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EFFECT OF TEMPERATURE AND WIND ON DATE PALM CULTIVATION IN AL-MUTHANNA GOVERNORATE

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Abstract:

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Abstract:
Palm cultivation is exposed to climatic influences, which affects its production of dates, and thus on economic production. It is suitable for palm cultivation of all types (lower, higher, and optimal), except in the winter months (December, January, and February) in which the minimum temperatures fell below the appropriate degree for palm cultivation. The results also showed that the wind speed is not appropriate in the pollen season. Palm trees sprout, i.e. the months (March and April), as well as during the ripening season in the months (August and September).

Keywords: temperature, wind, palm trees

INTRODUCTION:

Palm cultivation is affected by many factors, including natural factors, and the most important of these factors are climatic factors, where the temperature, whether high or low, affects the cultivation and production of palm trees. In the impact on the cultivation and productivity of palm trees, when the wind speed increases, it works to spread diseases in addition to many effects, so it requires shedding light on the effect of the elements of temperature and wind on palm cultivation and its impact on palm productivity.

SEARCH PROBLEM:

The research problem includes the following questions:

1. Is there an effect of climatic factors(temperature and wind)onPalm cultivationIn Muthanna Governorate?
2. Is there a variation of the influence of climatic factors (degree the heat and wind)inPalm cultivationMuthanna Governorate?

INQUIRIES HYPOTHESIS:

1. There is an influence of climatic factors(degree the heat and wind)on cultivationPalmin Muthanna Governorate.
2. There is a variation of the influence of climatic factors(degree the heat and wind)on Palm cultivation inMuthanna Governorate.

Search Goal:

The research aims to shed the light on impact Elemental temperature and wind on Palm cultivation , and finding the necessary means for it, in order to increase the production of palm cultivation, which is reflected in the increase and improvement of the economic level of the population of Muthanna Governorate in particular and Iraq in general..

Importance search:

for importance Palm cultivation and the economic importance of palm production,And what is the importance of climate elements in influencing its cultivation and production,I applied Researcher to study this the topic , and find ways and plans future to keep To cultivate palm trees and increase their production.

Structural search:

contain search on Two topics,The research contained the first on(features temperature and wind speed in Muthanna Governorate),And eat The topic the second(distribution spatial to cultivate Palm and influences climatic on cultivated in Muthanna Governorate)included search on Results and recommendations.

Border Search:

Spatial search limits:

represented border the study in governorate Double located south Iraq,and bounded The kingdom Arabic Saudi Arabia from the South,And from North It borders the province Qadisiyah,And from the West It borders the province Najaf,And from the East and north Eastern borders the province The tar,It borders it to the east and south eastern governorate Basra.a map(1),As for the astronomical location It lies between two latitudes (29.05 5 - 31.42 5) north And between linear Length (43.50 5 - 46.32 5) east , and reaches space Governorate(51,740how much2)from space

Iraq adult(435244how much2).It is the second largest province in Iraq in terms of area five districts(Samawah,and Al-Rumaitha,and greens,And the salmon,and Warka).

Border Search Temporal:

Locate search cycle climatic from(2000-2022)by adoption on data climatic for a body the heat weather Iraqi .

Qualitative limits: It is represented in studying the climatic effect (temperature and wind) on date palm cultivation in Al-Muthanna Governorate for the period from (2000-2022).

