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Obstacles to Agricultural Development in the District of Samarra and AL-Dour

Hambatan Pembangunan Pertanian di Wilayah Samarra dan Al-Dour

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Abstract

This article presents a comprehensive study conducted in Samarra and Al-Dour districts, focusing on the impact of agricultural components on development. The study aims to identify and analyze the natural, human, and economic obstacles that impede agricultural progress in the region. Through questionnaire data analysis, several key findings emerge. Natural factors such as inadequate rainfall, arid soil conditions, and soil salinization pose significant challenges to agricultural development. Insufficient utilization of water resources further exacerbates these constraints. Agricultural pests also cause substantial damage to crops, leading to farmer abandonment of agricultural practices. Roughly 30-35% of cultivated areas are affected. Moreover, a decline in agricultural labor is observed, with individuals deterred by constraints and limited financial returns. The increasing population in the region intensifies food demand and pressures agricultural land for housing, compounding challenges for farmers. Water scarcity emerges as a primary constraint, leading to neglect of agricultural areas due to inadequate irrigation. Progressive soil salinization and desertification, influenced by natural and human factors, worsen the situation. Approximately 22.38 km² of land are affected, particularly in eastern and southern Samarra and eastern Al-Dour. The study underscores the need for targeted interventions and policies to overcome these obstacles and foster sustainable agricultural development. Strategies should prioritize water resource management, pest control, technological advancements, and addressing labor shortages. Implementing these measures will contribute to long-term agricultural sustainability, food security, and economic growth in the studied regions.

Highlights:

- Natural and human constraints hinder agricultural progress in Samarra and Al-Dour districts.
- Agricultural pests cause significant damage and discourage farming activities.
- Water scarcity and soil salinization negatively impact agricultural development.

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Introduction

Development is the common theme for all developed and developing countries alike, because it includes the development of planning strategies and development policies that form a balanced work methodology that is conducive to achieving economic and social development and takes into account the fulfillment of the requirements of society and does not deplete environmental resources. Being the ideal solution for the goals of development, making it available as much information and knowledge as possible to a large segment of society is a prerequisite for making development a national issue in which all individuals and segments of society participate. Agricultural development is the process that results in an increase in the life chances of some people in society without eliminating the opportunities of others at the same time. The natural and human geography that the study area possesses, but it suffers from many obstacles that stand in the way of achieving comprehensive agricultural development in it. This was reflected in the fluctuation in the size of the cultivated areas and the lack of quantities of agricultural production.

The study Problem

The study area suffers from many geographical constraints, including natural and human ones, that stand in the way of the development of agriculture and the achievement of sustainable development in it in order to achieve food security for the population of this region, which is the impact of natural constraints represented by the surface, climate, soil and water quality on agriculture in the study area as well as mismanagement. The impact of soil and water on the development of agriculture in the study area, as well as the impact of the lack of agricultural supplies and services, and the traditional agricultural methods used in agriculture on production sufficiency.

Study hypothesis

For the purpose of achieving sustainable agricultural development and implementing its basic principles in the agricultural aspect, the consumption aspect must be linked to agricultural development so that the relationship is positive between agricultural consumption and sustainable agricultural development and the protection of the agricultural environment from agricultural misuse. The hypothesis is that the natural constraints represented by topography, climate extremes, soil quality, and water resources fluctuation, as well as the impact of human constraints represented by poor management of agricultural production by farmers, have a significant impact on the fluctuation of agricultural production in the study area and impede the achievement of comprehensive agricultural development.

Method

Several geographical approaches were used to reach the best solutions to the problem of the study, including the use of descriptive, regional and crop approaches as well as the quantitative method and the use of geographic information systems to study the phenomenon and reach the results. Contents of the study: The study included three sections, the first section dealt with the introduction and the theoretical framework, while the second section dealt with the natural geographical components of agricultural development, and the third section dealt with the human components of agricultural development. The second topic: the natural geographical components. The geographical components play a major role in achieving agricultural development because they provide the means that help them spread in most of the administrative units in the study area, and the density of vegetation and agricultural cover varies between different regions depending on the climate conditions, soil characteristics, location, terrain and other factors influencing agriculture. Growth and distribution of plants, animals and agricultural lands and their spatial relationships.

Results and Discussion

Location and area

The study area lies between latitudes 33-275 and 355-415 north, and between 42-325 and 44-595 east longitudes. This site is characterized by climatic conditions and topographical characteristics represented by its location in the sedimentary plain region within the transitional zone between the Mediterranean climate and the desert climate in central and southern Iraq. The study area is about 19351 km². It is bordered to the north by the district of Tikrit, to the east by the district of Dhuluiya, and to the west by Anbar Governorate. The population of the study area is (1,919,604) people, according to the statistics of the Ministry of Planning for the year 2022.

