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Study of some Weather Factors on Population Fluctuations of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner), in Green Flat Plant, *Pasplum vagenatum*

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ABSTRACT

Insects and plants are affected by some weather factors all over the world. Experiments were carried-out to studying survey for lepidopteran-species and effect of temperature, relative-humidity and wind-velocity on population fluctuations of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner), which attacking plants of evergreen, *Paspalum vagenatum* (Seashore Paspalum Turfgrass) in Smart-Village, Giza Governorate and Maryland-garden, Cairo Governorate during 2021 season to study population fluctuations of major and minor cotton leaf worms. Through the survey by using of light trap "Robinson type", five noctuid species (*Agrotis ipsilon* (Hufnagel), *Agrotis segetum* (Denis and Schiffermüller) *S. littoralis*, *S. exigua* and *Spodoptera frugiperda* (Smith) were recorded. Results showed that, the highest-population peaks of *S. littoralis* in Smart-Village were recorded in beginning of June and mid of October. While the highest population peaks of *S. exigua* in Smart-Village were in mid-April and mid-September. In Maryland-Garden, *S. littoralis* recorded two peaks of abundance in mid-June and mid-October, and *S. exigua* recorded two peaks in beginning of May and mid of September. Correlation coefficient values between independent factors (temperature, relative-humidity, wind-velocity) and populations of *S. littoralis* or/and *S. exigua* showed varied effects during the season. In general, *S. exigua* infestation was higher compared with *S. littoralis* in both areas during 2021 season, and populations of S. *littoralis* and *S. exigua* were higher in Smart-Village than Maryland-Garden.

Keywords: Correlation, Population fluctuation, Green Flat Plant, *Pasplum vagenatum* Turfgrass, Smart-Village and Maryland-Garden.

INTRODUCTION

Insects and plants are affected by weather factors eg. temperature, relative-humidity and wind-velocity. The *Pasplum vagenatum* grasses, which are groundcover plants, contribute to the quality of the urban environment by preventing soil erosion caused by water or wind, increasing the organic matter content of the soil, purifying the air, and controlling air temperature (Choo and Lee, 2017). They are also used in the construction of natural landscapes, sports facilities, and the improvement of residential environments (Choo *et al*., 2000; Bae *et al*., 2013). The demand for grasses is increasing rapidly owing to the diversification of grass consumption and an increase in incomes (Youn *et al*., 2006; Bae *et al*., 2013). Leaf-chewing caterpillars may be present on the plant. The leaf loss due to caterpillar feeding can adversely impact on primary plant processes, such as the rate of photosynthesis, which are directly related to the plant's productivity (Meyer and Whitlow, 1992; Mitchell *et al*., 2016). Together, the damage caused by RKN and herbivorous insects can reduce crop production by ~20 % annually, making them agro-economically important crop pests (Karajeh, 2008; van der Meijden, 2015; Mitchell *et al*., 2016). Lepidoptera (butterflies and moths) is one of the largest insect orders with 160.000 described species, of which 95% are moths (New, 2004; Kristensen *et al*., 2007). The beet armyworm, *Spodoptera exigua* (Hübner) is a pest of economically important crops including soybean in Iran (Mojtahedi, 1979) and many parts of the world (Abdullah *et al*., 2000; Idris and Emelia, 2001).

The most widely applied method to survey moths is to use light traps, which exploit their attraction to artificial light (Franzen and Johannesson 2007; Merckx *et al*., 2009; Groenendijk and Ellis, 2011). Many entomologists suggested using of light traps for recording new species and for determining the relative abundance of major insect pests throughout the year. Such information may enable them to predict the possible outbreaks of certain insect species (El-Deeb *et al*., 1968; Ghanim, 1977; Fayle *et al*., 2007; Leraut, 2009). In addition, this information makes it easier to predict the populations of such species and determine the amount of the insecticides required or other integrated control methods. By the data collected by these traps, it can be tested the relationships between weather factors and population abundance of an insect species (Hendricks *et al*., 1975; Ghanim, 1977). Climate has a great effect on insects, so the information must be update about pest population and its dynamic over time is highly required for future pest management.