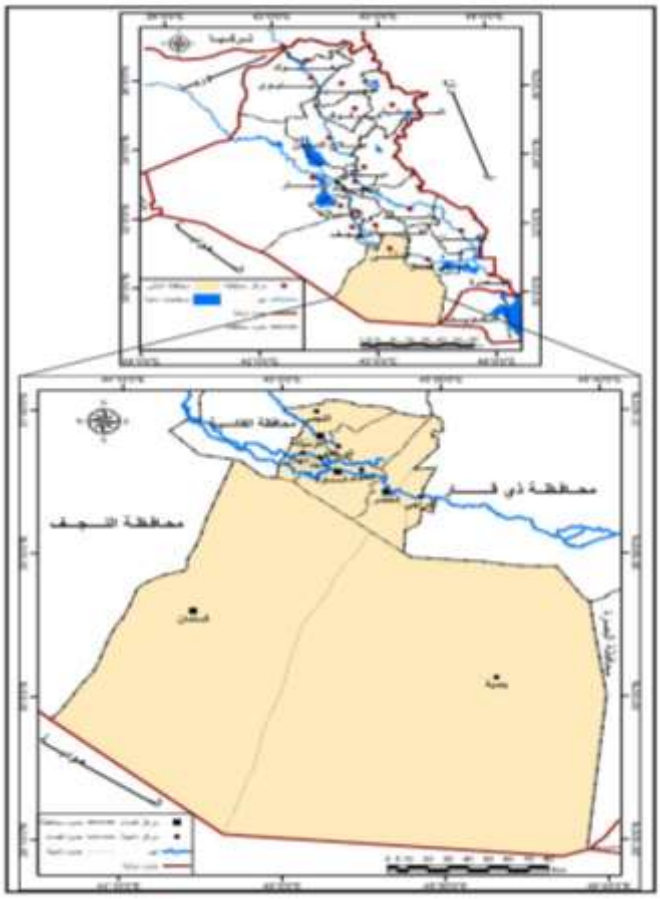
Methodology Search:

The research followed the analytical approach in analyzing climatic data and its relationship to date palm cultivation for the period (2000-2022), and the research relied on sources and studies in this field.

Terminology :

- Sun blight: It occurs when exposed to direct sunlight, so half of the fruit is reddish.
- Al-Jamri: It is considered one of the stages of development of palm fruits, and it lasts from (5-6) weeks, with its green color, oval shape, and bitter taste.

Map (1) Location of Muthanna Governorate, Iraq



Source: Ministry of Water Resources, General Directorate of Survey, for the division of production maps, the digital unit, the administrative map of Iraq, and the map of Muthanna Governorate, scale (1: 1,000,000), Baghdad, 2007 2 - Program (3: 10ARCGIS).

The first requirement : the characteristics of temperature and wind in Muthanna Governorate:

Is characterized by Al-Muthanna Governorate with climate desert dry,This climate is characterized by several characteristics, which we review from during data analysis climatic station Samawah And asCome :

1- Temperature: From Table (1) and Figure (1), the following appears:

A- normal temperature:

The average annual normal temperature was (25.3 °C), the highest was recorded in July and August, when it reached (36.1, 37.4 °C), respectively, after which it begins to gradually decrease, as the lowest temperature was recorded in January, when it reached (11.7 °C). .

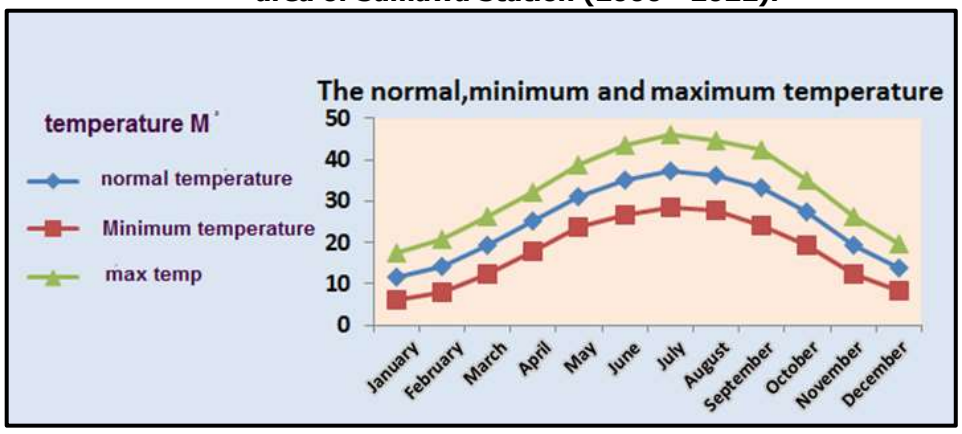
- The lowest temperatures: The average annual minimum temperature was (17.8 °C), while the lowest monthly temperature was recorded in January, which amounted to (6.0 °C), while the highest average was recorded in July, when it reached (28.6 °C).
- The maximum temperature: The average annual average maximum temperature was (32.7 °C), the highest was recorded in July when it reached (46.2 °C). While the lowest average temperature was recorded in January, when it reached (17.4 °C).

