# Spatial variation of date production in Al-Zahdi and Al-Khistawi in Iraq for the duration (2010-2019) and its future predictions

*M.D. Amal Sabah Hassan Kazim*
*Baghdad University/ Faculty of Arts*
*Department of Geography and Geographic*
*Information Systems*
[mailto:amalsabaah@coart.uobaghdad.edu.iq](mailto:amalsabaah@coart.uobaghdad.edu.iq)

**Abstract**

The study is part of agricultural studies that address the productivity problem of the two most prominent types of dates in areas known to have been cultivated since ancient times. Palm cultivation and date production are constantly deteriorating in most of its production areas, so the study summarized the spatial variation of the production of Al-Zahdi and Al-Khistawi in iraq's production provinces for the period (2010-2019), to determine the volume of production and future predictions using approved statistical methods.

The study was followed by two main approaches (geospatial analysis method) to determine spatial variations in production (and the inference analysis method) as the simple linear regression model was chosen to find the predictive value of its production in the study area by relying on a time series of production quantity (2010-2019) by provinces and for the two categories through a set of results such as correlation value coefficient and F value of the overall morality of the regression equation and the value (t) of the partial parameters of the parameters. According to this model, the production of the two categories was predicted until 2025, and the results showed a spatial and temporal variation in production at the level of the producing provinces. The hierarchical cluster analysis was used to divide the provinces into clusters with common elements and characteristics in production and which is unique from the rest of the provinces by producing one of the categories, indicating the specificity of these provinces in their production in quantity and quality. Based on the data available from the Ministry of Planning/Central Bureau of Statistics/Directorate of Agricultural Statistics on production volumes at the level of the provinces producing for the calculated period.

The study included many tables, charts and illustrative maps, the study also came up with a number of conclusions and proposals, and the study relied on many important sources in the topic.

**Keywords:** Production of dates, al-Zahdi and Al-Khistawi, simple linear regression, time series, cluster analysis.

**Introduction**

Agriculture has been a central pillar of the global economy, and all societies are seeking to meet their needs and achieve agricultural and food sufficiency, which requires expanding agricultural knowledge and the requirements of the agricultural economy, and building future agricultural policies that guarantee food and raw materials for the food industry. From these points of view, the importance of studying and analysing agricultural phenomena in the geographical analysis approach has grown, and their role in detecting the spatial relationships of agricultural phenomena, identifying the causes of variations, and also building predictive models. This is what the study found, where it dealt with an important food and industrial crop in an effort to identify spatial variations in production volume and future forecasts.

Dates are important economic crops in Iraq and have been cultivated since ancient times, as mentioned in the writings of ancient civilizations. Iraq has a comparative advantage in growing and producing this type of economic crop, which enhances its competitiveness for regional and international producing countries. This importance and competition comes because of its production of many varieties, especially rare ones, as it is one of the most geographical areas suitable for the cultivation and production of palms in the world, as the environmental requirements of the palm tree correspond to the characteristics of the natural environment in the regions of central and southern Iraq.

**The importance of study**

The importance of dates is nutritional and industrial importance, and the expansion and development of production means the development of the local economy and the expansion of foreign trade, which iraq's economy currently needs in its declared strategy of supporting the national product and reducing dependence on oil exports as it is subject to the vagaries of the world market and the collapse of its repeated prices, which requires diversification of the sources of Iraq's gross national product. Iraq's current production of dates, particularly the two categories, is not at the required economic level, while it is possible to develop and expand production because of the requirements of iraq's agriculture and increase production, which required studying the spatial variation of production volumes and making future forecasts with a view to building sound economic policies based on scientific foundations.

**Study problem**

The study problem can be viewed in several ways:
- The study of agricultural phenomena is a multifaceted study, it is the focus of economic studies and a starting point for building strategic

policies. It is also important in studying population activity and building population policies in terms of unemployment, balancing the economic and professional composition of the population, and calculating the optimal size of the population.

-How important is the food and economic importance of the date crop in Iraq and whether it is possible to develop its production to bring about economic changes at the local and external level.

