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Spatial Analysis Of The Production Of Main Grain Crops In Al-Muthanna Governorate For The Year 2019

Prof. Dr. Turki Muften Saad and Assistant Lecturer. Mustafa Falah Al-Hassani

Sawa University, Ministry of Higher Education and Scientific Research, Iraq

Abstract

The research aims to clarify the variation of the areas of cultivation of grain crops in Al-Muthanna Governorate, as the area of the barley crop reached (3500 dunums) in the Rumaitha district, followed by the Warka district with an area of (1320 dunums), while no area of the rest of the administrative units was recorded, such as Al-Samawah district center, Al-Suwayer district, Al-Khader district, and the district Al-Darraji and Salman district. As for the wheat crop, the Salman district recorded the highest cultivation area for the crop, reaching (112004 dunams), followed by the Najmi district with an area of (14,000 dunams). As for the lowest administrative unit, it was in the Suwayer district (1116 dunams), and with regard to the rice crop, it reached The highest area in the Rumaitha district is (3500 dunams), followed by the Warka district center (1320 dunums), while there are administrative units that did not grow the rice crop due to the lack of natural and human factors necessary for them, such as the district of Samawah, Al Khader, Salman and others, and that the variation in crops is restricted. The study is mainly due to natural and human factors, as it affects the distribution of areas, production and productivity, and the most important of these factors are location, as it affects the angles and the amount of solar radiation, degrees of temperature, humidity, winds as well as the type of surface H, which is considered one of the most important requirements for the cultivation of cereal crops, in addition to the effect of the size of the vegetation cover and the amount of water resources (shabeh is scarce) in the study area. All of these factors affect the type of soil, its texture and the amount of nutrients (humus) present in it.

Keywords: Cereal Crops, MuthannaGovernorate, Contrast, Wheat, Barley, Rice

Introduction

Cereal crops are among the first crops planted by man when he knew agriculture and stability. The presence of wheat and barley plants was a reason for establishing stable agriculture by man in different regions of the world, and with the development of agriculture over time, the area planted with cereal crops increased in the world;This is due to their importance in human food and protecting it from hunger. The grains of these crops are of high nutritional value .It contains a high percentage of carbohydrates (70%), and some grains contain a relatively high percentage of protein, and there are some crops that contain a high percentage of oil, such as maize varieties, and the grains of these crops contain some vitamins and mineral elements. It is worth noting that grains are a cheap source of calories needed for humans when compared to any other food source.

Research problem

1. What are the natural factors affecting grain crops in Al-Muthanna Governorate?
2. Did the areas of cultivation of grain crops vary in the study area?
3. How were the areas of cultivation of the study crops reflected on the amount of production?

Research Hypothesis

1. The impact of the natural factors represented by the location, the surface, the vegetation cover, the water resources and the soil on the areas of cultivation of agricultural crops, as they are among the most important requirements for their cultivation.
2. There is a very large discrepancy in the areas of cultivation of grain crops between the administrative units of the study area, and this is due to the natural factors affecting it, the most important of which is the abundance of water resources in the region.
3. The amount of production for the agricultural crop depends on the area of cultivation of the crop, as the more the area increased and expanded, the quantity of production increased in relative terms and the productivity decreased.

Research limits

The limits of the research were represented in Al-Muthanna Governorate, which lies between two latitudes (31.2°-29.5°) North and between longitude (46.32°-43.50°)In the east, as for the spatial boundaries, the study area is located in the southwest of Iraq and within the central Euphrates governorates, and it is bordered from the north by Al-Qadisiyah Governorate, from the south and southwest by the Kingdom of Saudi Arabia, from the west by Najaf Governorate, from the east by Basra Governorate, and from the northeast by Dhi Governorate Qar, maps (1) and (2)

Study Approach

The researchers followed three types of curricula for the purpose of achieving the goal of the research, as the first approach represented the descriptive approach, which was limited to clarifying the theoretical research concepts. The effect of geographical factors on the variation in the areas of cultivation of grain crops in the study area.

Methodology

The researchers divided the research into two sections preceded by an introduction, where the first topic represented the natural factors affecting the cultivation of grain crops. It touched on the spatial variation of the cultivation and production of the main cereal crops in the study area.

