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EFFECT OF DIRECTIONS AND SOME ENVIRONMENTAL FACTORS ON DAMAGE AREA AND IT PERCENTAGE CAUSED BY THE INFESTATION OF LEAF MINER PHYLLONORYCTER PLATANI

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Abstract:

According to the results, the north had the highest damage area rate, averaging 42.8 cm2, which was significantly different from the south's average of 28 cm2. The north also had the highest damage rate, averaging 26.13%, which was significantly different from the south's average of 17.17%. With an average of 10.71 larvae per leaf, the northern region had the highest average number of larvae, which was slightly different from the southern region's 8.81 larvae per leaf. Regarding the qualities under study, such as chlorophyll, the results indicated that the percentage of chlorophyll in the leaves decreased from the previous months in mid-October, with an average of 0.2694 mg/cm2. It was also observed that the number of larvae in the autumn was higher than in the summer, with the highest number of larvae per leaf being 13 in early October. The water content decreased from July and August in mid-September and early October, with percentages of 54.98% and 56.4%, respectively. According to the results, the leaf's thickness increased to 0.2835 in mid-July and reached its lowest point at 0.2158 at the start of October, when there were 15 larvae per leaf. according to the experiment's timing.

Keywords: environmental study, damage ratio, squamous wings, and necrosis of the platani' leaves.

INTRODUCTION

Because of their direct and indirect effects on the environment, human health, tourism, and economy, forests are considered to be among the most significant natural and renewable resources. Trees also help to maintain water temperature, soften the atmosphere, and improve the environment. However, the wood product stands out among these advantages since it is a fundamental raw material that has been used in many industries and because of the recent rise in demand brought on by the world's population growth and the absence of developed substitutes that can make up for the lack of wood on the global market (FAO, 2015). These trees are infected with many different insect pests that cause Damage to it is represented by its death, and reducing the value of its commercial wood, including: the phyllonorycter Platani insect belonging to the family of tortricidae from the order Lepidoptera, as it is one of the important insects that spread in Iraq on the trees of the GENAR; because of the damage it causes in the leaves of the GENAR, as the females lay their eggs on the lower surface of the leaves, and after hatching, the larvae attack the spongy cells, forming filamentous and macular tunnels in the first three larval instars, and in the larval instars the last (fourth and fifth) feed on the columnar cell layer; to form tent tunnels that damage the leaves, and then their fall (al-Mallah et al., 2013).

MATERIALS AND METHODS :

The influence of the type, numbers of insects and some environmental factors on the area and percentage of damage caused by infection with the phyllonorycter platani insect : Each tree was randomly divided into two directions (north, south), 5 leaves were collected randomly from each facade of the tree, periodically for each half a month, the number of the sample (50 leaves) was placed in paper bags with the number of the tree and the facade from which it was taken, and brought to the laboratory for subsequent experiments on it, using the (Image J) program, a special computer program that calculates the smear of the damaged part of the paper directly the principle of its work involves scanning the infected plant leaf using a computer and a scanner, the program determines the total area Then the values of the simple correlation of the relationship between the area and the percentage of damage, the average number of insects, the average temperature and relative humidity for each type of tree of the study are calculated, and the regression

equation of the relationship between the previous variables is also found to determine the percentage of impact of each factor in an area, and the percentage of damage caused by insect infestation.

THE EFFECT OF PLANT LEAF THICKNESS :