Therefore, this study aimed to survey the lepidopteran-species which attacking *Pasplum vagenatum* lawn (Turfgrass) in Smart-Village, Giza Governorate and Maryland-garden, Cairo Governorate during 2021 season, and studying of some weather factors effect (temperature, relative-humidity, wind-velocity) on population fluctuations of major and minor cotton leaf worms *Spodoptera littoralis* (Boisd), *Spodoptera exigua* (Hubner) in the same season 2021.

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MATERIALS AND METHODS

1.The tested fields:

Experiments were carried-out on plants of evergreen, *Paspalum vagenatum* Seashore Paspalum (Turfgrass) in Smart-Village, Giza Governorate and Maryland-garden, Cairo Governorate during 2021 season from the beginning of January to end of December to study population fluctuations of major and minor cotton leaf worms. The experiment of each tested-area was carried-out on an area 1800m2 divided at two areas, each area was about 900m2 (30m×30m), one-trap of ("Robinson type" light-trap) was putted in center of area on 8 meter height, It was enough to cover the tested-area.

2.Trap description and composition:

The trap consists of an inverted metal cone, 24 inches in diameter, and contains six radial vanes projecting two inches above the upper aperture. These vanes obstruct the flight of insects circling or heading for the light and thus reduce their flight speed causing them to stall and fall into the sloping cone and then into the receptacle .At the lower aperture of the cone and in the center of the vanes, a 250 watts clear mercury vapour l amp is fixed in a socket and so adjusted that its light is unobstructed above the upper structure is fitted tightly on a barrel –like 24 inches deep receptacle which forms the base of the apparatus. Sodium cyanide, put in a glass jar, is used as a killing agent inside the trap. The light trap was set off daily for a period of 12 hours from sunset to sunrise.

3.Field work and moths surveying:

The use of the ideal "Robinson type" light-trap which provided with "250 watt" ultra-violet, mercury-vapour lamp had been chosen. The light-trap container jar of "calcium cyanide" for quick killing insect. The trap was operated and fixed on any of three meters high above the ground, and this high is very suitable for good attractant to the flying moths. The time of operate the trap is very important to reach the good results of trapping moth. So, the trap was start work from dust sunset period, and reaching to down time daily and automatically operated for one year starting from the first of January 2021 and reached to the end of December 2021. The collecting of the attracted moths have been daily gathering in paper sac provided by fine paper stripes to prevent the moisture, molding and breakage throughout the "cyanide jar or within the preserving sac before the separation process.

4.Isolation and identification process:

The traps were emptied every morning and the traps catches were singly placed in polyethylene sac, and the daily catch was a accumulated biweekly for one year of study, and then the isolated and separated moths were sent to for identification in "Taxonomic division" in Plant Protection Research Institute, Ministry of Agriculture, Dokki, Giza, Egypt.

5.Data collection of weather factors:

Effects of some weather factors on the population fluctuation of two insect species attacking lawns (Turfgrass). Biweekly data of the maximum, minimum,°C, relative humidity (R.H.%) and wind velocity (m/sec.) were obtained from the Meteorological station, Agric. Research Center, located at Giza to recalculate these factors a biweekly earlier than inspection.

6.Statistical analysis:

The correlation coefficients between the mean biweekly numbers of the two insect species attacking lawns (Turfgrass) and the mean biweekly temperature degrees and the relative humidity were statistically calculated. Data were analyzed by using two way analysis of variance (ANOVA), correlation coefficient and multiple regression equation using computer advanced statistical program (Costat 1990).

RESULTS AND DISCUSSION

1.Survey and population fluctuation of main insect pests from family Noctuidae attacking lawns (Turfgrass):

Survey of insects from family Noctuidae associated with lawns (Turfgrass) was conducted during one year; extending from January 2021 in two governorates whose one species of lawns (Turfgrass) was planted. , *P. vagenatum* (Paspalum) which belonging to one family Poaceae (Gramineae). The first area was at Smart village, Giza governorate, and the second area was at El-Mireland Garden – Cairo Governorate Obtained data are summarized in table (1) and illustrated which reveal that throughout the one year, five-insect' species belonging to Family Noctuidae and order Lepidoptera.

Table 1. List of four insects from family Noctuidae, order Lepidoptera recorded on *P. vagenatum* at Smart-village and El-Mireland-Garden, Giza and Cairo Governorates respectively throughout season 2021.

