

The Effect Of Climatic Characteristics On Agricultural Pests That Infect The Wheat Crop In Najaf Governorate

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Abstract:

This study aims to shed light on the relationship between plant disease in wheat crops in Najaf Governorate and climatic conditions. The main driver is the economic and nutritional importance of wheat crops as the main nutrition for the population. The increasing need for this product comes as a result of the increase in the population. This led to the need to work on raising the level of wheat production and improving its quality. But plant epidemics such as diseases in sects and weeds led to fluctuations in their production, especially the sun bug, which was not known before in the region with all its negative effects on wheat crops, which leads to a lack of production and poor quality despite that. The conditions and weather conditions suitable for growing this type of crops in the study area with the possibility of improving these crops, but the average production is not as expected. Therefore, this study aims to clarify the suitability of climatic elements for growing wheat and the relationship of climate and its impact on the spread of the plant epidemic that affects wheat crops which leads to a decrease in production in quality and quantity .

This study included the theoretical side, including the problem and hypothesis related to the topic, while revealing the study's objectives and justifications. And also dealt with the importance of wheat crops economically and nutritiously, the history of growth and the types that were cultivated in the study area .

The climate of the region is controlled by some fixed and variable systems and their impact on the climatic characteristics of the study region, and the analysis of those characteristics to find out the level of its commodity with wheat crops. It also dealt with the relationship between climatic features and the plant epidemic that affects wheat cultivation (diseases, insects, weeds), in addition to the level of its impact on wheat production and the resulting losses .

- 1- The suitability of the climatic features represented in the extreme and precise temperatures of the area for the cultivation of wheat with the ability to increase and improve its quality, as it is within the scope of its requirements.
- 2-The spread of Sunn pest in the study area and its effect on wheat production.
- 3-The spread of other diseases in plant permits that have a negative impact on the quantity and quality of production.
- 4- There is some difference in production between regions according to temperature and its effect.

Introduction:

One of the most important human activities through which he seeks the continuity of his existence on earth is working to provide food through agriculture, which plays a key role in financing economic development plans in different countries of the world, including Iraq, and was a reason for the development of developed countries and that its priority is not an option but a necessity. Inevitably, due to the impossibility of a fundamental launch in

industry without a prior development in agriculture, and the development of agriculture is closely linked to multiple natural, human and life factors, man tries to employ the appropriate ones to work on increasing production in quantity and quality but his attempts may collide with the , presence of obstacles that reduce What he seeks to achieve from the increase in production, as an inevitable necessity that must be achieved in order to satisfy his increasing need for food after its numbers

began to increase in a way that exceeds the increase in food production, which may cause him problems. Among these obstacles are ,agricultural pests represented by diseases insects and jungles* where man has entered , into a bitter struggle with them since he was found on earth because his interests conflicted with their interests. It works to reduce its production in quantity and quality, with its negative effects on the growth of the crop, and its economic damage may reach .approximately (50%) of the production The elect of food crops to meet the human need for food is the wheat crop, which is the ,main food for most of the world's population including the residents of Iraq and the study area. Who among us does not eat it as a basic material in his meals? Therefore, the wheat crop is of economic importance, and it is a strategic crop, as it has become a political tool used to target food security for peoples, and its shortage means a lack of national sovereignty . Especially that the factors for its cultivation and development, and as it will become clear later, are available in northern ,Iraq and are almost the same in the province it only needs to be according to modern scientific methods, taking into account the obstacles of agriculture and the extent of its impact on agricultural pests and work to treat .them

Although the percentage of the plain area in the governorate, in which wheat is concentrated, constitutes only (5%) of the total area of the governorate, we find it in ,areas with abundant agricultural production ,especially grain crops, including the rice crop which the governorate takes the lead in the cultivated area and its production in Iraq, and ,with the same fields of cultivation of this crop wheat is cultivated, whose production in the province can contribute to filling part of the country's need for this crop. He begins it to present his findings to the decision-makers to take the means that would achieve them for .the purpose of cultivating the wheat crop

The Study Problem:

The research problem can be determined according to the following question:

- Are the climatic characteristics in Najaf) governorate related to agricultural pests to which the wheat crop is exposed?
- There are other secondary questions as follows:
- Do agricultural pests contribute to reducing wheat production in Najaf governorate, in terms of quantity and quality?
- Is the percentage of wheat crop infested with agricultural pests different between the administrative units of the governorate, and can it create a spatial ?disparity in the production of the crop

Research Hypotheses:

The main hypothesis of the study is:

The effect of climatic characteristics in) Najaf governorate and its relationship to the pests to which the wheat crop is exposed, and (affect its production in quantity and quality There are secondary hypotheses as follows :

1. Agricultural pests have negative economic effects on the production of wheat crop in .Najaf Governorate
2. Agricultural pests contribute to creating a spatial disparity in this wheat production between administrative units .

Objective and importance of the study: The study aims to study the relationship between climatic conditions in the province and agricultural pests that are exposed to the wheat crop in Najaf province, which affect its .production

The rationale for the study can be summarized :as follows

- 1 . The fluctuation of wheat production in Najaf governorate, at a time when this production must be stable due to its dependence on irrigation from rivers, then there must be reasons that require research .and study
2. The emergence of some insects that were not endemic as a pest affecting wheat production in Najaf governorate during recent years, after they were concentrated in the northern regions of Iraq, and many farmers in the governorate were ignorant of their dangers to the production of this crop. It is epidemiological 0, which requires awareness .and alert

* Agricultural pests include rodents, birds and ants as well, and the study of their effects on wheat

cultivation and production has been excluded in .this study due to the breadth of the subject

3. Poor production in some seasons as a result of the crop being exposed to agricultural pests to a degree that makes it unfit for human consumption, and its use as fodder for animals, especially domestic ones, at a time when there is an increase in demand for this crop to increase population numbers, and this demand must be covered by import From abroad, and this is a waste of hard currency that can be used in the development of economic sectors, including agriculture in the province.

:Study area boundaries

The boundaries of the study area are spatially represented in Al-Najaf Governorate, one of the Middle Euphrates Governorates, which is located in the southwest of Iraq, between two latitudes (50 -A). – 29 ° (- (21° - 32°) north and longitudes (50° - 42 °) – (45 ° - 44 °) east, it is bordered to the north by Karbala governorate, to the northeast by Babel

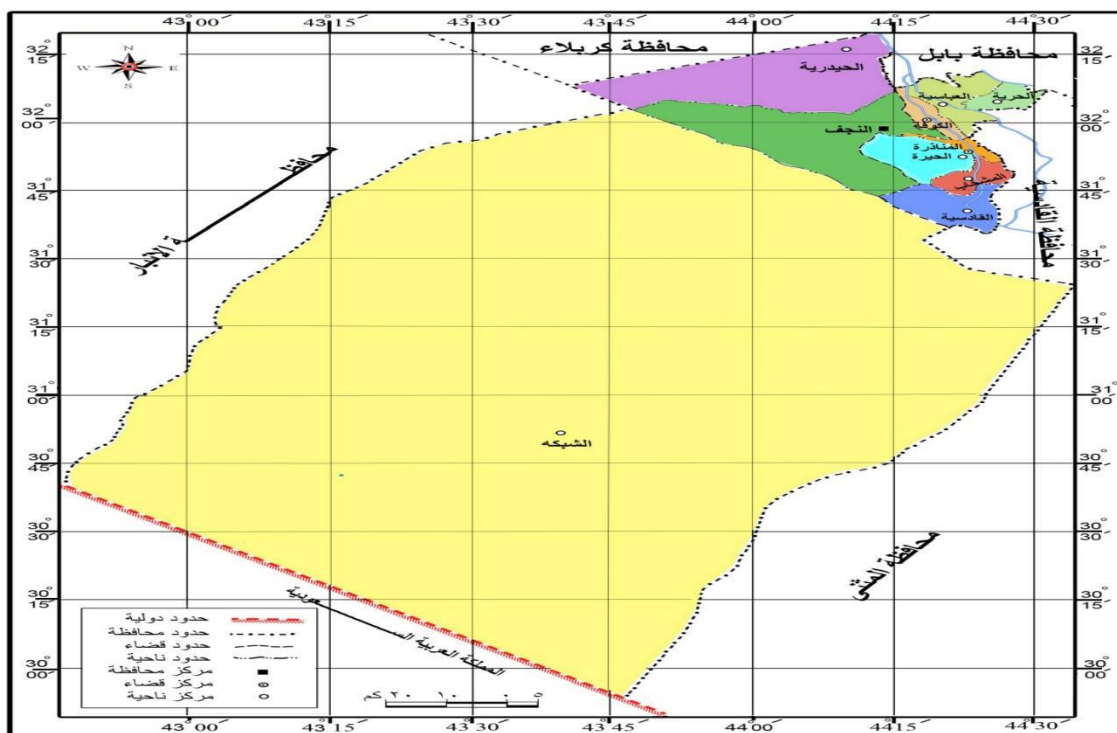
governorate, and to the east by the two governorates of Qadisiyah Al-Muthanna and Al- Anbar Governorate from the west and the Kingdom of Saudi Arabia from the south. The area of the governorate is (28,824) km², and) it constitutes 6.6 %) of the area of Iraq which is (km² ⁽¹⁾ . Administratively, the (435052 ,governorate consists of three districts comprising ten districts of varying size, which are Najaf district (27657 km²). It includes the Najaf district center (1029) km², Al - Haidariya district (1228) km², Shabakah .district (25400) km², and Kufa district (430) km² and it consists of the center of Kufa district (95) km², Al-Abbasiya sub-district km², Al-Hurriya sub-district (107) (228) km², and Al-Manathrah district (737) km² and it consists of Al-Manathrah district center km², Al-Hira sub-district (265) km², and (63) Al-Mashhab sub-district (132) km², and Al-Qadisiyah sub-district (277) km². Table (1) .and Map (1)