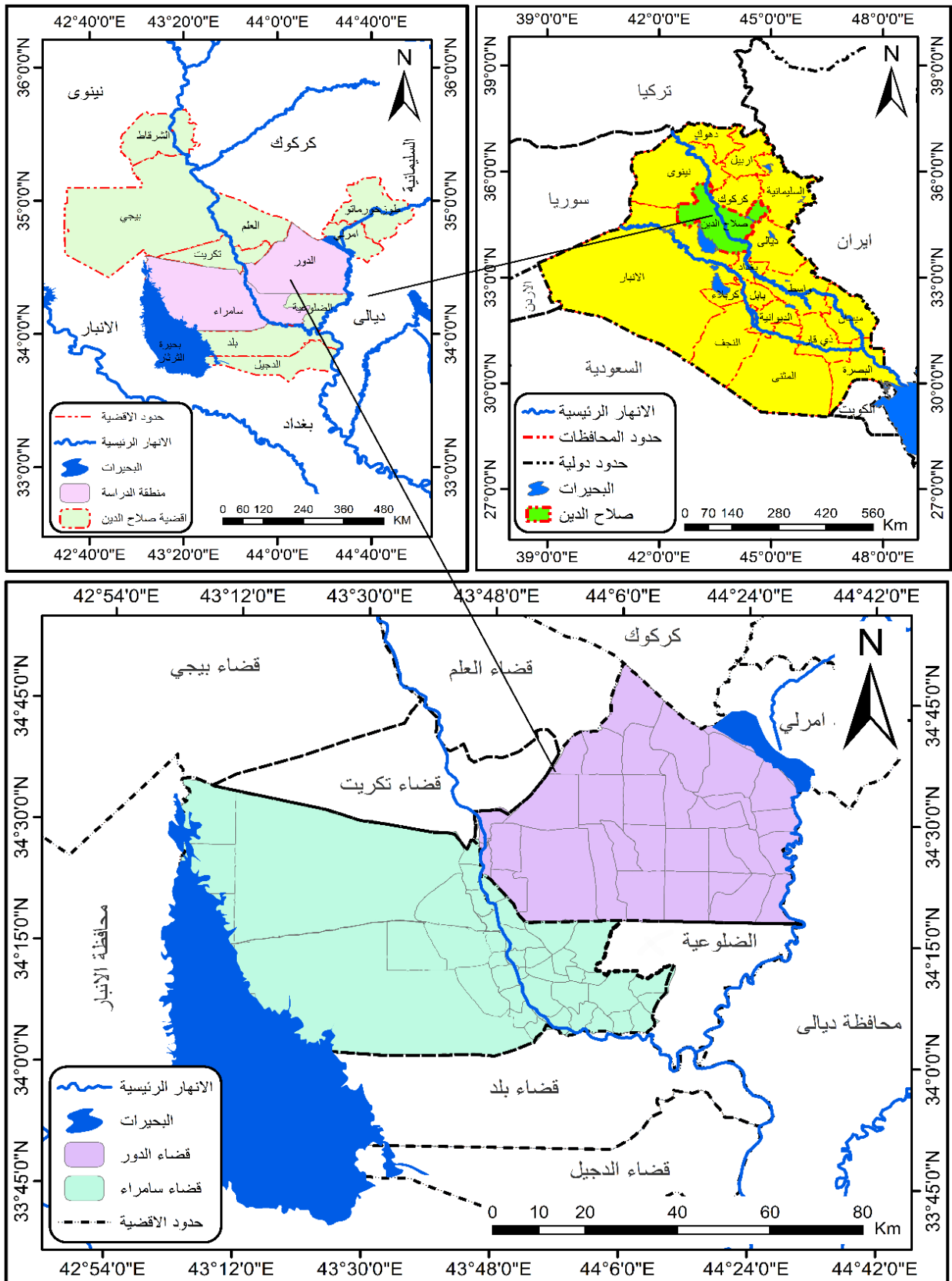


Figure 1. Map (1): The location of the study area

Source: Depending on the researcher and the ARC GIS V10.3 program

Surface

The surface sections in the study area vary between the lands of the plateau and what they contain of valleys, hills and depressions, and between the Tigris River and its low course, as well as the sedimentary plain, which is distinguished by its relatively flat surface. See Map No. (2) it is distinguished. The surface of the study area, which is located south of the undulating area in Iraq, is characterized by little erosion, and the elevations are determined according to the contour lines (the Tigris River penetrates the Samarra district, which forms the southern part of the study area and divides it into two parts, the eastern part and the western part, and its area constitutes the eastern part of the Samarra district. The northern part is represented by the district of Al-Dur, so the presence of the plain is limited to a narrow strip along the Tigris River, the smallest part, which is represented by the sedimentary flood plain, one of the formations of the sedimentary plain, which reached a width of (1.3 km). Which was formed due to the low slope of the Tigris River in the Samarra district, and the features of the surface in this region are one of the factors that helped the expansion of agricultural activity in the study area, and it extends between the Tigris and Al-Azim rivers. The sedimentary deposits of the upper amphitheater are made of gypsum, sandy and fertile materials, and are sometimes covered by wind-transmitted sand dunes, which cover the sediments by (1.5 m) [1] The area of the island includes the western sections of the study area, as it extends from the heights of Hamrin to the western district of al-Dur in the north and ends with the district of Samarra. Its surface is in the form of a shallow basin sloping from north to south. The valley and depression of the street lake are considered the main drain for its waters. The surface of the island area is distinguished by simple undulating, and its lowest height in the street depression reaches sea level, and it is interspersed with some hills [2]. Various agricultural activities to achieve agricultural development.