Common name	Species	stage	Site on plant	Occurrence period
Black-cutworm	*Agrotis ipsilon* (Hufnagel)		Leaves & Stem	October & March
turnip moth	*Agrotis segetum* (Denis and Schiffermüller)		Leaves & Stem	October & March
Egyptian cotton leaf worm	*Spodoptera littoralis* (Boisd.)	Larvae	Leaves & Stem	March &May
Beet armyworm	*Spodoptera exigua* (Hübner)		Leaves	March & May
fall armyworm FAW)(	*Spodoptera frugiperda* Smith		Leaves & Stem	June & December

As shown in Table (1) five insect species were recorded on lawns (Turfgrass) *P. vagenatum* (Paspalum plants).

- *Agrotis ipsilon* Hufnagel, (Noctuidae: Lepidoptera).
- *Agrotis segetum* Denis and Schiffermüller, (Noctuidae: Lepidoptera).
- *Spodoptera littoralis* Boisd, (Noctuidae: Lepidoptera).
- *Spodoptera exigua* Hubner, (Noctuidae: Lepidoptera).
- *Spodoptera frugiperda* Smith. (Noctuidae: Lepidoptera).

These results are in agreement with those obtained by Wu-GuiSheng *et al.* (2007) who surveyed infestation of pest insects on the turf grass. They found that the major insect pests were grubs; armyworms and noctuid moths. Similar results were obtained by Murdoch *et al* (1990) . The fall armyworm, *S. frugiperda* (Lepidoptera: Noctuidae), which originated in the tropical and subtropical regions of America, has been identified as a notorious polyphagous pest with high migration ability, a wide range of hosts, voracious larval feeding and high fecundity; this pest is known to cause heavy economic damage to crops and pastures worldwide Montezano, *et al.* (2018) .who tested the effects of different larval densities of the 4 major lepidopterous-pests of Turfgrass in Hawaii, *Herpetogramma licarsisalis, Spodoptera mauritia* and *Agrotis ipsilon*. In addition, Baldwin (1990) surveyed turf has been expanded to cover pests and incorporates new information. In the identification of Turfgrass pests was outlined. Damage caused by minor insect pests (cutworms).

2.Population fluctuation of the two most dominant insect species *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner) on lawns (Turfgrass) plants:

Population fluctuation of *S. littoralis* and S. *exigua* moths (adult) on *P. vagenatum* is tabulated and graphically presented in Tables (2&3) for the one year (2021).

At Smart-Village, Giza Governorate:

Spodoptera littoralis (Boisd)**:**

Data presented in Table (2) and Fig (1) showed the population fluctuation of S. *littoralis*, on *P. vagenatum*. The appearing of *S. littoralis* adults started on 15th of January 2021 by 3.2 adults (moths), when the maximum, minimum temperature °C, relative humidity R.H.% and wind velocity (m/ sec.) were 22.8, 14.4°C, 92.2% and 10 m/ sec., respectively. The population of adults were fluctuated and till the highest two peaks obtained of 1st of June 2021 with number 156.9 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 33.8, 20.3°C, 76% and 17.7 m/sec, respectively and second higher peak obtained of 15th of Oct. 2021 with number 124.3 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 30.2, 20.5°C,56% and 18 m/sec, respectively. The population density of *S. littoralis* fluctuated and reached zero adults at the end of the season on the 15th of Dec. when the means of the climatic factors were 20.9, 14.2°C, 71.3% and 11.3 m/sec, respectively.

Table 2. The biweekly total number of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner) adults on *Paspalum vagenatum* and in relation to some Weather factor at Smart-Village, Giza Governorate during season 2021.

