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Influence of certain environmental factors on the Population density of main potato insect pests in Egyptian Northern Delta.

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ABSTRACT

Potato (Solanum tuberosum L.) holds a prominent position in Egypt's agricultural landscape, serving as a vital staple crop and a cornerstone of the nation's economy. The present work was planned to survey and evaluate population density of insects of Potato plant for two growing seasons 2022/2023 and 2023/2024, at Dakhlia (Aljamalih region) and Damietta (Tftish alsarw region) Governorates and effect of to environmental factors (mean temperature and relative humidity) on population density of insects. Four insect species belong to Order Hemiptera (*Bemisia tabaci* (Gennandius), *Myzus persicaee* (Sulker), *Empoasca descipiens*, and *Aphis gossypii* (Glover) and three insect species belong to Order Lepidoptera (*Phthorimaea operculella* (Zeller); *Tuta absoluta*; and *Agrotis ipsilon*) were surveyed and identified from collected samples. Collected insects were higher population and percentage of frequency in Tftish alsarw region, Damietta Governorate than in Aljamalih region. Dakhlia Governorate, the population and frequency (%) of insects were higher through 2022/2023 than 2023/2024 growing seasons. Meanwhile, *Empoasca descipiens* insect was the most population and percentage of frequency compared with other insects, following by *Bemisia tabaci* (Gennandius) insect and *Agrotis ipsilon* insect was the lowest population and percentage of frequency.

Introduction

Potato, *Solanum tuberosum* L. is one of the most important vegetable crops in Egypt and the world, it is a crop of international importance for consumers everywhere in the world. The total production of potato in the world has reached 5 million ton/year with a market value of 250 million USD. Around 20% of the entire agriculture land that is used for growing vegetables in Egypt is dedicated to potato production. The percentage of small farmers in Egypt with less than 2 hectares is more than 80% of the landholding; most of this land is in the Nile Delta and Valley (FAOSTAT, 2018). Potato production in Egypt has grown steadily during the last decade with increasing growth in both the cultivated area and yield. Potato is produced in 25 of Egypt's 27 Governorates. However, 65% of its production occurred in governorates of the Nile Delta, concentrated in areas of suitable soils (El-Hady and Abdelaty2019) alongside various channels of the Nile delta. The total cultivated area in 2019 was 171 thousand hectares which produced 5.2 million tons, while average potato yield was about 30.3 ton/hectare (FAO, 2015)

Unfortunately, insect pests cause considerable yield loss in each of quality and quantity, climate conditions have a direct influence on the activity as well as on the rate of development of insects and other ectothermic organisms. According to **Zalom and Wilson (1982)** the rate of development is based on the accumulation of heat measured in physiological rather than chronological time. Chiang (1985) denominates “optimal range” the temperature going from the lower threshold to the upper threshold, where the development is directly proportional to temperature. Outside these limits activity decreases to almost a standstill without necessarily causing death. The thermal unit provides a valuable tool for insect pest control; in forecasting infestations monitoring and timing

insecticide applications **Zalom *et al.*, (1983).** From the practical aspect, cumulated thermal units have been used to predict the seasonal development and emergence of various insects **Abolmaaty *et.al.*, (2010), Abolmaaty *et.al.*, (2011), Eckenrode *et al.*, (1975), Sevacherian *et al.*, (1977), Daoud *et.al.* (1999) and Khalil *et. al.*, (2010).** The assessment report from the Intergovernmental Panel on Climate Change (IPCC predicts an increment in mean temperature from 1.1 to 5.4oC toward the year 2100 **Meehl *et al.* (2007)**. An increment of this magnitude is expected to affect global agriculture significantly **Cannon (1998)**. Environmental conditions have a major influence on the survival, pests and dispersal of plant insects. The effects of the climate are insect and pests most obvious for pest infection, which require suitable temperatures and minimum amounts of moisture to survive and reproduce and to initiate the infection process in plants **(abolmaaty *et al.*, 2011).** In addition, such changes in climatic conditions could profoundly affect the population dynamics and the status of insect crops pests Woiwod (1997). Insect pests are major biotic factors affecting potato yield and tuber quality. Globally, losses are estimated on average at 16% (**Oerke *et al.* 1994)**. Locally, if not routinely controlled, reductions in tuber yield and quality can be between 30 and 70% for various pests **(Kroschel 2013; Kroschel and Schaub 2013)**

These effects could either be direct through the influence that weather may have on the insect's physiology and behavior **Parmesan. (2007), Merrill *et al.* (2008)**, or may be mediated by host plants, competitors or natural enemies **Bale *et al.*, (2002).** The objective of the present study is to insect infestations potato under northern delta in Egypt on two governorates.

Materials and methods

1.Survey of insects on Potato plants: These experiments were carried out through 2022/2023 and 2023/2024 winter growing seasons on Potato plants (1 feddan/ region), at Aljamalih region. Dakhlia Governorate and Tftish Elsarw region, Damietta Governorate. Where, five square (42 m2) were randomly selected / feddan and ten plants were randomly selected/ square as replicates. The survey was started after 45-50 days from sowing and continued until the end of the season for two successive seasons. Two methods were applied to collect the samples as the following: (1) sweep net (25 diagonals double strokes) and direct field observation followed by laboratory examination:(2) The second method was done by inspecting 100 leaves picked at random before sun rise and examined primarily by a pocket lens in the field, then transferred to the laboratory in paper bag for examination to confirm identification.