Geographical factors affecting grain crops in the study area

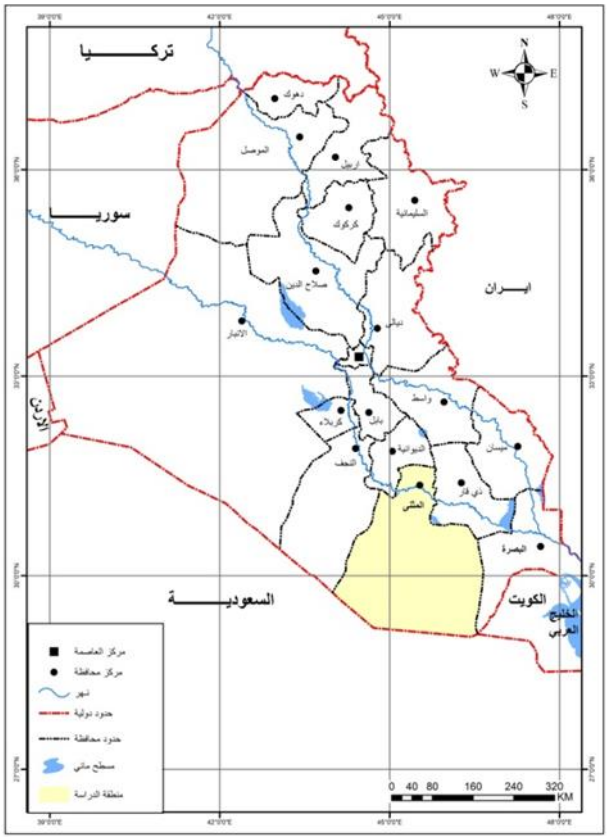
1- Location and space

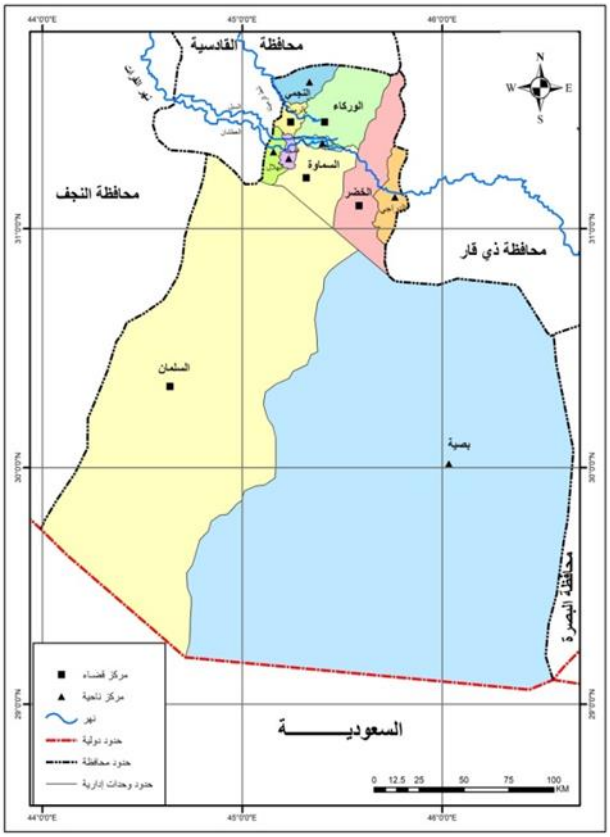
Astronomically, Al-Muthanna Governorate lies between latitudes (29.05°-31.42°) in the north and longitudes (44.50°-46.32°) in the east. Karbala, Najaf and Qadisiyah) where it is bordered to the east by the province of Basra and to the northeast by the province of DhiQar and from the north and northwest surrounded by the province of Qadisiyah and from the western side it is adjacent to the province of Najaf and bordered by the Kingdom of Saudi Arabia from the south and southwest see map (1). The governorate consists of (12) administrative units consisting of (5) districts located (4) including within the sedimentary plain and one neighborhood within the western plateau and (7) sub-districts of these neighborhoods, a map (2) and astronomical districts, and the spatial area became in fact the least cultivated land in This area is like 745 km 2), but the area is 51740 km 2) (1) and the area of arable land is about 1278,111 (acres) equivalent to 1953) km 2 (2) but due to geographical factors, the most important of which is the location.

2- Ceiling

The surface of the study area is flat in the first place, especially the sedimentary plain area (Map 3). This flatness affects the area and production of agricultural crops by raising temperatures, as it is known that the variation in surface heights affects temperatures. Which works on a vertical change in it as the air temperature decreases by one degree per 100 (m)

(3) and this is due to moving away from the main heating source (the surface) and as a result of high temperatures, the frequency of the dust phenomenon increases as a result of the effect of heat on the soil and the evaporation of its water, which It disintegrates and is subjected to transport by wind, and altitude also affects wind speed and direction. Barriers in front of the wind, which leads to a deviation in its direction and a decrease in its speed. The plains are exposed to the winds



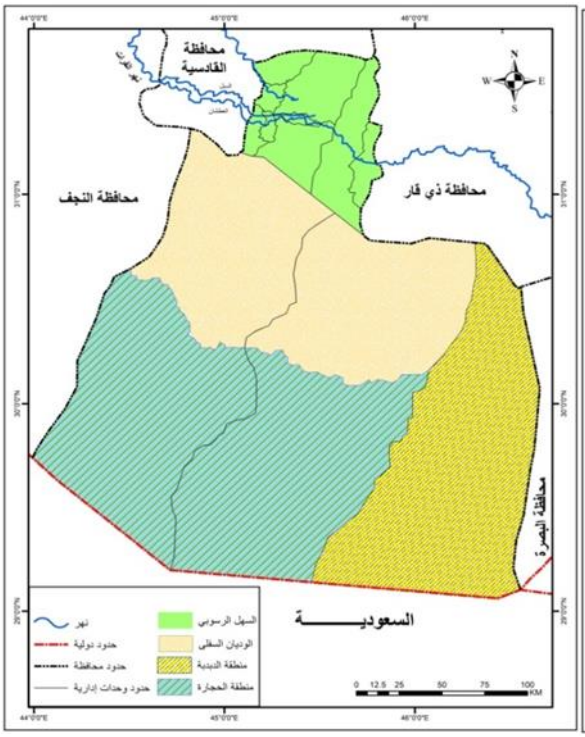


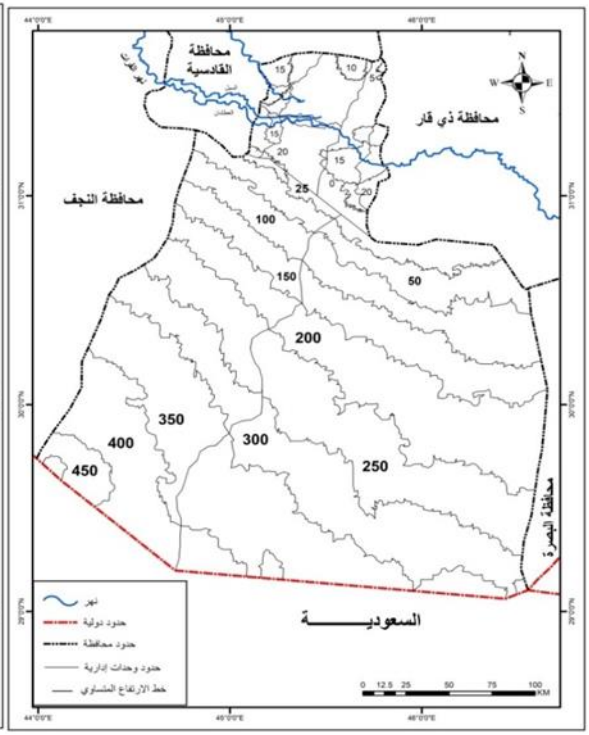
Map (1)The location of the province of Iraq Map (2) Administrative units of the study area

Source: Certified Researcher, Republic of Iraq, Ministry of Water Resources, General Authority for Survey, Al-Muthanna Administrative Map, Baghdad, 2015, 100,000: 1 scale.

The rapid and coming from areas of high pressure to low pressure and this is what the study area is exposed to, and Muthanna Governorate is located between two terrain areas as shown on map (4), each of which will be explained as follows:

A. Alluvial Plain: The proportion of the alluvial plain area is (9.3%) of the total area of the governorate and its area is 4812 (km 2) from the area of the study area from 51748 km 2) (4), and it occupies the northern part of the governorate and the southwestern side of the plain Sedimentary in Iraq, where the surface of the study area predominates in this section of its sections, as the lines of equal elevations are simple not more than 25 m) above sea level.
B. Western plateau:The western plateau constitutes (90.7%) of the total area of the governorate and its area is 46936 (km^2) of the total study area, and the height of this section ranges between 450-25 m. The height of this section varies from one region to another, as it rises gradually with the direction of the south and southwest of the governorate, and there is a maximum height in the section.





Map (3)Lines elevation in the study area Map (4)Departments of the surface of the province

Source: The researcher based on: Republic of Iraq, Ministry of Water Resources, General Authority for Survey, topographic maps of Al-Muthanna Governorate, at a scale of 1: 100,000, Baghdad, 2010.