Date of inspection (biweekly)	Mean no. of moths / trap		Weather factor (Means)			
			Temp. ºC		Mean of RH%	W.v. m/sec
	S. littoralis	*S. exigua*	Max.	Min.		
01/01/2021	0	12.5	19.7	10.4	88.6	11.1
15/01/2021	3.2	11.3	22.8	14.4	92.2	10
01/02/2021	9.1	31.1	19.6	10.5	75.9	16.9
15/02/2021	16.1	42	24.3	12.8	82.8	12.5
01/03/2021	33.6	78.7	19.4	10.2	91.8	14.6
15/03/2021	35.5	124.6	23.3	11.4	77	16.6
01/04/2021	52.2	173.2	24.4	13.8	69.4	17
15/04/2021	66.5	189.6	25.4	11.8	71.5	17.8
01/05/2021	114.1	175.3	32.5	16.3	71.6	21.5
15/05/2021	132.3	118.9	36.6	21.4	60.3	14.9
01/06/2021	156.9	83.8	33.8	20.3	76	17.7
15/06/2021	87.7	62.1	33	21	77.5	18.6
01/07/2021	29.9	25.5	35	22.8	77.3	16.1
15/07/2021	29.1	38.1	36.3	24.5	78	13.8
01/08/2021	30.9	40.3	36.7	24.8	80.1	13.9
15/08/2021	37.8	82.4	38.9	27.5	82.8	11.8
01/09/2021	49.2	65.4	36	26	85.2	12.7
15/09/2021	74	163.5	33.9	24.3	77.4	15.1
01/10/2021	109.3	121.1	31.9	22.1	78.4	15.7
15/10/2021	124.3	66.2	30.2	20.5	56	18
01/11/2021	71.5	25.9	30	20.2	84.2	13.1
15/11/2021	22.6	13.5	27.5	19	87.6	13
01/12/2021	8.5	7.7	25.2	16.9	80	7.7
15/12/2021	0	9.6	20.9	14.2	71.3	11.3
Total	1294.6	1762.3	-	-	-	-
Mean	53.9 Syntax Error, AVERAGE	73.4	-	-	-	-

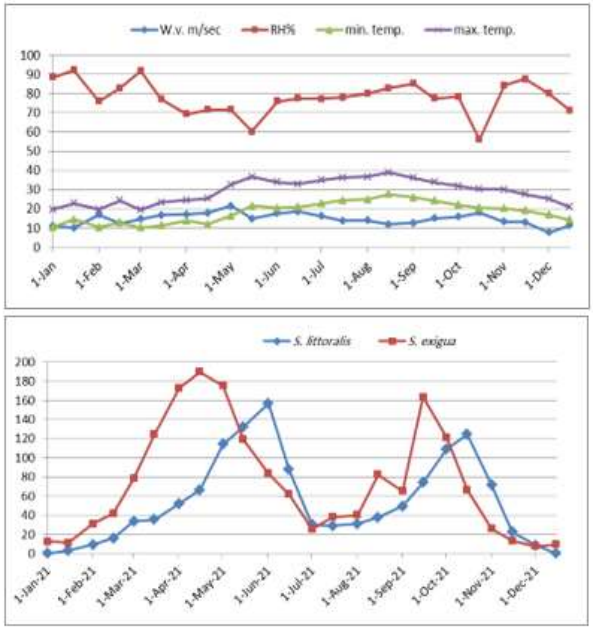

Fig. 1. The biweekly total number of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* adults on *Paspalum vagenatum* and in relation to some Weather factor at Smart-Village, Giza Governorate during season 2021.

Results in Table (3) illustrated the relationship between some Weather factors and the adults of *S. littoralis* during 2021 season. Simple correlation coefficient values (r) were 0.518, 0.348, -0.579 and 0.656 with significant relationships between maximum, minimum temperature °C, relative humidity (R.H. %) and wind velocity (m/sec.) between *S. littoralis* insect adult numbers. The partial regression analysis gave a precise effect where the (b) values were 3.612,-1.115, -1.310 and 6.055 by the change of the fore mentioned Weather factors by one unit (Table 3). The explained variance during 2021 was 63% of the variance of insect population.

***Spodoptera exigua*:**

Data presented in Table (2) and Fig (1) showed the population fluctuation of *S. exigua*, on *P. vagenatum* The appearing of *S. exigua* adults started on 1st of January 2021 by 12.5 adults (moths), when the maximum, minimum temperature °C, relative humidity R.H.% and wind velocity (m/ sec.) were 19.7, 10.4°C, 88.6% and 11.1 m/ sec., respectively. The population of adults were fluctuated and till the highest two peaks obtained of 15th of April 2021 with number 189.6adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 25.4, 11.8°C, 71.5% and 17.8 m/sec, respectively and second higher peak obtained of 15th of Sept. 2021 with number 163.5 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 33.9, 24.3°C,

44.4% and 15.1 m/sec, respectively. The population density of *S. exigua*, fluctuated and reached 9.6 adults at the end of the season on the 15th of Dec. when the means of the climatic factors were 20.9, 14.2°C, 71.3% and 11.3 m/sec, respectively.