- What is the level of spatial and temporal variation of date production in the producing provinces?

-What is the general trend of future forecasts on which economic policies are based.

**Study hypothesis**

Scientific hypotheses are :

- Agricultural phenomena can be prepared as starting points for the development and building of economic and population policies, and this requires scientific study and analysis, with a view to bringing about the desired development changes.

- There are spatial and temporal variations in the volume of production, and these variations influenc the economic situation and need to be studied and analysed.

- The development of the production of date crops entails economic and social changes, providing employment opportunities for men and women, supporting gross national product and providing raw materials that are included in many industries, particularly food.

- Through initial experiments we expect a direct relationship between the time factor and production, and this relationship can be relied upon in calculating predictive values and determining the overall behaviour of the phenomenon.

**Study methodology**

The study was based on several approaches.

- The methodology is geographical analysis. It was adopted in the study of the phenomenon, showing its characteristics and size, analysing it and drawing conclusions by collecting the information and preliminary data addressed in the study.

- The method of analysis (descriptive) using different statistical methods.

As arithmetic Mean $\bar{X} = \frac{\Sigma x}{n}$

(Standard Deviation) $Sx = \sqrt{\frac{\Sigma(X-\bar{X})^2}{n}}$

Standard Score) $Z = \frac{X-\bar{X}}{SX}$ (Joel and, Robert, 2014, p.4)

The revised standard score $(T_{Score} = 50 + (10)$ (Graig. A. Mertler, 2007, p.120)

- The method of analysis (inference) was used as the model of the general trend of time series was used by conducting an applied study on the official data, namely the production of dates In Al-Zahdi and Al-Khistawi in Iraq for the years (2010-2019) and using the SPSS, which played a major role in the processing of data to reach the results.

**Spatial and temporal boundaries of study**

The spatial dimension of Iraq's date-producing provinces was excluded (the governorates of the Kurdistan region and kirkuk and Nineveh governorates) for lack of production, look at map (1). The temporal dimension is based on data from the Iraqi Ministry of Planning/Central Bureau of Statistics/Agricultural Statistics/Date Production 2010-2019.