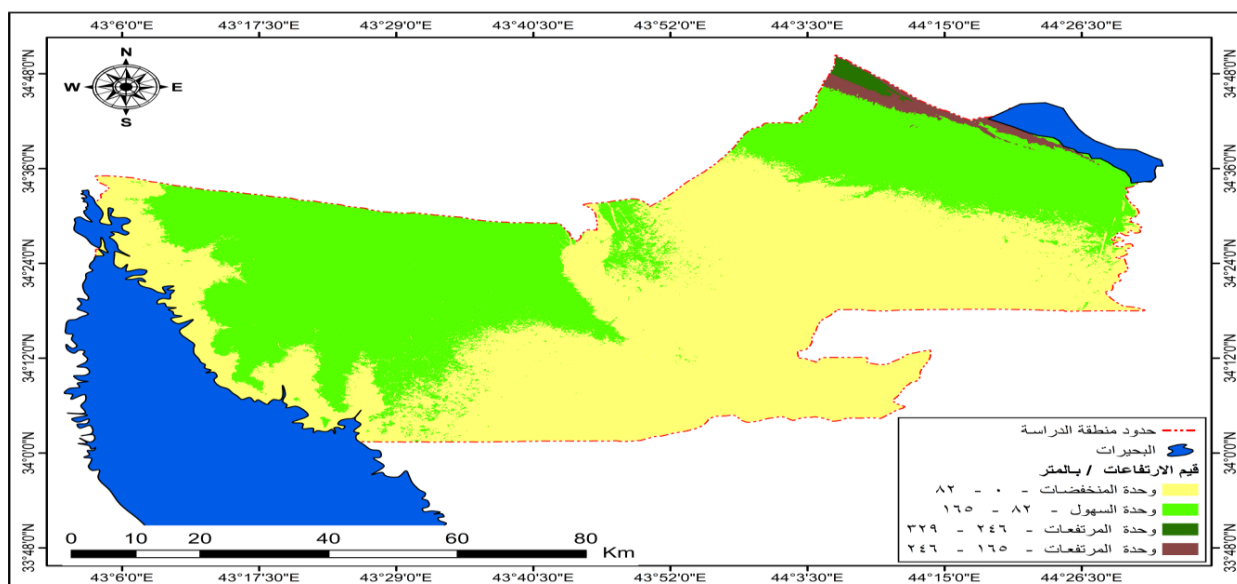


Figure 2. Map (2): the surface sections in the study area

Source: Depending on the researcher in ARC GIS V10.3

the climate

The climate of the study area is characterized by high annual and daily temperatures and drought, and for the purpose of giving a clear picture of the climatic characteristics of the region, which is believed to have a direct and indirect impact on agricultural crops now and in the future. 11.5-11.51) hours in Baiji and Samarra, due to the sun's perpendicularity over the Tropic of Cancer, and the rise in temperatures leads to an increase in the process of losing water losses. Thermal energy responds to it during the growth season [3][4] and the climate of the study area falls within the arid climate, as it is characterized by being hot, dry in summer and moderate, rainy in winter. The most important characteristic of temperatures in the study area is the rise in the summer and the decrease in the winter. The averages of the maximum and minimum temperatures for the period 1985-2009.

station	K2	February	March	April	May	June	July	August	September	T1	T2	K1	The rate is
Samarra	9.4	12.6	16.3	3.22	28.8	32.7	36	8.35	31.5	25.9	4.17	11.3	3.23
Tikrit	8.8	11.1	15.7	21.9	27.6	31.2	36.2	35.7	31.1	25.2	16.5	10.9	22.6

Table 1. Monthly and annual average temperatures (°C) at Samarra and Tikrit stations for the period (1985-2019)

Source: The researcher worked on data from the Ministry of Transport, the Iraqi General Authority for Meteorology, Climate Department, unpublished data, 2019.

As for precipitation, the precipitation is distinguished by its fluctuation from year to year, in addition to its inadequacy for irrigation of agricultural crops, but it works to raise the irrigation efficiency and the lack of use of irrigation pumps during the cold half of the year, and with regard to the wind component, the wind is characterized by medium speed rates that do not exceed 4 km / hour. Except for some days of the year in which the wind speed is active and is more harmful when it accompanies dust and sand dunes. In general, northwest winds prevail most days of the year.

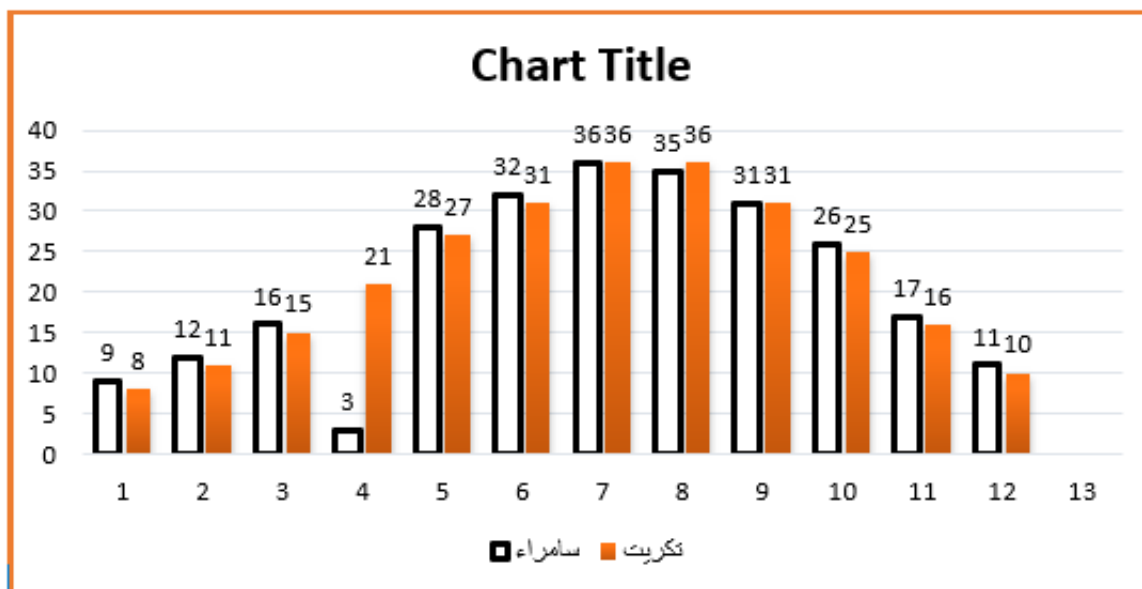


Figure 3. Average temperatures in Samarra and Tikrit

Source: Based on Table No. (4)

The soil

Soil is defined as the thin layer of crumbled rocks that cover the surface of the earth and resulting from the fragmentation of rocks due to ancient or recent transformations that occurred in it as a result of the effects of certain factors present in nature[5].

The soil is a balanced ecosystem in the state of instinct, but an imbalance may occur in this balance that destroys some of its characteristics or some of its elements. It may be the result of a natural emergency, such as bouts of drought. Or infection of farms with epidemics and diseases, or encroaching sand dunes and so on, but the imbalance in most cases comes as a result of human action in misusing the lands and their resources and it is called degradation and it has multiple aspects and the closest meaning to degradation is the low levels of lands in the degrees of interest and agricultural productivity and one of the most important types of soils in the region The study is the soil of the shoulders of rivers 2 - the gypsum soil 3 - the sandy soil The soil of the ancient river plains and after the turbo factor is one of the most improved elements and its impact on the use of machines, machines and equipment directly [6].