The southwest, near the political border between Iraq and Saudi Arabia, which reaches 450 (m) above sea level (5) and the western plateau descends toward the sedimentary plain, which is reflected in the flow of air masses above it. On it and the renewal of air in it, which led to a decrease in its temperature compared to the temperature of the sedimentary plain. In terms of precipitation, it falls within the equal rain line 100 (mm) and this line represents the lowest precipitation line in Iraq due to the distance of depressions from it (6) Vegetation. The winds are often laden with dust due to the sand dunes in this section, especially in the western part on the one hand, and the influence of the depression on the Arabian Peninsula, and the western plateau consists of three surface sections, the first of which is represented. With the stone area, which includes the highest values for the height of the surface of the governorate in its lower parts, which rises to 400 (m) above sea level in the far south and southwest of the study area (400-200 m) and occupies an area (21,114 km^2), which is equivalent to (45%) of the total area of the governorate (7) and that most of the surface formations of this area are exposed and soil rocks, as well as coarse gravel and limestone deposits that constitute an obstacle to Cultivation of cereal crops. The second region is represented by the lower valleys, which occupy (24.9%) of the total area of crops. An area of (11,695 km^2) (8) characterized by the abundance of valleys and streams sloping towards the Euphrates River or depressions located west of the Euphrates, and their heights range between 15-200 m (above sea level, the surface of this area covers limestone, limestone and sandy formations (9) and contains vast areas of sand dunes that extend from the northwest to the southeast in the form of long areas called (Bahr al-Salam) (10) and the third section is represented. It constitutes (30.1%) of the total study area, which is about 14127 km^2(11) and it is gradually in height from north to south where the lines are equal in height. Ranging between 20-350 (m) above sea level and its surface contains a group of valleys and depressions, in addition to the presence of some hills, and its surface is surrounded by pebbles and sandy fragments.

3- Climatic characteristics

It is clear from Table (1) and Figure (1), that the Samawh station recorded high rates of angles of solar radiation during the summer months and in almost vertical degrees, reaching their highest levels in June and amounting to 82.2 degrees). The lowest score was recorded in December of 35.4. As for the theoretical radiation (the length of the day) or the so-called (the period of insolation), it also increased during the hot season of the year, where the highest rate was recorded in the month of June, which amounted to 14.6 hours/ day), as for the actual and intended radiation that Physically reaching the Earth's surface, June and July had the highest actual radiation rates of 11.6, 11.8 (hour/day) for both, respectively. As for the temperature (maximum and minimum), the other is affected by an increase or decrease in solar radiation. The maximum temperature in Samawah station recorded its highest in August, which reached 45.6 degrees Celsius (July comes with an average of 45.2 degrees Celsius) and the lowest average maximum temperature was recorded in January, which is 17.5 degrees Celsius), and with regard to With the lowest temperature recorded in July, which is 28.3 degrees Celsius (and the lowest rate was recorded in January, which is 6.2 degrees Celsius), and with the increase in solar radiation rates and temperatures, the wind speed increases with it, reaching its highest speed in June, which is 4.1 (m/ s) and this speed decreases with the apparent inclination of the axis of the sun and the sun. Low vertical angle and lower temperatures, reaching the lowest wind speed in December and January averaging 2.7 m/s) for both. As for relative humidity rates, they are inversely related to the previously mentioned elements, as they decrease during the winter months and rise in the winter. The month of July recorded the lowest rate of relative humidity of 22.6%, and the highest rate was recorded in January, which is 64.6%), and this applies to rain as well, as it is absent in the summer. Because of the control of low temperatures coming from high temperature areas, such as the Indian seasonal depression, which is characterized by high temperature and dominates the study area absolutely for a period of no less than two months in the season (June and July). Winter and spring, the region witnesses precipitation with the predominance of Mediterranean depressions coming from the Mediterranean Sea loaded with amounts of rain during winter and spring, and the highest amount of rain reached in March, reaching 25.2) mm), and with regard to evaporation, It is directly related to the elements of solar radiation and heat, as it reached its highest rate in June, which amounted to 439.9 (mm) and the lowest rate for this element was recorded in January, which is 84.9 mm)

4- Soil

Soil is one of the natural components that depends on the type and quantity of the space crop, because it is the center in which the roots of plants grow and moves their diet. Leads to the formation of dust storms or dust.

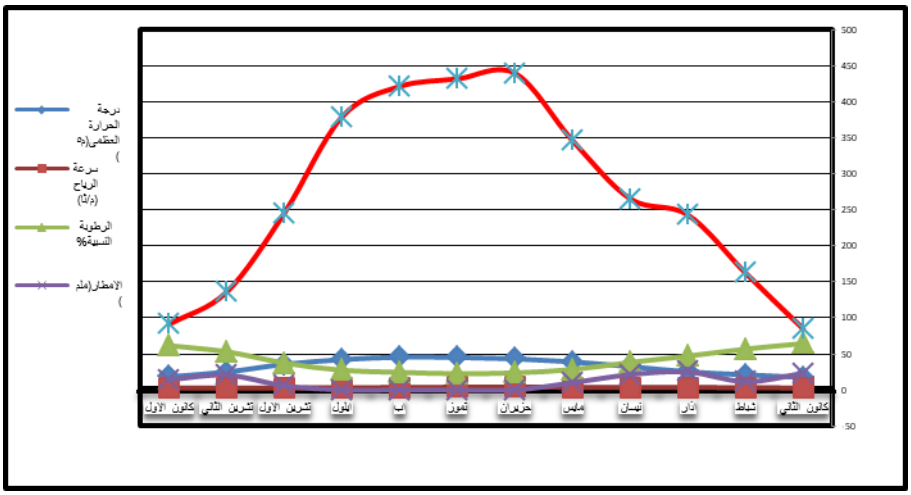
Table (1) Monthly averages of climate elements in Samawa station for the period (1989-2018)

evaporation (mm)	rain (mm)	Humidity relativity (%)	Speed wind (m/s)	temperature		solar radiation			the element climatic the month	No
				heat the small (C)	heat the great (C)	radiation Actual (hour/day)	radiation theoretical (hour/day)	angles the fall (Degree)		
84.9	23.3	64.6	2.7	6.2	17.5	6.5	10.3	38.9	January	1
162.4	11.5	56.9	3.2	8.7	21.1	7.6	10.5	45.8	February	2
243.1	25.2	47.2	3.5	12.3	25.3	8.6	12.6	56.7	March	3
265.6	21.4	38.3	3.6	18.6	32.5	8.7	12.3	68.9	April	4
346.3	10.1	28.5	3.7	23.8	39.1	9.2	13.4	76.8	May	5

439.9	0.0	23.8	4.1	25.9	43.3	11.8	14.6	82.2	June	6
432.1	0.0	22.6	3.9	28.3	45.2	11.6	12.4	78.5	July	7
421.7	0.0	24.5	3.4	27.5	45.6	9.4	12.1	71.6	Father	8
379.5	0.0	27.5	3.1	24.1	42.2	8.8	11.3	62.9	September	9
245.9	5.8	37.5	2.8	18.9	35.7	7.6	10.3	48.5	October	10
136.2	20.7	53.1	2.5	12.5	25.1	6.9	10.1	35.2	November	11
91.2	14.2	61.7	2.7	7.7	18.4	6.4	10.2	35.4	December	12
3248.6	132.2	40.5	3.3	17.9	32.6	8.6	11.7	58.5	the average	13

Source: Republic of Iraq, Ministry of Transport and Communications, General Authority for Meteorology and Seismic Monitoring, Climate Department, Baghdad, unpublished data ,2019.