For the purpose of studying the effect of the thickness of plant leaves on the number of larvae, samples were taken randomly and for each (15) days of the studied juniper trees in the same way as mentioned above, after which the number of larvae present in each leaf was calculated, then the thickness of the Leaf was calculated for(15) leaves under study with three readings per leaf, and the thickness of the leaves was measured through (Vernia), namely: an electronic device that gives the reading directly upon contact with the plant leaf (Al-Jubouri, 2013) . The effect of chlorophyll ratio : Following the same previous method, samples were taken randomly every (15) days from the Junar trees and the number of larvae on the leaves was calculated according to the method (McKinney, 1941) modified by (Arnon, 1949) and small parts of the tender and intact Junar leaves weighing(0.2) g were crushed using a ceramic mortar with (12) ml of acetone solution at a concentration of 80%, placed in a centrifuge Senterfuge at a speed (3000) cycles/min and for (5) minutes; for the purpose of separating the precipitate from the filtrate and then placing the extracted filtrate in one of the glass cells of the spectrophotometer and in the other cell, distilled water was placed; for the purpose of zeroing the device, then the chlorophyll reading was taken at Wavelengths (663_645) Nm for chlorophyll A,B by using the following equations :

Chlorophyll a = [12.7(D663) - 2.69(D645)] x V/ 1000 x W

Chlorophyll b = [22.9(D645) - 4.68(D663)] x V/ 1000 x W

Total Chlorophyll = [20.2(D645) + 8.02(D663)] x V/ 1000 x W

Where is that : =V the size of the final filter after completion of the separation process using a centrifuge.

D= Light intensity (absorbance) reading of the extracted chlorophyll.

W- Wet weight / GMW As well as finding a regression equation for the relationship between the average percentage of chlorophyll and the average number of insects to determine the percentage of the effect of chlorophyll in insect numbers.

THE EFFECT OF THE WATER CONTENT OF THE LEAVES:

To study the effect of water content, (10) leaves were taken randomly every (15) days from the studied junipers trees, and the number of larvae on the leaves was calculated, and the method (Wangwa, 1998) was used to estimate the water content, by weighing them; to determine the wet weight of each leaf, they were placed in paper bags separately in the oven at a temperature (70 Ohm) until the weight was stable, after which they were taken out of the oven and weighed directly by a sensitive electronic balance to determine the dry weight and calculate the percentage of water content using the equation the following : Water content % = wet weight-dry weight × 100 Wet weight Then the simple correlation values of the relationship between the average number of insects and the average water content of each of the studied tree species were calculated, and we also derived a regression equation showing the relationship between the average number of insects and the average water content to determine the proportion of the effect of water content in the average number of insects.

STATISTICAL ANALYSIS:

The data was analyzed using the Genstat 12 program. the averages were tested using the Duncan multi-range test (DMRT). the different averages took significantly different characters, while the non-different averages took similar characters. Genstat ,2020).

RESULTS AND DISCUSSION:

The impact of the number of larvae in the area and the percentage of damage resulting from infection with them : Larval numbers The results of the statistical analysis in Table (1) showed the presence of significant differences in the overall average number of larvae between the tree facades (northern and southern) . The beginning and the middle of October were marked by the presence of the highest average number of larvae, which amounted to 12.5 and 17.98 larvae/leaves, respectively . The results showed a decrease in the number of larvae, and the incidence of infection on plant leaves during high temperatures during the months of July and August, which recorded the lowest rate of the number of larvae in the middle of July and August, with an average of 5.76 and 6.36 larvae / Leaf, respectively. The reason for this may be due to the insect larvae being greatly affected by the environmental conditions represented by temperatures and relative humidity .an inverse relationship between larvae and heat was observed, and a direct relationship between larvae and relative humidity. the numerical density of larvae decreased when temperatures rose, and humidity decreased during the months of July and August, while the insect resumed its activity by mating, laying eggs, increasing the number of larvae and infection rates gradually during low temperatures, and increasing humidity, especially at the beginning and middle of October. As for the overall average trends, the results of the same table confirmed that the highest rate of larvae was from the north, with an average of 10.71 larvae / leaves, which differed significantly with the number of larvae from the South, which amounted to 8.81 larvae / leaves, and this may be due to the preference of the insect to the north in laying eggs more than the South, which in turn affected the numbers of larvae, and this is confirmed (al-Jubouri, 2013)that the Poplar leaf insect prefers warm facades . This result also agreed with what was found (Mullah Obaida, 2014), it showed that the north side exceeded the number of larvae during its study. Table (1) shows the overlap between larval numbers, sample collection time and trends

