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Ecological Studies and Effect of Different Rates to Nitrogen Fertilizer on *Aphis Gossypii* Glover (Hemiptera: Aphididae) Infesting *Chrysanthemum Morifolium*

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ABSTRACT

Chrysanthemum morifolium, is one of the most important marketable ornamental and flower plants. The experimental carried out at El - Orman Garden, Giza Governorate, Egypt. The present aimed to studying population fluctuation of Aphis gossypii Glover insect and the effect of different nitrogen rates on the densities of chrysanthemum *Aphis gossypii* infesting chrysanthemum plants during two successive seasons from September 2020 to August 2021 and from September 2021 to August 2022. studied using four different species and colors of *C. morifolium* Plant in Giza Province. Seasonal abundance of The cotton aphids (*A. gossypii*) and the relation between the population activity, weather factors were studied during two seasons from September 2020 to August 2021 to September 2021 to August 2022 seasons on the Chrysanthemum Plant. At El-Orman Garden, Giza Governorate. data indicated that the total stages of the cotton aphids (*A. gossypii*) have overlapping two generations; the first one with highest number occurred at the mid of April while the 2ndgeneration occurred in early May. Generally the infestation of The cotton aphids in during season, Sept. 2021 and Aug. 2022, more than during season, Sept. 2021 and Aug. 2022. The data illustrate that aphis gossypii record, 4th and 5th generations on white, red, yellow and pink. Especially, population density to *A. gossypii* on 4th species to *C. morifolium* disclosed that white species was more susceptibility where come to first order contrast by other species, in case of Nitrogen fertilization, the results revealed that the lower population of the cotton aphids, *A. gossypii* (1.08 insects /leaflet) in the treatment of lower nitrogen rate (2 grams N/liter) then the population increased to 1.16 insects /leaflet in treatment of 3 liter N/liter. The 3rd rate of N fertilizer (3 grams N/liter) recorded 1.30 insects /leaflet but the maximum population recorded (1.46 insects /leaflet) in treatment of 5 grams N per liter.

Keywords: Aphids, *Aphis gossypii*, *Chrysanthemum morifolium*, abiotic factors and population fluctuation.

1. Introduction

Chrysanthemum morifolium, is one of the most important marketable ornamental and flower plants. Chrysanthemum (*Chrysanthemum morifolium* Ramat) which we commonly known as Autumn Queen is one of the most important ornamental plants as cut flowers and pot plants. It is a member of the Asteraceae family and native to Northern hemisphere, chiefly Europe and Asia (Anderson, 1987). Owing to its has high medicinal benefits, ornamental plants and floriculture value, it contributes a very large share of Horticultural (GDP abbreviation on what) and world flower trade. Besides, benefits medicinal its adding economic importance, it has aesthetic importance to a place. Chrysanthemums are sold as annuals at garden centers every autumn season. The mums are actually perennials and will bloom for years if planted correctly. The medicinal and aromatic plants are Infested with aphids and thrips. *Aphis gossypii* Glover and *Macrosiphoniella sanborni* (Gillete) (Homoptera: Aphididae), commonly known as chrysanthemum aphid, is an important pest of chrysanthemum. The adults and nymphs of aphid attack the chrysanthemum plants and suck the cell sap from flowers tender shoots and buds to breakable, ultimately decreasing the market value of chrysanthemum flowers. Aphid infestation cause badly affects the flowering capacity of plants, resulting in 20-40% losses. The aphids are apterous and

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reproduce parthenogenetically. Aphid populations may increase very rapidly under natural conditions (Gilkeson and Kelin 2001 & Islam 2007). The seasonal abundance of aphid is significantly influenced by the environmental factors such as temperature, relative humidity and rainfall, It is not much than other factors, temperature is an important environmental variable that affects the rate of aphid development, reproduction, mortality, survival and subsequently its population increase (Dixon, 1987). More than 15 species are known to colonize cultivated and wild chrysanthemum (Miller and Stoetzel, 1997). Aphidian were recorded:

Aphis fabae Scopoli, Aphis gossypii Glover, Colorado rufomaculata, Macrosiphoniella sanborni and Myzus persicae. A. gossypii was the most dominant species throughout the study period while *M. persicae* is the lesser species (Hayder B. Ali, 2017). In greenhouse ornamental production, fertilizers are being extensively used to produce high-quality crops. Frequently cited as an unwanted consequence of increased fertilization is an increase in plant nitrate and soluble amino acids (Mengel and Kirkby, 2001), population growth rate and development time of phytophagous insects are influenced not only by plant nutrient levels but also nutrient ratios (Jansson and Ekbom, 2002). Responses by aphids to fertilization vary greatly. Some studies report that nitrogen fertilization does not affect either aphid fecundity or number. (Archer *et al.,* 1995), found that the fecundity of *Aphis gossypii* Glover differs among cultivars of chrysanthemum regardless of irrigation or fertilizer levels. However, studies of *A. gossypii* on cotton show that aphid fecundity increases with increasing nitrogen fertilization (Nevo and Coll, 2001). showed that leaf nitrogen is higher in young and physiologically mature leaves than older, basal leaves, with production agriculture, environmental concerns and government regulations have prompted the need to reduce point-source runoff. As a result, fertilizer usage for a number of ornamental crops such as roses, poinsettias, and hydroponically grown chrysanthemum has been modified (Rose and White, 1994). However, strategies for judicious use of fertilizers that maintain plant marketability, minimize aphid population growth, and reduce pesticide usage are needed a better understanding of the influence of fertilization not only on pest populations but also on pesticide usage may form the foundation for the development of reduced-input crop management practices.

In studying to (Vehrs *et al*., 1992,) revealed that the shift from organic soil management to chemical fertilizers has increased the potential of certain insects and disease to cause economic losses. (Yardım and Edwards, 2003). Fertilization levels for ornamental crops may influence the dynamics of pest numbers, crop quality, and pest management strategy (Chau *et al.*, 2005).The present deliberating aimed to studying population fluctuation of *Aphis gossypii* Glover insect and the effect of different nitrogen rates on the densities to chrysanthemum aphid (Hemiptera: Aphididae) infesting chrysanthemum plants.

2. Materials and Methods

2.1. Ecological studies

The ecological studies on Aphid specimens colonizing cultivated chrysanthemum plants were collected from El-Orman Garden, Giza Governorate, Egypt, Counting started during period from September,2020 to August,2021 and 2021 to 2022, respectively. Aphids were collected from cultivated chrysanthemums plants with a fine brush and preserved in 70% ethyl alcohol. The collecting and preserving technique was based mainly on (Eastop and Van Emden 1972) method, for slides preparation, maceration and clearing of the specimens with a simple procedure for preparing balsam mounts is as follow (Martin 1983).

2.2. Experiment design

The experiment was conducted on four colors of Chrysanthemum morifolium cultivars: white, Lapana Red, Yellow Ambassador and Pink lilac. Throughout two successive seasons (2020-2021 and 2021-2022) at El-Orman Garden, Giza Governorate, Egypt. The four cultivars were allowed for irrigation and each cultivar was planted in three plots (replicates), with total number of 12 replicates for all cultivars. The plot size was 3m x 4m and contains ten rows. 32 plants in each row, with 30 cm width the row, and 12.5 cm between plants and the experiment was maintained free from using pesticides.

2.3. Population density of aphids

The estimation of population density of aphids, randomized selected three plants/ cultivar/ replicate/ week, the plants (samples) were transferred in to polyethylene bags (36 plant samples/ week),

the plants were kept in refrigerator thenceforth the aphids were collected on three plants and counted.

2.4. Weather factors

Effects of weather factors on the population of Aphid included day- maximum temperature (D. Max. T.), day minimum temperature (D. Min. T.) and daily mean relative humidity (D.M. R.H.) were studies. Records of the weather factors of Giza Governorates were obtained from the Central Laboratory for Agriculture Meteorology, Agricultural Research Center, Ministry of Agriculture. The daily records of each weather factor were grouped as averages biweekly according to the sampling dates. These averages were assumed to represent the field experimental records at sampling times.

2.5. Nitrogen fertilization levels and insects

Cuttings *Chrysanthemum morifolium* were transplanted into pots (15.5 cm in diameter 14.5 cm) in depth, with four cuttings per pot. Chrysanthemum require elevated and balanced levels of nitrogen for proper vegetative growth (Crater, 1992). Commercially available and complete fertilizer was used as the source of nutrients. The fertilizer used provides 53% Nin nitrate form, 20.4%Nin ammoniacal form and 26.1% N in urea form. This formulation is recommended by propagators to reduce leaf yellowing and increase longevity (Yoder Brothers Inc., 2001). Plants were fertilized twice a week and watered as needed between fertilizations. Depending on the fertilization levels, 200 ml of reverse-osmosis- treated tap water (for no fertilization) or fertilizer solution (for the other fertilization levels) was applied to each pot When there was 2–2.5 cm of new growth on plants, Aphids used in the studies were obtained from an *A. gossypii* colony established originally with individuals collected from chrysanthemum grown in El-Orman Garden, Giza. The colony was maintained in the laboratory at 26^{O}C and 45% relative humidity (RH). we applied Three replicates were designed, plant-to-plant (two Chrysanthemum morifolium plants were randomly selected from each pot then upper, middle and lower leaflets and flowers were investigated weekly in early morning by using 30X hand lens. Numbers of *Aphis.*

***2.6. A. gosypii* were recorded**

In order to study the effect of nitrogen fertilization levels on coexistence of Aphis on Chrysanthemum plant, all the previous mentioned procedures were followed. In addition, four rates of nitrogen fertilization (2, 3, 4 and 5 grams/Liter) were added to soil at 7, 14, 21 and 28 days from transplanting date. The data were statistically analyzed and means were compared at 0.05 probability level. (Gomez and Gomez, 1984).