¹*Table (1) Administrative units in Najaf Governorate

%	m/km ²		
3,57	1029	Najaf District Center	Najaf Province
4,26	1228	Haidariya	
88,12	25400	the network	
	27657		Total
0.33	95	Kufa District Center	Kufa
0,79	228	Abbasid	
0.37	107	Freedom	
	430		Total
0.22	63	Al Manathera District Center	prognoses
0.92	265	Confusion	
0,46	132	Mashkhab	
0,96	277	Qadisiyah	
	737		Total
100	28824	Total area of the province	

) Source: Relying on map (1), and using geographic information systems GIS in calculating the percentages of the areas of administrative units, then extracting the area for each administrative unit by the researcher

map (1) Map of administrative units in Najaf Governorate



districts were transferred to the Al-Manathrah District Center. However, the Al-Hira district was created later by the Diwani order / in the Presidential Office Book No. / S/41569 on . 1999/14/12,

Geographical distribution of wheat production in Najaf Governorate

The wheat plant and the original home of this crop and the most important varieties of wheat cultivated in Iraq and the study area, the nutritional importance of wheat, as well as the geographical distribution of the cultivated area, production and yield of wheat in Iraq and study area

Wheat (wheat)* which is a herbaceous plant, with hollow and solid stems at the nodes. Its stems consist of nodes and visible internodes its height ranges from (50-130) cm. This depends on the genetic characteristics of the cultivated variety and the prevailing climatic conditions in the area of its cultivation, and the quality and fertility of the soil, in addition to the cultivation system and regular irrigation⁽³⁾ The leaves consist of a blade with parallel veins and sheath surrounding

the stem, and its roots are fibrous and its flowers are green in color without sepals and petals. There are different and different opinions about the origin of the existence of wheat. Some trace the origin of its existence to the Egyptian civilization, where archaeologists found wheat grains in the tombs of the Egyptians around 3000-4000 BC, while others trace the origin of its existence to Iraq and Palestine, and another, dates back to its cultivation. In Asia Minor but others went to know it in Switzerland and on the whole⁽⁵⁾ during the Stone Age others refer to its cultivation in the middle latitudes where ancient human civilizations arose and then spread from them to the rest of the world⁽⁶⁾ Its opinions Some researchers through studies and archaeological excavations, believe that Southwest Asia, and in particular the Middle East, is the first home for the emergence of wheat, at least (10) thousand years ago. Northern Iraq, which is km away from the city of Chamchamal (11) in the Sulaymaniyah Governorate, as it is the first area in which traces of grain and ears of wheat appeared, and it was found on pieces of

pottery , and in the same area , The charred grains and ears of this crop were found dating back about (10) thousand years, as diagnosed .using radioactive carbon 14 ⁽⁷⁾ 0

In the study area, the cultivation of wheat was previously limited to areas that were not cultivated with rice , and it was not allowed to ,grow it in the lands where rice is grown because wheat is stressful to the soil. Many types of wheat are grown in the world, and these types are classified according to different bases and criteria. Including hard wheat and soft wheat or soft wheat. Wheat is called hard and soft based on the softness and hardness of the endosperm structure. The environmental conditions prevailing in the areas where wheat is grown may affect this trait, but to a lesser degree. ⁽⁸⁾

basis of thegrowing season , the crop is ,divided into winter wheat And spring wheat spring wheat, which is the first that is as it is divided ,0*2 dominant in the study area on the basis of the height of the plant stem into short wheatDwarf Wheat semi-short wheat , Seml -Dwarf and TallWheat Among the 0⁽¹⁰⁾ -most important of its varieties: 1Sabir Beg variety2- Mixbak variety 3- Florence Aurora class Urora

Ajeeba variety_ Kina Collar variety Kenya Gular Class Abu Ghraib Abu-Ghraib class x kokurtCocaret c-.

The nutritional and economic importance of : wheat

Wheat is from The most important cereal crop, and the most widespread and productive in the world, and mainly depends on it for subsistence by more than two-thirds of the

world's population. Table (2) the most important components of the wheat grain of food, which It is clear from it that the wheat grain consists of three parts, namely the embryo and constitutes its proportion (2-3%) and the endosperm and its proportion (80-85 of the components of the grain, and from (% both of them bread is made when grinding wheat and after removing the cover that is the third part of the components of the grain Its percentage is (13-17 %) 0 and each part of these parts is formed in different proportions from the other in terms of its chemical components. The fetus contains (28.5%) protein, (14%) starch and (16.2%) sugars and - fats (10, 4%), cellulose (7.5%), hema cellulose (0.8%), ash (4.5%), moisture and carbohydrates (44.9%), as shown (%11.7) by the above-mentioned table that the endosperm consists of starch. (71%), protein ,sugars (1.1%), hema cellulose (9.8%) ,(%9.6) ash (0.7%), moisture (14%), fats (1.4%) and carbohydrates (74,3%) and endosperm proteins are claydin And gluten , where it is combined with water, a compound called gluten, which makes wheat superior to other grains in the manufacture of bread ⁽¹¹⁾ The function of gluten is to expel gases caused by fermentation ⁽¹²⁾ , and the last section is the bean envelope, which is composed of the fruit cover (the cover of the ovary) and the seed coat (the cover of the ovum). Among the layers of the fruit and seed coat with the geyser layer and the aleurone layer, the bran material is formed during the grain milling ,process, which consists of (8%) of starch of protein, (4.6%) of sugars, and (%14.4) ,cellulose (21). 4%), hema cellulose (26.2%) ash content (6.3%), moisture (13.7%), fat and carbohydrates . The percentage is ,(%4.7) ⁽¹³⁾· (% 61,4)

Table (2) Percentages of nutritional and chemical components of wheat grain parts

* local label , It is called a group of weeds with similar ancestors, from which bread and pastries can be made from the flour of its grains, because it contains a type of protein that helps to fluff the dough when exposed to heat . The part of the grain that can be ground, and the grain of wheat is wheat because its casings (the chaff and the sap) do not , stick to the seed pod. As for wheat, it is the ripe ,wheat, where the wheat is called wheat when ripe and it is said (the wheat is ripe) , which means . ripeness

Source: Mazen Nouri Al-Moussawi, Wheat the - first strategic crop in the world - physiology technology - production - breeding and .improvement, Al-Rafa Press, Baghdad, 2009, pg 0 5

* Its cultivation begins in the first half of November and continues to grow throughout the winter to ripen at the end of spring , i.e. at the end of April. Harvesting begins at the beginning of May and during the first half of it. end of April 0
Source : Questionnaire form 0

bran _ % 17-13	Suwayda %85 - 80	fetus _ % 3-2	Pill parts and components	
14,4	9,6	28,5	protein	1
8,6	71,0	14,0	Starch	2
4,6	1,1	16,2	sugars	3
61,4	74,3	44,9	carbohydrates	4
4,7	1,4	10,4	Fats	5
21,4	0,2	7,5	Cellulose	6
26,2	9,8	0,8	Hema cellulose	7
6,3	0,7	4,5	ash	8
13,7	14,0	11,7	moisture	9

Source: Abd al-Hamid Ahmad al-Younis and others, Grain Crops, Directorate of Dar al-Kutub for Printing and Publishing, Mosul, 1987, pp. 55 and 77

The bran is the only part that contains a large proportion of salts and vitamins. A grain of wheat is one of the miracles of God Almighty as He surrounded it with a cover and placed two sources of human food in it, namely the salts and vitamins necessary for the human body. This shell is usually removed, ground and sold in what is known as bran, which is a container. It contains phosphorous, which nourishes and strengthens the brain, nerves, and reproductive organs, as well as iron which gives the blood strength, vitality, and oxygen. The shell also contains calcium, which builds bones and strengthens teeth silica, which strengthens hair and increases its shine, and iodine, which modifies the work of the thyroid gland. The bran also contains a group of The vitamins necessary for humans and their function is to direct the physiology of the work of the organs, and these vitamins B6, B2, B1, are necessary for the work of nerves, and vitamin E, a sex stimulant. Old wheat is ground with its husk, and a good type of bread is made from it, which is brown bread. If the bran is removed from it, it becomes white bread, but it is missing. For salts and vitamins ⁽¹⁴⁾ In addition, bran is considered a feed material of great nutritional value for animals, especially poultry, through which it can increase their productivity of meat and eggs, and thus develop this activity in the study area. In the manufacture of pastries of all kinds, such as biscuits and cakes. As for the remnants of wheat cultivation and after harvesting, what is left of the wheat stalks, which are called locally as (Straw straw). It has many uses that can be benefited from, and the most important of these uses is that it is considered as animal

feed, despite its lack of proteins, but it is rich in fibers and it can not withstand storage for a long time, as it loses its distinctive smell luster, and animal palatability ⁽¹⁵⁾ in addition to the fact that some of it remains inside the soil and decomposes. It helps to increase the percentage of organic matter in the soil and increases its cohesion, which reduces the process of erosion of the soil. (The straw is sometimes mixed with clay to build farmers houses because it leads to the cohesion of the clay used in building those houses) Among the other uses of straw is that it enters as a raw material in the manufacture of insulating panels as well as compressed wood that is used in the manufacture of home furniture as a substitute for tree wood, and therefore straw or straw can constitute an additional income for the farmer in the study area, in addition to what was mentioned that wheat is important from The commercial aspect is at the forefront of food consumer goods in terms of the volume of trade exchange