Figure (1) Monthly averages of climate elements at Samawah station for the period (1989-2018)



Source: the researchers based on the table (1)

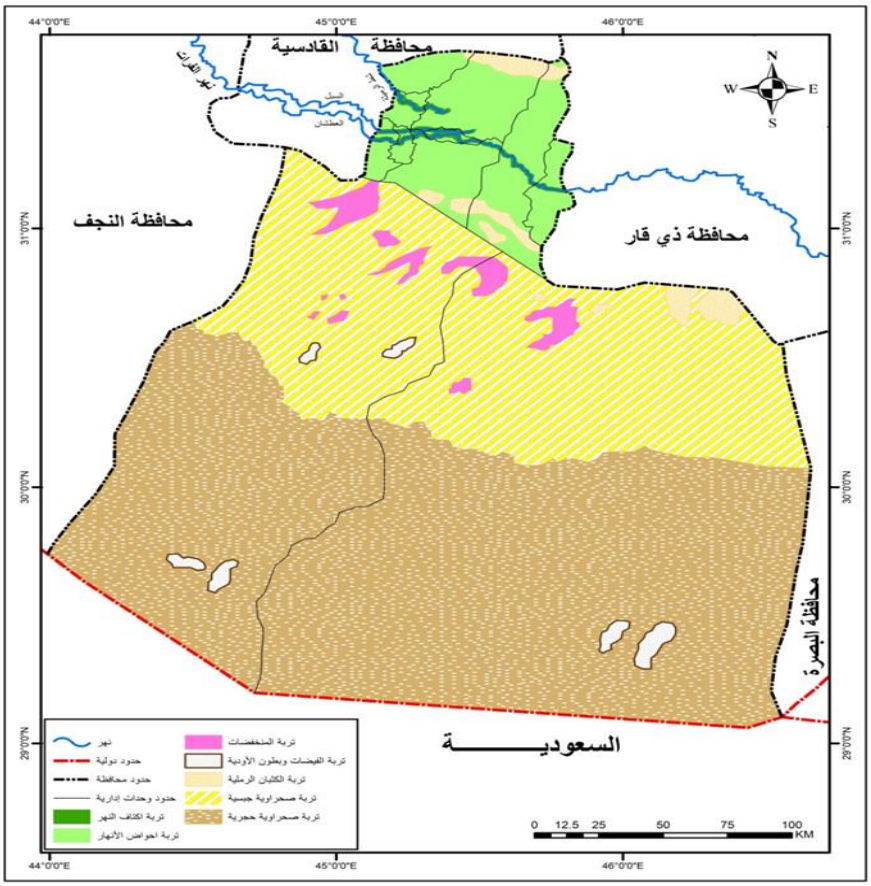
They stumble or rise, depending on the wind speed and direction, and this is what effectively and directly affects agricultural crops, as well as the cause of the emergence of diseases that affect those crops. The western plateau in view of the map (5) the soil of the sedimentary plain consists of the sediments of the Euphrates River, floods that formed on both sides of the river, and the winds contributed to the transfer of these sediments to areas farther from the two sides. From the river called (moveable soil) and the proportion of clay in this soil reaches (35%), silt (43%) sand to (12) (22%) the alluvial plain soil in the governorate is divided into the soil of the shoulders of the rivers that lie along the sides of the river. The river extends over a narrow range in which the percentage of silt increases in depth 0-30 cm, which is (43%). Then comes the proportion of clay, which is (40%), and as for sand, it occupies a small percentage, not more than (17%) for the same depth. A large amount of clay in depth reaches (51%), then silt comes in (31%), and sand has reached (18%), and the third type is represented by sand dunes that are found in both the sedimentary plain and the western plateau, which were formed from the accumulation of sand that It was deposited by the winds, and it occupied the northern parts of Al-Khader and Al-Warqa districts, as well as the southern parts. In terms of greens and Samawah and the presence of

this soil in separate parts on the one hand. It is a loose soil that is prone to erosion due to the coarseness of the particles and the relatively large size. There are other types of soils in this section, including the soil depressions located in the southern part of the alluvial plain and the northern part of the alluvial plain. The western plateau extends in small sizes (13). As for the soil of the western plateau, these soils are characterized by their high porosity and low fertility, where the proportion of sand is high and the proportions of silt and clay are low, and this is what made them more disintegrated and exposed to air. The percentage of erosion and the percentage of sand forms (50%), while the clay reached (33%), while the silt rate did not exceed (17%), and the high sand percentage in the first depth is due to the role of wind in the deposition of sand in the surface layer of the soil, which changes the physical properties and its texture. The soil of the western plateau contains many types of desert soils, such as gypsum soil, which is not more than 20 cm deep) and is subject to wind erosion due to its disintegration and fragility, and lack of cohesion due to the high sand content in it, which amounts to (80%), but the clay reached (15%) and silt a small percentage that does not exceed (14) (5%). Likewise, there is a conflict of flooding of the bottoms and the bottoms of the valley, which are found in the stomachs of the main valleys and are considered transported soil as a result of the watery soil to carry them in this part and it consists of a mixture of sandy and gravel mixed with silt and clay (15)

4-Water Resources

Water resources are considered one of the most important factors affecting agricultural crops, as their scarcity leads to soil dehydration and disintegration, as well as the lack of vegetation cover and affect the soil type. (6) However, their quantities do not cover the governorate, rather they are few, so that some of them are seasonal, depending on their source on rain, and then dry up with no rainfall. The types of these resources in the region will be explained as follows:

Map (5) of soil types in Al-Muthanna Governorate

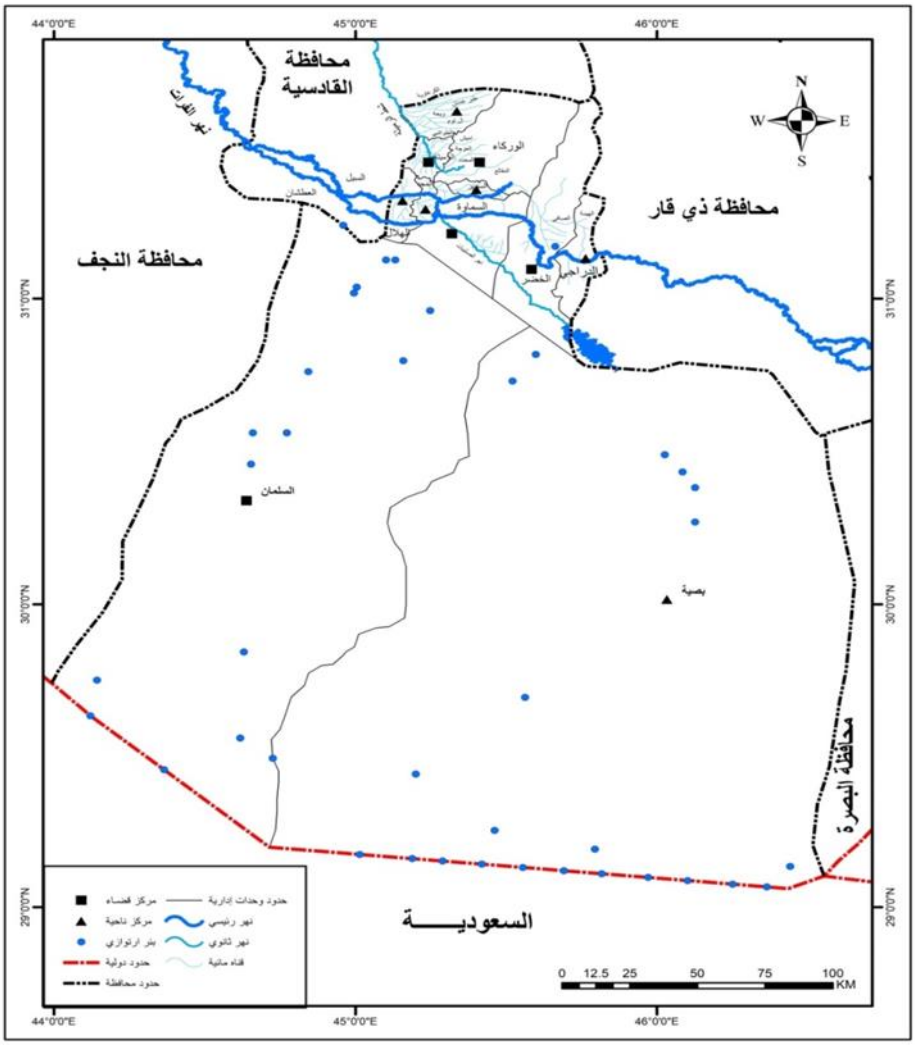


Source: the researcher based on: Republic of Iraq, Ministry of Water Resources, General Directorate of Survey, Map Production Department, Digital Unit, Administrative Map of Iraq, Scale (1: 100000), Baghdad, 2007.

A- Surface water Surface water

The surface wealth is represented in the Euphrates River and its branches and Al-Rumaitha Shatt. As for the Euphrates River, it is the main source of water in the study area, which enters from the northeastern border (the southern border of the Qadisiyah Governorate), where it passes through each of the districts of Al-Rumaitha with its suburbs (Al-Majd) and Al-Hilal, and the Samawah district all the way to Al-Khader district until its exit from the governorate through Al-Daraji district from the northwest, and its length reached 107 km) (16) from its entry area to its exit area in the study area, and it is divided into two parts, the first is the Sobel River, which Represents the main course of the Euphrates River in the province. In Samawah, the Euphrates River is unified, and as for Shatt Al-Rumaitha, it is an extension of Shatt Al-Diwaniyah, one of the branches of Shatt al-Hilla, and it enters the province from the northeastern side, and extends for an estimated distance of 37 km (17)

Map (6) The water resources of the study area



Source: The researcher based on the Republic of Iraq, Ministry of Water Resources, General Directorate of Survey, Map Production Department, Digital Unit, Administrative Map of Iraq, 1:10000 scale, Baghdad, 2017.

B- Ground water underground water

It is one of the water resources found in the ground and at different distances that seep from rivers and rain through the pores and cracks of the soil and rocks, and it depends a lot in the desert areas for agriculture and other uses through drilling wells or appearing in the form of eyes and springs, and in the province there are many artesian wells spread between The districts and districts of the governorate, however, are not widely used in agriculture, but are limited to

drinking water and other daily uses. Here it is necessary to refer to the validity of groundwater for irrigating crops or field crops, and this depends on its content of salt, and water close to the surface of the soil is usually salty because the more We go deep into the soil, we get water suitable for irrigating crops, and this depth is more than (150km) from the soil surface.

The second topic: the geographical distribution of the areas and production of grain crops in the study area

First: barley

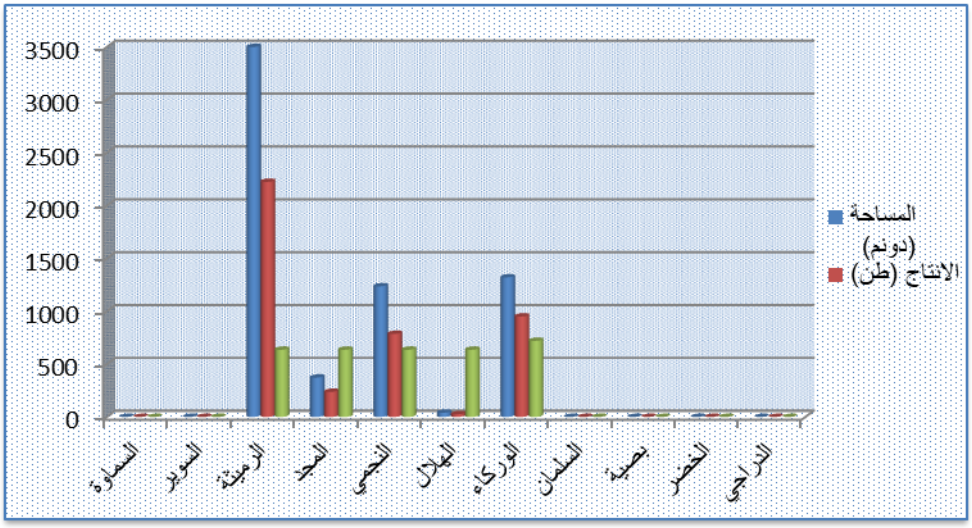
It is clear from Table (2) and Figure (2) that the areas of cultivation of the barley crop for the year 2019 reached the highest in Al-Rumaitha district, reaching (3500 dunums), with a production quantity of (2224 tons) and productivity (635.4 kg/dunum), followed by the Warka district with an area It reaches (1320 dunums) with a production quantity of (950.1 tons) and a productivity rate of (719.8 kg/du), then Al-Najmi district came third with an area of (1235 dunams) and with a production quantity of (758 tons) and a productivity rate of (635.4). kg/dunum), while no area was planted with this crop in the center of Samawa district, Al-Suwayr district, Al-Khader district, Al-Daraji district, Al-Salman district center and Busayyah district, map (7)