Table (1): The monthly averages of the normal, minimum and maximum temperatures in the study area. to Samawa station (2000-2022)

Months	The average normal temperature m°	average minimum temperature m°	an average grades The maximum temperature m°
January	11.7	6.0	**17.4**
February	14.2	7.8	**20.7**
March	19.3	12.3	**26.4**
April	25.1	17.9	**32.3**
May	31.2	23.6	**38.9**
June	35.0	26.7	**43.4**
July	37.4	28.6	**46.2**
dad	36.1	27.7	**44.5**
September	33.3	24.1	**42.6**
October	27.2	19.4	**35.1**
November	19.3	12.5	**26.1**
December	13.8	8.1	**19.6**
annual rate	**25.3**	**17.8**	**32.7**

***Source*: Ministry of Transport and Communications, Iraqi General Authority for Meteorology, Climate Department, unpublished data, 2022.**

Figure (1) Monthly averages of the normal, minimum and high temperatures in the study area of Samawa Station (2000 - 2022).



Source: Table (1).

2- Wind speed and direction:

It turns outfrom table (2), and Figure (2)The average annual wind speed was reached at Al stationSamawah(3.4m/s),and registeredhigherratesHainJuneit reached (4.4m/s),while recordedget lighteraz these rates in months (November, December, and January) soregistered(2.5, 2.6, 2.7m/s) respectively . As for whatRegardsWind directionIt is clear from Table (3) in wind Prevailing she wind North western It recorded its percentage(25.1%), and comes in second placewind western As it reached(22.4%) , As for wind NorthIt was ranked third, as it reached its percentage(12.6%), And in fourth place was the eastern wind, with a rate of (8.8%)rate wind Southern percentage reached(3.5% , whatmultiplicity trends wind instudy area , lits location in south West from easy sedimentary , Than Assist on Access wind from all directione she has.

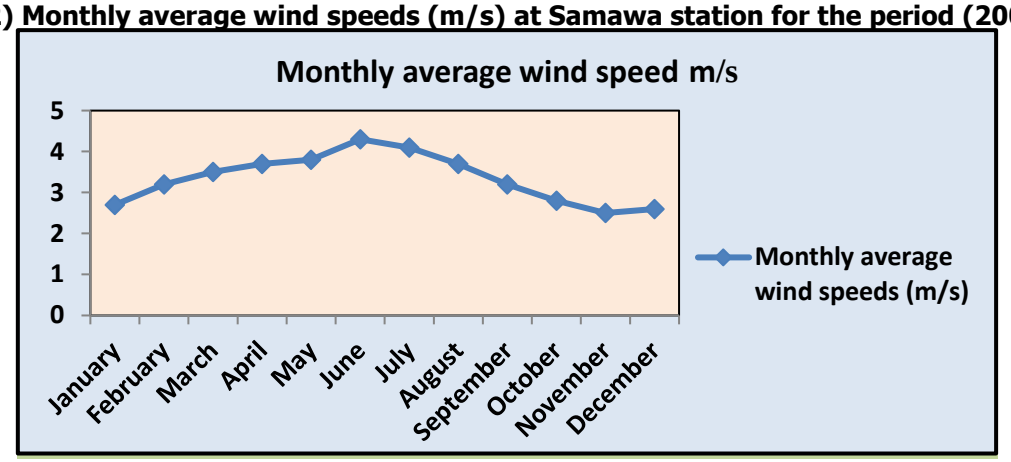
Table (2): Monthly average wind speed (m/tha)instudy areafor the period (2000-2022)

Months	rates monthly to wind speed (m/tha)
January	2.7
February	3.2
March	3.5
April	3.7
May	3.8
June	4.4
July	4.2
dad	3.7

September	3.2
October	2.8
November	2.5
December	2.6
annual rate	3.4

***Source*: Ministry of Transport and Communications, Iraqi General Authority for Meteorology, Climate Department, unpublished data, 2022.**

Figure (2) Monthly average wind speeds (m/s) at Samawa station for the period (2000-2022)



Source: Accredited researcher on Schedule(2).