Degrees of humidity	Average temperatures	Overall average of appointments	Number of larvae		Sample collection date
			South	North	
15	37.8	5.76	4.32	7.2	15/7
27	35.1	8.38	7.44	9.32	1/8
11	39	6.36	5.24	7.48	15/8
25	34.4	7.42	5.72	9.12	1/9
19	28.5	9.9	9.84	9.96	15/9
39	26.9	12.5	12.12	12.88	1/10
32	25.1	17.98	16.96	19	15/10
			8.81	10.71	Overall average of trends

The total area of the plant sheet :

The results of the statistical analysis Table (2) showed that there are clear significant differences between the transactions in the total area of the paper, as the month of July and August was characterized by the highest percentage in the total area of the paper, especially at the date of 1/8 and the date before and on the date of 15/7, with an average of 206.6 and 183.1 cm2, respectively, and the total area of the paper the total leaf area increased during the growing season of the plant, while the total leaf area decreased , Especially during the month of October, at a reading of 141 cm2, the lowest rate of total sheet area was recorded . As for the overall average of the trends, the results of Table (2) confirmed the absence of significant differences in the paper space between the northern and southern facade. While the results of Table (2) indicated that there were no significant differences in the total area of the paper at the interface (North and South); but they differed significantly at the date of taking the readings, this result agreed with what I found (Mulla Obaida, 2014), I noticed a discrepancy in the average paper area during the dates of collecting samples for Al-janar trees. Table (2) shows the total area of the paper, the overlap between and the time of collection of samples and trends

Degrees of humidity	Average temperatures	Overall average of appointments	Number of larvae		Sample collection date
			South	North	
15	37.8	183.1	181.5	184.7	15/7
27	35.1	206.6	205.8	207.5	1/8
11	39	178.2	178	178.5	15/8
25	34.4	144.3 ج د	164.3 ب ج	158.9 ب ج	1/9
19	28.5	144.4	129.8	124.5	15/9
39	26.9	141	144	138	1/10
32	25.1	163.6	161.1	166.1	15/10
			166.4	165.4	Overall average of trends

Area of damage :

The results of the statistical analysis Table (3) showed that for the overall average of sample collection dates there are clear significant differences between the coefficients in the area of damage and the increase in the percentage of injury, as the months of July and August were characterized by the presence of the lowest percentage of damage at the date of 15/7 and the date after and on the date of 1/8, with an average of 14.35 and 24.76 cm2, respectively, and the area of damage varied between them according to the date of sample collection, as it was noted through the results that the area of damage to the paper decreased during high temperatures, especially during the months of July and August, which recorded the lowest rate of damage at the dates 15/7 and 15/8, with an average of 14.35 and 22.1 cm2, this may be due to the environmental conditions represented by temperatures Humidity has an impact on the insect's activity, a decrease in the area of damage was observed at high temperatures and low humidity during the months of July and August, while the insect resumed its activity in laying eggs, increasing the number of larvae and gradually increasing the area of damage during low temperatures and increased humidity, especially during October at the last two dates, which recorded the highest rate of damage . As for the overall average of trends, the results of Table (3) confirmed that the highest rate of damage area was from the north, with an average of 42.8 cm2, which differed significantly from the damage area from the south, with an average of 28 cm2, and this may be due to the influence of environmental conditions represented by temperature, humidity and wind, which affect the behavior of the insect in causing damage, this result agreed with what I found (Mullah Obaida, 2014), she stated that the highest average damage area in the Western. The results of the statistical analysis Table (3) indicated that there are clear significant differences in the overlap between the dates of sample collection and trends in the area of damage and the presence of variation according to the date of sample collection and the presence of larvae, as the results confirmed that the highest rate of damage area was during the month of October at the last date and on the date of 15/10, where there was no significant difference in the area of damage from the North and South with an average of 79.89 and 78.05 cm2, respectively . There were significant differences in the damage area for the rest of the dates on the North and south

sides, as well as significant differences at the time of collection of samples.the lowest average damage area was in July, with an average of 12.28 cm2 South and 16.42 cm2 North. Table (3) shows the area of damage, the overlap between and the time of collection of samples and trends