Table (2) Cultivated area, production and productivity of barley crop in the study area by administrative units for the year 2019

Productivity/kg	production (tons)	space	Administrative unit
-	-	-	Samawah
-	-	-	Alsuwer
635.4	2224	3500	Rumaitha
635.2	236.3	372	Glory
635.6	785	1235	Astral
635.0	25.4	40	Crescent moon
719.8	950.1	1320	Warka
-	-	-	Salman
-	-	-	Vegetables
-	-	-	Cyclist
655.3	4220.8	6467	Governorate

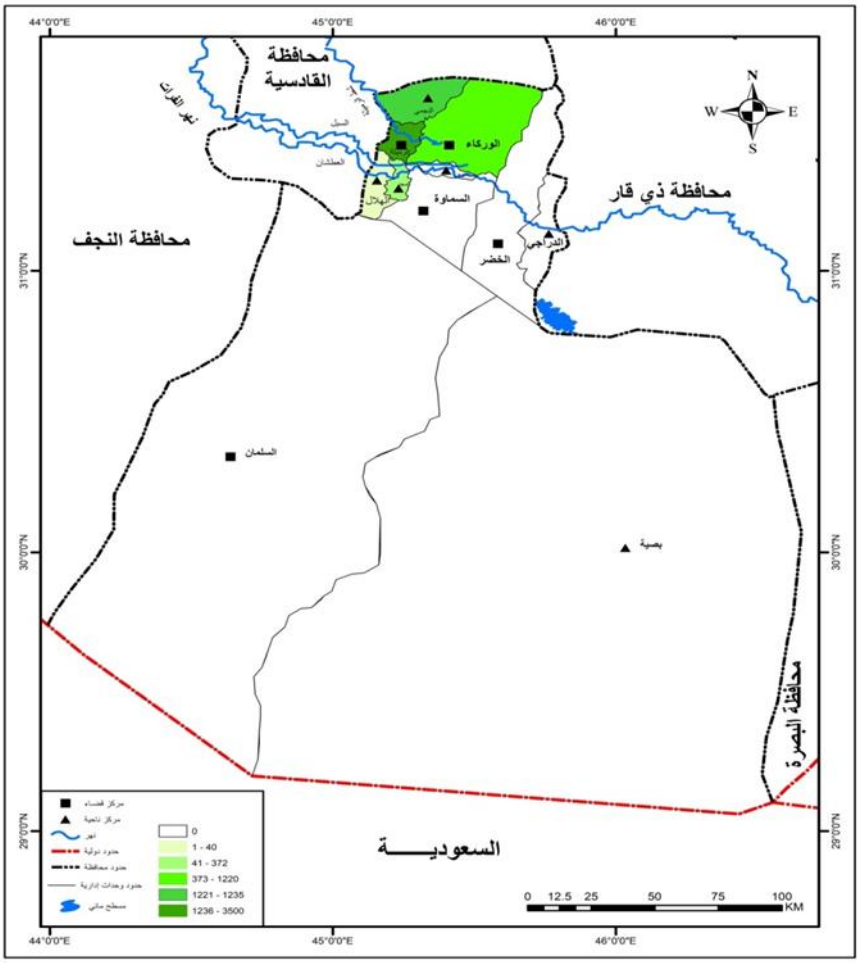
Source: Republic of Iraq, Ministry of Agriculture, Muthanna Governorate Agriculture Directorate, Planning and Follow-up Department, unpublished data .2020.

Appearance(2)Cultivated area, production and productivity of barley crop in the study area according to the administrative units for the year 2019



Source: Table (2)

Map (7) the area cultivated for barley in the study area according to the administrative units for the year 2019



Source: Table (3)

Second: Wheat

Table (3) and Figure (3) show that the areas of wheat cultivation reached the highest area in Al-Salman district, which amounted to (112004 dunums), with a productive quantity (53527 tons) and productivity (477.9 kg) by Al-Salman area. -

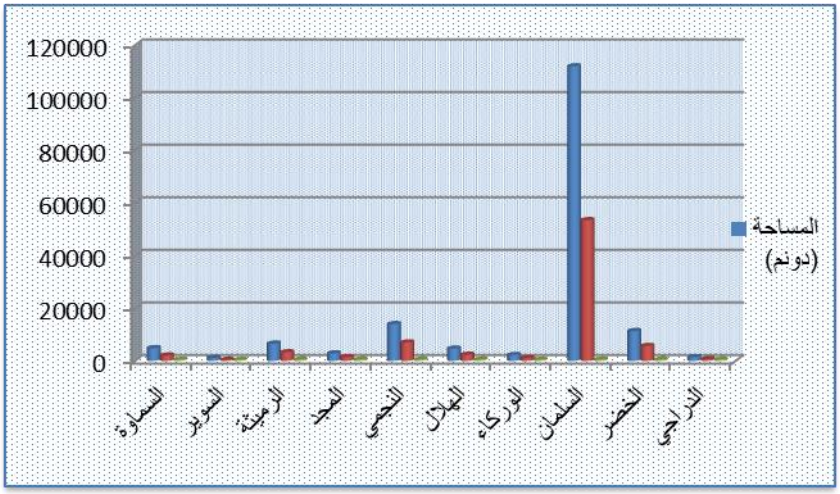
Al-Najmi district, with an area of (1400 dunums), with a production quantity of (7049 tons) and a productivity rate of (503.5 kg/du), then Al-Khidr came third with an area of (11345 acres). With a production quantity (5703.1 tons) and a production rate (502.7 kg). As for the lowest agricultural area for this crop, it was recorded in Al-Suwayr district, which amounted to (1116 dunums), with a productive quantity (477.2 tons) and a productivity of (427.6 kg) map (8)

Table (3) Cultivated area, yield and yield of wheat crop in the study area According to the administrative units for the period 2019

Productivity / kg / acres	production (tons)	space	Administrative units
427,6	2075	4852	mq.samawa
427,6	477,2	1116	Alsuwer
503,5	3323,1	6600	Mq .Rumaitha
503,5	1452	2884	Glory
503,5	7049	14000	Astral
503,5	2371	4709	Crescent moon
472,1	1081	2289	Warka
472,1	654	1385	Dignity
477,9	53527	112004	Salman
502,7	5703.1	11345	MQ Al-Khidr
502,7	704	1400	Cyclist
482,2	78416.4	162584	Total

Source: Republic of Iraq, Ministry of Agriculture, Muthanna GovernorateAgriculture Directorate, Planning and Follow-up Department, unpublished data .2020.