2. Population dynamics of insects:
To estimate the population density of insect pests on potato leaves sample content 100 leaves were randomly picked from each replicate representing the plant levels. Samples were put in paper bags and transferred to the laboratory and examined by the aid of stereomicroscope in the same day for examination, identify and counted the collected pests. Counts total of each investigated pest species /100 leaflets were recorded and registered. Also, percentage of frequency for each insect was calculated related to total count insects **(Hanan., 2004)**

3.influnce of certain environmental factors on population densities of insects, at two regions and two successive seasons: -
The seasonal fluctuations of the investigated insects in relation to environmental factors involved certain weather factors, the weekly mean of the temperature and relative humidity R.H%, at Aljamalih region. Dakhlia Governorate and Tftish Alsarw region, Damietta Governorate, during the period extended from October until December 2022 and 2023 winter growing seasons (**Bhatnagar *et al.* 2012**).

Static analysis:
Data was statistically analyzed using the "F" test and the value of LSD (P= 0.05) was calculated **(Snedecor and Cochran, 1982).**

Results And Discusion

1. Survey and population density of certain insects on potato plants

Data in Table (1 and 2) revealed that collected insects from Aljamalih region. Dakhlia Governorate and Tftish Alsarw region, Damietta Governorate through 2022/2023 and 2023/2024 winter growing seasons recorded four insect species belong to Order Hemiptera (*Bemisia tabaci* (Gennandius), *Myzus persicaee* (Sulker), *Empoasca descipiens*, and *Aphis gossypii* (Glover)) and three insect species belong to Order Lepidoptera (*Phthorimaea operculella* (Zeller); *Tuta absoluta* and *Agrotis ipsilon*)

The total number of insects were higher in Tftish Alsarw region, Damietta Governorate than

Aljamalih region, Dakhlia Governorate during the first year and represented with 6544 and 6164 individual/ sample for the two regions respectively. In contrast in the second year the total number of insects were higher in Aljamalih region, Dakhlia Governorate than Tftish Alsarw region, Damietta Governorate and represented with 7242 and 5571 individual/ sample respectively. The leafhopper, *E. decipiens* recorded the highest population in the two examined region during the 1st and 2nd years of study followed by *B. tabaci, P. operculella, T. absuluta, M. persica* and *A. gossypii* while the lowest population was recorded by *A. ipsilon.*
Meanwhile, *Empoasca descipiens* insect was the most population and percentage of frequency compared with other insects, *E. descipiens* represented by 2612 (42.4 %) and 2520 (34.8%) in Aljamalih region and 2904 (44.4 %) and 1349 (24.2%) in Tftish Alsarw region respectively. It is following by *Bemisia tabaci* (Gennandius) insect, where the population recorded 885 (14.4 %) and 1445 (20%) in Aljamalih region and 1182 (18.1 %) and 1195 (21.5%) in Tftish Alsarw region during the 1st and 2nd years of study respectively. On the other hand, the lowest population were recorded by *Agrotis ipsilon* in the two examined region in Aljamalih and Tftish Alsarw regions during the 1st and 2nd years of study and represented by 298(4.8 %) and 364 (5%) in Aljamalih region and 324(5 %) and 475(8.5%) in Tftish Alsarw region. (Table, 1 and 2).

Our results agree with **Herakly (1974)** found that *Empoasca discipiens*, aphids (especially *Myzus persicae*), *Phthorimaea operculella*, and *Bemisia tabaci* cause damage of economic importance on Potato plants. Also, **Yakonov and Chenko (1982)** stated that in a survey of aphids on plants of potatoes and found four species of aphids were vectors of potato virsuses, namely *Myzus persicae*, *Aulacorthum solani*, *Aphis gossypii* and *A. Framgulae*.grown Moreover, mentioned that the distribution, infestation rate and population density of Gelechiidae.

2.Relation between some environmental factors and population dynamic of insects, at two regions and successive seasons: -

Mean environmental factors (temperature and relative humidity) and average numbers of *Empoasca descipiens*at per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (3 and 10). *Empoasca descipiens* population had three peaks of seasonal abundance occurred on potato plant, in two Governorates. In Dakhlia Governorate, the first peak of at 14 th of Nov with average number of 440 insect / plant, but the second and peak was noticed at 28th of Nov. with average number of 714 insect / plant for 2022 growing season and the third peak occurred at 14th of Nov. with average number of 515 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 22.1 to 26.6 (°C) and from 61.1 to 63.3 %, respectively. Meanwhile, in Damietta the first and highest peak of *Empoasca descipiens*at population was recorded at 7th of Nov. with average number of 1127 insect / plant for 2022 growing season, but the second peak was noticed at 24th of Oct. with average number of 163 insect / plant for and the third peak occurred at 14th of Nov. with average number of 170 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 22.7 to 25.3 (°C) and from 60.7 to 75.4 %, respectively

Mean environmental factors (temperature and relative humidity) and average numbers of *Myzus persicae* per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (4 and 11). *Myzus persicae* population had three peaks of seasonal abundance occurred on potato plant, in two Governorates. In Dakhlia Governorate, the first peak was recorded at7th of Nov. with average number of 83 insect / plant, but the second peak was noticed at 28th of Nov. with average number of 110 insect / plant for 2022 growing season and the third peak and highest occurred at14th of Nov. with average number of 129 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 19.6 to 22.3 (°C) and from 59.1 to 59.4 %, respectively. Meanwhile, In Damietta Governorate, the first peak was recorded at7th of Nov. with average number of 97 insect / plant, but the second peak was noticed at 28th of Nov. with average number of 96 insect / plant for 2022 growing season and the third peak and highest occurred at 21th of Nov. with average number of 140 insect / plant for 2023 growing season, where

mean temperature (°C) and relative humidity (%) ranged from 20.8 to 24.6 (°C) and from 63.9 to 72.2 %, respectively.

