

ACCEPTANCE LETTER

Paper ID-3021092

Date: 11/09/2023

Dear,

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Warm Greetings!

It's a great pleasure to inform you that, after the peer review process, your article, **"Germination phase and its Impact on climatically determining Cotton production region in Iraq"** has been ACCEPTED and considered for publication in **Cartography and Geographic Information Science (CaGIS)** ISSN: 15230406 Volume 50 No. 6 Issue 2023.

Thank you for submitting your work to this journal. We hope you submit your articles in future.



Thank You,
Editor

**Germination phase and its impact on climatically
determining the cotton production region in Iraq**
**Prof. Dr. Saleh Ati Al-Moussawi and Fatima Majid Abd
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- Abstract:

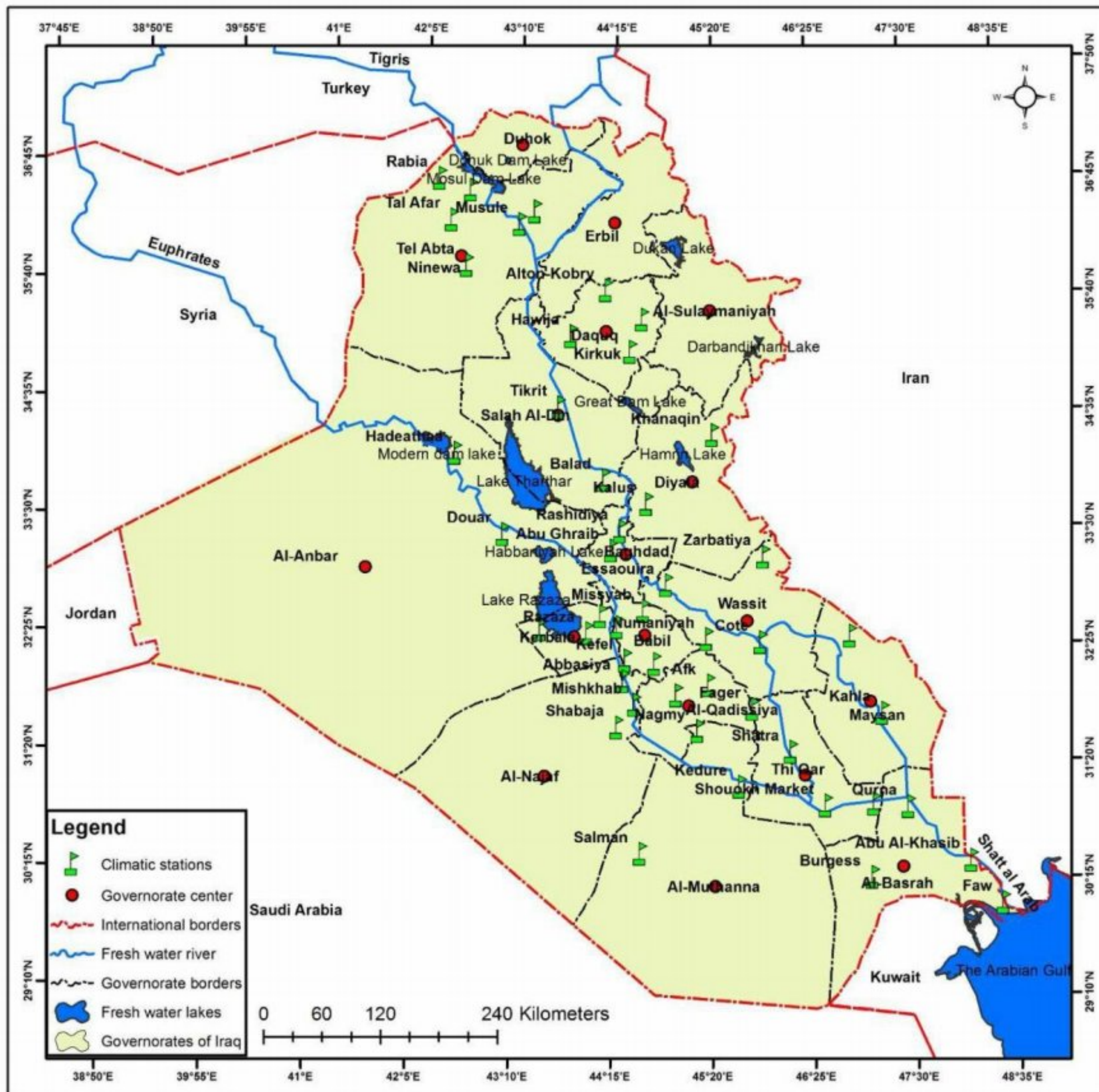
Study includes "The optimal climatic region for growing cotton in Iraq. Explaining the influence of climatic factors in Distribution of cotton crop Searching for one of the geographical studies that revolves around the field of agricultural climate, including: Study of climatic elements and A method for growing cotton crops in Iraq may be Thirty climate stations were chosen for this purpose, distributed across Iraq from north to south, and include (Zakho, Amadiyah, Shaqlawa, Dohuk, Merkat Sur, and Joman). And Hajj Imran, Erbil, Mosul, Tal Afar, Sulaymaniyah, Kirkuk, Baiji, Al-Qaim, Tikrit, Khanaqin, Al-Khalis, Baghdad, Ramadi, Rutba, Badra, Karbala, Al-Hilla, Al-Hay, Diwaniyah, Najaf, Nasiriyah, Amara, Samawah, and Basra), as approved TClimatic information for the period (2010-2020 AD) from stations in the study area affiliated with Heia General Authority for Meteorology Iraqi. The research touched on evaluating the suitability of climatic elements for the cotton crop in the study area. An evaluation of the suitability of temperatures for growing the crop was taken for the purpose of identifying climatically suitable areas for growing the cotton crop, because of its importance in the field of industry, and that growing this crop within the climate suitable for it supports agricultural planning. Currently and in the future, as far as climatic suitability is concerned, which allows us to obtain greater productivity, the germination phase was chosen in the suitability statement, because of the importance of this phase in starting the growth season for this crop.