Degrees of humidity	Average temperatures	Overall average of appointments	Number of Damage		Sample collection date
			South	North	
15	37.8	14.35	12.28	16.42	15/7
27	35.1	24.76	20.77	28.74	1/8
11	39	22.1	15.95	28.24	15/8
25	34.4	25.61	16.22	34.99	1/9
19	28.5	27.88	23.8	31.95	15/9
39	26.9	54.2	28.78	79.26	1/10
32	25.1	78.79	78.5	79.89	15/10
			28	42.8	Overall average of trends

The percentage of damage :

The results of the statistical analysis Table (4) showed that for the general average of sample collection dates, there are clear significant differences between the transactions in the percentage of damage, as the month of October was characterized by the highest percentage of damage at the last date on 15/10 and the date before it on 1/10, with an average of 26.37% and 47.14%, respectively. The damage rates varied between them according to the date of collection of samples, as it was noted through the results that the percentage of damage decreased during high temperatures, especially during the months of July and August, which recorded the lowest rate of larvae on dates 15/7 and 15/8 with an average of 10.01% and 12.42%, respectively, may be due to the fact that the insect activity decreased during high temperatures, as high temperatures were the insect is active in increasing the percentage of damage during low temperatures and increased humidity, especially during the month of October at the last two readings The two have the highest damage rates. As for the overall average trends, the results of Table (4) confirmed that the highest rate of damage was from the north, with an average of 26.13%, which differed by a significant difference from the South, which was 17.17%. this may be due to the influence of environmental conditions represented by temperature, humidity and wind in the direction of sampling, which in turn affects the percentage of damage and insect behavior in laying eggs and causing damage. This conclusion agrees with my conclusion (Mullah Obeida, 2014) As for the overlap between the dates of taking readings and trends, the results of the Duncan test Table (4) indicated that there are clear significant differences in the average percentage of damage and there is a discrepancy depending on the date of collection of samples and the presence of larvae, as the results confirmed that the highest rate of damage was during the month of October, especially on the last date, on the date of 15/10, where there was no significant difference in the percentage of damage from the North and South, with an average of 46.47% and 47.82%, as there were significant differences in the percentage of damage from the North and South, and the lowest rate was collected in July, especially from the south, with an average of 8.39%. On this basis, it turned out that there is a significant difference between the dates of collection of samples and trends, as the North surpassed the south in the percentage of damage . This result agreed with what was found (Mullah Obeida, 2014), as it showed that the highest percentage of damage was in the northern direction and the type of eastern jinar . Table (4) shows the percentage of damage, the overlap between and the time of collection of samples and trends.

Degrees of humidity	Average temperatures	Overall average of appointments	Number of Damage		Sample collection date
			South	North	
15	37.8	10.01	8.39	11.63	15/7
27	35.01	15.22	12.85	17.58	1/8
11	39	12.42	8.97	15.78	15/8
25	34.4	19.51	13.0	26.03	1/9
19	28.5	20.89	14.98	26.79	15/9
39	26.9	26.37	14.23	38.51	1/10
32	25.1	47.14	47.82	46.47	15/10
			17.17	26.13	Overall average of trends

Table (5) shows the regression equations for the relationship between the average number of larvae, the average area of damage and the percentage of damage.