Table:(3)pedigree painawYeh to rate repetition trends wind Prevailing for station Samawah(2000 -2022)

Wind direction	Northern	North-west	Western	Southwest	Southern	Southeast	Oriental	Northeast	Stillness	the total
the average	12.6	25.1	22.4	4.6	3.5	6.5	8.8	5	11.5	100%

Source:Researcher by adoption on Ministry Transport transportation, Commission the public for the weather weather Iraqi, to divide the climate, data not published,2020.

The second requirement:

Spatial distribution of date palm cultivation and climatic effects on its cultivation in Al-Muthanna Governorate :

Firstly: the spatial distribution of date palm cultivation in Al-Muthanna Governorate:

Al-Muthanna Governorate is famous for palm cultivation, and it produces several varieties of dates, Table (4), and these areas are distributed among its administrative units, and this distribution varies according to the conditions and factors affecting these administrative units, Table (5). Where the highest numbers of palm trees were recorded in the city of Samawah, as their number reached (351,754)by (36%), followed by the district of Al-Khader, as the number of palm trees in it reached (200,000) by (20.5%), and the reason for the increase in the number of palm trees in the districts of Samawah and Al-Khader is due to the passage of the Euphrates River in the middle of its lands, and it comes in the third phase in the direction of As-Sawir, as the number of palm trees in it reached (116,000), by (11.9%), while the rest of the administrative units (Warka district) were recordedGlory hand, pheasantRumaitha District,sDh al-Najmi and the district of al-Hilal (the number of date palms reached)**94420**,**80,000**,**40623**,**40144**,**38692**,**14545**) respectively and by (**9.7**,**8.2**,**4.2**,**4.1**,**3.9**,**1.5**), respectively, while the Salman district did not record any numbers of nxIt is due to the lack of surface water, scarcity of rain, and its sandy soil and rocky lands.

Table (4) The number of date palms and their productivity by cultivars

classification	number Palm	Palm that did reach a stage production	seductive Wassa within a year 2020	Palm in production			Average palm yield (kg/palm)		production (tons)
				unproductive	Really productive	the total	actually produced	in the production stage	
ascetic	2580	53965	22467	16055	165577	181,6	57.9	52.8	9593

al	64					32			
Khastawi	83907	21972	18949	-	42986	42986	58.1	58.1	2497
Sayer	53637	12206	6798	-	34,633	34,633	59.0	59.0	2043
Khadrawi	84,500	18673	9168	3400	53259	56659	58.8	55.3	3132
Sweets	52362	15611	9723	-	27028	27028	48.5	48.5	1311
Derry	96527	7667	4670	1684	82506	84190	57.1	56.0	4711
other kinds	374,873	97780	132403	15916	128,774	144,690	61.1	54.4	7868
Total females	1003870	227874	204,178	37055	534,763	571818	58.3	54.5	31155
males	30392	1495	390	-	28507	28507	-	-	-
the total	1034262	229369	204,568	37055	563,270	600325	58.3	54.5	31155

in Al-Muthanna Governorate 2020
Source: Directorate of Agricultural Statistics, Dates production report for the year 2020 .