**Map (1) Spatial Boundaries of the Study**
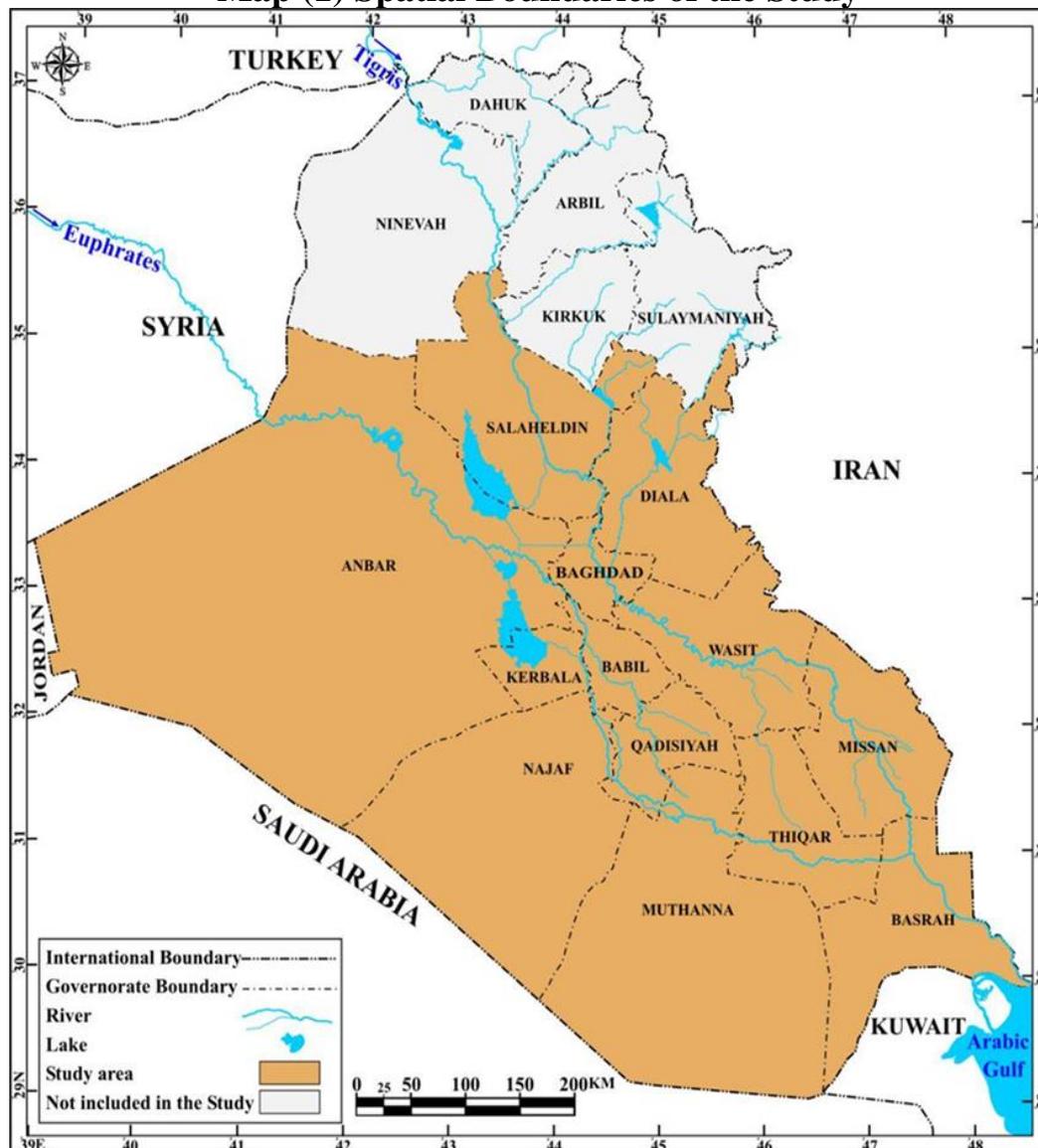


Source : Ministry of Water Resources, Directorate General of Area, Iraq Administrative Map  Scale 1/1000000 ، 2020 .

**Concepts and terminology**

**Quantity of production**: the quantity produced by introducing elements to achieve a certain level of output compared to the inputs invested for the production purpose. (Manash Dutta, 2009, p.14.14)

- **Tim Series**: Defined as a set of observations arranged according to their occurrence in time such as years, months or any time unit, a historical record that is adopted to build future expectations (Pauls and Andrew, 2009, p.1)

- **Zahdi Variety**, the most famous commercial item to be cultivated in all regions of Iraq, and there are ten million palm trees, and is one of the most productive Iraqi varieties, with the production of the Palm of Zahdi between (90 to 130) kg, and is characterized by the non-staple and long storage periods, and bears the palm of the salating, drought and frost (Al-Akkadi, 2008, p. 123)

- **Khistawi Variety**: One of the important Iraqi date varieties whose dates are soft and easy to fill store for long periods, characterized by a low productivity compared to the al-Zahdi category, where the productivity of its palm ranges from (100-140) kg, and the palm of the bats, salinity and frost, **(**al-Mudiris, 2010, p. 121)

**Time Series Analysis**

It is intended to separate the components of the time series from each other, with the aim of determining the impact of each component on the values of the phenomenon studied by the effect of time (Toma and Hanoush, 2009, p. 364).

The analysis of time series aims to:

- Study the relationship between the variable of time and a certain variable to see the changes that occur in the phenomenon from time to time to see its characteristics.

- Know the causes and consequences of the changes, to reach what the relationship between the phenomenon under study and other phenomena may be.