2.7. Statistical analysis

The simple correlation (r) and regression coefficient value (b) were adopted to clarify the change in population due to change in each of weather factors and the mean values compared with the least significant differences as well as, SAS program (SAS Institute 1988).

3. Results and Discussion

3.1. Population fluctuation of *Aphis gossypii* Glover on *Chrysanthemum morifolium* during season, 2020 / 2021 and 2021 / 2022 At El-Orman Garden, Giza Governorate:

Population fluctuations of the different stages of *Aphis gossypii* Glov. on *Chrysanthemum morifolium* were studding during season, Sept. 2020 / Aug. 2021 and Sept. 2021 / Aug. 2022. About 200 plants samples of Chrysanthemum sp. during period from Sept. 2020 to Aug.2021 were examined, the results show that there were one aphid specie was monitoring in related to family Aphididae.

A. gossypii, is well-known fact that precise knowledge of appropriate date of the *Aphis gossypii* activity from the one hand and number and duration of annual field generations from the other is considered the fundamental basic information for Integrated Pest Management programs. This work was dedicated to monitor the changes in the population density of *Aphid gossypii*, which occurs on the *C. morifolium*. The first, by integrating the fluctuations in the seasonal abundance curve expressed as number of half monthly count on *C. morifolium* at El-Orman Garden, Giza Governorate.

3.2. Population fluctuation of *Aphis gossypii* Glover on *Chrysanthemum morifolium* during season, 2020 / 2021.

Data tabulated in Table (1) and Fig. (1) show the population fluctuations of *Aphis gossypii* at El-Orman Garden, Giza Governorate infesting 4 species of *Chrysanthemum morifolium* ie white, red, yellow and pink, the two samples were taken per month during 2020-2021 season. From Table 1. The data illustrate that *aphis gossypii* record 4th, 5th, 3rd and 4th generations on white, red, yellow and pink, these generations were as follow 4 individuals, 1,98 and 6 individuals at a period 1/10/2020, 15/12/2020,15/4/2021 and 1/8/2021, respectively on the white ambassador. In case of red record 4th peaks at the date 15/10,15/11/2020,1/5 and 15/7/2021 recorded (3,2, 41 and 5 individuals per 5 flowers). On the other hand, in case of yellow the data in table 1. Deduced that aphis gossypii have three generations during developmental season beginning 1/10/2020 to 15/8/2021, the first generation occur in 15/9/2020 recorded 3 individuals, the second generation 15/12/2020 with 1 individual and the third generation record 44 individuals at 15/4/2021, respectively. While population fluctuation *A. gossypii* record 5th generation on pink species as follow 3,3,1,35 and 4 individuals at the date 1/10,15/10, 1/12/2020,1/5 and 15/7/2021.

Table 1: Population fluctuation of *Aphis gossypii* Glover on *Chrysanthemum morifolium* during season, 2020 / 2021.

Date	Average no. of *A. gossypii* / 5 flowers				Total	Weather factors		
	White Ambassador	Red Lapan a Red	Yellow mbassador	Pink lilac		Max. Temp	Min. Temp	RH%
01/09/2020	4	2	1	2	**9**	35.6	23.4	86.2
15/09/2020	3	2	3	1	**9**	34.8	20.8	87.2
01/10/2020	4	3	2	3	**12**	32.6	21.9	84.7
15/10/2020	3	3	3	1	**10**	30.1	19.7	85
01/11/2020	2	1	1	3	**7**	24.7	17.8	74.2
15/11/2020	1	2	1	0	**4**	22.4	14.9	82.6
01/12/2020	0	0	0	1	**1**	24.2	13.2	61.4
15/12/2020	1	0	1	0	**2**	20.6	10.6	93.6
01/01/2021	0	0	0	0	**0**	19.7	10.4	88.6
15/01/2021	2	0	1	0	**3**	22.8	14.4	92.2
01/02/2021	2	1	2	0	**5**	19.6	10.5	75.9
15/02/2021	5	2	1	3	**11**	24.3	12.8	82.8
01/03/2021	18	16	11	3	**48**	19.4	10.2	91.8
15/03/2021	24	20	22	5	**71**	23.3	11.4	77
01/04/2021	77	20	24	23	**144**	24.4	13.8	69.4
15/04/2021	98	36	44	25	**203**	25.4	11.8	71.5
01/05/2021	81	41	35	35	**192**	32.5	16.3	71.6
15/05/2021	62	13	9	30	**114**	36.6	21.4	60.3
01/06/2021	49	10	9	8	**76**	33.8	20.3	76
15/06/2021	13	11	5	3	**32**	33	21	77.5
01/07/2021	11	4	4	3	**22**	35	22.8	77.3
15/07/2021	5	5	1	4	**15**	36.3	24.5	78
01/08/2021	6	2	1	2	**11**	36.7	24.8	80.1
15/08/2021	5	1	1	1	**8**	38.9	27.5	82.8
Total	**476**	**195**	**182**	**156**	**1009**	-	-	-
Mean	**19.8**	**8.1**	**7.5**	**6.5**	**42**	-	-	-