Geographical Distribution of Cultivated Area and Wheat Production in Najaf Governorate

It is evident from Table (3) that the average area planted with wheat in Najaf Governorate amounted to (185887) dunams, for the period (2009-2001), and it constituted (2.3%) of the area planted with the crop in Iraq, which (.averaged for the same period (5652006) dunams, and the area planted with wheat in the study area reached (182596) dunams for the agricultural season (2000/2001), figure after which it increased and for the two (1) seasons (2001/2002) and (2002/2003) it reached (186339). And (190061) dunams for the two seasons in a row, then it decreased to

dunams for the agricultural season 129,237 and this is due to the political (2004/2003) conditions that Iraq went through after the fall of the previous regime and the deterioration of the security situation, with the impact of neighboring countries on Iraq's water share. The area planted with wheat was taken after

that This increased to reach (205977) dunams for the agricultural season (2006/2007), as it constituted (2, of the cultivated area in (%3 Iraq for the same season, which amounted to dunams, after which the area (6279514) planted with wheat decreased in the governorate for the two seasons (2007/2008).

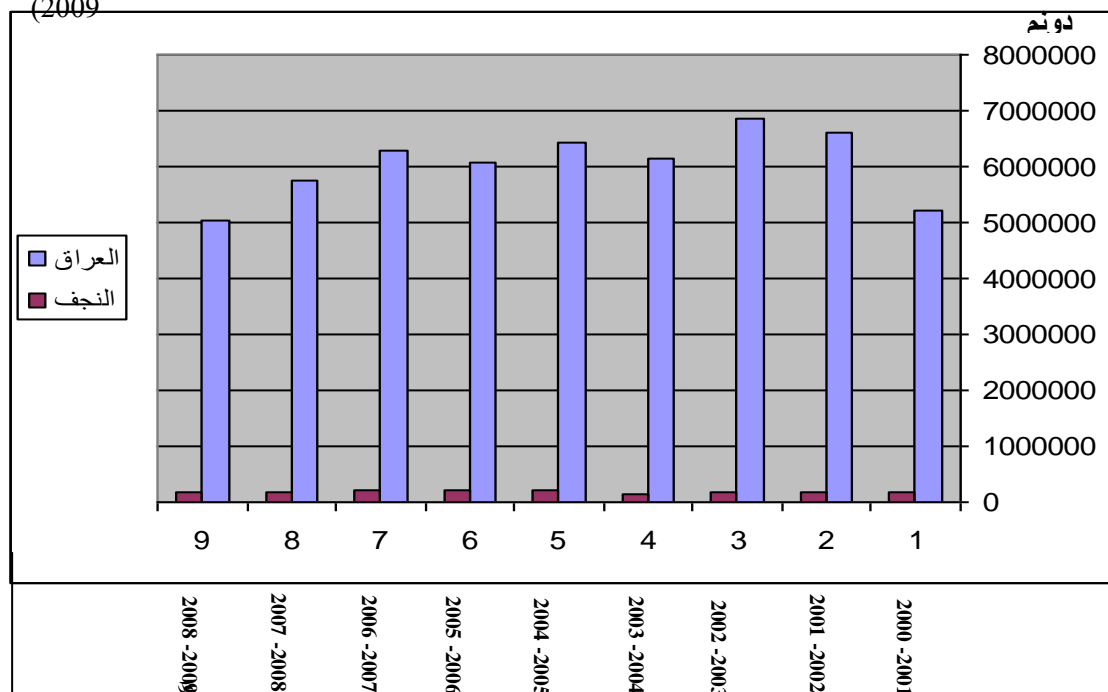
Table (2) An evolution of the cultivated area and wheat production in Iraq and Najaf Governorate for the period (2001-2009)

production / ton			The cultivated area in acres			the year
percentage 1 - 2	Najaf (2)	Iraq (1)	percentage 1 - 2	Najaf (2)	Iraq (1)	
9, 3	87098	2219000	4, 3	182596	5218000	2001 /2000
2, 3	85117	2589000	8, 2	186339	6595000	2002/2001
9, 3	92179	2326000	7, 2	190061	6855000	2003 /2002
3, 5	64489	1832000	0, 2	129,237	6159,000	2004 / 2003
8, 4	108468	2228000	7, 2	197215	6411000	2005/2004
8, 4	111393	2286000	3, 3	199807	6054000	2006 / 2005
4, 6	141284	2202777	2, 3	205977	6279514	2007/2006
8, 6	85254	1254975	2, 3	187643	5741162	2008 / 2007
2, 5	89876	1700390	8, 3	194116	5049753	2009 / 2008
6, 4	96129	2070904	2, 3	185887	5652006	average

Source: 1- Central Statistics Agency - Agricultural Statistics Directorate - Wheat and Barley Production Report - for the years 2006/2007/2008/2009

Ministry of Agriculture - Directorate of Agriculture of Najaf Al - Ashraf Statistics Division -2009 - 20

- shape (1) The area planted with wheat in Iraq and in Najaf Governorate the period from (2001 (2009



it amounted to (187643) dunams and (194116) donums for the two seasons respectively (2009/2008)

, as well as the area planted with wheat in Iraq for the same two seasons, reaching (5741162) ,donums and (5049753) donums respectively and this is due to a lack of share Iraq's water

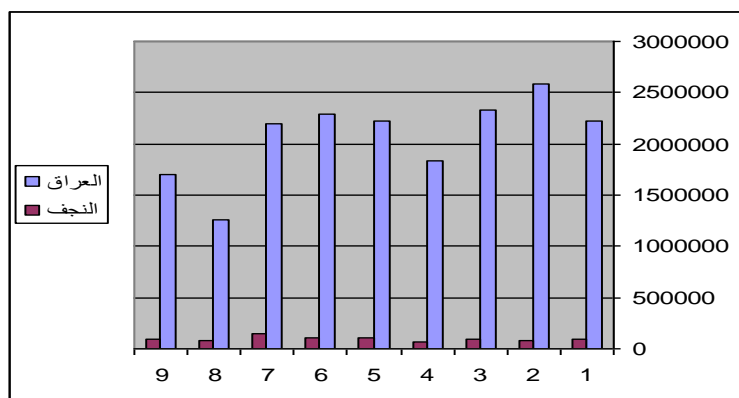
,resources, especially in the Euphrates River which passes in the study area, because of the ,encroachment on it by Turkey and Syria which called on the government to reduce the area planted with wheat according to the

amount of water allocated for agriculture, in addition to drought and the lack of rain during these years

As for the production, it is clear from Table that its average reached (96129) tons (2) during the study period, and it constitutes (6.4 % of the average production of Iraq of (wheat, which amounted to (2070904) tons for the same period, and the governorate's production amounted to (87,098) tons. For the agricultural season (2000/2001), which constitutes (9.3% of Iraq's production of (tons for the same season, after that (2219000) there was a sharp decline in the governorate and Iraq's production of wheat for the agricultural season (2003/2004), figure (2), it reached The governorate's production is tons, and it constitutes (5.3 (64,489)percent (of Iraq's production of (1832000) tons for the same season for the reasons mentioned above Then the production returned to rise for the

,season (2004/2005), reaching (108468) tons and the season (2005/2006). It reached tons, and it reached its highest level (111,393) tons in the agricultural season (141284) in the governorate and (2007/2006)) constituted4.6 of wheat production in (% Iraq for the same season, which amounted to (2202,777) tons, while in the two seasons In the following years (2007/2008) and (2008- production decreased, reaching , (2009 (85,254) tons and (89,876) tons, and it of Iraq's production of (12549 75 tons and ,tons for the two seasons (1700390) respectively, and this decrease is due to the government's reduction of the area planted with wheat and according to the available water resources, as we mentioned when talking about the area planted with wheat .during the two mentioned seasons

shape (2) The quantity of wheat production in Iraq and Najaf Governorate the period from (2001 - 2009)



As for the geographical distribution of the area and wheat production in ,Governorate for the agricultural season (2009/2010)* and at the level of administrative units (the (district), it is clear from Table (3) and Map 3 that the Al-Abbasiya district came first in the area planted with wheat, which amounted to dunams. (24.9%) of the total area (53984) ,planted with wheat in Najaf Governorate ,which amounted to (216767) dunams followed by Al-Qadisiyah district in the second place, with an area of (53,400) dunams equal to (24.6%) of the area planted with wheat in the study area for the aforementioned season, then Al-Mashkhab district In third ,place, with an area of (36,932) dunams representing (17%) of the total area planted with wheat in the governorate. As for the rest

of the administrative units, the area planted with wheat ranged between (24,631) in Al-Hira district, equivalent to (11.3%) of the total .area planted with wheat in Najaf governorate And the least area is (2878) in the district of Al-Haidariya and it constitutes (1.3%) of the total area planted with wheat in the governorate, while Al-Shabaka district did not contribute to the production of the wheat crop in the governorate, due to the absence of surface water resources and the fact that its sandy soil is fragile The reason for the Abbasid district to occupy the first place in the area cultivated with wheat in the governorate is due to the capacity of the land suitable for growing wheat in it with the abundance of water resources represented by the presence of a number of streams and irrigation

yield amount kg/dunum	percentage %	production quantity (tons)	percentage %	Cultivated area (acres)	side	liminate
554,96	7, 5	8346	9, 6	15039	Najaf	Najaf
554,52	1, 1	1597	3, 1	2878	Haidariya	
-----	-----	-----	-----	-----	the network	
554,94	8, 6	9943	2, 8	17917	Total	
766.8	9, 1	2882	7, 1	3759	Kufa	Kufa
815	4, 30	43997	9, 24	53984	Abbasid	
816,28	6, 11	16776	4, 9	20552	Freedom	
776.8	1, 44	63656	1, 36	78295	Total	
802,93	1, 3	4490	5, 2	5592	prognoses	prognoses
709,59	1, 12	17478	3, 11	24631	Confusion	
801,81	5, 20	29612	17	36932	Mashkhab	
358	2, 13	19117	6, 24	53400	Qadisiyah	
479,85	9, 48	70698	6, 55	120555	Total	Total
574,88	6, 99	144,296	6, 99	216767	Total	