Mean environmental factors (temperature and relative humidity) and average numbers of *Aphis gossypii* per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (5 and 12). *Aphis gossypii* population had three peaks of seasonal abundance occurred on potato plant, in two Governorates. In Dakhlia Governorate, the first peak and highest was recorded at14th of Nov. with average number of 80 insect / plant, but the second peak was noticed at 5th of Dec. with average number of 76 insect / plant, but the third peak was noticed at 26th of Dec. with average number of 50 insect / plant for 2022 growing season and the two peaks occurred at24th of October. with average number of 95insect / plant, but the second peak and highest was noticed at 11th of Nov. with average number of 124 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 22.2 to 17.6 (°C) and from 61.17 to 75.7 %, respectively. Meanwhile, In Damietta Governorate, the first peak was recorded at21th of Nov. with average number of 60 insect / plant, but the second peak and highest was noticed at 5th of Dec. with average number of 76 insect / plant but the third peak was noticed at 26th of Dec. with average number of 50 insect / plant for 2022 growing season and the first peak and highest occurred at 31th of Oct. with average number of 95 insect / plant ,but the second peak was noticed at 7th of Nov. with average number of 126 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 21.9 to 22.7 (°C) and from 62.3 to 70.1 %, respectively.

Mean environmental factors (temperature and relative humidity) and average numbers of *Bemisia tabaci* per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (6 and 13). *Bemisia tabaci* population had 0ne peaks of seasonal abundance occurred on potato plant, in two Governorates. In Dakhlia Governorate, the first peak of *Bemisia tabaci* population was recorded at 7th of Nov. with average number of 206 insect / plant for 2022 growing season and the second and highest peak was noticed at 7th of Nov. with average number of 347 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 21.6 to 22.3 (°C) and from 59.4 to 63.3 %, respectively. Meanwhile in Damietta Governorate, the first peak and highest of at 7 th of Nov. with average number of 278 insect / plant for 2022 growing season and the second was noticed at 14th of Nov. with average number of 221 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 19.7 to 25.8 (°C) and from 66.1 to 70.1 %, respectively.

Mean environmental factors (temperature and relative humidity) and average numbers of *Agrotis ipsilon* population per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (7 and 14). *Agrotis ipsilon* population had one peaks of seasonal abundance occurred on potato plant, in two Governorates. In Dakhlia Governorate, the first peak of *Agrotis ipsilon* population was recorded at 7th of Nov. with average number of 123insect / plant for 2022 growing season and the second peak was noticed at 7th of Nov. with average number of 168 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 21.6 to 22.3 (°C) and from 59.1 to 63.3 %, respectively. Meanwhile in Damietta Governorate, the first peak of at 31 th of Oct. with average number of 97 insect / plant for 2022 growing season and the second was noticed at 7th of Nov. with average number of 168 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) were 25.8 (°C) and 70.1 %, respectively.

Mean environmental factors (temperature and relative humidity) and average numbers of *Phthorimaea operculella* per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (8 and 15). *Phthorimaea operculella* population had three peaks of seasonal abundance occurred on potato plant, in two Governorates. In Dakhlia Governorate, the first peak of *Phthorimaea operculella* population was recorded at 7th of Nov. with average number of 123 insect / plant, but the second peak was noticed at 28th of Nov. with average number of 144insect / plant, but the

third peak and highest was noticed at 19th of Dec. with average number of 158insect / plant for 2022 growing season and the two peak was noticed at 7th of Nov. with average number of 126 insect / plant but the second and highest was noticed at 28th of Nov. with average number of 114insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 20.1 to 21.6 (°C) and from 63.3 to 71.2 %, respectively. Meanwhile in Damietta Governorate, the first peak of at 7th of Nov. with average number of 78 insect / plant, but the second was noticed at 28th of Nov. with average number of 96insect / plant, but the third and highest was noticed at 19th of Dec. with average number of 110insect / plant for 2022 growing season and the first peak was noticed at 7th of Nov. with average number of 123 insect / plant, but the second and highest was noticed at 28th of Nov. with average number of 121insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 20.3 to 25.8 (°C) and from 60.7 to 72.2 %, respectively.

Mean environmental factors (temperature and relative humidity) and average numbers of *Tuta absoluta* per plant were recorded at Dakhlia and Damietta Governorates, during the two successive years 2022 and 2023 are illustrated graphically in Fig (9 and 16). *Tuta absoluta* population had three peaks of seasonal abundance occurred on potato plant, in Dakhlia Governorate, where the first peak of *Tuta absoluta* population was recorded at 14th of Nov. with average number of 64 insect / plant, but the second was noticed at 28th of Nov. with average number of 93insect / plant, but the third and highest was noticed at 19th of Dec. with average number of 122insect / plant for 2022 growing season, and the first peak was noticed at 31 th of October. with average number of 76 insect / plant, but the second and highest was noticed at 14th of Nov. with average number of 721insect / plant, but the third was noticed at 12th of Dec. with average number of 86insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) ranged from 20.1 to 22.1 (°C) and from 70.2 to 71.2 %, respectively. Meanwhile in Damietta Governorate, the first peak of at 14 th of Nov. with average number of 62insect / plant, but the second was noticed at 12th of Dec. with average number of 85insect / plant for 2022 growing season, and the first peak was noticed at 14 th of Nov. with average number of 27 insect / plant for 2023 growing season, where mean temperature (°C) and relative humidity (%) were 19.1 (°C) and 70.1 %, respectively.