- The analysis of the time series leads to tracking the behaviour of the phenomenon in the past, identifying the current model of change and attempting to predict what the phenomenon will be like in t

**Time Series Components**

It is the most important step in determining the correct model of the time series by diagnosing time series values that enable us to use the appropriate method, called chain components:

1. Secular Trend
2. Seasonal Effects
3. Periodic Effects
4. Irregular (occasional) (Random Effects)

**In this study, we will simply address the general trend.**
**Secular Trend**

It is marked by the letter "T" and means the regular movement of the chain over a relatively long period of time, and the general trend of the series is positive if the trend towards increasing over time is said to be negative if the chain tends to decrease over time. The purpose of the study of the general trend is to predict the future values of the phenomenon and to dimension the impact of the general trend of the series data (Abdul Majid, 2013, p. 171) .

**Forecasting**

It is defined as planning and making assumptions about future events using special techniques over different periods of time, i.e. identifying the phenomenon under study in the future, in the sense of the most accurate scientific attempt to estimate future changes, by knowing the pattern and behaviour of the phenomenon and measuring the general trend of the geographical phenomenon from the estimation of the linear general trend because most geographical time series behave linearly (linear direction).

**Simple Regression Model**

This model works to find a general trend line for which the sum of the squares of deviations of points is equal to zero (Azzawi, 2019, p. 231). The equation of the linear general trend is estimated as follows (Al-Nuaimi, 2008, p. 343)

$$Y = a + bt$$

Where:

Y → variable

t → independent variable

a → a constant amount which is the cut part of the vertical axis y

b → is the slope and the y axis relative to time.

The values of constants (a and b) can be calculated using the following equations:

$$b = \frac{\Sigma yt}{t^2}$$

$$a = y - tb$$

By applying the production of dates, Sanfi Zahdi and Khistawi per ton in the governorates of Iraq for the years (2010-2019) as a dependent variable and years as an independent variable in the spss program, the following results were extracted:

First: Spatial variation of the production of the date crop of The Zahdi variety in the governorates of Iraq for the duration (2010-2019)

From table (1) we conclude that Baghdad province is the highest province by producing al-Zahdi dates in the study area, the form of the estimated model as we have reached is:

$$Y = -2832461.945 + 1434.630 * t$$

We conclude from the model that this is the following:

1- The value (F-test) calculated in the equation was (48.181) with a p-value probability value equal to (0.000) less than (0.05%) Therefore, we reject the nihilistic assumption of the model and we can say that the model of regression is moral, i.e. there is a moral relationship between the variable of Y (date production) of the Zahdi class in Baghdad province) and the independent variable (t) years.

2- The value of (t-test) calculated for morale (6.941) morally (0.000) which is less than (0.05%) In other words, the marginal tendency of the slope model is statistically moral, which means that the more one year the production of dates increases the Zahdi category in Baghdad province by (1434.630 tons).

3- The value of the correlation coefficient R date production was the Zahdi class in Baghdad province and time as an independent variable (0.92%) It is a very strong relationship, which indicates that the independent variable (years) has a very strong effect on the dependent variable (production quantity). This means that the variable in the equation, which is time, is interpreted by 85% The production of dates is the category of al-Zahdi in Baghdad province or in other words 85% of the production of al-Zahdi dates in Baghdad province is determined by the independent variable (years) and the remaining percentage (15%) It occurred because of factors other than the general trend attributed to it. In this way, it is possible to obtain the production of dates as a zahdi variety for each of the governorates of the study area and for the calculated duration. For more look at table (1)

**Table (1) statistical analysis of the production of dates Zahdi class in the provinces of Iraq for the duration (2010-2019)**