.The source is based on table (3)

first axis: the climatic characteristics of Najaf Governorate and its relationship to agricultural pests that infect the wheat crop

Man strives to increase his production of crops for the purpose of providing what he needs of food to meet his increasing need for it, and as a result of the increase in its numbers, he seeks to develop agricultural operations using all means that would work to increase the quantity of production and improve its quality, investing appropriate climatic conditions to achieve this, but these Climatic conditions may suit the emergence and spread of what reduces production in ,quantity and quality, not the least pests .whether they are diseases, insects or jungles Therefore, this chapter will deal with the issue of the appropriateness of climatic characteristics in Najaf governorate for the emergence and spread of these pests through .three sections. on the wheat crop.

A ny plant disease accompanies damage to the affected crop and results in an impact human .life and its struggle for survival and survival The annual losses in the wheat crop globally as a result of disease are estimated at (3, (33 million tons ⁽¹⁶⁾ because diseases cause reduced production and poor quality. Its quality is due to the deviation in growth or the shape of the plant from its natural state, as a result of the intrusion of a living organism or

the influence of one of the environmental factors, the effect of which can be reduced by using chemicals that kill the cause of the disease without harming the plant, whether it is a fungus, a virus or a bacteria ⁽¹⁷⁾ . For the disease to appear, a set of elements must be : available, as follows ⁽¹⁸⁾

- sensitive host plant 0
- ,Patients (fungus, virus, bacteria nematode) 0
- Appropriate environmental conditions such as temperature, humidity, light and soil 0
- Time sufficient for injury to occur 0
- human element is added to it , so that these . five elements are called the epidemic prism

However, any deficiency in one of these elements means the absence of disease 0 0 and the environmental conditions are considered the most important factor for the emergence of plant disease, through their effect on the host plant and the pathogen (the pathogen) clearly.

The causes of plant diseases differ greatly in their nature, composition and conditions of life, so plant diseases are divided according to :their causes into two main groups

A. Infectious Diseases

B. Non-Infectious Diseases

A- Infectious diseases, which are diseases caused by living organisms, i.e. , the parasitic

causes that form between them and the plant host a vital relationship called parasitism that leads to plant disease. Bacteria, viruses and nematodes.

B - Non-communicable diseases: They are called physiological diseases that are caused by non-living factors, such as inappropriate temperature, intensity or insufficient light excess or lack of moisture, soil or air pollution with toxic chemicals, poisoning with mineral elements, and lack of nutrients ⁽²⁰⁾ 0. These factors make the plant Unable to carry out biological processes normally, the plant's first reaction to attacking it with a sick cause is confined to the area where the pathogen enters the sick at first and is of a chemical nature and is often invisible. These changes expand to extend into the cells and visible changes appear on the plant called Symptoms 0 The pathogen works to weaken the plant cells and tissues and limit their ability to carry out their natural physiological functions, or it may stop permanently, resulting in weak plant growth or death. The amount of damage caused by the disease to the plant depends on the type of pathogen and the stage of plant growth at the time Infection occurs on the affected plant part, and symptoms caused by living organisms may overlap with those caused by non-living factors, and the latter often leads to .severe infection

The severity of the disease caused by a living organism depends on the degree of compatibility between the plant host and the sick causative agent capable of causing infection and the appropriate surrounding ,environmental conditions such as air and soil in addition to the presence of vectors such as insects and other organisms, as some types of insects play an important role in nature in transmitting pathogens such as viruses and bacteria And sometimes fungi, as some types of insects and other organisms work by excreting some toxins or causing wounds in the plant, make this plant more ready to infect other pathogens that were unable to attack the healthy plant ⁽²¹⁾

Environmental factors greatly affect the development of diseases and their geographical distribution, as it is necessary for the emergence and development of the disease to have a host ready for infection and a parasite capable of causing infection and appropriate environmental factors ⁽²²⁾ . The crop, and at the same time, this climatic environment may be an auxiliary factor and a

suitable medium for the emergence and ,development of many agricultural pests especially when these conditions deviate from the specified and established ranges for the plant's need, giving way for the pathogen to grow at the expense of the plant host who shows symptoms of disease, especially when it is weak and under The effect of the stress of that factor, which makes it unable to resist the disease ⁽²³⁾ The climatic conditions affect the ,development of the disease in various ways including the dispersal of the parasite and its survival from one season to another, the accumulation of the pollen material, its spread, its germination and its ability to penetrate the tissues of the host, and the environment affects the growth and development of the host before The occurrence of infection in a way that affects the degree of its willingness to infection, as well as the environmental conditions affect not only the infection of the host with the disease, but also the degree of disease development ⁽²⁴⁾ , so the effect of this will be discussed. Examine the elements of the environment separately to see their impact on :the development of diseases

:Light - 1

Despite the plant's need for light in the food process, its increase means an increase in the green substance (chlorophyll) in the plant, and a lack of light intensity and duration, which ,leads to the emergence of pale green leaves weak growth and premature fall of leaves and flowers, and this condition is known as Etiolation and thus the effect of light is , ⁽²⁵⁾ less than the effect of heat and humidity on the development of the disease, especially in natural conditions, but the effect of light is limited to increasing the sensitivity of plants to disease, as well as the severity of the disease . Because of the low light intensity ⁽²⁶⁾ and the effect of light on the pathogen may , vary according to the pathogen's need for light, some plant parasites are affected by light intensity, so low intensity light is preferred for the development of some diseases such as powdery mildew 0 and many fungi germinate their spores well in the light Some of them are in the dark, and the opposite may be true for some fungi, such as rust. What distinguishes the study area is that the circumstance is suitable for the growth of a ,number of diseases that affect wheat especially rust, due to the lack of light resulting from cloudy conditions during the

winter, as we notice a decrease in the actual brightness hours during the vegetative growth stage. In addition to the presence of suspended and sometimes raised dust, which reduces the intensity of brightness to suit the spread of spores. The general rate of actual solar brightness is (8.8) hours / day, while the rate decreased during the agricultural season to (6) hours / day. As a result of the .aforementioned influences

Temperature -2:

Temperature plays a major role in the distribution of diseases temporally and spatially by affecting both the parasite and the host ⁽²⁷⁾. Winter and early spring are below the minimum required by most pathogens, so diseases generally do not start during those times and those occurring diseases reach a stopping point 0, but with the appropriate temperatures some pathogens become active and when other environmental conditions are appropriate, they help to Infecting the plant and causing it disease, and pathogens differ in ,their preference for high or low temperatures ,and many diseases begin to appear in regions seasons or years with low temperatures, while others begin to appear, where and when .relatively high temperatures prevail and so on The effect of temperature on the emergence of a specific disease after infection depends on the type of host - the particular pathogen . The temperature is much higher or lower than the optimum temperature for the disease, or at temperatures close to the optimum temperature for the host. It is clear that the effect of temperature on the outbreak of the pathogen in a particular season is very severe Thus, we confirm that the temperature ⁽²⁸⁾ .affects the incubation period of the disease

There are many grain rust diseases, such as striped and white rust Zoghbi and Albia Z Powdery mildew and others start small with specific infections at the beginning of the season and then gradually increase and expand the area of infection by repeating the ,asexual reproductive cycles , and accordingly the time required to pass from the beginning of the infection until the appearance of spores is greatly affected by the temperature, and the number of times the repetition of the asexual cycle is also affected by this , which is reflected on the extent of the infection and the .spread of disease in the field

,Temperatures do not affect the parasite only but also the host. Often, temperatures are not appropriate for the plant, causing it to be infected by weak parasites. The temperature also has a great impact on the viral diseases in the plant. The temperature determines not only the plant's readiness for infection, but also whether the virus will multiply inside the host or not. It also affects the type of symptoms that will appear on the infected plant. It was found that the plant was exposed for several days or weeks. For high temperatures of up to (36 °C °) or more, it often results in completely paralyzing the virus and curing the plant from disease. ⁽²⁹⁾

The average temperature during the season of cultivation and production of wheat, which begins in mid-November and continues until April, which drops to the lowest level in ° December, reaching (10.5) m(table 4) and and ρ then begins to rise in January (14.8) ° February (16.8) AD and March (21.4 AD Table 4), as they are suitable for the emergence of diseases that affect the wheat .crop in its growth stages