Our results agree with Amitava and Paramita (2002) evaluated the incidence of aphids on potato. *M. Periscae* population reached the critical level (20 aphid / 100 leaves) during February to March. **Doss *et al.*, (1997)** mentioned that Aphids population on potato plants started in Feb. and reached its peak in March and April. **Cadman and Chambers (1960),** reported that both diseases are aphid transmitted viruses. It is important to study the population fluctuation of aphid to determine the suitable time to control the aphid with each climatic change in the world. ***Daiber (1989)*** recorded that *P. operculella* were found inside and outside a potato store in south Africa. He reported that outside the store catches decreased from a peak in January to June. stated that *P. operculella* recorded eight peaks per year in Egypt. found that larval population remained low throughout the cropping period from January to May under field condition.

*** Table (1). Total numbers of insect species and their frequency (%) on potato plants, during 2022 / 2023 and 2023 / 2024 growing seasons, at Aljamalih region Dakhlia Governorate.**

Order	Insect species	2022/2023 season		2023/2024 season	
		Total numbers/ sample	Frequence (%)	Total numbers/ sample	Frequence (%)
Hemiptera	*Myzus periscae*	554 d	9.0	719 d	9.9
	Aphis gossypii	416 e	6.7	704 d	9.7
	Empoasca descipiens	2612 a	42.4	2520 a	34.8
	Bemisia tabaci	885 b	14.4	1445 b	20.0
Lepidoptera	*Phthorimaea operculella*	827 c	13.4	908 c	12.5
	Agrotis ipsilon	298 f	4.8	364 f	5.0
	Tuta absoluta	572 d	9.3	582 e	8.0
Total		6164	100	7242	100
LSD at 5%		36.7		31.5	

Numbers followed by same litter in the same column are not significant differences

*** Table (2) Total numbers of insect species and their frequency (%) on potato plants, during 2022 / 2023 and 2023 / 2024 growing seasons, at Tftish alsarw region, Damietta Governorate.**

Order	Insect species	2022/2023 season		2023/2024 season	
		Total numbers/ sample	Frequence (%)	Total numbers/ sample	Frequence (%)
Hemiptera	*Myzus periscae*	618 c	9.4	779 d	14.0
	Aphis gossypii	339 e	5.2	710 e	12.7
	Empoasca descipiens	2904 a	44.4	1349 a	24.2
	Bemisia tabaci	1182 b	18.1	1195 b	21.5
Lepidoptera	*Phthorimaea operculella*	650 c	9.9	955 c	17.1
	Agrotis ipsilon	324 e	5.0	475 f	8.5
	Tuta absoluta	527 d	8.1	108 g	1.9
Total		6544	100	5571	100
LSD at 5%		42.1		39.7	

Numbers followed by same litter in the same column are not significant differences

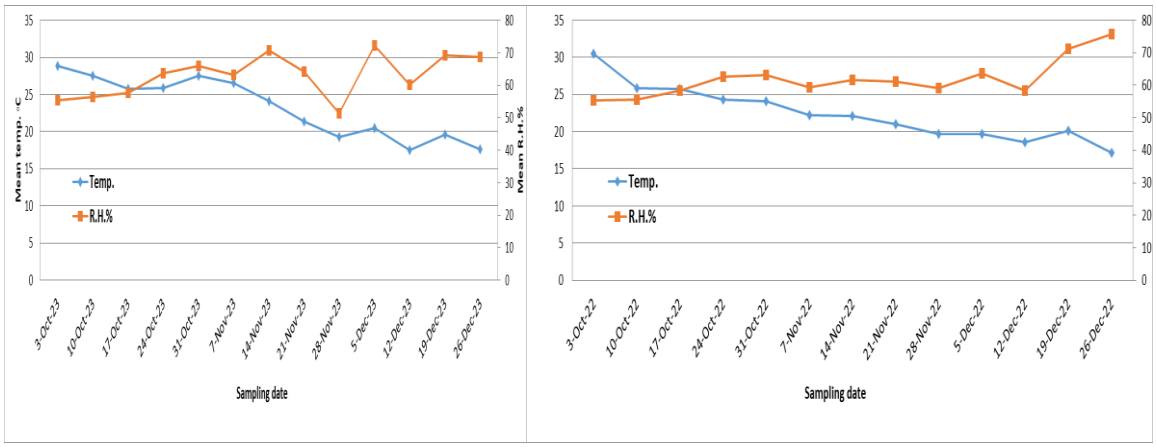

Figure (1): Mean temperature and relative humidity (Weakley), through the period from October until December for in the two successive seasons 2022/2023 growing, in Dakhlia governorates