Water Resources

The water resources in the study area include rain, surface water, and groundwater. Water is of utmost necessity in arid and semi-arid regions, because it is the backbone of life and its continuity, and water resources are characterized compared to other natural wealth resources as inexhaustible if they are well invested, and whenever water is obtained and in an inexpensive way, it expands its investment in agricultural activity, and vice versa when it is not Irrigation water is available, then the soil becomes exposed to the various manifestations of desertification, which is reflected in its effects on the environmental components that are characterized by high sensitivity due to high evaporation and a lack of water balance in most days of the year, so the need to practice irrigated agriculture based on the Tigris River and irrigation projects as well as groundwater was required. [7] The river forms the western border in its northern part within the lands of the district of Al-Dur and penetrates the study area in its southern part within the district of Al-Dur and divides it into two parts: the eastern section is represented by the district center, Al-Mu'tasim district, and their countryside, and the western section is represented by the center

countryside and the Tigris district. And called (the container) on the river water for irrigation, as it is cultivated with vegetable crops, and the general rate of discharge of the Tigris River is (625) m / s in the Samarra station for the period 1980-2010. The river has little desertification as a result of the lack of salts contained in the water and the good quality of the soil and the drainage of excess water from the crops' needs through the soil towards the river valley, and the existing salts are a result of poor irrigation [8].

As for the other range, it is the western range of the Tigris River represented by the lands of the island between the Tigris River and Lake Tharthar, and the average depth of the well is between (40-105) meters, and it is characterized by containing a high percentage of salts, as the percentage of salts reached one of the water wells located within ds district m3.5/48 The best [9] These percentages are considered to have high salinity on the surface of the soil and stunt crops because of it and because of the use of saline water. Due to high temperatures and high evaporation values, which increased the problem of desertification and its expansion, and the wells are distributed in different areas of the use of salty water. Which increased the problem of desertification and its expansion, and the wells are distributed in different areas of the study area, as they totaled (8694) wells, most of which are concentrated in the districts of 9 / Jazira and 10 / Abu Al-Jil, due to their wideness and their distance from the water sources in irrigation [10].

Working human factors

A- Population and labor force

After population growth is one of the main causes of aggravation of the problems of agricultural development, every population increase is accompanied by an increase in the demand for food, which means an increase in the area of cultivated land at the expense of natural vegetation, and an increase in the number of livestock that the population needs. Affecting, directly or indirectly, the status of the environmental milieu, through urban expansion at the expense of agricultural lands, and accelerated erosion due to various activities on the lands of the region [11]. But this factor dictates the main engine of the agricultural process in its various stages, as the labor force is considered the human wealth of any region because it is the hand that runs the machine to plow the land and extract its resources, and it produces, distributes and consumes, and that the agricultural labor force is one of the main human factors affecting agricultural production, so it cannot be imagined The establishment of any agricultural activity without it, as the intensity of agricultural labor generally affects the types of agricultural crops and the prevailing agricultural pattern, and this leaves an important role in all stages required by agricultural production processes [12].

B - agricultural policy

Governmental policy has a significant impact on agricultural services in the study area, as it is in the case of other regions of Iraq. This policy is evident in the annual plan issued by the Directorate of Agriculture of Salah al-Din, as well as the agricultural supplies it provides to farmers, which are fertilizers, pesticides, and agricultural equipment of all kinds, as well as government laws and legislation. Chemical control issued by the state to protect agricultural products, whether at the level of the country in general or Salah al-Din Governorate, including the region of Al-Din Chemical control: [20] It is through the use of chemical pesticides in order to control pests.) type, and the type of pesticide varies according to the type of agricultural crop. Among the pesticides used in the control of two (citrus) fruit flies, the Samarra district recorded the highest amount used of the Fasin pesticide, amounting to (144) tons. Among the pesticides used in the campaign to combat aphids on wheat are (Flash, (Al-Fasin, Kulan), the highest administrative unit was recorded in the amount of (Flash Kulan) in the Samarra district, about (24-54) tons, and among the pesticides used in the control of donkey insects on palm trees is Levon), as the amount used in the study area amounted to about (103) tons. Samarra district came with the highest amount used of this pesticide, amounting to (27) tons, and the lowest amount was in Al-Dur district, with (21) tanarasah in particular (19). Agricultural loans are one of the tasks and services of agricultural banks. The banks provide grants in the form of loans called agricultural loans, and they are the best types, as they are granted to reclaim agricultural lands. 49,000,000) Iraqi dinars.

□□□□

Administrative unit	Iraqi Dinar	The purpose of the imposition
Samarra	429,000,000	plastic houses
aldawr	49,000,000	Drilling a well / self-productive resources
the total	478,000,000	

Table 2. Agricultural advances in the study area for the year 2020

The concept of sustainable development

The concept of development refers to a planned program for a group of projects aimed at improving the economic and social conditions of the population, improving the performance of the production elements in the production

process, improving health, educational and entertainment services, and infrastructure services, as well as the balanced distribution of income to the members of society to reduce the differences between urban and rural areas. Therefore, development is a product of what is planned. Investing in natural and human resources and distributing development projects over the largest amount of space in a way that contributes to transferring the study area from one state to a better state [14]. It means the general framework and broad lines drawn by the development policy in the transition from underdevelopment to a state of growth. The development strategy seeks to achieve development. By defining the main objectives and milestones for them, the strategy depends on many considerations, including the prevailing conditions, what the desired goals are, and the role of the state in development [14]. In addition, it represents the plan or mechanism that can be followed to achieve the desired development goals, and the stage of extension of the development plan is one of the most important stages in the development process, as we start with preparing and analyzing the necessary data and end with the evaluation process, and the data collection stage requires conducting field surveys of resources in order to determine The social and economic reality of the region in preparation for its development [15].

Obstacles to sustainable agricultural development and ways to address them

There is a group of geographical obstacles that stand in the way of agricultural development in the study area, represented by natural and human obstacles, as well as life obstacles represented by agricultural pests and diseases. The most important of these obstacles are the following:

First: Problems related to natural factors

The study area suffers from a set of geographical problems related to the impact of natural factors. These problems are represented by salinization, desertification, and sand dunes, resulting from the climate layer being part of the desert region of Iraq. Table No. 26 and Map No. 16 show the layer of land cover manifestations in the study area.

