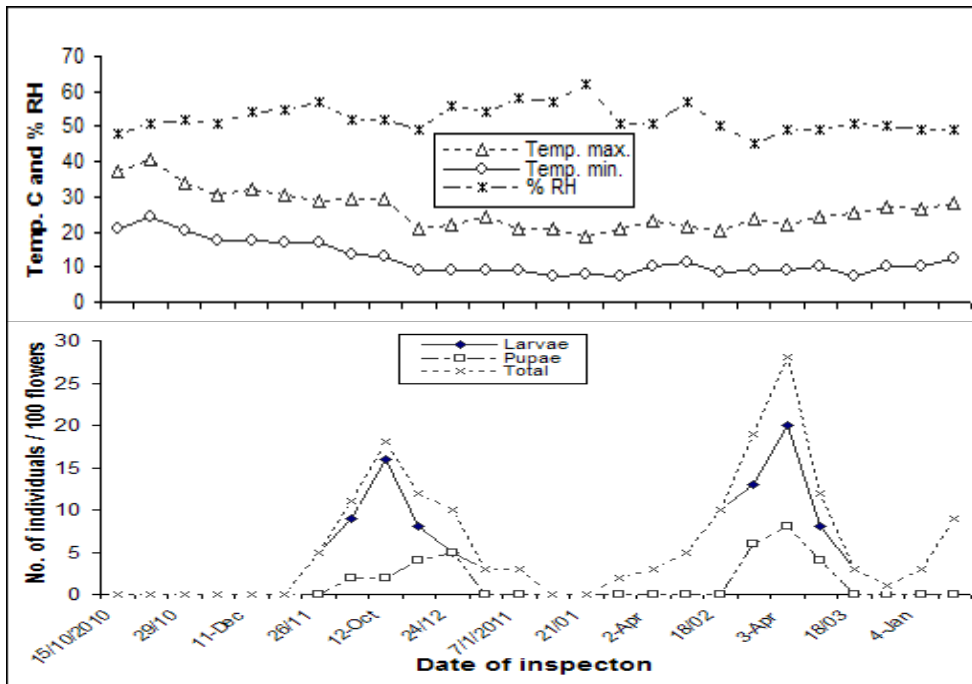


Fig.4. Weekly counts and percentage of infestation of the chrysanthemum fly, *Trupanea stellata* larval and pupal stages at Fayoum Governorate during 2010 / 2011 season.

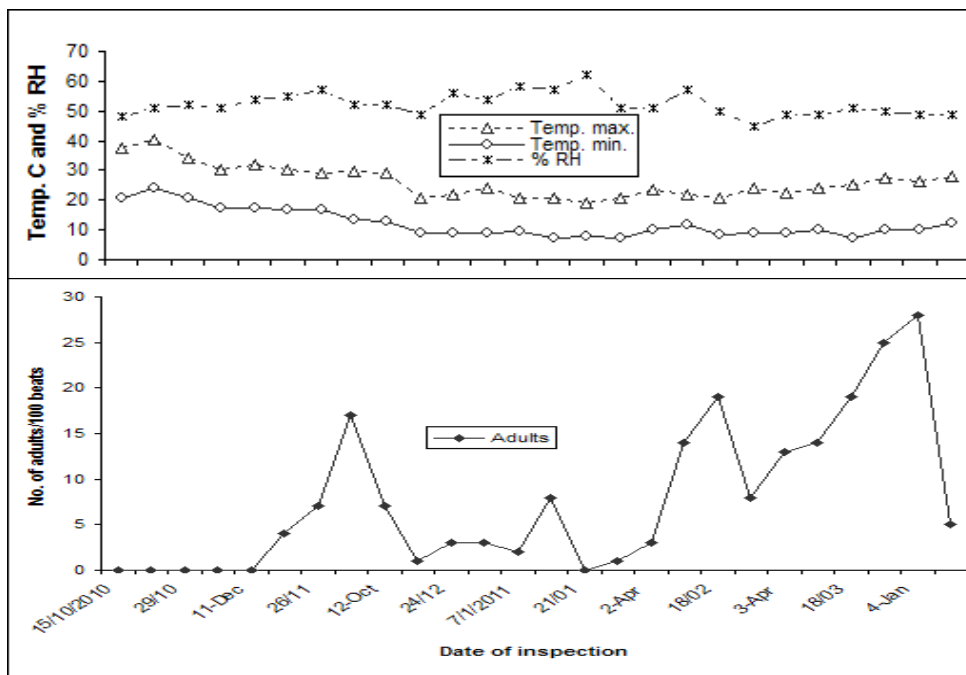


Fig.5. Weekly counts of the chrysanthemum fly, *Trupanea stellata* adult stage at Fayoum Governorate during 2010 / 2011 season.

Table 3

In the second season, data in table (2) and figs (4, 5) revealed that the population densities of chrysanthemum fly stages were much lower than those of the first season. Larvae and total population had two peaks. The first peak was found by second week of Dec. with 16 and 18 individs. / 100 flowers for larvae and total, respectively, while the second peak was in the beginning of March with 20 and 28 individs. / 100 flowers. Concerning adult stage, population density had four peaks. The lowest peak was found by mid Jan. with 8 flies / 50 double sweep net, while the highest peak was in the beginning of April with 28 flies / 50 double sweep net.

Effect of weather factors on population:

Statistical analysis, table 3, showed that the effect of maximum temperature on population density was insignificant negative except with population of larvae and total in the first season where the simple correlation was highly significant negative ($r = -0.519$ and -0.541). Concerning minimum temperature, simple correlation was highly significant with larvae and total population, while it was insignificant negative with pupae and adults in the first year. It was insignificant negative with all parameters of second season. The effect of % RH in the first season was highly significant positive on adult population. Also, it was insignificant positive on larvae population, but was insignificant negative on pupae and total population. In second season, the simple correlation was significant negative between relative humidity and population of larvae and total. Also, it was negative but insignificant between relative humidity and population of pupae and adults.

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دراسة تذبذبات التعداد لذبابة الكريزانثم (*F.*) *Trupanea stellata* على نباتات شيح البابونج في محافظة الفيوم

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أجريت دراسة لتذبذبات التعداد لذبابة الكريزانثم (*F.*) *Trupanea stellata* على نباتات الشيح البابونج *Matricaria chamomilla* في مركز أيشواي محافظة الفيوم، مصر خلال موسمين متتاليين ٢٠٠٩/٢٠١٠ و ٢٠١٠/٢٠١١. أظهرت الدراسة ان تعداد الحشرة في الموسم الأول اعلى كثيرا من تعدادها في الموسم الثاني. وقد سجل تعداد اليرقات والمجموع الكلي ثلاث قمم في الموسم الأول، كانت هذه القمم في الأسبوع الثاني من ديسمبر و نهاية يناير والأسبوع الثاني من فبراير، كانت أعلى قمة في التعداد في كل من اليرقات و المجموع الكلي خلال الأسبوع الثاني من فبراير. أما بخصوص الحشرات الكاملة فقد سجل التعداد خمس قمم أعلاها في الأسبوع الثاني من يناير. في الموسم الثاني سجلت اليرقات والمجموع الكلي قمتين فقط بينما سجلت الأفراد الكاملة أربعة قمم كانت أعلاها في بداية أبريل.