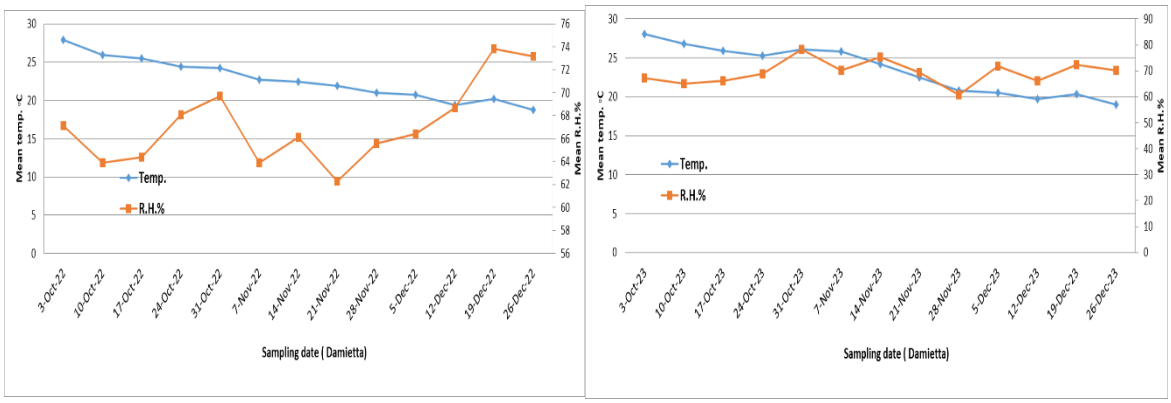

Figure (2): Mean temperature and relative humidity (Weakley), through the period from October until December for in the two successive seasons 2022/2023 growing, in Damietta governorates

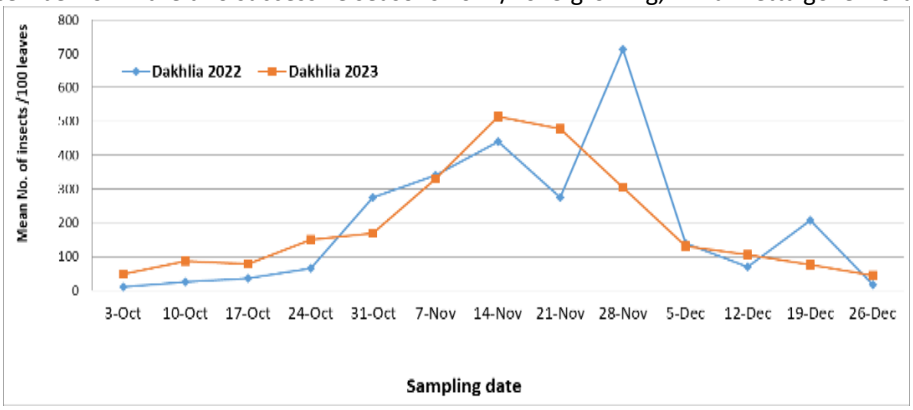

Figure (3) Population density of *Empoasca descipiens* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

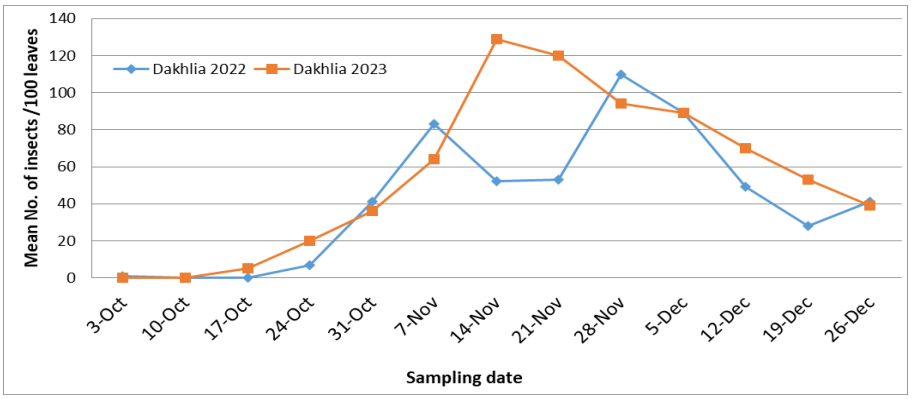

Figure (4) Population density of *Myzus persica* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

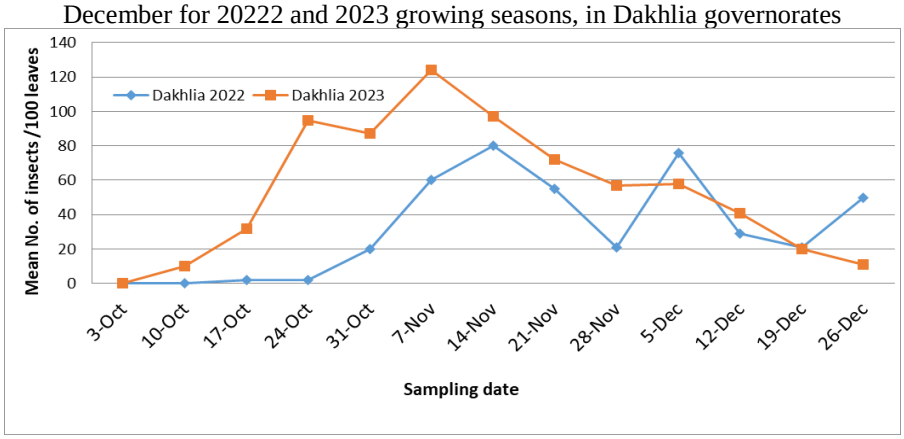

Figure (5) Population density of *Aphis gossypii* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

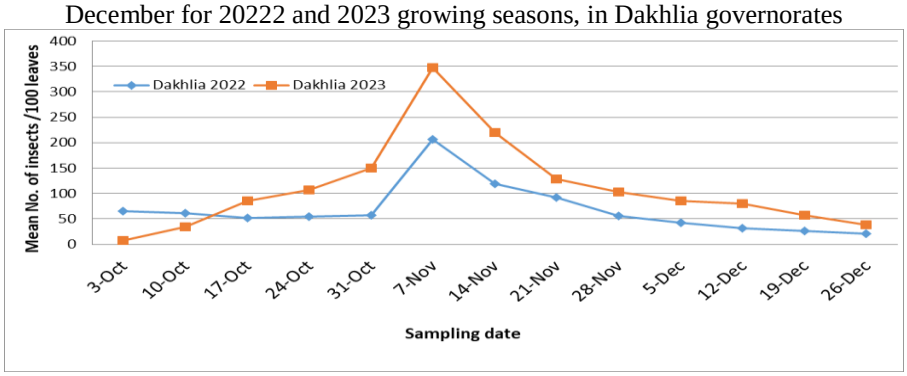

Figure (6) Population density of *Bemisia tabaci* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