Results in Table (3) illustrated the relationship between some Weather factors and the adults of *S. exigua*, during 2021 season. Simple correlation coefficient values (r) were 0.188, -0.020, -0.439 and 0.652 with significant relationships between maximum, minimum temperature °C, relative humidity (R.H. %) and wind velocity (m/sec.) between *S. exigua*, insect adult numbers. The partial regression analysis gave a precise effect where the (b) values were 7.125,-7.883, -7.754 and 7.699 by the change of the fore mentioned Weather factors by one unit (Table 3). The explained variance during 2021 was 47.9 % of the variance of insect population.

Results in Table (3) illustrated the relationship between some Weather factors and the adults of S. exigua, during 2021 season. Simple correlation coefficient values (r) were 0.499, -0.277, -0.463 and 0.748 with significant relationships between maximum, minimum temperature °C, relative humidity (R.H. %) and wind velocity (m/sec.) between *S. exigua*, insect adult numbers. The partial regression analysis gave a precise effect where the (b) values were 6.300,-4.469, -0.090 and 7.458 by the change of the fore mentioned Weather factors by one unit (Table 3). The explained variance during 2021 was 70.8 % of the variance of insect population.

Table 3. Simple correlation and regression values between the weather factors and biweekly mean No. of the adults of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner) infesting *Paspalum vagenatom* in Smart-Village, during 2021 season.

Variable		Simple correlation		Partial regression values				E.V.
		"r"	"P"	p	F	P	b	%
S. littoralis	Max. Temp	0.518**	0.010	0.351	8.091	0.001	3.612	63
	Min. Temp.	0.348	0.096	0.796			-1.115	
	R.H. %	-0.579**	0.003	0.152			1.310-	
	W.v. m/sec	0.656**	0.001	0.053			6.055	
S. exigua	Max. Temp	0.188	0.379	0.299	4.372	0.011	7.125	47.9
	Min. Temp.	-0.020	0.926	0.236			-7.883	
	R.H. %	-0.439*	0.032	0.578			-0.754	
	W.v. m/sec	0.652**	0.001	0.100			7.699	

"r" : Correlation coefficient, "b": Partial regression coefficient value, "P": Probability level, E.V. (%): Explained variance.

At El-Mireland-Garden, Cairo Governorate:

***Spodoptera littoralis* (Boisd):**

Data presented in Table (4) and Fig (2) showed the population fluctuation of *S. littoralis* , on *P. vagenatum* The appearing of *S. littoralis* adults started on 1st of February 2021 by 2.9 adults (moths), when the maximum, minumum temperature °C, relative humidity R.H.% and wind velocity (m/ sec.) were 19.6, 10.5°C, 75.9% and 16.9 m/ sec., respectively. The population of adults were fluctuated and till the highest two peaks obtained of 15th of June 2021 with number 122.5 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 33, 21 °C, 77.5% and 18.6 m/sec, respectively and second higher peak obtained of 15th of Oct. 2021 with number 101 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 30.2, 20.5°C,56% and 18 m/sec, respectively.

Table 4. The biweekly total number of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* adults on *Paspalum vagenatum* and in relation to some weather factor at El-Mireland Garden – Cairo Governorate during season 2021.