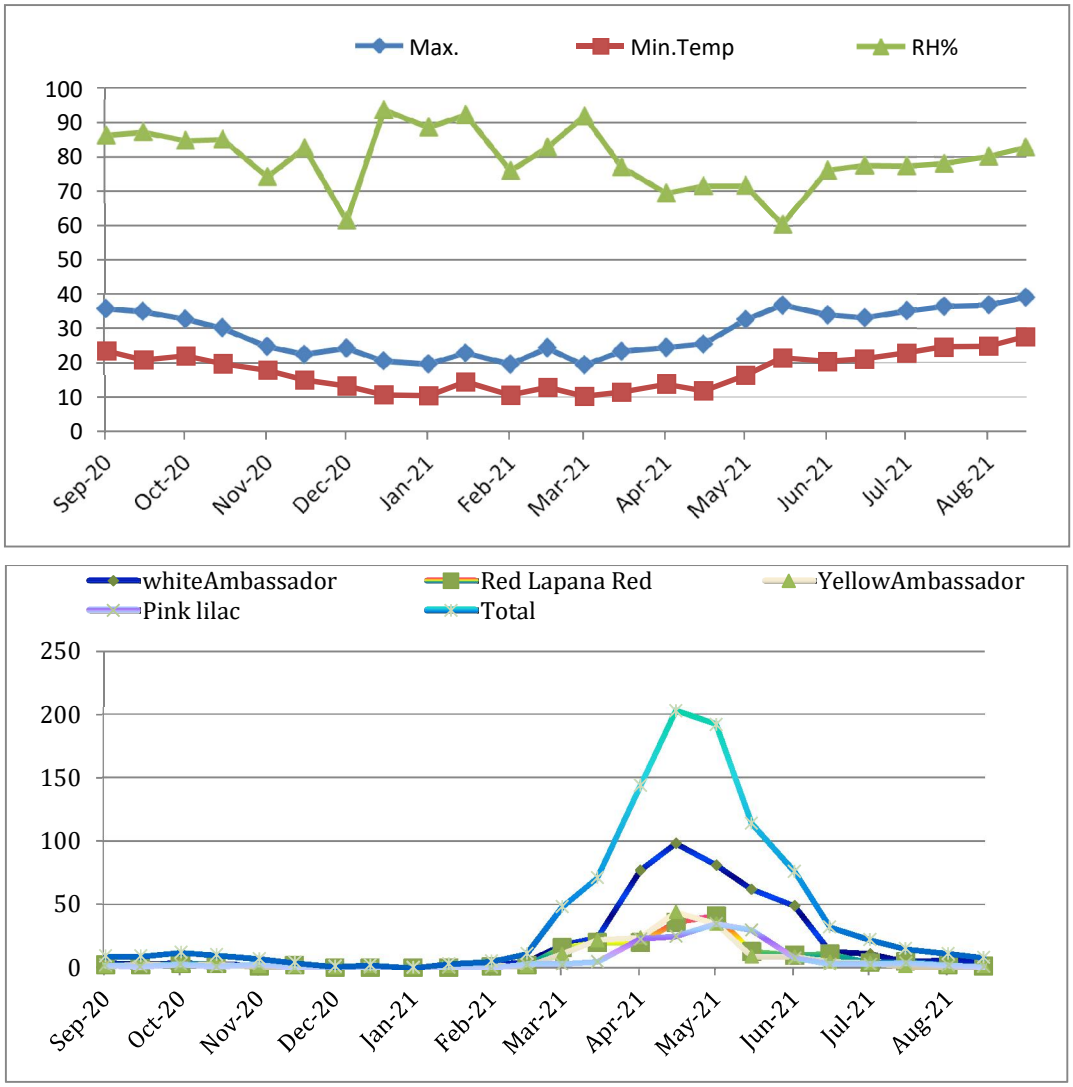


Fig. 1: Biweekly average No. of *Aphis gossypii* infesting *Chrysanthemum morifolium* in El-Orman Garden, during Sept. 2020 and Aug. 2021. Season.