1- Problems related to climatic effects:

The study area is considered one of the semi-arid regions whose climatic characteristics are reflected in the overall human activities. Agricultural production comes at the forefront because it is the most subjected sector to the influence of natural environmental factors, negatively and positively. Temperatures, as each plant has optimal temperatures suitable for its growth, and if abnormal situations occur during the plant growth season such as high or low temperature, it leads to a disruption in the growth rate to a large degree, and in the case of a very high temperature, this harms the plants greatly, especially with regard to the leaves and the fruits, which leads to dryness and loss of color and become white or yellow in color and is known as sun sting disease [16] High temperatures help to expand the field for increased activity of some types of agricultural pests, which enhances their ability to survive and their resistance to pesticides. The capillary property and thus the accumulation of salts on the surface of the soil and the hardening of the surface layer, which results in a poor soil composition. In addition, high temperatures increase the oxidation and decomposition of organic matter due to the increased activity of microorganisms responsible for the decomposition of these substances. These changes were negatively reflected in the decrease in rates of Yield in the study area.[17].

In addition, the climate is characterized by extreme temperatures, daily and annual thermal range, and the length of the summer season. It is also characterized by a lack of rain and relative humidity. Crop productivity decreases when the temperature rises above (38 C), while if it rises to (40 C), it is considered fatal to agricultural crops. Orange trees are the least of the citrus varieties. Tolerance to temperature, which was accompanied by an increase in wind speed and a relative decrease in humidity, which leads to drying and death of the soil [18].

As for dust storms, they are known as strong winds that carry large quantities of dust and silt, and these storms cause very serious damage to agricultural crops, causing the fall of flowers and new fruits, which causes great losses in production. As a result, the leaves wilt and the plant may perish. Dust also covers the crops with dust, which leads to the emergence of dust spiders, which are among the dangerous pests that affect date palms, and their danger increases if the extreme winds that carry the dust coincide with them [19]. During the past years, the study area was exposed to waves of dust storms that affected the production of various agricultural crops. Rain affects, despite its importance, as its sudden descent in the form of strong and rapid showers harms agricultural operations and agricultural production. Much of the spread of fungal diseases that affect agricultural crops, and that the amount of rain is insufficient to establish agricultural activity, and this prompted farmers to rely on irrigation in agriculture. Dima grain.

Administrative unit	Chapter name	Area (dunum)	Area (km)	The ration %
M.K Samarra district	Salt land	8.256	20.64	5
M.K Samarra district	Waters	3.024	7.56	1.83
M.K Samarra district	Desert lands	26.272	65.68	15.91
M.K Samarra district	Agricultural lands	96.116	240.29	58.21
M.K Samarra district	Vegetation cover	16.636	41.59	10.08
M.K Samarra district	Residential lands	14.808	37.02	8.97

Al-Mu'tasimdistrict	Salt land	13.588	33.97	12.42
Al-Mu'tasimdistrict	Desert lands	4.640	11.6	4.24
Al-Mu'tasimdistrict	Residential lands	1.132	2.83	1.03
Al-Mu'tasimdistrict	Waters □□□□	1.472	3.68	1.35
Al-Mu'tasimdistrict	Agricultural lands	66.904	167.26	61.14
Al-Mu'tasimdistrict	Vegetation cover	21.692	54.23	19.82
Tigris district	Vegetation cover	20.144	50.36	2.83
Tigris district	Desert lands	581.156	1452.89	81.78
Tigris district	Agricultural lands	25.204	63.01	3.55
Tigris district	Residential lands	12.768	31.92	1.8
Tigris district	Waters	49.708	124.27	7
Tigris district	Salt land	21.636	54.09	3.04
Tharhar hand	Waters	86.687	216.719632	11.824345
Tharhar hand	Desert lands	406.562454	1016.406135	55.455692
Tharhar hand	Agricultural lands	107.81324	269.5331	14.705878
Tharhar hand	Salt land	104.0018788	260.004697	14.186003
Tharhar hand	Vegetation cover	28.064102	70.160255	3.827983
K.M Aldawr district	Residential lands	4.972	12.43	0.84
K.M Aldawr district	Agricultural lands	118.204	295.51	19.9
K.M Aldawr district	Salt land	27.536	68.84	4.63
K.M Aldawr district	Desert lands	438.027	1095.18	73.73
K.M Aldawr district	Waters	128	0.32	0.02
K.M Aldawr district	Vegetation cover	5.228	13.07	0.88
Hamrin district	Desert lands	288.596	721.49	57.75
Hamrin district	Waters	936	2.34	0.19
Hamrin district	Salt land	108.980	272.54	21.82
Hamrin district	Vegetation cover	4.288	10.72	0.86
Hamrin district	Agricultural lands	78.108	195.27	15.63
Hamrin district	Residential lands	18.756	46.89	3.75

Table 3. Table No. (26) Land cover manifestations by administrative units in the study area for the year 2022 AD

The source is from the researcher's work, depending on the data of the satellite Anersat 10.3 and the program (GIS

Soil salinity

It is considered one of the most prominent problems that the study area suffers from, and it is the main problems that cause low and low productivity of agricultural crops and in determining the cultivated area on the one hand and the type of crop on the other hand, as it means the high concentrations of salts in it to a degree that harms the growth of plants and the ability of the soil to produce [33]. Soil salinity threatens agricultural activity with low production, and its appearance is due to several reasons, including the presence of salts in most of the soils of Iraq in general, which is the result of the overlap between the natural conditions represented by poor soil drainage, dry climate, and human conditions, as well as the presence of salts in the irrigation water used, the lack of drainage networks, and the waste of water. Irrigation operations and the proximity of salty groundwater to the surface of the earth are also one of the causes of evaporation resulting from high temperatures during the day [21]; The accumulation of salts in the soil damages the agricultural crop and reduces its productivity. Salinity reduces the growth of plants and affects their productivity because of its effect on plant nutrition. Soil alkalinity

(ph) As a result of the use of fertilizers with an alkaline effect, and since plants vary in their ability to absorb elements from the growth medium, we find that the effects of salinity in plant nutrition differ and vary clearly from one plant type to another, as it is indicated that the sources of soil salinity are either natural through high The level of groundwater, its proximity to the surface, and its salt content resulting from the decomposition of sedimentary rocks containing the accumulated dissolved salts, and rose to the soil surface through the capillary feature. According to the American Agricultural Classification, the study area (the role) was distributed into categories. It was shown that the first category (1.2-2.8) that was distributed among the selected samples, which is the lowest percentage of conductivity within the international classification of soils within the international classification of soils, is that it is non-saline and is due to the good natural conditions of the characteristics of this soil. Especially with regard to the texture of the soil, which played a role in washing the soil of harmful salts. Salinity values ranged

within the second category (2.9-4.8) and were classified as weakly saline soils. As for the third category (4.9-7.2) and were classified as low-salinity soils, this is due to the following The necessary methods in agriculture, such as the plowing process, especially since those soils are close to the Tigris River with good natural characteristics, while the fourth category (7.3-9) was classified within the high salinity soils, as well as the case in the fifth category (9.1-1.3), due to the presence of water Groundwater near the surface, which helped to raise water by capillary action and thus salinity of the soil [22]