Coefficient of determination R2	The equation	Adjective
88.9 %	Y = 4.979 + 4.172 X	Area of damage

77.0 %	Y = 5.012 + 1.573 X	Damage ratio

Number of larvae = X
Damage ratio = Y

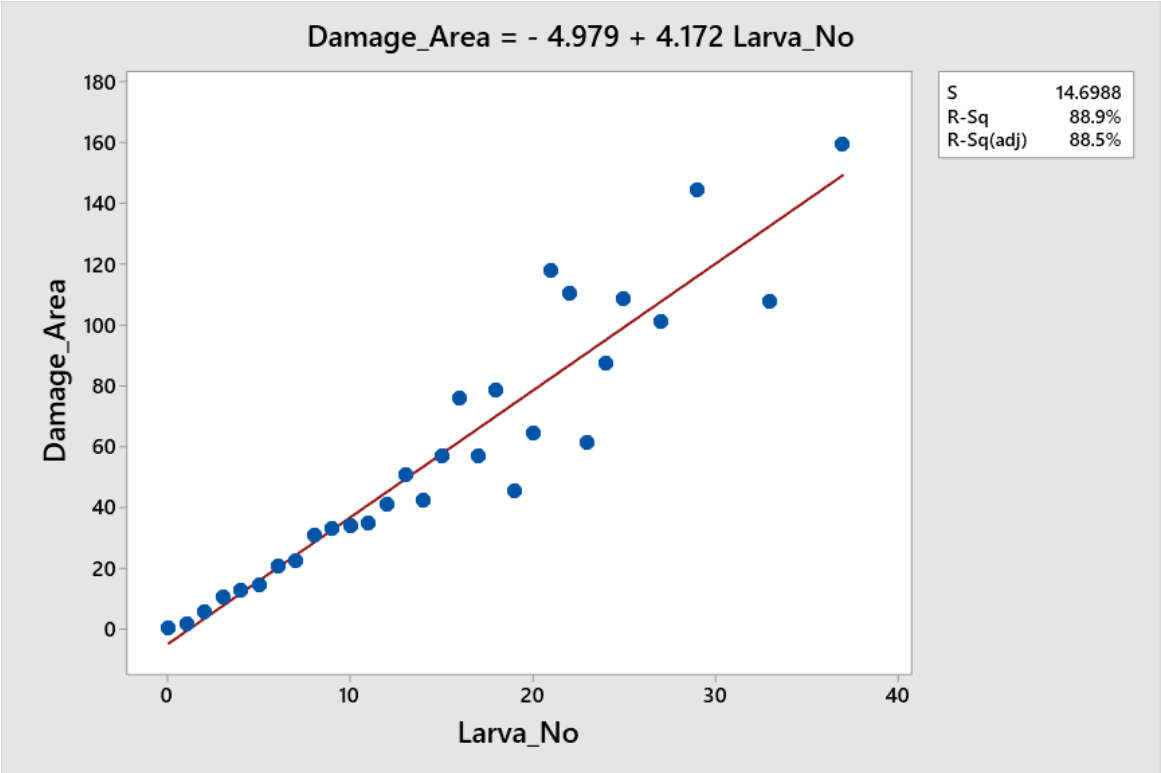


Figure (1) the relationship between the average number of larvae and the average area of damage in the leaves of the platani.