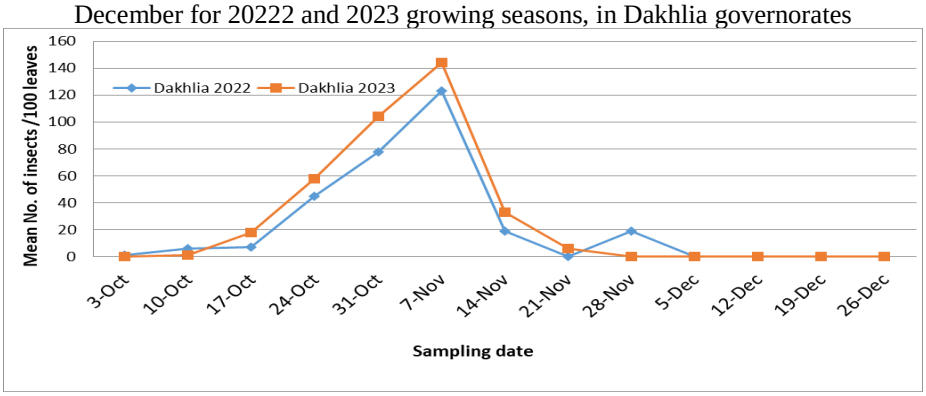

Figure (7) Population dynamics of *Agrotis ipsilon* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

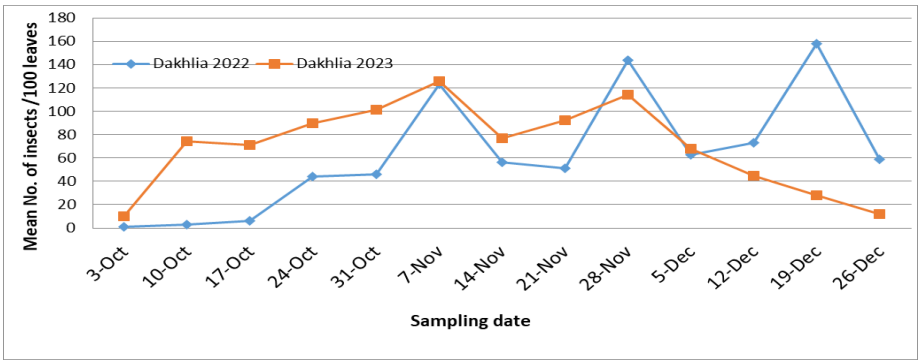

Figure (8) Population density of *Phthorimaea operculella* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

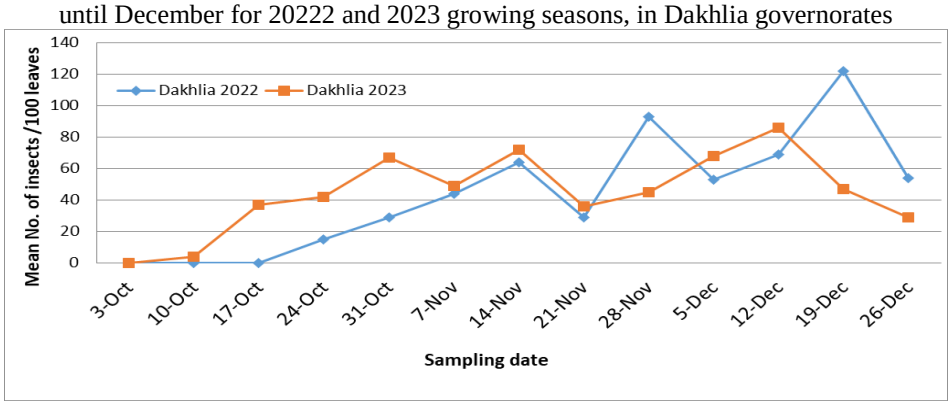

Figure (9) Population density of *Tuta absoluta* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Dakhlia governorates

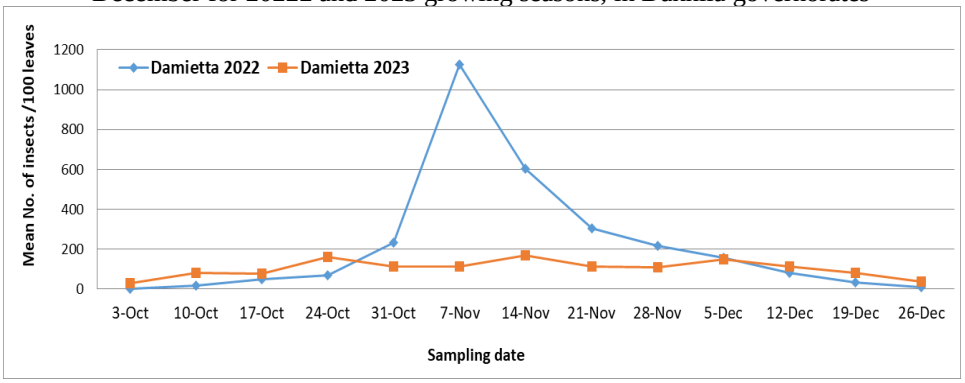

Figure (10) Population density of *Empoasca descipiens* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta governorates