As for Al-Mu'tasim sub-district within the Samarra district, it was classified into two categories: (0.01-4) mmose / cm, which has no effect on agricultural crops, while the second category (4-8) mmose / cm can be grown with crops other than those that are very sensitive to salinity, and salts have a negative effect on the soil. Through exposure of plants to thirst and dwarfism, which leads to the final result of low productivity of agricultural land and exposure to manifestations of desertification [23] In the center of the Samarra district, it was classified into four categories: the first category (601-727) mg / liter. Tharthar and to the top of Lake Tharthar in the Tigris sub-district, the third category (840-912) mg / liter and its extension was in most of the Tigris sub-district and a strip of the Tharthar sub-district and in the far northeast and south of Al-Mu'tasim sub-district, while the fourth category (912-1006) mg / liter and spread in In the middle of the Tigris sub-district in the far north of the North Island and in the west of Tharthar district near Lake Tharthar [24]. As for waterlogging, it is the rise of the groundwater level to the surface of the soil in the form of water ponds of different sizes, and some of them grow water plants, especially reeds, papyrus and tarafa plants. The land is white, which indicates the deposition of a high percentage of salts after the evaporation of the water containing them.

Ratio%	The size salinized lands(KM)	Administrative unit
0.33	2.85	Samarra district center
0.05	0.12	Motivational hand
0.17	3.06	Hand sheriff
0.67	11.92	Tigris Area
0.15	2.42	Center for Display
30.34	327.81	Hamen hand
31.71	348.18	Total

Table 4. Table (27) Geographical distribution of salinity rates by administrative units in the study area for the year 2022

Source: The researcher's work based on the data of the GIS program and the Lannersat satellite (10.3).

3- desertification:

It is considered a dangerous environmental phenomenon, as it has expanded widely and effectively in recent years. The threat of desertification has become a threat to large areas of agricultural lands, as it means the deterioration of the land in arid and semi-arid regions and in dry and semi-humid regions, which resulted from various factors, including negative human activity. And climate change and desertification is nothing but a process of demolishing and destroying the vital energies of the earth and destroying the production capacity represented by plant and animal production, and thus threatening the food security of society. Many countries around the world suffer from it. It is defined as a decrease in the biological production capacity of the land or the deterioration of the fertility of the productive lands at the rate that they acquire desert-like conditions. The lands subject to desertification accounted for about (5,679.5 km²) with a rate of (100%) and a change area of (50 km²) with a percentage of (31.8%) of the area of the study area, as they appear overlapping with the less dangerous degrees of them and are more concentrated in District 14 / Markaz, the most prominent of which The center of the Samarra district, along the Tigris River, the network of irrigation projects, and the semi-transportation roads due to the urban expansion at the expense of agricultural lands and the establishment of extractive industries sites. It appears widely in the eastern and northern parts, with an area of (1234.61) km that spreads over the study area. Among the negative effects of pressure on the terrestrial environment is the high numbers of livestock and their destruction of pastoral plants, which leads to desertification, degradation and decline of the land, and the difficulty of rehabilitating it in a short period of time. [27].

Ratio%	Desertified lands(KM)	Administrative unit
13.6	829.16	Samarra district center
4.34	247	Motivational hand
27.9	1585.59	Hand sheriff
18.1	1030.63	Tigris Area
21.7	1234.61	Center for Display
13.2	752.51	Hamen hand
100%	5.679.5	Total

Table 5. Table No. (28) Geographical distribution of desertified areas by administrative units in the study area for the year 2022