| The name of the province | The production of tons class Zahdi 2019-2010 | R Link coefficient | R² Selection coefficient | F The total Intangible | sig | The Partial Intangible t | sig |
|---|---|---|---|---|---|---|---|
| Baghdad | 576008 | 0.926 | 0.858 | 48.181 | 0.000 | 6.941 | 0.000 |
| Babil | 710342 | 0.863 | 0.745 | 23.353 | 0.001 | -4.832 | 0.001 |
| Kerbala | 609555 | 0.893 | 0.797 | 31.462 | 0.001 | 5.609 | 0.001 |
| Missan | 13986 | 0.793 | 0.629 | 13.568 | 0.006 | -3.683 | 0.006 |
| Wasit | 255732 | 0.504 | 0.254 | 2.726 | 0.127 | 1.651 | 0.137 |
| Diala | 453930 | 0.419 | 0.175 | 1.700 | 0.229 | -1.304 | 0.229 |
| Anbar | 158084 | 0.657 | 0.432 | 6.089 | 0.390 | -2.468 | 0.039 |
| Salaheldin | 55318 | 0.427 | 0.182 | 1.786 | 0.218 | -1.336 | 0.218 |
| Najaf | 214521 | 0.306 | 0.093 | 0.825 | 0.390 | 0.908 | 0.390 |
| Qadisiyah | 225922 | 0.038 | 0.001 | 0.044 | 0.917 | 0.107 | 0.917 |
| Muthanna | 97125 | 0.560 | 0.320 | 3.769 | 0.088 | 1.942 | 0.088 |
| Thiqar | 74214 | 0.329 | 0.108 | 0.971 | 0.353 | 0.985 | .353 |
| Basrah | 24212 | 0.430 | 0.185 | 1.818 | 0.214 | -1.349 | 0.214 |

Source: From the work of the researcher based on the results of the statistical analysis.

**Secondly: the spatial variation of the production of the crop of dates has been classified as Khistawi in the governorates of Iraq for the duration (2010-2019)**

It appears from table (2) that the highest province with the production of dates, the Khistawi category is the province of Muthanna, and the form of the estimated slope equation was as follows:

$$Y = -364982.800 + 182.133 * t$$

From this equation we conclude that :

1- The value (F-test calculated in the equation) (209.997) in moral terms (0.000) which is less than (0.05%) Therefore, we reject the nihilistic assumption that the regression model is not moral, which means that the regression coefficient is different from zero.

2- To determine that the moral regression factor, we took the value (t-test) or the so-called partial moral test of the model, with a calculated value (14.491) in morale (0.000) which is less than (0.05%) In other words, the decline factor is statistically d, meaning that the more years one year, the higher the production of the Khistawi crop in Muthanna governorate (182.133 tons).

3- The value of the $R$ correlation coefficient between the production of the Khistawi class in Muthanna governorate and time as an independent variable (0.98%) It is a very strong relationship, indicating that the independent variable (years) has a very strong effect on the dependent variable (production of a kestawi class), while the $R^2$ coefficient of the equation (0.963%) This means that the variable of the years explains 96% of al-Khistawi's production in Muthanna province, in other words, 96.3% of the production of al-Khistawi. Is the ability of the independent variable (years) to predict the dependent variable (production of the Khistawi dates in Muthanna province) and the rest of that is (4%) Factors other than the general trend are attributable to them.

In this way, the relationship of the years can be obtained for the production of  the Khistawi  dates for each of the governorates of the study area for the calculated duration, look at the table (2).

**Table (2) Results of statistical analysis of the production of dates Khistawi class in the provinces of Iraq for the duration (2010-2019)**

| The name of the province | The production of tons class Khistawi | R Link coefficient | R² Selection coefficient | F The total Intangible | sig | t The Partial Intangible | sig |
|---|---|---|---|---|---|---|---|
| Baghdad | 130081 | 0.956 | 0.915 | 85.81 | 0.000 | 9.263 | 0.000 |
| Babil | 134515 | 0.308 | 0.095 | 0.837 | 0.387 | 0.915 | 0.387 |
| Kerbala | 83293 | 0.232 | 0.054 | 0.454 | 0.520 | -0.674 | 0.520 |
| Missan | 6030 | 0.698 | 0.487 | 7.605 | 0.025 | 2.758 | 0.025 |
| Waist | 56373 | 0.384 | 0.147 | 1.381 | 0.274 | -1.175 | 0.274 |
| Diala | 101983 | 0.100 | 0.010 | 0.810 | 0.784 | 0.284 | 0.784 |
| Anbar | 36400 | 0.604 | 0.365 | 4.591 | 0.064 | -2.143 | 0.064 |
| Salaheldin | 13669 | 0.446 | 0.199 | 1.992 | 0.196 | -1.411 | 0.196 |
| Najaf | 37415 | 0.915 | 0.837 | 40.987 | 0.000 | 6.402 | 0.000 |
| Qadisiyah | 12865 | 0.748 | 0.560 | 10.175 | 0.013 | 3.190 | 0.013 |
| Muthanna | 19248 | 0.981 | 0.963 | 209.997 | 0.000 | 14.491 | 0.000 |
| Thiqar | 14639 | 0.892 | 0.796 | 31.284 | 0.001 | 5.593 | 0.001 |
| Basrah | 22476 | 0.940 | 0.884 | 60.773 | 0.000 | 7.796 | 0.000 |