Table (2) Monthly averages of the climatic elements of Al-Anwaa Air Station in Najaf Governorate For the period from (1980 - 2009)

the ave rage	Tot al	Can on/1	octo ber/ 2	octo ber/ 1	Septe mber	Fat her	Ju ly	Ju ne	May	A pri l	Ma rch	Febr uary	Can on/2	climate element s
82, 8	9, 10 5	6	4, 7	5, 8	1, 10	11	6 , 1 1	5, 11	6, 9	5, 8	8	3, 7	4, 6	Actual brightn ess rate hour/da y
2, 31		18	4, 24	6, 33	6, 40	44	4 , 4 4	1, 42	6, 37	4, 30	2, 24	3, 19	2, 16	Averag e maxim um temper

														/ ature ° m
6, 17		7	3, 12	4, 19	6, 24	1, 28	8 , 2 8	7, 26	9, 22	7, 17	5, 11	5, 7	5, 5	Averag e minimu m temper ature/m °
4, 24		5 , 12	3, 18	5, 26	6, 32	36	6 , 3 6	4, 34	2, 30	24	9, 17	4, 13	8, 10	rate / m °
5, 27		4, 17	1, 24	7, 30	8, 35	7, 37	7 , 3 7	3, 36	3, 32	4, 25	1, 21	8, 16	8, 11	average temper ature soil / m °
	08, 97	2, 16	8, 14	5, 5	----	----	-- --	--- -	3, 4	8, 13	0, 12	4, 14	16	Rainfal l/mm
5, 42		4, 67	3, 56	7, 39	2, 28	2, 23	2 2	2, 24	3, 31	4, 41	7, 49	2, 58	5, 68	average relative humidit % y
	37 34, 9	4, 95	3, 144	1, 279	4, 402	55 0	7 , 5 8 5	4, 53 7	9, 41 5	6, 29 3	8, 21 5	2, 126	2, 89	evapora tion rate/m m
1, 2		2, 1	4, 1	5, 1	8, 1	7, 2	2 , 3	3	5, 2	4, 2	2, 2	9, 1	4, 1	average wind speed (m/ s)
0.3		0.1	0.1	0.16	0.06	0.0 3	0. 1	0. 4	0. 7	1. 4	0.3	0.4	0.3	Dust storms/ day

Source: Ministry of Transport and Communications, General Authority for Meteorology, Climate Department, unpublished data 0

3.Relative humidity

Moisture is one of the important climatic elements in the growth and development of plant diseases, as most of the pathogens need moisture for their growth, but the quantity and type of water varies according to the cause and the host . It needs water to complete its ,life cycle, so water here is very necessary because these causes need water to be a medium in which swimming germs move, in addition to its entry into the composition of their cells . The temperature does not necessarily mean that it is suitable for the emergence of the disease unless there is an

appropriate humidity ranging between (60-70%). The humidity rates during the period of vegetative growth in the months of November, December and January were close to the mentioned percentage and it was within the limits of (60.3%) and (68.1). % and respectively, Table (13), and the (63.3%) areas of the shoulders of the rivers are more suitable in terms of temperature and humidity for the emergence of diseases, while we find other areas of the study area, and for the high temperatures there, severe drought and low relative humidity Because it is located within the desert plateau, it does not provide suitable

environmental conditions for the emergence of diseases, as is the case in the Rahima ,district (9) within the center of Najaf district and the humidity was recorded in it (20%) on Saturday 04/24/2010 0⁽³¹⁾

:Wind -4

The effect of wind in diseases affecting the wheat crop is limited to the process of transferring and spreading plant pathogens, so that the infection is more widespread and to include wider areas than if these winds did not play this role, as the wind works to release the spores OSmith 1966 studied The effect of wind speed on the release of spores, as the spores were not released until the wind speed reached (0.8 m / s), and its release increases with the increase in wind speed above this limit until it reaches a speed of (4.4 m / s)⁽³²⁾ and sometimes the spores are spread by insects which can themselves be carried by the wind over long distances and some basidiosporesBasidiospore and some conidia are usually quite thin and do not survive long- . distance wind transport

The effect of wind is more effective, not in the transfer of spores, but even in the development of the disease when accompanied by rain, as the wind-borne rain helps to displace spores and bacteria from the affected tissue and then carry them by the air and deposit them on moist surfaces. Which ,blows the plants, makes them rub together which facilitates infection with many fungi and bacteria, not to mention the effect of the wind if it is loaded with sand, which leads to the occurrence of wounds, scratches and erosion , making it hideouts for the entry of many sick bacteria and fungi⁽³³⁾ , and if the wind is loaded with fine dust, it leads To close the stomata in the surface of the leaves and thus prevent the process of transpiration 0 as well as infection with some viruses transmitted in a mechanical way, and the wind may help prevent infection by drying them to the wet plant surfaces when they are dry where the opportunity for fungal spores or bacteria to penetrate the plant and it is more likely that these bacteria dry up and die before . injury to occur⁽³⁴⁾

The indirect effect of the wind on the amount of relative humidity and temperature and the changes occurring in them is a result of the different characteristics of the wind, and its help in creating environmental conditions .suitable for infection with diseases

The average temperature of the study area during the agricultural season (2009/2010) is characterized by (23.6 °C °), average humidity (55.6%), and wind speed averaged⁽³⁵⁾ , which is favorable for the (m/ s 4.2) emergence of diseases, which This led to the emergence of some diseases to which the wheat plant was exposed, such as leaf rust and ,striped rust, which were widely spread especially the latter in the eastern part of the ,governorate due to its high heat and humidity while these diseases did not exist in the western part due to the high temperature and humidity. few 0

:Diseases affecting wheat in the study area:

The wheat crop in the world is exposed to more than (44) diseases, and with different causes, living and non-living⁽³⁶⁾ . In the ,administrative units of Najaf Governorate and some professors specialized in plant / protection in the College of Agriculture University of Kufa, as it was found that one of the most important diseases affecting the cultivation and production of wheat crop in :the province is as follows

First - Rustsdiseases

The word “wheat echoes” was referred to by ancient excavations (1300 BC). The ancient Romans worshiped the rust god (Ro Pegus) BC and were offering him sacrifices to 043 protect their crops . The echoes are a group of diseases that affect the wheat crop and cause .damage to it , leading to economic losses Large production quantity and quality annually, and the size of the losses they cause depends on the growth stage of the crop and the time of infection. This group of diseases mostly affects the stems and leaves, and . sometimes the flowering parts and fruits These diseases increase respiration and transpiration and reduce the process of photosynthesis and affect plant hardness, root growth and grain formation⁽³⁷⁾ . The fungi that cause rust diseases in wheat are characterized by the length of the life cycle and their need for two types of plant hosts to complete the life cycle, and five types of germs are formed on them (Bazidia , In addition to the presence of the mutual host on which the rust fungus completes the life cycle , rust fungi can also infect some grasses (secondary hosts) The diseased pathogen eliminates it during the period between the agricultural seasons. Rust diseases differ among themselves in the fungi

,that cause the disease, the site of the infection its shape and the climatic conditions of each of them. The most important rust diseases :prevalent in the study area are

1- Orange Rust of Wheat

This disease is also called leaf rust or dwarf rust Dwarf Rust or brown rust Brown Rust and , it spreads in all wheat-producing countries of the world, which have high air humidity . Its danger if it occurs early and continuously during the growing season, as this leads to a reduction in the size of grains and a decrease in total production (38). The disease also increases when the crop is late in the spring (38) : Symptoms of the disease

Symptoms begin in the form of oval uredoid pustules of reddish-orange or brown color on the upper surface of the leaves, and sometimes on the sheaths of leaves and stems The lower leaves are as they appear on the . leaf sheaths and stems, and their color is brownish-black, and the stalk pustules remain covered by the skin of the host without bursting, thus giving them a smooth, shiny . texture (39)

The cause of the sick is the fungus *Puccinia recondita* Rob .ex Desm .F.sp . *tritici*

It belongs to the class of Basidia fungi , a bi-host in which the Pekingese and Aishi torans are formed on the first host of plants spread in the field with the wheat crop . , as for the urea phase And the following Vitkonan on the .wheat plant

The most appropriate temperature for the germination of mushroom spores and the occurrence of infection, the symptoms of which appear in early March, ranges from 10 to 18 °C. The infection with this fungus does not occur if the temperature rises above (27 °C) with high humidity ranging between (90- , (40) as the infection with orange rust , (41) (%100 increases in an epidemic manner, if the most appropriate time for the growth of spores Mushrooms are the early morning, as the minimum and appropriate temperatures for mushrooms are recorded , which ranged during the agricultural season between (14.8 °C) in the month of March and (18.5 °C) in the month of April, accompanied by high relative humidity in the morning and close to the requirements of mushrooms, as The humidity of the leaves and the morning dew that collects on them helps to provide these

requirements, even if the humidity of the air has not reached (90%), so the climatic conditions, especially the relative humidity ,are not conducive to the spread of the disease Al-Abbasiya and (2.1%) in Al-Qadisiyah sub-district, while no infection with this disease ,was recorded in the Al-Mishkhab sub-district Al-Manathrah district center and Kufa district .center*

Stripe Rust of Wheat

This disease is also called yellow rust or cannabis rust Glume Rust which in addition , to wheat infects more than (18) species of bush (40), is one of the diseases that expose the .wheat crop to infection in the study area