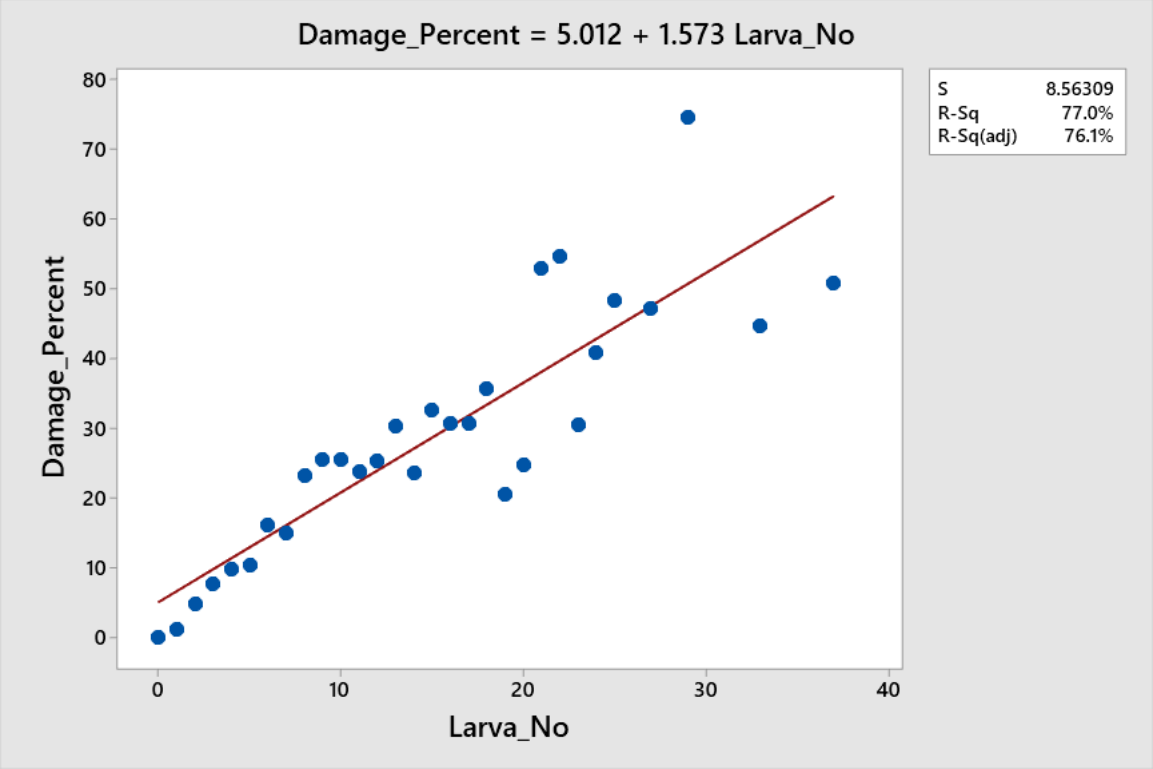


Figure (2) the relationship between the average number of larvae and the average percentage of damage in the leaves of the platani.