Regarding population density to *A. gossypii* on 4th species to *C. morifolium* disclosed that white species was more susceptibility contrast by other species, recorded 476 individuals followed by red 195 individuals, yellow 182 individuals thenceforth the pink 156 individuals.

It is well-known fact that precise knowledge of the appropriate date of the insect activity, number and duration of annual field generations are considered the fundamental basic information for Integrated Pest Management programs so, this work was dedicated to monitor the changes in the population density of the *A. gossypii* on the *Chrysanthemum morifolium* plants,

The Aphid individuals appeared by early of September and reduction gradually in the months of December and January and then gradually increased to make the

first generation with the highest number by mid of April with average mean number 203 individuals when maximum temperature was 25.4°C, minimum temperature was 11.8°C and the relative humidity was 71.5%; after that the infestation with total stages decreased to early June. and decreased again till the end of the Season.

3.3. Influence of Weather Factors:

Weather factor affect on population fluctuation of *A. gossypii* the "P": Probability level were varied between fourth species, but record 0.785 and 0.403 for max. and min. Temperatures respectively.

However, statistical analysis proved an obvious relation between relative humidity and the population fluctuation of *Aphid gossypii*; simple correlation coefficient ((r)) was -0.583, while ((p)) was 0.009.

Table 2: Simple correlation and regression values between the weather factors and biweekly mean No. of *Aphid gossypii* infesting Chrysanthemum morifolium in El-Orman Garden during Sept. 2020 and Aug. 2021.

Variable		Simple correlation "r"	Probability "P"	E.V %
White	Max. Temp	0.870	0.658	58%
	Min. Temp.	-0.142	0.508	
	R.H. %	-.0550**	0.005	
Red	Max. Temp	0.005	0.980	54.1%
	Min. Temp.	-0.299	0.283	
	R.H. %	-0.402	0.051	
Yellow	Max. Temp	-0.079	0.714	52.2%
	Min. Temp.	-0.301	0.152	
	R.H. %	-0.390	0.060	
Pink	Max. Temp	0.180	0.400	62.8%
	Min. Temp.	-0.051	0.812	
	R.H. %	-0.615**	0.001	
Total	Max. Temp	0.059	0.785	59.8
	Min. Temp.	-0.179	0.403	
	R.H. %	-0.583**	0.009	

"r" : Correlation coefficient " "P": Probability level

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

3.4. Population fluctuation of *Aphis gossypii* Glover on *Chrysanthemum morifolium* during season, 2021 / 2022.

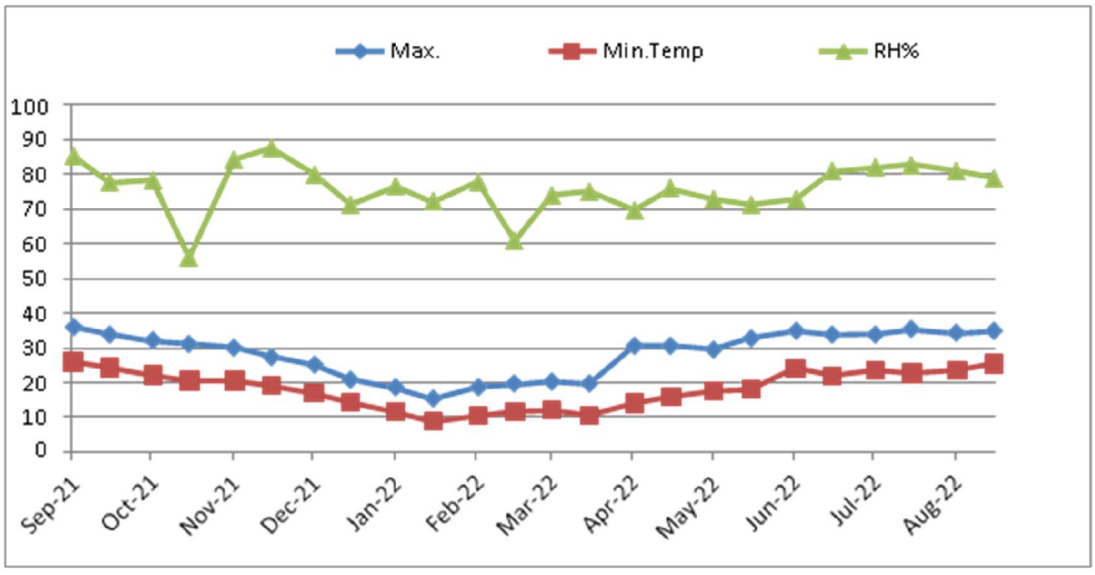
Data tabulated in Table (3) and Fig. (2) show the population fluctuations, population density and generation of *Aphis gossypii* at El-Orman Garden, Giza Governorate infesting 4 species of *Chrysanthemum morifolium* i.e white, red, yellow and pink, the two samples were taken per month during 2021-2022 season. From Table 3. The data illustrate that *aphis gossypii* record 5^{th}, 5^{th}, 5^{th} and 4^{th} generations on white, red, yellow and pink, these generations were as follows 8, 4,3, 112 and 6 individuals at a period 15/9, 1/11, 1/12/2021, 15/4 and 1/8/2022, respectively on the white ambassador. In case of red record 5^{th} peaks at the date 1/12/2021,15/2, 15/4, 1/6 and 1/8/2022 recorded (2,18, 24,11 and 4 individuals per 5 flowers). On the other, in case of yellow the data in Table 3. Deduced that *aphis gossypii* have five peaks during developmental season beginning 15/10,15/11/2021, 1/3,1/4 until 1/8/2022 record the first peak recorded 2 individuals, the second peak 2 individual, the third peak record 31 individuals, the fourth peak record 47 individuals and the fifth peak record 3 individuals, respectively. While population fluctuation A. gossypii record 4^{th} generation on pink species as follow 4,1,31 and 3 individuals at the date 15/9,1/12/2021, 15/4 and 1/8/2022.