Figure (3) Cultivated area, production and productivity of wheat crop in the study area for the year 2019

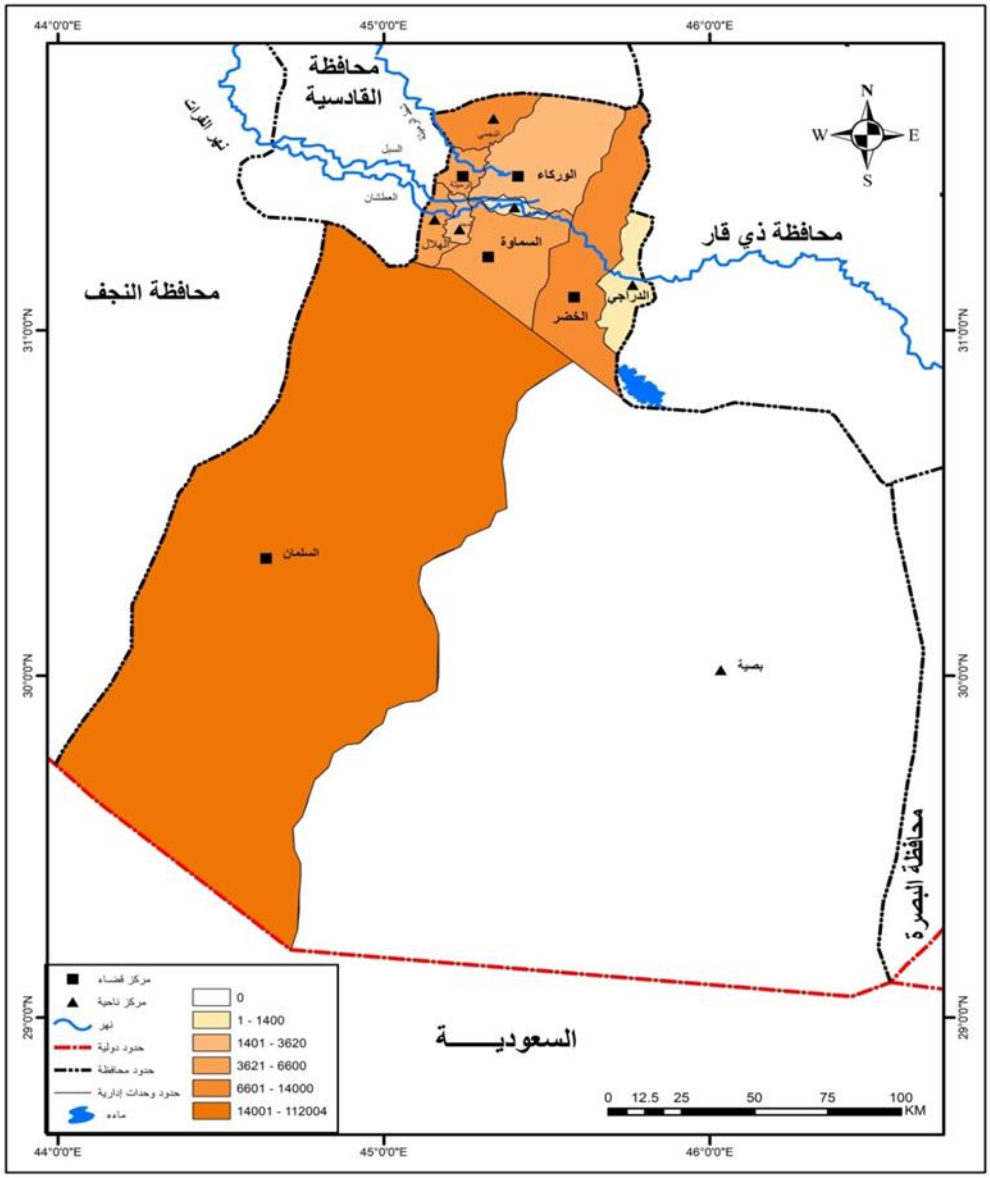


Source: Table (3)

Third: Rice

It is clear from Table (4) and Figure (4) that the areas of rice cultivation reached the highest area in Al-Rumaitha district, reaching (3600 dunums), with a production quantity of (2024 tons) and productivity (615.3 kg), followed by Al-Najmi district with an area of It reaches (1635 dunams), with a production quantity of (985 tons) and a production rate of (645.4 kg), then the Warka district came third with an area of (1587 dunams) and with a production amount of (970.3 tons) and a productivity rate of (729.8 kg). While no area was planted with this crop in the district of Samawah, Al-Suwayr district, Al-Khader district, Al-Daraji district, Al-Salman and Busayyah district, map (9)

Map (8) of the area cultivated for wheat in the study area according to the administrative units for the year 2019



Source: Table (3)

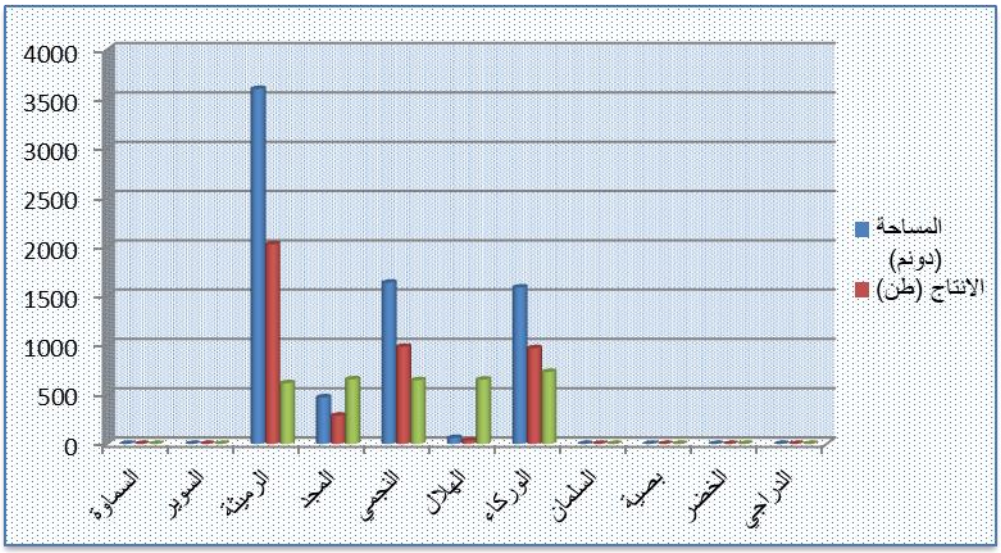
Table (4) Cultivated area, production and productivity of rice in the study area for the period 2019