- introduction :

The success of growing any crop depends on the nature of the climatic characteristics in the region. It is known that every plant or agricultural crop has specific light, thermal and water requirements. These requirements are needed by the plant in every stage of its growth, and they differ from one stage to another. Therefore, every agricultural crop does not give economic production unless its climatic requirements are met in addition to the soil requirements. Its type, composition, amount of fertility, and surface shape. Therefore, this research aims to determine the climatically suitable areas for growing the cotton crop, by comparing its thermal requirements with the temperature average in climatic stations in Iraq, depending on the stage of germination, in order to know the degree of suitability and its geographical distribution in the study area. Among the most prominent elements that have a clear and important impact on the cultivation and growth of this crop are light, temperature, humidity, and wind. Our choice of the temperature element came due to the great importance of this element compared to other elements, it affects plant growth more than other elements do, and other researchers could address other elements on the one hand, and the growth phases affected by those elements on the other hand.

- Boundaries of the study area:

The spatial boundaries of the research are represented by the total area of Iraq, which is located between two latitudes (29° and 37° north) and two longitudes (38° and 48° east). Within this area, thirty climate stations were chosen distributed throughout Iraq, and they vary in terms of location. Most of the climate data is available for these stations, as they cover most parts of Iraq. They are the climate stations mentioned in the research abstract and indicated in Map No. (1).



Map (1) of the geographical location of Iraq and the climate stations whose data were approved in the study

Source: Based on the administrative map of Iraq, General Authority for Survey, Baghdad, 2007, scale 1,000,000/1.

Cotton is one of the agricultural crops that occupies great economic importance due to its multiple human uses. The geographical location of Iraq has created climatic capabilities that are compatible with the cultivation of the crop. Every crop has thermal limits. Optimal according to the phases of its growth season, including the cotton crop, as follows:

Germination phase:

At this stage, the cotton crop needs a temperature suitable for seed germination. The temperature that ranges between (24-28°C) is considered the best temperature for seedling growth. The germination process is slow when it drops to (17°C), but if it reaches (15°C). °), then germination stops completely, while the low temperature contributes to the crop becoming infected with rot. Note that the maximum temperature harmful to the crop in this phase reaches (37°C) and above, as shown in Table (1), which includes the thermal requirements of the crop in all its growing beds, and not only in the germination phase, for the purpose of reviewing those requirements throughout the season. Growth, although we focus in the study on the germination phase.