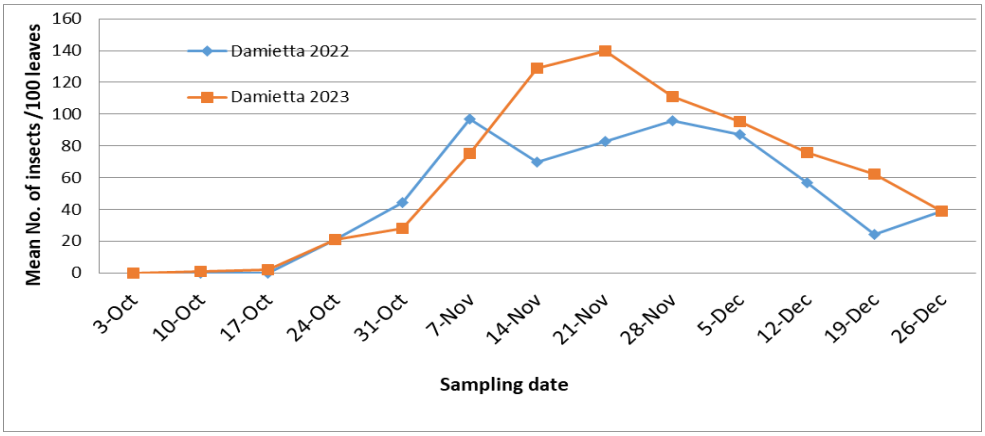

Figure (11) Population density of *Myzus persica* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta governorates

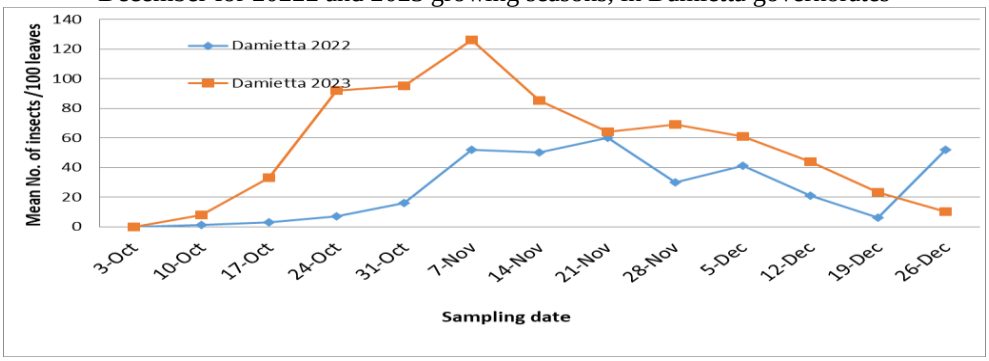

Figure (12) Population density of *Aphis gossypii* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta governorates

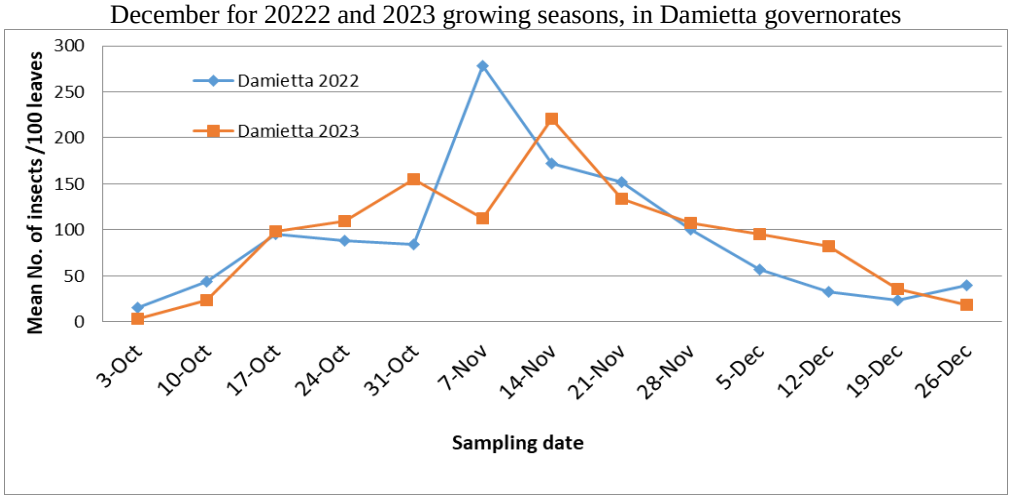

Figure (13) Population density of *Bemisia tabaci* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta governorates

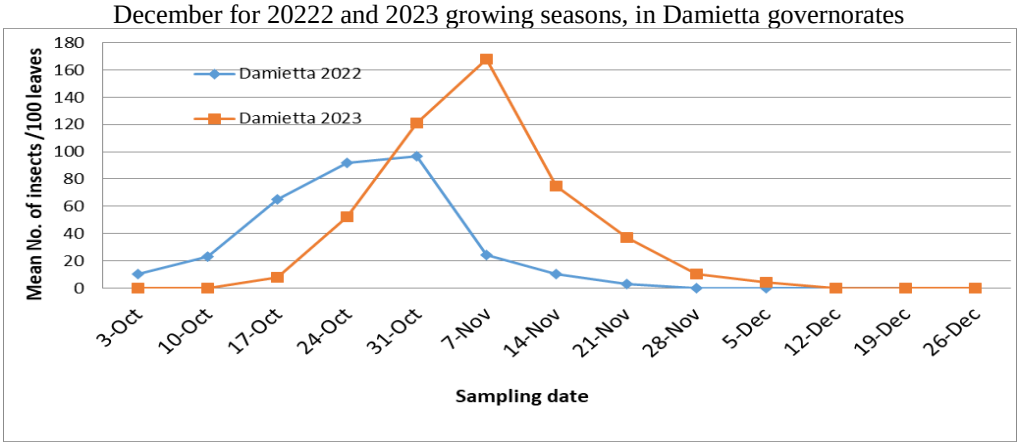

Figure (14) Population density of *Agrotis ipsilon* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta governorates