Table (5) Spatial distribution of the number of date palms in Al-Muthanna Governorate 2020

T	Administrative unit	Space (dunum)	Percentage (%)	Total number of palm trees	Percentage (%)	orchard numbers	orchards area (dunum)
1	Samawa district	313668	1.5	351,754	36	2400	8700
2	Al-Khader district	542800	2.6	200,000	20.5	710	5000
3	handSawyer	125932	0.6	116,000	11.9	600	3000
4	spendWarka	391,200	1.9	94420	9.7	1418	4000
5	handglory	58,000	0.3	80,000	8.2	381	2000
6	handPheasant	124,000	0.6	40623	4.2	208	1042
7	spendRumaitha	42400	0.2	40144	4.1	209	2500
8	star side	261,600	1.3	38692	3.9	245	1129
9	handCrescent moon	128400	0.6	14545	1.5	310	1600
10	spendSalman*	18,708,000	90.4	zero	zero	zero	zero
the total		20,696,000	100	976178	100	6481	28971

Source : Sadiq Neghamish Jassim Al-Jayyashe1 and Arkan Nahi Mosua Obstacles to the development of palm tree cultivation and date production in Al-Muthanna Governorate. p40-41

1- The Effect of Temperature and Wind on Palm Cultivation:

Palm cultivation is exposed to many effects of climatic elements, some of which are positive and some are negative. We will explain the effect of some of these elements (temperature, wind) as follows:

A- temperature :

The plant needs lower and higher temperatures that are ideal for its cultivation, including palm cultivation and its production of dates, which are directly affected by the mentioned temperatures. Therefore, palm cultivation is not suitable in cold regions, but palm trees can grow in these areas, due to the loss of the ability to flower and produce dates, while it grows in the regions With a warm warm climate[(1)] ,Therefore, we will explain the temperature requirements for date palm cultivation and their suitability in the study area, as shown below: Table (6).

1- Minimum temperatures needed by palm trees:

Opinions differed about the minimum temperature needed by palm trees, as this degree differs according to the different species and varieties, some of them consider the temperature (12 C 5) as the minimum degree, and some consider (9 C 5) as the minimum degree for palm cultivation[(2)] . The effect of a drop in temperature depends on factors including (the age of the palm tree, soil fertility, the degree of drop in temperature, and the species and varieties).[(3)] The minimum temperature in the study area drops below (9 C 5 C) in the winter months (December,

January, and February), and it is considered unsuitable for the limits during these months, as it recorded (8.1, 6.0, 7,8 C) respectively, while it is suitable during the remaining months. Table (1), and a decrease in temperature below this degree leads to immaturity.It is a degree the heat (-8) temperatureThe world harmfulfor palm trees.
Varieties are divided according to thermal needs into three sections:[4]:

A- Soft varieties: These items need thermal units 1200-1400 thermal units.

B- varieties Half dry: And this Categories need to units refractory1500-1700lonliness refractory.

C-varieties dry: And this Categories need to units refractory 2500-3000Oujda refractory and more.

Table (6) climatic requirements for date palm cultivation

Source: Abd al-Amir Mahdi Matar, Palm cultivation and production, University of Basra, College of Science, 1991, pg. 67.

temperature	the value
minimum temp	5٫9
upper temp	5٫44
optimal temperature	(9-44 m 5) for flowering, (25m5) and (35m5) ideal for the first stages of maturity
relative humidity	40-60%
wind	7-9M/S
Average palm temperature during the growing season	26.6
The amount of heat accumulated	3396
Harmful upper temperature m	50-
Minimum harmful temperature m	8-

Source: Abd al-Amir Mahdi Matar, Palm cultivation and production, University of Basra, College of Science, 1991, pg. 67.

2- Degree The Heat Supreme That Needs It Palm:

When the temperature exceeds the upper limit, the growth of the date palm stops, as the date palm does not bloom except at an air temperature higher than 18 C 5 from May to October, and the recorded temperatures in the study area during the mentioned period ranged between (35.1-38.9 (table) 1), and it is considered suitable for the months of growth, and it also differs according to the varieties, and the temperature (44 °C) is considered the highest suitable degree that palm trees need in the summer during the flowering period. Putting the production on the market and selling it in the form of (cooked) such as jibjab and al-barim, leading to economic losses (5)If the temperature drops below 44 °C, the ripening of dates stops[6]And the temperatures in the study area during the summer months (June and August) are suitable for palm cultivation, as they reached (43.2 and 44.5 C) respectively, while in July it rises above (44 C) when it reached ([5]46.2M) . The date palm can bear a temperature of (-5 C 5) in the winter[7].
In addition, high temperatures cause the death of the protoplasm, which leads to the leaves turning yellow, causing an imbalance in the functions of the leaves, and they become weak at a temperature of (24 °C), while the temperatures are fatal when they reach between (50-60 °C) in the vegetative sap.[8].However, the palm tree can bear a temperature of more than (52 m 5), due to the presence of fronds at the top of the palm tree, which works to protect the gemara from high temperatures.[9].