: Symptoms of the disease

Symptoms of this disease appear on wheat early compared to the rest of the wheat sprouts and are in the form of small yellow uredoid pustules separated from each other and arranged in parallel and adjacent rows . On the flowers, and sometimes it may appear on the sheath of the leaves and on the stem . The stalk pustules appear towards the end of the season. They are similar in shape and distribution to the urethral pustules , except that they appear mainly on the sheaths of ,leaves and stems and are dark brown in color and they are formed in small numbers. The telomeres remain covered by the host's epidermis without bursting and are smooth to the touch and appearance

The cause of the sick is the fungus *Puccinia striiformis* West (syn . p. *glumarum* Eriks & Henn

Of the waterways , which range between (60- while the infection rate in the (42) (%70 province reached (37) the western quarries in ,the center of Al-Manathira district (96.5%) and for the same reasons mentioned previously, comes the percentage of infection in the province (17) who saw the stone In Al-Mishkhab sub-district, which reached while the infection rates in other ,(%94.5) provinces ranged between (91%) in the 38th district of Hor Naim and Abu Dahab in the Al-Mishkhab district, and (15.3%) in the 28th district, including the fat and Shafallah districts . Al-Hira district. As for the level of administrative units, it is clear from Table and Map (11) that the center of Al- (17) Manathrah district was in the first place in the

* Due to the limited incidence of this disease in wheat-growing areas in the governorate and the

,absence of infection in some administrative units the analysis of the correlation between this disease .and climate elements was not adopted

infection rate, reaching (96.5%), and the Kufa district center came in second with the infection rate reaching (77.9%), while Al-Mishkhab district came in third place and the infection rate was (73.2%) 0. The infection rate in the rest of the administrative units ranged between (68.3%) in Al-Abbasiya district and (5.1%) in Al-Hira district, while no infection with this disease appeared in the district center. Najaf, within the district (9) of Al-Rahima , due to a significant decrease in the humidity, reaching about (20%) with a high temperature Rara 0⁽⁴³⁾

As for the analysis of the results of the multiple correlation* between the four , climate elements, temperature, hours of actual solar brightness, humidity, wind, and the rate of infection with planned rust disease in some

administrative units in Najaf Governorate* , they are different (Table 5), at a time when the relationship was complete in the Kufa district center, as The correlation coefficient amounted to (1), the relationship was strong in the areas of Abbasiya and Mashkhab, as the correlation coefficient in them reached (0.77) and (0.83), respectively, while the relationship was weak in Al-Qadisiyah because the correlation coefficient did not exceed (0.44) and this is due to this The contrast for the influence of Al-Qadisiyah district on the climatic conditions of the western plateau region, and for the suitability of these elements to the spread of the disease in the center of the Kufa district and the Abbasid and Al- Mishkhab districts . While this relationship was weak in the Abbasid district, because the coefficient of

Table (5) The results of the correlation between climate elements and the rates of wheat infection with planned rust disease in some administrative units in Najaf Governorate for the agricultural season (2009/2010)

relationship type				Link type	correlation coefficient				climate elements
4	3	2	1		Qadi siyah 4	Mashk hab 3	Abba sid 2	Kufa 1	
weak	strong	strong	complete	multi for four elements climatic	0.44	0.83	0.77	1	average temperature Actual solar brightness hours relative humidity wind
weak	strong	weak	complete	Multiple climatic	0.46	0.63	0.27	1	average temperature Actual solar brightness hours

) Business, with the use of the program spss Dar (Wael Publishing , i/1, Amman, 2009 0

* The relationship between climate elements and agricultural pests was analyzed in only four administrative units, namely M. The district of Kufa and the districts of Abbasiya, Mashkhab and Qadisiyah, due to the spread of agricultural pests in them significantly and more than in the rest of the other units 0

* To clarify the relationship between climate elements and agricultural pests affecting wheat production, and to prove the role of these elements affecting the growth and spread of pests, a) computer system SPSS) was used.) for the statistical analysis , to find the correlation coefficient between four of the climate elements collectively with the percentages of pests that were

reached in the field 0 and the multiple correlation coefficient gives the degree of the relationship between three or more variables, and it lies between (0 - 1). If the correlation coefficient is (1) The relationship is complete, if it is zero, it indicates that there is no linear relationship between the variables, and the closer the correlation coefficient is to one, the stronger the correlation, and the closer it is to zero, the correlation is weak 0. Moreover, the researcher extracted the multiple correlation coefficient for some climatic elements With the incidence rates using the following mathematical formula

$r_{123} =$

, Source: Abdel Hamid Abd Lamji D El-Baldawy Statistical Methods for Economic Sciences and Management

				elements					
weak	weak	weak	complete	Multiple climatic elements	0.38	0.35	0.22	1	average temperature relative humidity
strong	strong	weak	complete	Multiple climatic elements	0.82	0.82	0.22	1	average temperature wind

According to Table (4)

The correlation in it was (0.27) and the relationship was strong in the Al-Mishkhab district, as the correlation coefficient reached while the relationship was weak in the (0.63) Al-Qadisiyah district (0.46), and the reason for this is due to the proximity of this region to the plateau that leaves its traces through dust storms Which reduces the actual hours of solar brightness 0. As for the relationship of the elements of temperature and relative humidity with this disease, it was complete in the center of Kufa District (1) as well, and weak in the areas of

Abbasiya, Mashkhab and Qadisiyah, as the correlation coefficient in these administrative units reached (0.22), (0.35) and (0.38) respectively, which indicates that the rates of temperature and humidity in these areas are not suitable for the spread of rust disease planned in them. The heat and wind percentage of the incidence of planned rust disease was complete in the center of the district of Kufa because the correlation coefficient (1) and in the areas of Al-Mishkhab and Al-Qadisiyah, the relationship was strong, because the correlation coefficient between the two mentioned elements and the planned rust disease in these units is (0.82) and (.082) Respectively, while the relationship was weak in the Abbasid side as the correlation coefficient was (0.22) to express the weak relationship between these two components and the incidence of the aforementioned disease 0

:Economic effects of diseases

,often exposed to death as a result of wilting ,or these diseases may lead to stunted growth which leads to a significant deficit in the

plant's productive capacity, as well as poor quality, such as if the economic parts are small in size, atrophic or light in weight ⁽⁴⁴⁾ and this is what It is reflected in the quantity of the crop produced first, and it may refuse to be received by the General Company for Grain Trade due to its poor quality, which causes economic losses to farmers. Crop losses for this season have been estimated at about (18%) ⁽⁴⁵⁾ 0

second axis - the climatic characteristics of Najaf Governorate and its relationship to insects that infect the wheat crop

Among the other pests that cause damage to human crops, are insects that are found in the fields in large numbers and with different types, and this is what was observed in the study area, God willing. The Almighty and He must have wisdom in that , so man is afflicted with various creatures that disturb his sleep and disturb the peace of his life and drain him of the greatest effort and money in order to prevent them and combat them ⁽⁴⁶⁾ 0

The conflict between man and insects began ,long before the dawn of civilization, or rather since the first man practiced the profession of agriculture, and that conflict has continued to this day and will undoubtedly continue in the future without interruption as long as the human race and insects remain on the same environment, because both beings have the same goal. And if a person thinks that he is the master of nature, he usually forgets an important fact, which is the primacy of insects in the sovereignty and possession of nature many centuries before the appearance of mankind on earth ⁽⁴⁷⁾ , and nature is not devoid ,of insects of various sizes, types and numbers

but they may be under control and have little effect, due to the possibility of combating them. Biologically or chemically, the number of harmful insects found in nature is estimated at 10-30 thousand species and constitutes (2-3% of the total number of insects in nature (3 Some sources indicate that the losses caused by insects to grain crops are estimated at about 8), million tons annually ⁽⁴⁸⁾. Those (17 interested in entomology divide insect pests : into three types: ⁽⁴⁹⁾

Key Pests

They are harmful insects that appear on the crop annually, causing economic losses. This type of pest requires good monitoring to know the beginning of its appearance and reproduction to determine the time required to start the control before its presence becomes epidemic, difficult to control

Occasional Pests

These insect pests are also annual, but they are rarely a pest where their economic damage is limited, but sometimes and under special circumstances their numbers increase to become a specific factor for the production of a particular crop, which requires conducting control operations to protect that crop and this situation occurs in irregular periods If every years or more is 0 (3 — 2)

Infrequent Pests

Such pests are usually found in very few numbers and are rare and often do not affect crop production

In the study area, there are large and varied numbers of insects, and this was noted through field visits to the fields planted with wheat and in different parts of the region

Climatic conditions and their relationship to the emergence and spread of insects that infect the wheat crop

1. Light:

Sunlight plays an important role in directing insects in their environment and in the timing of events in their life cycle, directly or indirectly. In terms of direct influence, it varies according to the variation in the duration and intensity of illumination, the type and length of the light wave and the direction of the light, and this is what makes us notice insects in the day that cannot be Watching them during the night and so on, as for the indirect effect , the light affects the

temperature, humidity and food factor ⁽⁵⁰⁾
The various activities of insects occur during a certain period of the day, whether it was day or night, so synchronization allows the two sexes to get to know each other for the purpose of mating . It also determines the search for food and escape from enemies or finding a suitable place to lay eggs, and insects always spend part of each day while they are inactive

Sunlight has a negative effect on insects especially when the temperature increases with it, which increases the evaporation of body water and its dryness to the point of death, and sunlight affects many migratory neighborhoods that kill insects through the content of ultraviolet rays that kill most types of microorganisms ⁽⁵¹⁾ and can Interpreting the movement of the insect and its daily activity as a response to a certain level of light or another natural factor that occurs regularly every day. In other words, the activity of the insect is a response to external factors . represented by sunlight and heat ⁽⁵²⁾