Table (1) Thermal requirements for cotton crops according to growth stages

Optimum temperature	Phase
24-28°C	Germination
28-32°C	Vegetative growth
33-36°C	Flowers
27-30°C	Maturity

Source: depending on:

(1)<http://aradina.kenanaonline.com/users/aradina/topics/9059>

<http://kenanaonline.com/users/agrinserve/posts/102294?re=161157>

(2) Muhammad Musleh Abd, The relationship between climate change and cotton crop productivity in Kirkuk Governorate, Journal of the College of Education for Human Sciences, Tikrit University, College of Arts, p. 317.

(3) Salah Ali Hamza, Climatic characteristics and their relationship to cotton crop cultivation in Babil Governorate, Maysan Research Journal, Volume Nine, Issue Eighteen, Year 2013, p. 216.

It is the first phase in which the plant is more vulnerable compared to the subsequent growth phases. This means that if the requirements match the thermal reality, or are close to it, then this is a positive aspect of plant growth, on the one hand, and of producing greater productivity, on the other hand, despite

There is no ideal region in which the requirements match reality, in any part of the world's agricultural regions.

Cotton is one of the crops most affected by differences in planting date. Cotton seed is a sensitive seed that is difficult to germinate unless the appropriate climate conditions are available for it at the time of sowing. Therefore, the appropriate time to start planting cotton depends on the weather conditions that are suitable for seed germination, which change from one location to another. And he growsHTable (2) Growth phases of the cotton crop in Iraq. The germination phase begins on April 15–May 4, and the duration of the growing season is 20 days. The vegetative growth phase begins from May 4 - June 9, and the duration of the growing season is 35 days. The flowering phase begins from June 9 - August 7, and the duration of the growing season is 60 days. As for the vegetative growth phase, it begins from August 7 - September 6, and the duration of the growing season is 20 days. Growth lasts for 30 days, while the maturity phase begins from September 6 to 21, and the duration of the growing season is 15 days. This means that the plant's growth season extends from April 15 to September 21, for 160 days ⁽¹⁾. Note that this type of study is not overlookedtoAbout explaining the reality of soil temperature, which is important in agricultural reality, as it changes at the surface depending on the air temperature, in addition to the germination process and the appearance of seedlings being largely dependent on it, and its importance appears in advanced stages of the life of most agricultural crops. The best date for planting cotton in the northern region of Iraq is March 15–October 20), and the duration of the growing season is (219 days). In the central

(1) Ali Hussein Ibrahim Al-Bayati and Haider Hassan Falah Al-Azzawi, The effect of the physiographic location on the suitability of the land for growing cotton in some agricultural projects within the Iraqi alluvial plain, Al-Anbar Journal of Agricultural Sciences, Volume (15), Issue (2), 2017, p. 322.

region, the planting date is (March 15 - October 31) and the duration of the growing season is (230 days).

In the southern region of Iraq, the planting date is (March 1 - October 25) and the duration of the growing season is (239 days)²⁾ This should not be delayed because it leads to reduced yields, deterioration of quality, increased production costs, and insect infestation.

Table (2) Cotton crop growth phases, dates, and number of days in Iraq

The number of days	to	from	Growth phase	T
20 daya	May 4th	April 15	Formation duration (Establishment) (DevelopGermination)	1
35 daya	June 9	May 4	DurationThe vegetativeH (Vegetative Stage) (vegetative prosperity)	2
60 Yowhat	August 7	June 9	DevelopFlowering(Flowering stage)	3
30 daya	September 6	August 7	Configuration of outcome(Yield Formation)	4
15 daya	September 21	September 6	Maturity(Ripening Stage) (staple maturity)	5
160 Yowhat	September 21	April 15	Growth season(Growing)	6

Source: Researcher based on:

- Ali Hussein Ibrahim Al-Bayati and Haider Hassan Falah Al-Azzawi, The effect of the physiographic location on the suitability of the land for growing cotton in some agricultural projects within the Iraqi alluvial plain, Al-Anbar Journal of Agricultural Sciences, Volume (15), Issue (2), 2017, p. 322.

(1) Sahar Jaber Kazem Al-Ghazali, The impact of climate on the spatial variation of industrial crop cultivation in Iraq for the period (1981-2012 AD), Master's thesis, College of Education for Human Sciences, University of Babylon, 2015, p. 28.