Source: From the work of the researcher based on the results of the statistical analysis.

**Spatial variation of the directional value (predictive) of the production of dates Sanfi Zahdi and Khistawi in the governorates of Iraq for the year (2025):**

After the production values of the date crop of The Zahdi class in the provinces of Iraq were predicted for the duration (2020-2025) using the equation of the general trend by tracking the behavior of the phenomenon of production in the past, to obtain the production value for the future, and for the presence of a variation in the amount of production between the provinces of the study area seen table (3)

**Table (3) Predictive value of date crop Sanfi Zahdi and Khistawi in The Provinces of Iraq for the duration (2020-2025)**

| The name of the province | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|
| Baghdad | Zahdi | 65491 | 66926 | 68361 | 69795 | 71230 | 72664 |
| | Khistawi | 16231 | 16817 | 17403 | 17989 | 18575 | 19161 |
| Babil | Zahdi | 63172 | 61743 | 60314 | 58884 | 57455 | 56025 |
| | Khistawi | 14161 | 14290 | 14420 | 14549 | 14678 | 14807 |
| Kerbala | Zahdi | 71036 | 72868 | 74701 | 7634 | 78367 | 80199 |
| | Khistawi | 8096 | 8053 | 8011 | 9768 | 7926 | 7883 |
| Missan | Zahdi | 1048 | 984 | 920 | 857 | 793 | 729 |
| | Khistawi | 661 | 672 | 683 | 693 | 704 | 714 |
| Wasit | Zahdi | 27732 | 28125 | 28517 | 28910 | 29302 | 29695 |
| | Khistawi | 4953 | 4829 | 4704 | 4580 | 4455 | 4331 |
| Diala | Zahdi | 38138 | 36819 | 35500 | 34181 | 32862 | 31543 |
| | Khistawi | 10407 | 10445 | 10483 | 10520 | 10558 | 10596 |

| Anbar | Zahdi | 22196 | 20851 | 19505 | 18159 | 16813 | 15468 |
|---|---|---|---|---|---|---|---|
| | Khistawi | 5944 | 5754 | 5563 | 5372 | 5181 | 4990 |
| Salaheldin | Zahdi | 13110 | 13402 | 13695 | 13987 | 14280 | 14572 |
| | Khistawi | 3138 | 3195 | 3253 | 3311 | 3368 | 3426 |
| najaf | Zahdi | 22173 | 22304 | 22435 | 22567 | 22698 | 22829 |
| | Khistawi | 4151 | 4226 | 4301 | 4375 | 4450 | 4524 |
| Qadisiyah | Zahdi | 22680 | 22696 | 22712 | 22728 | 22744 | 22760 |
| | Khistawi | 1843 | 1944 | 2045 | 2146 | 2248 | 2349 |
| Muthanna | Zahdi | 10316 | 10425 | 10535 | 10645 | 10755 | 10864 |
| | Khistawi | 2927 | 3109 | 3291 | 3473 | 3655 | 3837 |
| Thiqar | Zahdi | 7736 | 7794 | 7851 | 7908 | 7965 | 8023 |
| | Khistawi | 1739 | 1789 | 1839 | 1889 | 1939 | 1989 |
| Basrah | Zahdi | 1825 | 1717 | 1608 | 1500 | 1392 | 1283 |
| | **Khistawi** | **4100** | **4437** | **4774** | **5110** | **5447** | **5784** |

Source: Researcher work based on statistical analysis results.