3-The optimum temperature for palm cultivation:

The limits of this degree vary according to the stages of growth and according to the varieties, as the cultivation of palm trees in the flowering stage requires a temperature of (18 C 5), while this temperature turns to (25 C 5) in the fruiting stage, while the requirements for palm cultivation in the summer season range between (9-9 44 m5)[10], And if it is lower than this degree, it will lead to the palm trees stopping the ripening of the fruits, but if it is higher than this limit, it will lead to the drying of the fruits, especially when it is accompanied by dry winds. They are suitable conditions for cultivation in the study area during the summer months (June, July and August), as we mentioned earlier, as normal, minimum and maximum temperatures were recorded (temperatures of35.0, 37.4 , 36.1) and (26.7 ,28.6,27.7) And (43.4,46.2,44.5) respectively . These requirements differ in the winter, as they are considered inappropriate in the stages of flowering and maturity.

4- Accumulated Temperature:

she sum grades thermal accumulated necessary to reach to stage maturity during Season the growth,Which We increase on alone the first,And extract from the difference between middle grades the heat for a day what and zero the growth that It is considered(6M5).[11]The amount of heat accumulated for dates from the beginning of flowering to the stage of ripening is approximately (5100 m 5), so the areas with a total temperature unit of more than (18 m 5) from (May to October) are suitable for cultivating the wet variety, and the thermal units needed by the dry variety increase compared to those suitable for the semi-dry variety[12]. The number of caloric units for each variety also varies according to the length of the growing season, as the fruits need approximately (150 days) to reach maturity, and differ according to the number of days and the geographical location, as the al-Khaddawi variety needs (280 days), Al-Zahdi (270 days), and Al-Khastawi (150 days), And Al-Sayer to (130 days), as the temperature and season of growth are important factors in palm cultivation[13].

And vary degree to bear Varieties Palm for degrees the heat where He endures higher degree(sweets)to Least it to bear he (ascetic)[14] ,Thermal anomalies in the winter during the night at temperatures less than zero degrees Celsius, and their rise to more than (51 m 5) during the summer during the day affect the productivity of date palms and the adherence to types or cultivars that suit the weather conditions in the study area.
It is also known that Muthanna Governorate Located within a territory the climate desert , which is characterized by an increase in range thermal daily , As it affects the speed of gaining or losing heat between the density of the fleshy part compared to the density of the fruit, where the temperature during the night is lower than during the day, which leads to the occurrence of a phenomenon (scaling of the peels from its fruits due to the expansion and contraction of the two tissues[15] .

SECONDLY : THE WIND:

The wind affects palm cultivation with several effects, including positive effects, as the wind works to provide some gases necessary for the process of respiration and the process of photosynthesis that the plant needs, including palm trees such as (carbon dioxide and oxygen). The wind works as a natural pollination of the palm, and the wind works to supply the soil with organic matter indirectly, through the decomposition of the leaves and branches of the plant falling on the ground. (dust spiders)[16]Picture (1), and hot winds are more effective and dangerous in transmitting diseases than cold winds because of the high temperatures that help them hatch for pest eggs[17] . The strong winds cause the palm trees to fall, especially the old and tall ones, while the young trees bear the strong winds because of the strength of the trunk of the palm tree and its fixation in the ground. And the speed of the wind and its dryness affect the female stigmas, which pushes the pollen grains to great distances, as it leads to the loss of many of these grains in the flowering stigmas and thus negatively affects the amount of date palm production.[18]The intensity of the winds also causes black spots on the fruits of the palm trees due to their impact on the palm trees. The fruits also dry due to the dry winds and their quality decreases because they are polluted by sand.[19]The annual wind speed in the study area was (3.4 m/s) Table (2), while it was recorded in the months (March and April) during the pollen season of palm pollen (3.5 and 3.7 m/s), which is a high speed compared to what palm needs in this season. The period depends on the wind speed, as the speed is required to be less than that, in order for the pollen grains to remain for a longer period in the female pollen, and high speeds lead to the volatilization of the pollen grains. The farmer or gardener must be careful when carrying out the pollination process by choosing a suitable day when the wind speed decreases. Dry winds in the summer make the fruits harden due to the evaporation of water inside the fruits[20],As well as to the hardening of the lands of the orchards