Productivity/kg	production (tons)	space	Administrative units
-	-	-	m.q.samawah
-	-	-	Alsuwer
615,4	2024	3600	m.q .Rumaitha
655.4	286.3	472	glory
645.4	985	1635	astral
652.1	31,6	60	Crescent moon
729.8	970.3	1587	Warka

-	-	-	
-	-	-	Salman
-	-	-	MQ Al-Khidr
-	-	-	cyclist
3298.1	4297.2	7887	Total

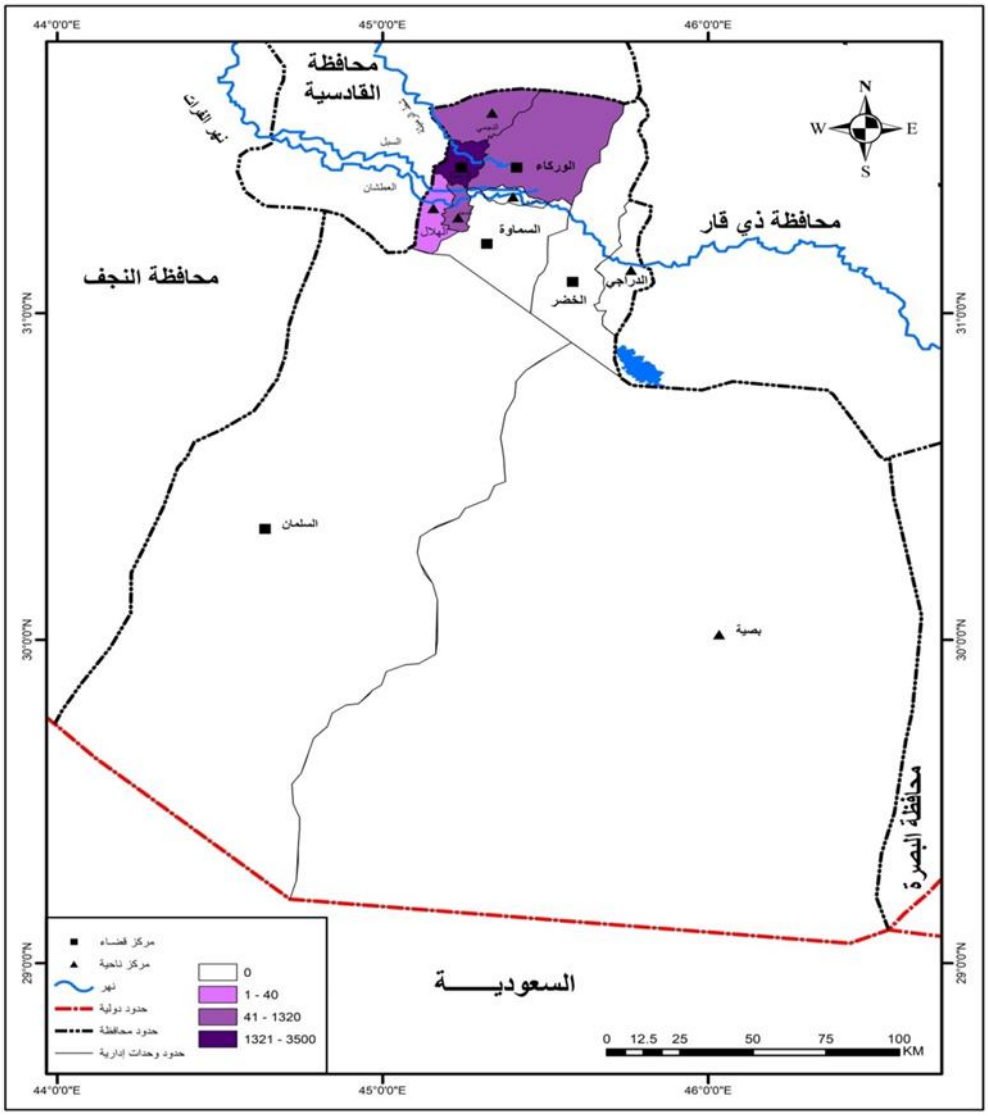
Source: Republic of Iraq, Ministry of Agriculture, Muthanna Governorate Agriculture Directorate, Planning and Follow-up Department, unpublished data2020.

Figure (4) Cultivated area, production and productivity of rice in the study area according to the administrative units for the year 2019



Source: Table (4)

Map (9) of the area planted with rice in the study area by administrative units for the year 2019



Source: the researcher based on the table (4).

Conclusions

1- Natural factors play a very big role in the variation of the agricultural area of grain crops. These factors are represented by the location (astronomical and geographical), surface, vegetation, climate, soil and water resources.

2- The areas of barley cultivation reached the highest in Al-Rumaitha district, reaching (3500 dunums) with a production quantity of (2224 tons) and a productivity of (635.4 kg/dunum). to (950.1 tons) and a productivity rate of (719.8 kg / dunum), then Al-Najmi district came third with an area of (1235 dunums) and a quantity of production up to (758 tons) and a productivity rate of (635.4 kg / dunum), while no area was planted With this crop in the district of Samawah, Al-Suwayr district, Al-Khader district, Al-Daraji district, Al-Salman and Busayyah district.

3- The areas of wheat cultivation reached the highest area in the Al-Salman district, reaching (112004 dunums), with a production quantity of (53527 tons) and a productivity of (477.9 kg). to (7049 tons) and a productivity rate of (503.5 kg / dunum), then Al-Khader district came third with an area of (11345 dunums) and a production amount of (5703.1 tons) and a productivity rate of (502.7 kg / dunum), while the lowest agricultural area for this The crop was recorded in Al-Suwayr district, which amounted to (1,116 dunams), with a production quantity of (477.2 tons) and a productivity of (427.6 kg).

4- The areas of rice cultivation reached the highest area in Al-Rumaitha district, reaching (3600 dunums), with a production quantity of (2024 tons) and a productivity of (615.3 kg). It reached (985 tons) and a productivity rate of (645.4 kg/du), then the Warka district came third with an area of (1587 dunams) and a quantity of production up to (970.3 tons) and a productivity rate of (729.8 kg/dunum), while no plant was planted An area with this crop in the district of Samawah, Al-Suwayr district, Al-Khader district, Al-Daraji district, Al-Salman and Busayyah district.

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