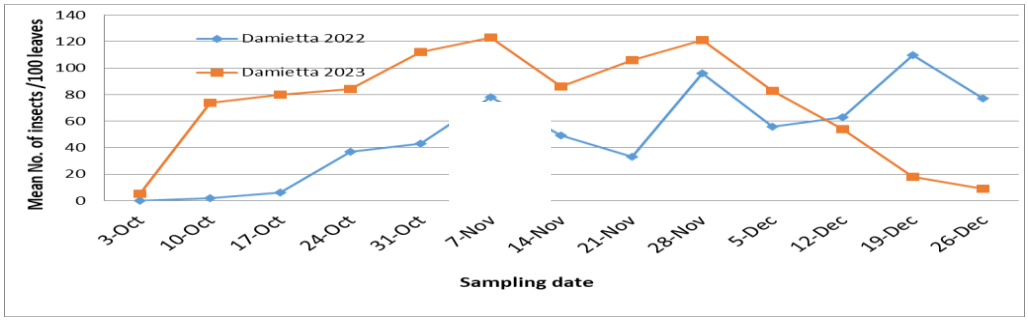

Figure (15) Population density of *Phthorimaea operculella* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta governorates

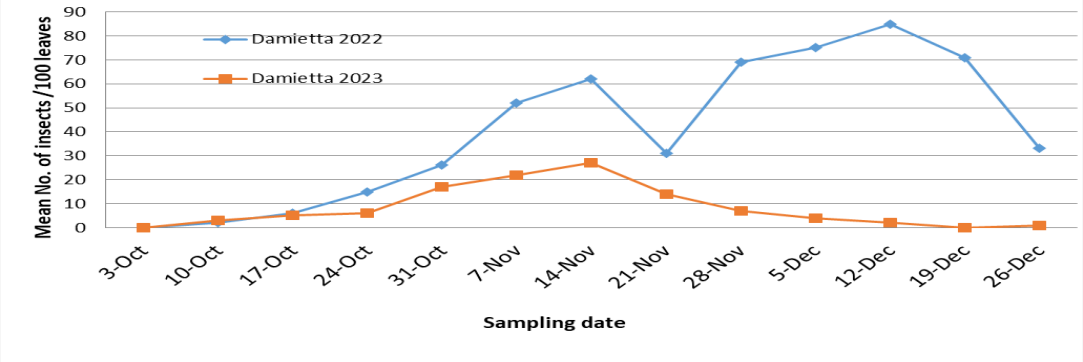

Figure (16) Population density of *Tuta absoluta* on Potato plants through the period from October until December for 20222 and 2023 growing seasons, in Damietta vernorates

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تأثير بعض العوامل البيئية على الكثافة العددية لآفات البطاطس الحشرية الرئيسية في شمال الدلتا المصرية

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* تحتل البطاطس (Solanum tuberosum L.) أهمية كبيرة على المستوى الزراعي في مصر، ويعتبر محصول حيوي وحجر أساسي فى الاقتصاد المصري. أجريت تلك الدراسة بغرض حصر وتقييم الكثافة العددية لاهم الحشرات التي تصيب محصول البطاطس لموسمي النمو 2023/2022 و 2024/2023، في محافظتي الدقهلية (منطقة الجمالية) ودمياط (منطقة تفتيش السرو) ودراسة تأثير بعض العوامل المناخية (متوسط درجة الحرارة والرطوبة النسبية) على تعداد الاصابات الحشرية. كان من اهم النتائج التي تم الحصول عليها انتماء أربعة أنواع من الحشرات إلى رتبة Hemipte التي تتضمن حشرات الذبابة البيضاء ، و حشرة المن الخوخ الأخضر ، و نطاط اوراق القرعيات ، و من القطن وثلاثة أنواع من الحشرات تنتمي إلى رتبة Lepidoptera التي تتضمن (دودة درنات البطاطس و حشرة صانعات انفاق الطماطم (توتا ابسيلوتا و الدودة القارضة) وتم حصر وتعريف العينات التي تم جمعها. وكان تعداد الحشرات ونسبة تكرارها في منطقة تفتيش السرو بمحافظة دمياط أعلى بالمقارنة بمنطقة الجمالية محافظة الدقهلية، وكان تعداد الحشرات وتكرارها بالنسبة المئوية (٪) أعلى خلال موسم النمو 2023/2022 من موسم النمو 2024/023. في حين كانت حشرة نطاط أوراق القرعيات هي الأكثر انتشارا ونسبة تكرار الإصابة بها مقارنة بالحشرات الأخرى، تليها حشرة الذبابة البيضاء وتعتبر حشرة الدودة القارضة هي الأقل في التعدد ونسبة التكرار.

الكلمات المفتاحية: البطاطس – الآفات الحشرية – العوامل الجوية