Date of inspection (biweekly)	Mean no. of moths / trap		Weather factor (Means)			
			Temp. ºC		Mean of	W.v.
	S. littoralis	*S. exigua*	Max.	Min.	RH%	m/sec
01/01/2021	0	9	19.7	10.4	88.6	11.1
15/01/2021	0	9.8	22.8	14.4	92.2	10
01/02/2021	2.9	22.2	19.6	10.5	75.9	16.9
15/02/2021	7	29.3	24.3	12.8	82.8	12.5
01/03/2021	12.2	58.5	19.4	10.2	91.8	14.6
15/03/2021	29.1	88.6	23.3	11.4	77	16.6
01/04/2021	33.7	113.3	24.4	13.8	69.4	17
15/04/2021	37.2	114	25.4	11.8	71.5	17.8
01/05/2021	60	143.4	32.5	16.3	71.6	21.5
15/05/2021	98.1	120.1	36.6	21.4	60.3	14.9
01/06/2021	117.6	119.5	33.8	20.3	76	17.7
15/06/2021	122.5	110.5	33	21	77.5	18.6
01/07/2021	78	99.1	35	22.8	77.3	16.1
15/07/2021	30	49.2	36.3	24.5	78	13.8
01/08/2021	38.4	42.7	36.7	24.8	80.1	13.9
15/08/2021	38.2	62.5	38.9	27.5	82.8	11.8
01/09/2021	49.5	78	36	26	85.2	12.7
15/09/2021	55.5	125.8	33.9	24.3	77.4	15.1
01/10/2021	75.1	111.6	31.9	22.1	78.4	15.7
15/10/2021	101	58.2	30.2	20.5	56	18
01/11/2021	97.3	43.3	30	20.2	84.2	13.1
15/11/2021	57.9	20.2	27.5	19	87.6	13
01/12/2021	21.9	20.5	25.2	16.9	80	7.7
15/12/2021	3.3	10.1	20.9	14.2	71.3	11.3
Total	1166.4	1659.4 Syntax Error	-	-	-	-
Mean	48.6 Syntax Error, AVERAGE	69.1	-	-	-	-

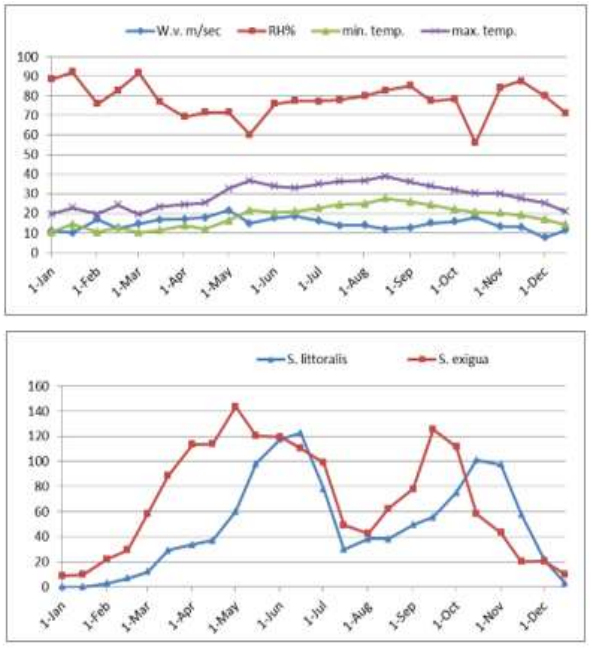

Fig. 2. The biweekly total number of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner) adults (moths) on *Paspalum vagenatum* and in relation to some Weather factor at El-Mireland-Garden, Cairo Governorate during season 2021.

The population density of *S. littoralis* fluctuated and reached 3.3 adults at the end of the season on the 15th of Dec. when the means of the climatic factors were 20.9, 14.2°C, 71.3% and 11.3 m/sec, respectively. Data obtained showed that the population fluctuation of *S. littoralis* had seven peaks were found all the year round (Ghanim, *et al*., 2019).

***Spodoptera exigua* (Hubner):**

Data presented in Table (4) and Fig (2) showed the population fluctuation of *S. exigua*, on *P. vagenatum* The appearing of *S. exigua* adults started on 1st of January 2021 by 9 adults (moths), when the maximum, minimum temperature °C, relative humidity R.H.% and wind velocity (m/ sec.) were 19.7, 10.4°C, 88.6% and 11.1 m/ sec., respectively. The population of adults were fluctuated and till the highest two peaks obtained of 1st of May 2021 with number 143.4 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 32.5, 16.3°C, 71.6 % and 21.5 m/sec, respectively and second higher peak obtained of 15th of Sept. 2021 with number 163.5 adults when the maximum, minimum, °C, relative humidity (R.H. %) and wind velocity (m/ sec.) were 33.9, 24.3°C, 44.4% and 15.1 m/sec, respectively. The population density of *S. exigua*, fluctuated and reached 10.1 adults at the end of the season on the 15th of Dec. when the means of the climatic factors were 20.9, 14.2°C, 71.3% and 11.3 m/sec, respectively.