Source: The researcher's work based on the ARCGIS V10.3 program

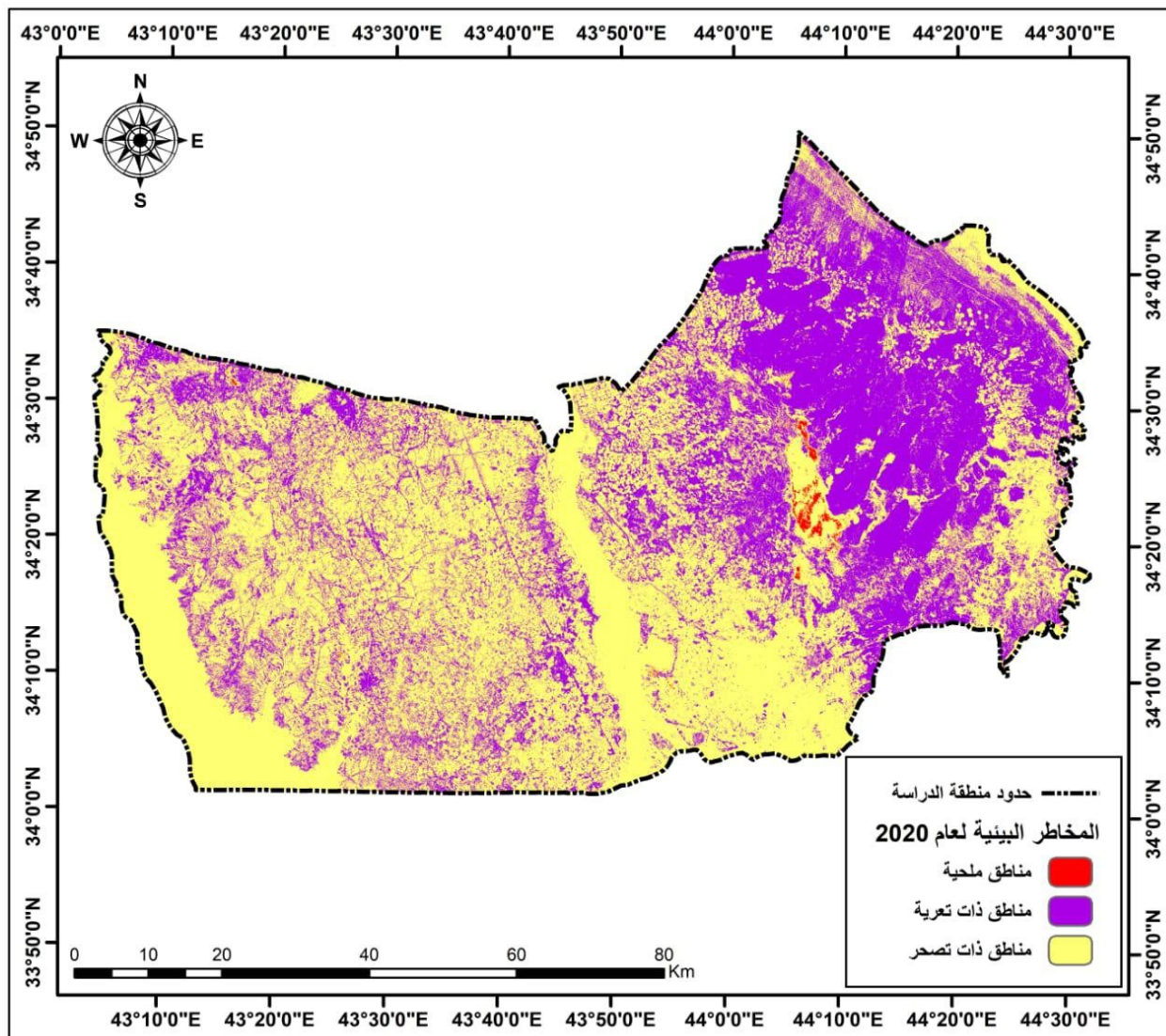


Figure 4. Map No. (16) environmental hazards in the study area for the year 2020

Source: The researcher's work based on the ARCGIS V10.3 program

It is noted from the previous table that al-Tharthar district occupies the first place with an area of (1585.59) km², with a rate of (27.9%), and the second place comes in the center of al-Dur district, with an area of (1234.60) km², with a rate of (21.7%), and the third place comes in the Tigris district, with an area of (1030) km², with a rate of (21.7%). .

Future directions for the uses of invested agricultural land for agricultural and vegetable production:

Development can be based on objective policies aimed at modernizing and developing production through horizontal and vertical expansion, and the following is a look at the future of development in the study area:

A- Horizontal agricultural development:

The horizontal expansion of agricultural lands is one of the most important goals that achieve self-sufficiency in the needs required to meet the increase in population size. One of the important things that agricultural development depends on is the development of agricultural production, which contains two important aspects: strategic crops,

which represent grain crops. The development plan for this activity is based on data Which is represented in the following [28]:

- 1- Work to increase agricultural lands as the first basic resource according to which agricultural development is achieved through horizontal expansion in the agricultural field.
- 2- Run the national action program to develop modern irrigation operations, implement the integrated package for the economic and planning successes achieved by this program, and reorganize agricultural operations through financial and scientific support for farmers and investors who are subject to the program's procedures.
- 3- Diversifying production and increasing it in proportion to the rates of development in food consumption as a result of the high level of income with the expansion of the crop composition inputs of the region to include other economic crops commensurate with the environmental and climatic conditions of the region.
- 4- Determine the methods that work to develop the productivity of agricultural crops by searching for alternatives suitable for the region.
- 5- There is a large percentage of the lands of the study area that are not agriculturally exploited, and due to the small agricultural holding, these lands are used annually without being included in an agricultural cycle, so it is necessary to use a special fertilization system for it by adding basic and secondary elements in a scientific way that guarantees raising the productivity of the land.
- 6- Revitalizing and activating agricultural extension work, interacting with farmers, and finding means that encourage farmers to increase response in applying scientific recommendations and applying the integrated package program in following modern technological methods in agriculture, starting from preparing the land in terms of plowing, smoothing, and leveling appropriate for agriculture by adding types of fertilizers in their dates and quantities Irrigation dates, agricultural cycles, control of weeds, insects and diseases, down to the importance of timing and implementation of the harvest, reducing wastage and marketing methods, all of which help in achieving an increase in production.
- 7- Adopting the pioneering method of cultivation in the cultivation of strategic crops, while providing appropriate support in production requirements

B- Vertical Agricultural Development:

Vertical development aims to improve production and increase agricultural revenues in the study area through agricultural intensification. Agricultural intensification can be applied in the study area by following modern methods used in agriculture, including:

C/ Future directions for the uses of invested agricultural land for agricultural animal production:

Animal production is the second component of agricultural production, so any future plan for the development of agricultural production in the study area will not be feasible unless it takes into account the development of livestock, because its products are of great importance in providing food for the population, and the raw material for some food and textile industries. In order to plan and develop livestock in the study area in a scientific and studied manner, the following should be followed:

- 1- The need to move towards specialization in animal production, through the establishment of projects for fattening calves for their meat, and the establishment of projects for raising cows for milk production, such as the location of the milk factory in Al-Dur.
- 2- Preventing marginal agriculture (marginal farming) or the expansion of non-economic agriculture at the expense of pastoral lands in Hamrin district.
- 3- Directing the official departments, especially the directors of agriculture in the study area, to pay attention to providing fodder for livestock by increasing the amount of its production by expanding the cultivation of land areas and providing fodder storage in order to avoid shortages that occur in many years, especially in the district.
- 4- Providing good varieties of green fodder at the level of high productivity and nutritional value, and moving them from small decent holdings to holding large areas and specialized projects in accordance with modern systems in agricultural mechanization and forage harvesting and production, especially in Hamrin district.
- 5- Taking care of the health of animals by providing the necessary vaccines for animals infected with diseases, as well as giving a vaccine against the disease that spreads to healthy animals, by carrying out periodic field campaigns to vaccinate infected animals against diseases and epidemics that they are exposed to and lead to the death of large numbers of them, especially in Hamrin district, which There is a lack of vaccinations for animal.
- 6-Cleaning animal pens to raise the health level of animals and protect them from diseases resulting from their

living in unhealthy places, especially in the Tharthar area.