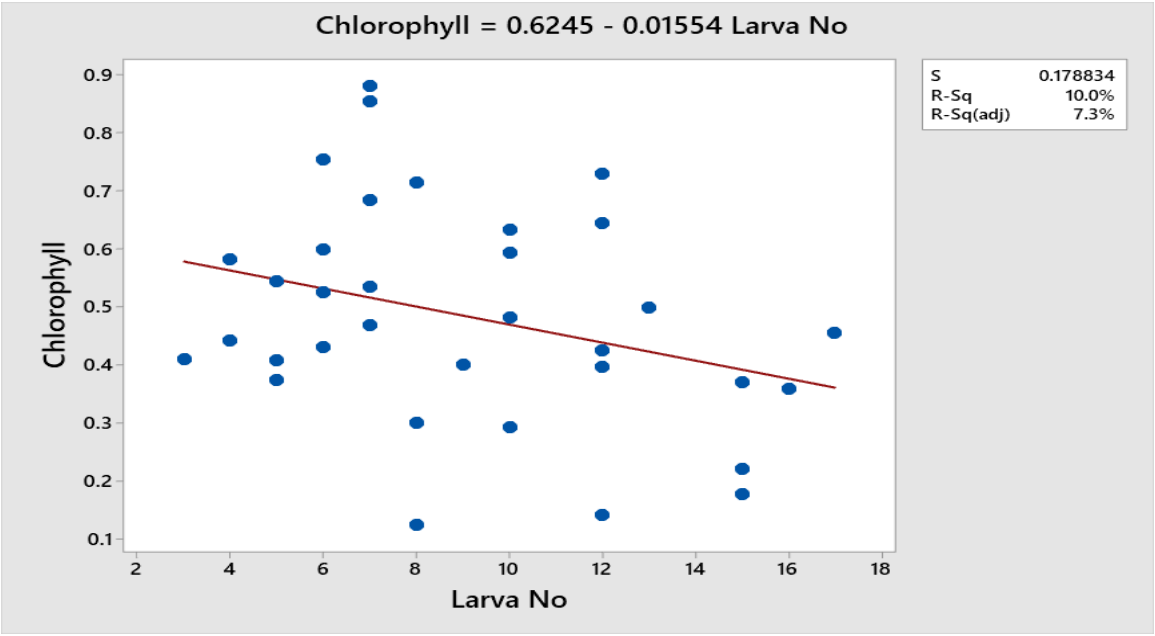
The influence of phenotypic and physiological traits in the numerical density of a pH insect. platani :
The effect of the proportion of chlorophyll . The results of the statistical analysis Table (6) showed the excess of the number of larvae in the autumn season starting from mid-September and the highest number of larvae at the date 15/9, where the number of larvae reached 12.8 larvae/Leaf, may be due to the suitability of environmental conditions for the appearance of insects, as for the total chlorophyll exceeded at the date 15/8, unlike the last two dates, the amount of chlorophyll decreased in October and on the date (1/10 and 15/10) with an average of 0.2909 and 0.2694 mg/cm2 the reason for the gradual decrease in the percentage of chlorophyll from the beginning of sample collection may be due to physiological reasons, as the process of photosynthesis increased with increasing temperatures and lighting Gogoi Basumatary (2018) that this increase The condition of the trees consuming nutrients gradually decreased, as well as the occurrence of a second growth cycle for the gnar trees, which led to the appearance of new leaves with a low chlorophyll content during this period, while the time was favorable for the appearance of the insect, which gives an opportunity for the largest number of larvae to feed .this result does not correspond to what I found (Mullah Obaida, 2014), as it showed that gnawing Gnar larvae prefer leaves with a high content of chlorophyll due to the ability of the leaves to provide food that enables the larvae to grow, develop, continue and reproduce. Table No. (6) shows the dates of collection of samples, the number of larvae and total chlorophyll.

Humidity degrees	average temperatures	total chlorophyll	number of larvae	sample collection date
15	37.8	0.5.11A	4.6B	15/7
27	35.1	0.500A	6.4B	1/8
11	39	0.6771A	7.4B	15/8
25	34.4	0.5918A	7.2B	1/9
19	28.5	0.5617A	12.8B	15/9

39	26.9	0.29029B	12.4A	1/10
32	25.1	0.2694B	12.2A	15/10

Table (7) shows the regression equation for the relationship between the average number of larvae and the average percentage of chlorophyll

معامل التحديد R^2	المعادلة	الصفة
10.0%	Y = 06245 _ 0.01554 X	the percentage of chlorophyll



The effect of water content :

The results of the statistical analysis Table (8) indicated the superiority of the number of larvae in the autumn season, starting from the month of October, the highest was the number of larvae at the date 1/10, where the number of larvae reached 13 larvae/leaf, this may be due to the fact that high temperatures and low humidity negatively affected the activity of the insect, as the record the highest rate of larvae, for water content exceeding at Date 1/7, reaching 65.28%, unlike the last two dates, the water content decreased in October, on 15/9 and 1/10, with a percentage of 54.98% and 56.4%, the reason for the decrease in water content may be due to the fact that the leaves growing in autumn had less water content than the leaves growing in summer, or to the activity of larvae and their feeding behavior during this

period, which helps to reduce the water content of the Leaf, this result does not agree with 2014) found that larvae prefer leaves that have a high water content to carry out vital activities such as growth, development and reproduction.

Table No. (8) shows the dates of sampling and the water content of the leaves of the platani.