Regarding population density to *A. gossypii* on 4^{th} species to *C. morifolium* disclosed that white species was more susceptibility and come to first order contrast by other species, recorded 560 individuals followed by yellow species 235 individuals, pink 156 individuals thenceforth the red 144 individuals.

The Aphid individuals appeared by early of September and reduction gradually In the months of December and January, then gradually increased to make the highest number by first of April with record 206 individuals when maximum temperature was 30.6°C, minimum temperature was 16°C and the relative humidity was 75.8%; the population density was increased on the half of December with total number of 111 individuals when maximum temperature was 32.9°C and minimum temperature was 18°C while, the relative humidity was 71.2% and decreased again till the end of the season.

Table 3: Population fluctuation of *Aphis gossypii* Glover on *Chrysanthemum morifolium* during season, 2021 / 2022

Date	Average no. of *A. gossypii* / 5 flowers				Total	Weather factors		
	White mbassador	Red Lapan a Red	Yellow Ambassador	Pink lilac		Max. Temp	Min. Temp	RH %
01/09/2021	5	3	2	2	**12**	36	26	85.2
15/09/2021	8	1	1	4	**14**	33.9	24.3	77.4
01/10/2021	6	1	2	2	**11**	31.9	22.1	78.4
15/10/2021	3	0	2	2	**7**	31.2	20.5	56
01/11/2021	4	1	1	1	**7**	30.2	20.5	84.2
15/11/2021	2	2	2	0	**6**	27.5	19	87.6
01/12/2021	3	2	1	1	**7**	25.2	16.9	80
15/12/2021	1	1	0	0	**2**	20.9	14.2	71.3
01/01/2022	3	0	2	0	**5**	18.4	11.5	76.5
15/01/2022	3	0	2	1	**6**	15.2	8.7	72
01/02/2022	11	14	16	1	**42**	18.8	10.4	77.8
15/02/2022	15	18	23	1	**57**	19.5	11.6	60.8
01/03/2022	33	11	31	3	**78**	20.3	12	74
15/03/2022	41	9	22	13	**85**	19.6	10.5	75
01/04/2022	84	14	47	22	**167**	30.6	14.1	69.6
15/04/2022	112	24	39	31	**206**	30.6	16	75.8
01/05/2022	50	11	11	20	**92**	29.6	17.5	72.8
15/05/2022	74	10	11	16	**111**	32.9	18	71.2
01/06/2022	56	11	10	18	**95**	34.8	24.2	72.8
15/06/2022	16	2	1	11	**30**	33.8	22	80.7
01/07/2022	17	1	2	1	**21**	34	23.5	81.8
15/07/2022	5	1	2	1	**9**	35.2	22.7	82.8
01/08/2022	6	4	3	3	**16**	34.2	23.6	80.9
15/08/2022	2	3	2	2	**9**	34.8	25.4	79.
Total	**560**	**144**	**235**	**156**	**1095**	-	-	-
Mean	**23.3**	**6**	**9.7**	**6.5**	**45.6**	-	-	-