7- Developing the artificial insemination program, and the necessity of providing well-trained technical manpower in all steps of artificial insemination and reproductive care in order to increase the productivity of local animals and the use of modern methods and means in providing veterinary services, which allows to improve the level of animal health and then increase production, especially in Hamrin area.

8- Expanding the establishment of poultry and fish farming projects, within the abandoned land, and supporting these projects with all the production requirements they need, in order to meet the increasing demand for their products of meat and eggs, especially in Samarra.

9- Going towards specialization in animal production through the establishment of projects to raise cows for milk production, and the establishment of projects to fatten calves for their meat, especially in the Al-Dur area.

First: Establishment of fish farm projects:

What is meant by fish farming is the process of controlling the cultivation of multiple types of fish under controlled conditions of living, feeding, growth, emptying, harvesting, water quality and environmental conditions under human management and control, and in specific areas that are either in the form of earthen ponds or cages (49) The location of a number of agricultural villages on the Tigris River in the study area encouraged the establishment of such farms, in addition to the presence of large unexploited areas, as well as its proximity to the market and its location on paved roads, which helped in the establishment of fish farming because fish farming is an important source in providing food for the population and its revenues The large economy in the field of its investment and development, raising fish in cages is one of the modern methods of fish farming, and this technology has spread widely and has become one of the important and main methods in aquaculture.

Second: the dairy industry:

Milk and its products are considered complete food for humans, due to the necessary nutrients it contains, and milk cannot be preserved in its fresh form for a long time without a change in its natural characteristics due to the presence of microbes in it or from the external environment. A small amount of sheep's and goat's milk, powdered milk, table salt, emulsifying salts, and other materials for the production of milk and cheese (29). It is considered one of the old agricultural industries that depend on livestock (cows, buffaloes). This is done by converting milk products into dairy and cheese. This type of industry was limited to the form of Domestic The activity of this type helped the availability of large numbers of animals, and one of the most important reasons for the closure of dairy factories in the recent period due to dependence on imports from neighboring countries was the dairy factory in the Tigris district because it had areas to collect milk.

Fifth: Feed industry:

It is one of the important agricultural industries for the development of livestock, whether for raising livestock or raising poultry and fish, as it is possible to establish feed factories in each administrative unit of the units of the study area. Sixth: The flour industry: It is considered one of the important manufacturing industries because it is linked to human food, in addition to benefiting from wheat bran and barley as animal fodder.

Sixth: Flour Industry:

It is considered one of the important manufacturing industries because it is related to human food, in addition to benefiting from wheat bran and barley as animal feed. Two factories can be established in each of Samarra and Al-Dur, due to the availability of raw materials represented by wheat and barley grains, in which the study area is characterized by abundant production.

Conclusions

1- It was found through the study that there are natural geographical obstacles represented by (lack of rainfall, the nature of the dry soil and salinization of some of them, as well as the poor investment of water resources despite their availability) with a clear impact on agricultural development, as the study showed through that the following: A- The study showed that agricultural investment has stopped for large areas of agricultural land due to its low productivity or the lack of possibilities to grow it in any of the crops because of what agriculture faces, how many natural and human constraints represented by lack of marketing and manpower and the obstacles of modern technology.

2- Agricultural pests spread in the study area, as they affected large areas of agricultural crops, which led to great damage and losses to farmers, which ultimately leads to the farmers' departure and their reluctance to farm. The size of the cultivated area affected by agricultural pests reached (30-35%).)

3- The study revealed that the study area suffers from a decrease in the number of agricultural labor, as the

number of those who abstained from agricultural work reached about (25%) as a result of the reluctance to agricultural work due to the large number of obstacles that stand in the way of the farmer's unwillingness to invest in work and the low financial return obtained from it.

4- The study showed that the size of the population in the study area began to increase annually, as the population reached (222,356) people for the year 2020 AD, which caused an increase in the number of unemployed hands in light of this deteriorating agricultural reality on the one hand, while the increase in the number of population led to an increase in the demand for Food and pressure on agricultural land in order to achieve housing.

5- The water deficit is at the forefront of the natural constraints, because it has a great impact on agricultural development in the study area, which led to the neglect of large areas of agricultural land due to the lack of irrigation water, in the areas flowing from the river, as drought led to a decrease in the levels of surface and underground wells, and the impact of This greatly depends on the size of the cultivated areas.

6- The exacerbation of soil salinity and desertification year after year in the study area due to natural and human factors that led to an increase in this problem, as the volume of salinized lands reached (22.38) km², as is the case in the eastern and southern regions of Samarra and the eastern regions of the center of Al-Dur district.

Recommendations

1- The need to invest the natural and human resources available in the study area with the aim of achieving sustainable agricultural development and preserving agricultural potentials from human depletion.

2- Agricultural pests should be controlled in the correct ways that ensure their disposal by providing the best types of agricultural pesticides that ensure their disposal and control them periodically from time to time and work to establish diagnostic laboratories for plant diseases in the region and use optimal and more appropriate methods to combat agricultural pests, and search for alternatives in a manner Environmentally friendly biological control of fruits and insects.

3- The need to import agricultural machines of all kinds and sell them to farmers at reasonable prices, with the aim of introducing modern technology in all agricultural operations.

4- Farmers should be encouraged to apply the system of agricultural rotations in accordance with soil characteristics and the nature of climatic conditions in order to restore soil fertility.

5- The need to follow the correct methods in the agricultural fertilization process to preserve soil fertility and raise its productive capacity.

6- The need to establish industrial factories for the production of food products, depending on the abundant production in the study area, including, for example, the establishment of factories for fodder, molasses, pickles, juices, etc.

7- The need to work seriously to solve the problem of agricultural marketing of agricultural products for the farmers of the study area, as the production is large and is marketed locally only modestly, as the study area needs to open marketing outlets that are more spacious than the existing one, especially in the center of the Samarra district.

8- Specialized agricultural units should be established and responsible for agricultural planning in the fields of agricultural production in its various forms, such as the irrigation and water sources unit, the soil and fertilizer unit, the plant and animal disease control unit, and the agricultural extension unit, with attention to documenting agricultural information in each agricultural division in the study area.

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