:Temperature -2

Insects generally depend on the temperature of the surroundings in which they live in order to sustain their life and activity, as the change in temperature causes insects to change their enzymatic activity and the permeability of their membranes ⁽⁵³⁾ Therefore, it is affected by the temperature of its surroundings. The higher the temperature at certain limits, the higher the metabolic rates which leads to an acceleration of growth and an increase in reproductive activity and consequently an increase in the number and vice versa ⁽⁵⁴⁾

Insects also vary in their ability to withstand low temperatures, and most insects die when exposed to a high temperature between (52- C) for 3 — 4 hours. Therefore, the insect's life cycle goes through three thermal stages

:A - Thermal activity stage

It is located most often between (15-27 m °) where the activity of the insect increases and there is a temperature within this stage at which the activity of the insect is at its peak in terms of the speed of growth and the rate of the number of eggs that it lays, which is known as the optimum temperature, and in the study area the rate of The temperature in April was (26.4 °C °) (Table 10) during the agricultural season (2009/2010), so the Sunnha nymphs of various stages were at the

height of their activity in the fields of the .wheat crop

: b- Thermal rest phase

The extents of this stage may lie above or below the thermal activity stage. In both cases, the activity of the insect decreases significantly, forcing it to stop feeding and resort to shaded places for the purpose of hibernation, which is known as summer hibernation, which is temporary hibernation that disappears as soon as the unsuitable conditions are gone, or the insects may be forced by the decline Extreme temperatures have to search for areas of winter hibernation to protect itself until the temperature rises .again to resume its activity

:c- Thermal death stage

This stage is always above the thermal dormancy stage, where the insect's activity stops and it dies sooner or later, even if the temperature subsequently drops below that degree, and if the temperatures continue to rise to the level mentioned previously, the insect also dies within a very short period as The researcher was not able to find the sunnah insect in areas with high and dry temperatures, as in the district (7) of Jabour lands in Al-Hira district, adjacent to the Najaf plateau, or district (9) in the center of Al-,Najaf district located within the plateau area and other areas with the same Thermal properties, as a result of the harmful effects caused by high temperatures on the physiological characteristics of the membranes that can change the nature of the work of omnivorous enzymes in the metabolism process of the insect . 100%) due to the low temperature in winter because it is generally sensitive to freezing ⁽⁵⁵⁾. The effect of temperature on insects can be summarized :as follows

- 1- Spread - Temperature has a great influence on the spread of insects if it is appropriate, especially at the start of high temperatures in the spring, but the continuation of the rise in the summer months pushes them to take cover and .disappear, which reduces their spread With the beginning of May , when the crop matured in the area The study, and the rise in temperature to high rates in this month (31.1 m °), (Table 10), it is , absurd to search for the sunnah insect which is one of the most influential insects in the production of the crop in .the study area

- 2- The speed of growth, as the process of insect growth increases with the increase in temperature until it reaches a certain limit, then the effect of temperature becomes inverse, and growth stops when the temperature drops to a certain extent, and this is . called the growth threshold
- 3- The degree of fertility, by the influence of temperature. The degree of fertility of insects is determined by the amount of eggs they lay at this point, so the number of eggs decreases or increases when the temperature changes from this limit ⁽⁵⁶⁾ . The Sunna insect lays between (150-180) eggs. During its life cycle in the form of groups, each group contains (8 - 15) eggs on two parallel rows ⁽⁵⁷⁾ at temperatures ranging from (15 - 20 m °) and the average temperature during the mating phase and laying eggs in the study area during the months of February and March (16.8 °C °) and (21.4 °C °) respectively during the agricultural season (2009/2010), while the general averages of temperature for these two ° months were (13.4 °C °) and (17.9 °C °) .respectively ,(

3. Rain and Humidity:

The forms of moisture that affect negatively or positively on insects vary between direct rain, relative humidity, irrigated water, or soil moisture, with dew and fog drops. The egg or the virgin, which leads to the absorption of water in large quantities, and this ends the static role of the insect and accelerates its growth. Also, the large number of rain increases the relative humidity as well as the ground humidity, which leads to an increase in the numbers of some insects ⁽⁵⁸⁾. On the other hand, rain has a negative impact on the life of insects if it It fell in the form of rain and in abundance, it leads to the death of many insects by drowning, especially the insects that take the soil as their home Also, rainfall is of great importance in the distribution of plants in nature, and thus the distribution of insects that feed on them. The best example of this is deserts where drought and the absence of insects 0

As for the dew drops that gather on the plant leaves in the morning, they are a source of water that supplies the insects with their water needs. The fog also plays a role, as it hinders

the movement and activity of insects such as the sunnah bug because it increases the air humidity in the insects' environment, which makes them stick to each other or stick to the leaves and thus expose them to death if it remained attached to water droplets for more than half an hour⁽⁵⁹⁾

Although the direct physiological effect of moisture is less than the effect of heat perhaps due to the food that supplies the insect with the water necessary for its metabolic processes, the effect of moisture on the activity and distribution of insects in nature remains an important factor because the insect, in order to survive, must maintain its water content as long as the water is inside the insect. Affected by external weather factors we find that the life of insects is threatened, as high humidity leads to limiting the spread of some insects as it leads to the growth and spread of bacterial and fungal diseases at the expense of insects, and in an atmosphere where the temperature rises and the relative humidity decreases, the matter will be critical because of the high content The water inside the insect's body and its decrease outside it which results in the risk of water loss due to evaporation, and this was observed during the field visit to wheat fields in the center of Kufa district, where the temperature (24 °C) and relative humidity (70%)⁽⁶⁰⁾ were recorded due to its proximity to the Euphrates River and the presence of palm groves And the insect was in the widest spread in this area, while in the area of Al-Hira, no insect was found, because the temperature recorded by the researcher was (30 m) and the relative humidity of Very low (10%)⁽⁶¹⁾ due to its distance from water bodies and its proximity to the western plateau

4. Winds:

insects , as it may lead to the destruction of large numbers of them, as the wind transports them to unsuitable environments, or may lead to their dissemination in places where they did not exist previously . In neighboring countries and then to the northern region of Iraq, it then moved to the center and south of the country including the study area, as this insect was not previously known, and it has now become one of the most dangerous insects affecting wheat production in the region, and the winds also

stop the activity of some insects If its speed is more than (8.9 m / s) and the movement of air has an effect on the speed of water ,evaporation from the body of the insect ,especially the sensitive ones to low humidity in addition, the wind impedes many of the vital processes of insects such as mating and laying eggs, and the disability is greater when the strength of the wind increases Which affects the reproduction of these insects, but if the wind is laden with dust, it has a negative effect on some types of insects, as it stands as an obstacle to their spread and also reduces the rates of infection with these pests, as the wheat planting season coincides with the influx of a large number of insects. There were 9 dust storms during the agricultural season (2009/2010), which were monitored by the Najaf meteorological station, in addition to the cases of suspended and light dust⁽⁶²⁾ 0

The most important insects affecting wheat production in Najaf Governorate large number of insects of different types and , sizes were monitored, including sunnah spiders, aphids , aphids, wasps, ladybirds and rats . In the wheat crop with a percentage of not to mention the poor quality⁽⁶³⁾ (%90 - 70) represented by the presence of an unpleasant smell in the grains, as well as the harvest residues that are not palatable even by . animals, so the focus will be on this insect sunn insect* Eurygaster sp Puton

It is one of the most important agricultural pests that infect wheat in many countries of the world, including Iraq, Turkey, Iran, Syria ,Jordan, Palestine, Lebanon, southern Russia Greece, Pakistan, Afghanistan, Cyprus and Bulgaria⁽⁶⁴⁾

The existence of this insect was recorded for the first time in the world and of the type E- integriceps The year 1920 0, which spread in the northern parts of Iraq after it entered Iraq in the late 1990s. As for the central and southern regions, despite the delay in the spread of this insect, the type that spread in the governorates of Najaf, Babylon, Karbala ----- and Diwaniyah is of the type E-testndinaria Where the General Authority for Agricultural Research / Sunna Grain Research Laboratory for the central Euphrates region sent a sample to the Natural History Museum

* The insect is toxic by this name because it feeds on a plant called the sun

,Source: Ali Abdul-Hussein, Field Crop Insects Basra University Press, Basra, 1984, p. 44

in London ,For the purpose of diagnosing it this was done. The Sunn insect belongs to the Hemiptera order - And the family of that al DuryScutellendae ⁽⁶⁵⁾

: Sunn insect life stages

The egg - and it is a light green color at the -1 beginning of its laying, it turns to light yellow and then to dark after that, its height reaches mm, it is sandy in shape and there are 1.2 many inscriptions on its surface , it is placed in the form of groups (Picture 9) on two rows and the number of eggs (14) eggs, and the female may lay about (150-180) eggs during her lifespan , and the eggs hatch after an incubation period of (7-10) days ⁽⁶⁶⁾ . The hatching time varies depending on the ,weather conditions. At high temperatures hatching takes place after nine days. If the temperature drops, the hatching date may extend to twenty days ⁽⁶⁷⁾ . In the study area, it was found that the hatching period extends from (10-15) days, when it ranges between Temperatures between (25 — 32) and the amount of moisture between (60-70%) (⁶⁸) and the hatching period is limited between late February and early March , when the temperature rates ranged between (16.8 o C) .and (21.4 C) , respectively