Results in Table (5) illustrated the relationship between some Weather factors and the adults of S. *littoralis* during 2021 season. Simple correlation coefficient values (r) were 0.638, 0.548, - 0.431 and 0.513 with significant relationships between maximum, minimum temperature °C, relative humidity (R.H. %) and wind velocity (m/sec.) between *S. littoralis* insect adult numbers. The partial regression analysis gave a precise effect where the (b) values were 0.145, 3.654, -0.543 and 5.543 by the change of the fore mentioned Weather factors by one unit (Table5). The explained variance during 2021 was 59.1% of the variance of insect population.

Table 5. Simple correlation and regression values between the weather factors and biweekly mean No. of the adults of *Spodoptera littoralis* (Boisd) and *Spodoptera exigua* (Hubner) infesting *Paspalum vagenatum* in El-Mireland-Garden, during 2021 season.

Variable		Simple correlation		Partial regression values				E.V.
		"r"	"P"	p	F	P	b	%
S. littoralis	Max. Temp	0.638**	0.010	0.966	6.850	0.001	0.145	59.1
	Min. Temp.	0.548**	0.006	0.340			3.654	
	R.H. %	-0.431*	0.035	0.490			0.543-	
	W.v. m/sec	0.513*	0.010	0.045			5.543	
S. exigua	Max. Temp	0.499*	0.013	0.064	11.527	0.001	6.300	70.8
	Min. Temp.	0.277	0.190	0.230			-4.469	
	R.H. %	-0.463*	0.023	0.905			-0.090	
	W.v. m/sec	0.748**	0.001	0.007			7.458	

"r" : Correlation coefficient **"b": Partial regression coefficient value**
"P": Probability level **E.V. (%) : Explained variance.**

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دراسة تأثير بعض العوامل المناخية على تذبذب تعداد دودة ورق القطن الكبرى ***Spodoptera littoralis*** **(Boisd) والصغرى *Spodoptera exigua* (Hubner) على نباتات المسطحات الخضراء *Paspalum vagenatum* Turfgrass**

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الملخص

تتأثر الحشرات والنباتات ببعض العوامل المناخية فى جميع أنحاء العالم . وفى هذه الدراسة تم حصر لرتبة حرشفية الأجنحة Lepidoptera ، ودراسة التغيرات المناخية وأثرها على تذبذب تعداد دودة ورق القطن الكبرى *Spodoptera littoralis* (Boisd) والصغرى *Spodoptera exigua* (Hubner) التى تصيب نباتات مسطحات *Paspalum vagenatum* المستديم الخضرة فى القرية الذكية بمحافظة الجيزة وحديقة الميريلاند بمحافظة القاهرة موسم 2021 . ومن خلال الحصر بإستخدام المصايد الضوئية "Robinson type" ، تم إكتشاف خمسة أنواع من الحشرات ، الدودة القارضة *Agrotis ipsilon* (Hufnagel) و *Agrotis segetum* (Denis and Schiffermüller) ودودة ورق القطن الكبرى *S. littoralis* والصغرى *S. exigua* ودودة الحشد الخريفية *Spodoptera frugiperda* (Smith) فصيلة: Noctuidae رتبة حرشفية الأجنحة Lepidoptera. وقد أثبتت الدراسة أن متوسط تعداد دودة ورق القطن الكبرى *S. littoralis* فى القرية الذكية له ذروتين ، الاولى فى شهر يونية والأخرى منتصف أكتوبر خلال الموسم ، بينما كانت منتصف ابريل ومنتصف سبتمبر لدودة ورق القطن الصغرى *S. exigua* وفى حديقة الميريلاند كانت دودة ورق القطن الكبرى *S. littoralis* لها ذروتين ، الاولى منتصف شهر يونية والثانية منتصف أكتوبر ، وكانت أول شهر مايو والأخرى منتصف سبتمبر لدودة ورق القطن الصغرى *S. exigua* فى موسم الدراسة . وأثبتت نتائج تحليل معامل الارتباط أن متوسط درجة الحرارة والرطوبة النسبية وسرعة الرياح لها تأثيراً متبايناً ما بين طفيف إلى معنوى قوى لدودة ورق القطن الكبرى والصغرى . وبصفة عامة زادت اعداد حشرة دودة ورق القطن الصغرى مقارنة بالكبرى وتعداد الحشرتين في القرية الذكية أعلى مقارنة بحديقة الميريلاند خلال موسم الدراسة 2021 .