25		1/9
19		15/9
39		1/10

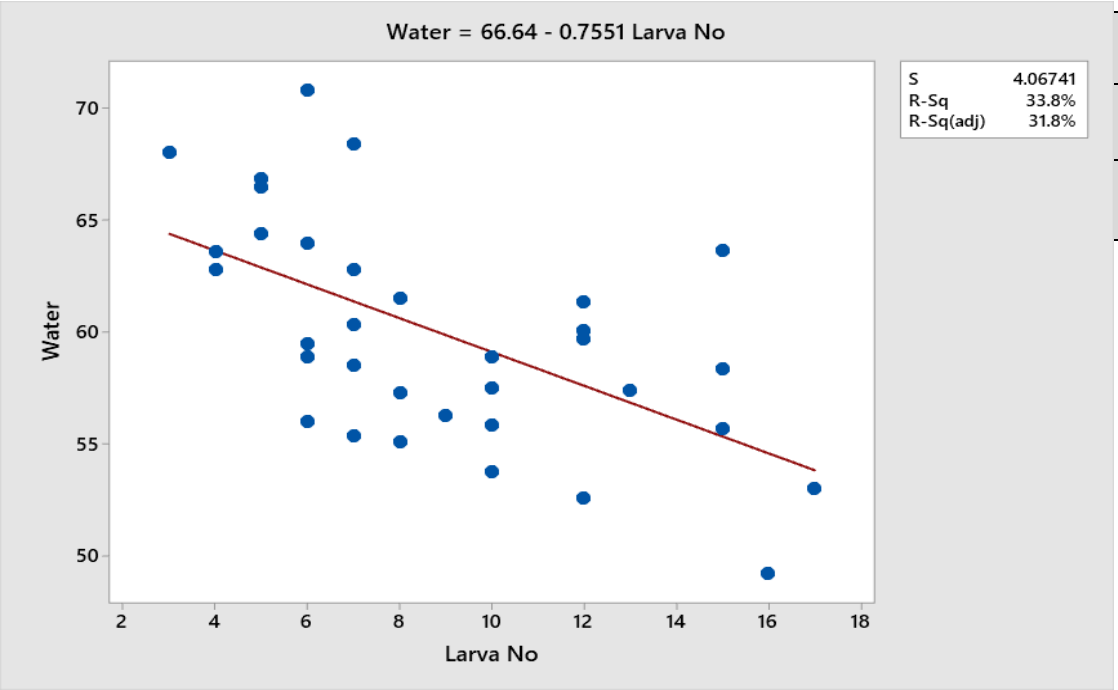


Figure (4) the relationship between the average number of larvae and the average water content.

The effect of sheet thickness:

The results of the statistical analysis showed table (10) that the number of larvae exceeded the number of larvae in October on dates 1/10 and 15/10, where the number of larvae reached 15.933 and 15.133 larvae/leaves.this may be due to the environmental conditions represented by temperature and humidity play an important role in the behavior of the insect, as the decrease in the number of larvae was observed at high temperatures and low humidity during the months of July and August, while the insect resumed its activity in laying eggs, increasing the number of larvae and the percentage of infection gradually during low temperatures the humidity increased, especially during the month of October at the date of 1/10, as the number of larvae reached 15,933 larvae/leaf, which recorded the highest rate of larvae, relative to the thickness of The paper exceeded the 15/7 date by 0.2835 mm, while the lowest thickness was recorded at the 1/10 date by 0.2158 mm . As it is clear from Table(11), an increase in the number of larvae and a decrease in leaf thickness in the autumn may be due to the appearance of new leaves of low thickness, while the date of infection was very favorable for the insect from environmental conditions, temperatures and humidity . These results agreed with the findings of(al-Sharif, 2020), which showed that the thickness of the plant leaf plays an important role in insect infestation and resistance, as the thickness of the Leaf is an obstacle to the mouth parts of the insect rodent during the process of penetration into the plant tissue or in front of the female during the insertion of eggs, which varies depending on the type of insect and the type of plant host. Mustafa et al. 2018 explained that the environmental conditions surrounding the trees have a significant impact on the thickness of the Leaf . While this result differed from what was found(Mullah Obaida, 2014), which showed that an insect gnawing the leaves of the gnar prefers thick plant leaves .

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