Climatic conditions in Najaf Governorate and its relationship to the life of the sunnah insect

sunnah insect is found in the northern and central regions of Iraq, and if it is in the northern sections it sets off from its mountainous walks to cross several kilometers to reach wheat fields with the temperature rising to (20°C) during the month of February with a relative humidity of then it is in an area The study does not ,(0%60) need to travel such a distance, because it winters in areas very close to the fields, where the sedge plants are dense on the banks of streams and streams, as well as the sedge that grows around the trunks of palm trees, which have fragile and wet soil, where the insect hides itself in the soil when the summer temperatures rise to more than (40 ° C) and humidity less than (50%) and the insect prefers places opposite to the direction of the . sun, where there is almost permanent shade Especially when it rains, and when the temperature and humidity rise in the beginning of February to the levels mentioned previously, these insects leave their dens and go to the wheat fields for the purpose of

feeding, where they feed from (5-7 days) and then begin to mate and after d A period of (5 days, the insect begins to lay eggs, as we (6 - have seen previously, on the back of the dry leaves close to the surface of the soil. With the high temperature of the green leaves, all this in order to shorten the incubation period for the eggs. After an incubation period for the eggs, which lasts from (7-14) days, the ,nymphal stages begin after the eggs hatch and an insect spreads in large numbers on the wheat crop in areas where The weather conditions are available in terms of temperature, which ranges appropriate for its activity between (25-32 °C) and a humidity of (60%) ⁽⁶⁹⁾ , and due to the availability of these conditions, the sunnah insect was found spread in several areas of the governorate. The sunnah is also affected by temperature and humidity even during One day, we find it spread on ears of wheat in the morning and evening and disappear at noon in the shade areas between the half-plant due to the high , temperatures and low humidity at noon ⁽⁷⁰⁾ and as soon as the temperatures begin to rise in the study area, with the beginning of the month of May , which the average in this .month reaches (31.1 m) , and the crop is ripe This insect migrates to the areas of summer and then winter hibernation, where the old generation has ended as a result of the mating ,process and the new generation has appeared which will start from its nurseries again, and this means that the insect has one generation .during the year

This insect is one of the pests that is strongly related to the elements of climate, so the correlation coefficient of the four elements combined with the effect of an insect was Al-Sunnah , (1) that is, the relationship is ,(0) complete in all administrative units, table the center of the district of Kufa and the districts of Al-Abbasiya, Al - Mishkhab and Al-Qadisiyah . Actual temperature and , sunshine hours with insect effect Al-Sunna the correlation coefficient was (1) , meaning that the relationship is perfect, in the center of Kufa district, and weak in the Abbasid district, where the correlation coefficient was while the relationship was strong in the ,(0.47) areas of Al-Mishkhab and Al-Qadisiyah, as the correlation coefficient was (0.76) and respectively 0. As for the correlation (.(0.88) coefficient between the elements of temperature and relative humidity, it was (1) in the center of Kufa district , meaning that the

relationship is complete, while the relationship was strong in the areas of Abbasiya and Mashkhab, as the correlation coefficient in them was (0.99) and (0.74) Respectively, while the relationship was weak in Al-Qadisiyah area because the correlation coefficient (0.25) and the reason for this variation in the correlation coefficient is due to the presence of local factors that affect the

values of some climatic elements , which leads to the strength of the relationship .sometimes and its weakness at other times Sunna insect , it was complete in the center of Kufa district (1) and strong in the rest of the other units because the correlation coefficient in the Abbasid district and (0.94) in the (0.97) Al-Mishkhab district and (0.84) in the Al-Qadisiyah district

Table (6) The results of the correlation between the elements of climate and the rates of sunn pest infestation in some administrative units in Najaf Governorate for the agricultural season (2009/2010)

relationship type				Link type	correlation coefficient				climate elements
4	3	2	1		Qadisiyah 4	Mashkhab 3	Abbasid 2	Kufa 1	
complete	complete	complete	complete	multi for four elements climatic	1	1	1	1	average temperature Actual solar brightness hours relative humidity wind
strong very	strong very	weak	complete	Multiple climatic elements	0.88	0.76	0.47	1	average temperature Actual solar brightness hours
weak	strong	strong very	complete	Multiple climatic elements	0.25	0.74	0.99	1	average temperature relative humidity
strong very	strong very	strong very	complete	Multiple climatic elements	0.84	0.94	0.97	1	average temperature wind

Source: based on Appendix (6) and Table (19)

The economic effects of the sunn insect:

Sunna insect causes great damage to the ,wheat crop, when it appears in large numbers it causes a loss in wheat production, estimated .at about (70-90 %) ⁽⁷¹⁾ of the crop production The study area, the percentage of losses) caused by this insect may range between 0 due to the failure of the infected ⁽⁷²⁾ (% 90-50 plants to form spikes or from the formation of the starchy substance in the spikes . And the infected grains become either empty or atrophied and shrunk and of a brittle texture. Even when the grains dry and

gradually harden, they are also attacked by the insect, but the sunnah bug needs at this stage more effort to enter its mouth parts inside the grain to absorb its starchy contents, and thus the infected grains It is not suitable for making bread due to its dough losing its cohesion property (Syala wheat) with little germination, and the hay produced in severely ,affected fields is fragile and poor in nutrients animals refrain from eating it and do not want to eat it because it contains an unpleasant odor, as the insect excretes the Sunna from

special glands foul odor on grain and other parts of the wheat plant 0⁽⁷³⁾

In order to reduce the damage of this insect or ,reduce the size of the losses resulting from it it is necessary to know the critical economic limit for the presence of the Sunna insect in the wheat fields for the purpose of starting the control, and the damage caused by this insect is determined in the production of the wheat crop when it feeds on (2-5%) of the grain 0 It was noticed , by visiting the wheat crop receiving centers (the silos of the General Company for Grain Trade) in Najaf governorate, that large quantities of the crop were refused to be received from farmers because the infection rate exceeded the permissible limit, which is (4%), as the crop is transferred after this percentage. to a fodder crop 'because it is not suitable for human use at a time when the crop is considered a second-class crop if the rate of infestation of the sunnah insect exceeds (2%)⁽⁷⁴⁾ , and the reason for the high volume of losses in some fields is due to the lack of knowledge of about of the Farmers with the insect and its (%76) dangers , and only about (15 percent) of them report its appearance in their fields and demand its control⁽⁷⁵⁾

Conclusions

1. Variation of wheat crop production in Najaf governorate, as Kufa district, with its ,three administrative units, ranked first followed by Al-Manazira district and then Najaf district. The exposure of the crop to agricultural pests is one of the main reasons for this discrepancy, and this is consistent .with the hypothesis of the study in this aspect

2. The limited contribution of Najaf governorate to wheat production in Iraq, and the low productivity of the dunum of this crop compared to its productivity in developed countries, and the exposure of wheat plant to agricultural pests is among the most important .reasons

3. Adequacy of the climatic characteristics of the province for the cultivation of the wheat crop, and this agrees with the hypothesis of the study, as there is a possibility of expanding wheat cultivation and increasing .its production

4. The wheat plant in the study area was exposed to many agricultural pests, such as diseases, insects and bush spread, which had a negative impact on wheat production in .terms of quantity and quality

5. The striped rust disease is the most influential disease in the wheat plant grown in the study area, with the plant being exposed ,to leaf rust disease, but with a limited scope and the exposure of the crop to these diseases had a great impact on the quantity and quality of its production.

7. Sunna is one of the insect pests that have been exposed to the wheat crop in the governorate, which negatively affected its production, both quantitatively and qualitatively, and to the variation of this effect between wheat cultivation areas, and .according to the degree of its spread

8. The spread of bushes in wheat fields in the study area had a prominent role in the negative impact on its production and in the variation of this production according to the intensity of growth of these bushes in these .fields

9. The climatic conditions in Najaf governorate are suitable for the emergence and spread of agricultural pests, and the relationship between these pests and climatic conditions ranged between perfect and strong in many areas of the crop cultivation in the governorate, which negatively affected production in quantity and type, and this matter is consistent with the hypothesis of this .research particular

10. The field study showed that the human factor has a clear impact on the exacerbation of the negative impact of agricultural pests on the production of the wheat crop in the governorate, which is represented by the following:

A - The limited control of agricultural pests due to the weak support of the agricultural departments in this regard, and the lack of pesticides in sufficient quantities in the local markets and the poor therapeutic efficiency of some of them to exceed their usability and to the high prices, in addition to the limited machines used in the control and the high prices of their purchase or rental, with the need to change The type of pesticide from one ,year to the next, due to the agricultural pests especially the bush, being characterized by their ability to self-adapt and confront the effect of the pesticide, which reduces its effect .if used in repeated years

B The farmer's ignorance of the dangers of - spreading diseases and insects, as well as the jungle, and the lack of seriousness in combating them for the aforementioned .reasons

C. The method of cultivating wheat in most of its cultivated fields in the governorate intertwined with the rice crop before the latter's harvest, played a major role in the survival of agricultural pests in the field and their renewal of activity with the beginning of the availability of climatic conditions for that and the scarcity of using the method of plowing the field and covering it with water (Tarbasa) before planting, which can work to kill a lot of pests

D. The use of a large number of farmers, non-fermented seeds of various types of wheat with the presence of impurities and bush seeds, which led to a decrease in production and to the continued presence of these pests in the field.

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