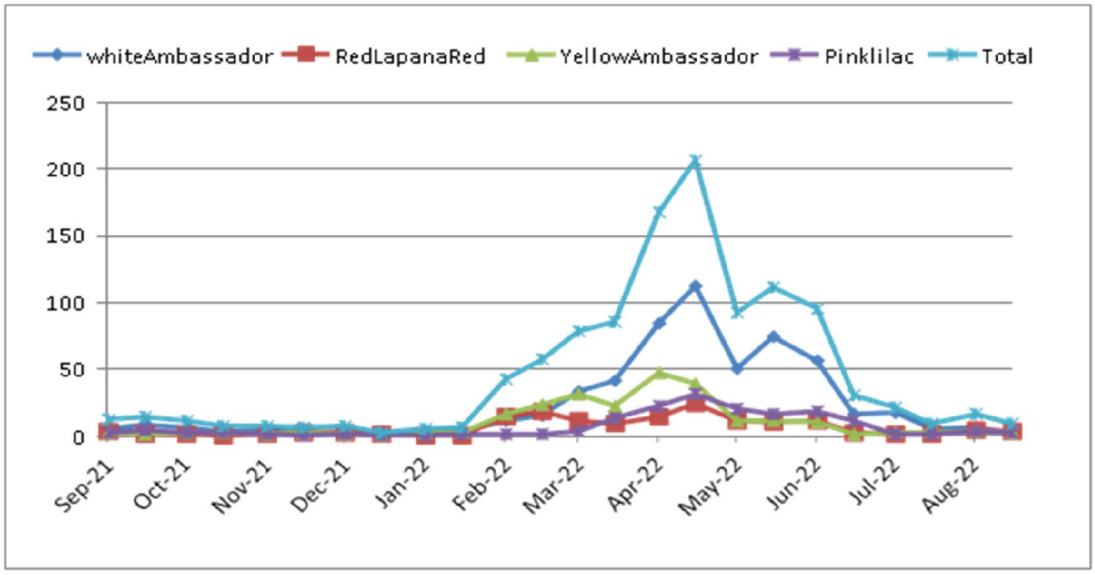


Fig. 2: Biweekly average No. of *Aphis gossypii* infesting Chrysanthemum morifolium in El-Orman Garden during Sept. 2021 and Aug. 2022 season.

Table 4: Simple correlation and regression values between the weather factors and biweekly mean No. of *Aphid gossypi* infesting *Chrysanthemum morifolium* in El-Orman Garde during Sept. 2021 and Aug. 2022 season.

Variable		Simple correlation"r"	Probability "P"	E.V %
	Max. Temp	0.142	0.507	
White	**Min. Temp.**	-0.177	0.407	72.8%
	R.H. %	-.0.246	0.247	
	Max. Temp	-0.149	0.488	
Red	**Min. Temp.**	-0.381	0.066	46.5%
	R.H. %	-0.336	0.109	
	Max. Temp	-0.206	0.335	
Yellow	**Min. Temp.**	-0.477	0.018	64.6%
	R.H. %	-0.346*	0.097	
	Max. Temp	0.242	0.255	
Pink	**Min. Temp.**	-0.059	0.785	65.3%
	R.H. %	-0.201	0.346	
	Max. Temp	0.049	0.819	
Total	**Min. Temp.**	-0.267	0.208	72.5%
	R.H. %	-0.290	0.169	

"r" : Correlation coefficient " "P": Probability level
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed)

3.5. Influence of Weather Factors:

The results of Statistical analysis presented in Table (4) showed there were positive correlation relationship, insignificant effect between individuals and Max. temperature but these relationship were negative with min. temperature and relative humidity on the population fluctuations of Aphid during Sept. 2021 and Aug. 2022 (total number) r values were 0.049, - 0.267 and – 0.290, respectively. The Probability level analysis showed the real influence of each factor on the amount of change in the insect population the "P": Probability level were 0.819 and 0.208 for max. And min. Temperatures respectively. However, statistical analysis proved an obvious relation between relative humidity and the population fluctuation of *Aphid gossypii* ; simple correlation coefficient ((r)) was -0.290, while ((p)) was 0.169.

The obtained results are relatively agree with these of (Bale *et al.,* 2002) who reported that the most effective abiotic factor in insect population variation is temperature. Also (Ismail 2018) who stated

that the meteorological parameters are the main variable factors that affect on population fluctuation of sucking insect pests.