Image (1) Dust spider disease

Source : Sadiq Neghamish Jassim Al-Jayyashe1 and Arkan Nahi Mosua Obstacles to the development of palm tree cultivation and date production in Al-Muthanna Governor p45

matter that calls farmers to further from irrigation so registered during Monthly(June,And July)Quick winds reached(4.4 , 4.2)on respectively,And count not Relevance And her its effects negative as We mentioned previously And diseases increase, especially the dust spider, which is one of the most common diseases in the study area at this stage, which is called the (Al-Jamri) stage.[21], as Working windHot during the pollination period by affecting the flowering seasons and making them dry, which leads to poor fertilization due to the inability of pollen grains to swell, especially in the late pollination season.[22].
In the ripening season (August and September), wind speeds were (3.7 and 3.2 m/s). This leads to the shaking and falling of the fruits, and their transmission of diseases that affect the date palm, which affects the amount of production.
As for the direction of the winds, the northwestern wind prevails in Iraq in general and in the study area in particular, especially in the summer, where the percentage of the northwestern wind was recorded in it (25.1%), and it works to stir up dust storms when the soil dries up, in addition to transporting dust and soil from the lands adjacent to the orchard lands[23].

CONCLUSIONS:

1. And count grades the heat in region the study during Months summer within Duration the study Relevance to cultivate Palm for my month(June,and father)so reached(43.2 , 44,5M^5)on respectively As for in Month July So it goes up on degree heat(44M^5)so reached(46.2M^5).
3- The minimum temperature is not suitable in Months winter(Canon the first,and canon the second,and February)that decreased In which grades the heat The world on Class Occasion to cultivate Palm .
2. The wind speed during the pollen season was (3.5 , 3.7M/tha)In the months of (March and April), as it is a high speed compared to what palm trees need in this period.
3. The wind speed was recorded in the summer during the months of (June,And July)Quick winds reached(4.4, 4.2m / s)on respectively. It is a severe dry speed that works on hardening the fruits to evaporate the water inside the fruits.
4. registered in season maturity in Monthly(dad,and September)Speed winds reached(3.7, 3.2M/tha)so lead toTo shake and drop the fruits.

RECOMMENDATIONS:

1. Raising awareness among farmers and providing agricultural guidance so that they are aware of the prevailing climatic developments and conditions.
2. Providing good varieties and creating the appropriate conditions for their cultivation by supporting the owners of the orchards financially and technically.
3. Establishing climatic stations close to the orchards to provide them with suitable weather conditions for their cultivation.
4. There should be means of linking the directorates of agriculture in the regions, meteorological stations, and orchard owners to know the weather conditions, with regard to climate elements, especially the wind speed at the beginning of palm pollen.
5. Existence of ways to repel winds around palm groves so that pollen grains do not fly and to obtain more production from palm cultivation.
6. Using research and field studies to find out how to obtain the appropriate varieties and increase production.
7. Providing soft loans to support farmers and orchard owners to focus on expanding palm cultivation.
8. Exploiting other lands that have the potential to grow date palms in the study area.
9. Taking care of palm trees by providing them with protection from diseases that affect them during their cultivation stages, and working to combat them.
10. Work on joint investment between the private sector and the government sector.

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