***Mulla evaluation and Temperatures for growing cotton crops in Iraq climate stations For the duration (2010-2020) In the process of germinating:**

table indicates (3) And (4) To evaluate melon The temperature regime in the germination phase for growing the cotton crop is shown in the table (3)(4) and map (2) There is a discrepancy between the stations in the study area in their suitability for growing cotton crops, as they were excellently suitable in both (Peggy And Al-Qaim And Tikrit And Khanaqin And Sincere And Baghdad And Gray And Badra And Karbala And Hilla And District And Diwaniyah And Najaf And Nasiriya And Architecture And Heaven And Basra) so The temperature rates therein (24.2 And 24.5 And 24.4 And 24.9 And 24.2 And 25.4 And 24.4 And 25.2 And 26.0 And 25.5 And 24.6 And 27.0 And 27.3 And 28.3 And 27.6 And 27.8 And 27.8°M) Successively It is considered an ideal temperature for the crop .

It was a good fit at stations (Dohuk And Merka a wall And Erbil And Mosul And Kirkuk And wet) When I reached Degree rates The temperature in these plants during the germination phase Germination (20.7 And 20.7 And 20.9 And 20.9 And 23.9°M). As for the stations (Zakho, Amadiyah, Shaqlawa, Joman, Haj Omran, Tal Afar, and Sulaymaniyah), the temperatures were unsuitable for growing cotton crops, as they ranged between (less than 20 °C and more than 32 °C), with average temperatures in them reaching (19.2, 16.2, and 19.3 degrees Celsius). 12.3, 12.3, 19.9 and 16.4) respectively. Based on this, the Iraqi flood plain region comes at the forefront of the other regions of Iraq, recording the excellent suitability of the cotton crop in the germination stage, in addition to some places farthest from it, in Baiji, Al-Qaim, Tikrit, and Khanaqin, while the stations of the flood plain region are considered starting from Al-Khalis and Baghdad in the north, to Basra. In the south, the region is climatically optimal for the germination phase, while the northern climate stations of Iraq fall outside the range

of suitability due to the low temperatures during this phase below what is required.

Schedule (3) Evaluating the suitability of temperatures for growing cotton in Iraq's climatic stations

For the period (2010-2020) it is in the process of germination

the description	Degree of suitability	Average temperature during phase Anoplants	The station
Not suitable	3	19.2	Zakho
Not suitable	3	16.2	Amadiya
Not suitable	3	19.3	Shaqlawah
Good fit	2	20.7	Dohuk
Good fit	2	20.7	Merka a wall
Not suitable	3	12.3	Goman
Not suitable	3	12.3	Haj Imran
Good fit	2	20.9	Erbil
Good fit	2	20.9	Mosul
Not suitable	3	19.9	Tal Afar
Not suitable	3	16.4	Sulaymaniyah
Good fit	2	23.9	Kirkuk
Excellent fit	1	24.2	Peggy
Excellent fit	1	24.5	Al-Qaim
Excellent fit	1	24.4	Tikrit
Excellent fit	1	24.9	Khanaqin
Excellent fit	1	24.2	Sincere
Excellent fit	1	25.4	Baghdad
Excellent fit	1	24.4	Gray
Good fit	2	21.7	wet
Excellent fit	1	25.2	Badra
Excellent fit	1	26.0	Karbala
Excellent fit	1	25.5	Hilla
Excellent fit	1	24.6	District
Excellent fit	1	27.0	Diwaniyah
Excellent fit	1	27.3	Najaf
Excellent fit	1	28.3	Nasiriyah
Excellent fit	1	27.6	Architecture
Excellent fit	1	27.8	Heaven
Excellent fit	1	27.8	Basra

Source: based on:

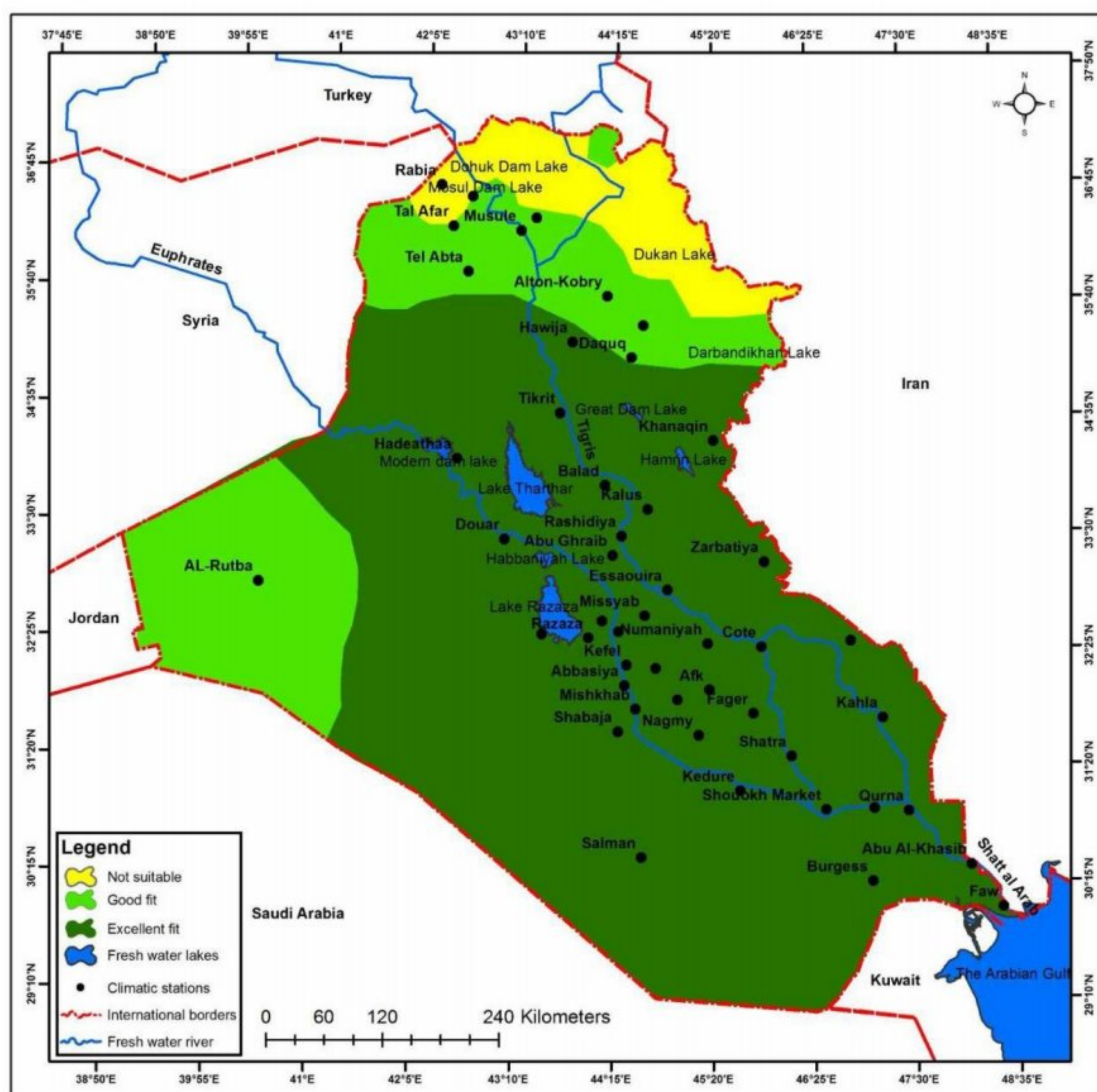
(1) Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring in Iraq, Climate Department, other published data 2022.

(2) Based on Table No. (1).

Schedule(4) Limits of suitability climatic According to the need of the crop Cotton Average temperature during germination

Suitability limits according to crop needs	Degree of suitability	T
24-28	Excellent fit	1
20-23.9 And 28.1-32	Good fit	2
Less than 20 and more than 32	Other than Mulla and Mh	3

Source depending on Table No. (1).



Map (2) of the region for producing excellent, thermally suitable cotton at the germination stage in Iraq

- Conclusions:

The study concluded that there is a discrepancy between the Iraqi climatic stations in their suitability for the cultivation of

the cotton crop, for the average temperature during the germination phase of the crop, between excellent suitability, good suitability, and unsuitability, as excellent suitability was recorded in the Iraqi floodplain region, starting with the Khalis, Baghdad, Ramadi, and Badra stations, passing through In Karbala, Al-Hilla, Al-Hay, Al-Diwaniyah, and Najaf, and ending with Al-Nasiriyah, Al-Amarah, Samawah, and Basra, and with it enters distant places represented by Baiji, Al-Qaim, Tikrit, and Khanaqin.

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