3.6. Effect of different rates of nitrogen fertilizer on population of *Aphis gossypii* insect infesting *Chrysanthemum morifolium* plant:

The data in (Table 5) showed significant difference (LSD 0.05) in population of *A. gossypii* on *C. morifolium* plants, also the results revealed that the lower population of the cotton aphids, *A. gossypii* (1.08 insects /leaflet) in the treatment of lower nitrogen rate (2 grams N/liter) then the population increased to 1.16 insects /leaflet in treatment of 3 grams N/liter. The 3rd rate of N fertilizer (3 grams N/liter) recorded 1.30 insects /leaflet. Maximum population (1.46 insects /leaflet) was recorded in treatment of 5 grams N per liter. In the present study, the population of cotton aphid was mostly non-significantly different on plants, which were supplied with different nitrogen levels. Similar results have been reported by (Aslam *et al.,* 2004) who found highest aphid (Lipaphis erysimi) infestation with application of higher rates of Nitrogen fertilizer. (Kumar *et al.,* 1998) also recorded maximum aphid infestation at high level of Nitrogen. The excessive rate of nitrogen fertilizer may produce lush green plants, which will attract pest infestation. Moreover, higher levels of fertilizer also affect the crop maturity and cause heavy attack of sucking pests. Results of statistical analysis data showed insignificant effects between mean of population densities of aphid at the six levels of nitrogen fertilizer throughout. studied the relationship between nitrogen fertilizer level and aphids' infestation and increasing nitrogen level

Table 5: Mean numbers of *A. gossypii* per leaflet of *Chrysanthemum morifolium* under various rates of nitrogen fertilizer at different dates of observation at El-Orman Garde, Giza Governorate during Fall plantation of 2021.

Date		22 Sept.	29 Sept.	6 Oct.	13 Oct.	20 Oct.	27 Oct.	3 Nov.	10 Nov.	17 Nov.	24 Nov.	1 Dec.	8 Dec.	General mean ± SE
		Average number of Aphids / investigation												
Nitrogen rates "Units/Liter	2	0.00	0.00	0.22	0.51	0.93	1.84	2.78	2.45	2.00	1.55	0.75	0.00	1.08±0.03
	3	0.00	0.00	0.23	0.51	1.33	2.01	2.88	2.95	2.12	1.35	0.63	0.00	1.16±0.03
	4	0.00	0.00	0.31	0.55	1.53	2.15	3.11	3.26	2.19	1.72	0.78	0.10	1.30±0.03
	5	0.00	0.00	0.33	0.62	0.90	2.95	3.42	3.61	2.86	1.81	0.98	0.00	1.46±0.02
L.S.D. 0.05														0.416

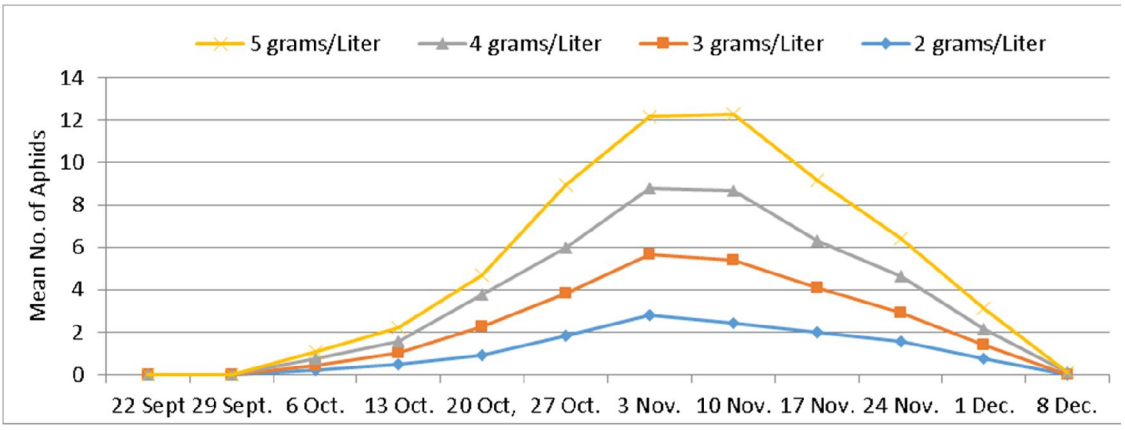


Fig. 3: Mean numbers of *A. gossypii* per leaflet of *Chrysanthemum morifolium* under various rates of nitrogen fertilizer at different dates of observation at El-Orman Garde, Giza Governorate during Fall plantation of 2021.

Causes increase in the infestation rate with this insect pest (Draz *et al.,* 2013). nitrogen was the most fertilizer that had an effect on infestation rates, all levels of it led to a high significant increase in the number of tested pests compared with other fertilization (Abeer Sh. Awad 2022) . The present study

aimed to throw the light on the effect of different nitrogen levels on the population density and average numbers of the main aphid *Aphis gossypii* to serve as a basis for the use of this information's in integrate pest management programs.

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