The standard grades were extracted and because the standard grades may be negative or contain a decimal part or may be zero or difficult to understand, the researcher resorted to the use of the T grade or the standard grade adjusted $T_{Score}$ to get rid of fractions and negative signals, because their outputs are always positive, and here several levels can be distinguished according to their adjusted standard grades of the amount of production predicted for 2025, see Table (4).

**Table (4) Revised standard grades for the predictive value of date production in Iraq for 2025**

| The name of the province | Predictive value for for al-Zahdi class | Standard grade | Adjusted standard grade |
|---|---|---|---|
| Baghdad | 72664 | 1.715322483 | 67 |
| Babil | 56025 | 1.073366803 | 61 |
| Kerbala | 80199 | 2.006033226 | 70 |
| Missan | 729 | -1.060029514 | 39 |
| Wasit | 29695 | 0.057518911 | 51 |
| Diala | 31543 | 0.128817312 | 51 |
| Anbar | 15468 | -0.491378467 | 45 |
| Salaheldin | 14572 | -0.525947389 | 45 |
| Najaf | 22829 | -0.207380885 | 48 |
| Qadisiyah | 22760 | -0.210043001 | 48 |
| Muthanna | 10864 | -0.669007168 | 43 |
| Thiqar | 8023 | -0.778616885 | 42 |
| Basrah | 1283 | -1.038655426 | 40 |
| Total | 366654 | | 0 |
| Average arithmetic | 28204.15385 | | |
| Standard Deviation | 25919.23477 | | |

Source: From the work of the researcher based on table (3).

**First: Spatial variation of the production of dates, al-Zahdi class in the provinces of Iraq for the year 2025**

It appears from table 3 that the predictive value of date production in Iraq for 2025 was about (36665 tons), distributed at five levels according to its revised standard grades, table (4) and map(2) are considered:

**1- The first low level of (39%-30)** and its values represent the lowest quantities of date production of the category Zahdi and is the level of the province (Missan), where the predictive value for the year 2025 was about (729 tons) and with a modified standard degree of (3) 9%, due to the low amount of production due to the small number of palm trees of this class, as the cultivation of secondary and hybrid varieties prevails in the province, reflecting the lack of interest in the main varieties, in addition to leaving the process of multiplication in a fundamentalist way and content with the random processes of multiplication based on what appears of palms that sprout from the falling cores on the ground.

2- **The second acceptable level of (49%-40**) and its values below the arithmetic average and represents the low rates in the production of dates class al-Zahdi and includes the level of Basrah, Thiqar, Muthanna, Salaheldin, Anbar, Najaf and Qadisiyah) with adjusted standard grades ranging from Between (48%-40) due to the decline of palm trees in recent years, not many reasons, including the high proportion of palms of old age, which led to a decrease in productivity, in addition to the lack of water quotas and high salinity of water, which causes a risk Palms are in them even though they endure drought and salinity, which has led to a decrease in palm productivity.

3- **The third intermediate level (59%-50)** represents the value of the high rates and is shown in both wasit and Diala province with adjusted standard grades of (51%) This is due to the role of the human factor (the experience of farmers in both provinces), and the ideal natural conditions for palm cultivation provide the fact that the two provinces have been home to palm plantations since ancient times.

4- **The fourth good level of (69%-60)** represents the value of the high rates and shows the level in the provinces (Babylon, Baghdad) and with a modified standard score of (61-67%), due to the increase in the productivity of the palm variety of al-Khistawi in these two provinces, as it is not lower than (62) kg / palm in Babil governorate and not below (72.1 kg) kg/ palm in Baghdad province.

5- **The fifth level is very good of (70% and above)** and its values represent the highest production rates and includes this level of governorate (Kerbala) with a modified standard score of (70%), due to the lack of dust storms in recent years and attention to the network of

peas by the local government, which led to the lack of salinity, which led to the destruction of palm trees in the province, in addition to the interest of the owners of orchards in the control of the land instead of the air control, which stopped work in the recent period.

### Map (2) Revised standard grades of the predictive value of date production in Iraq for 2025
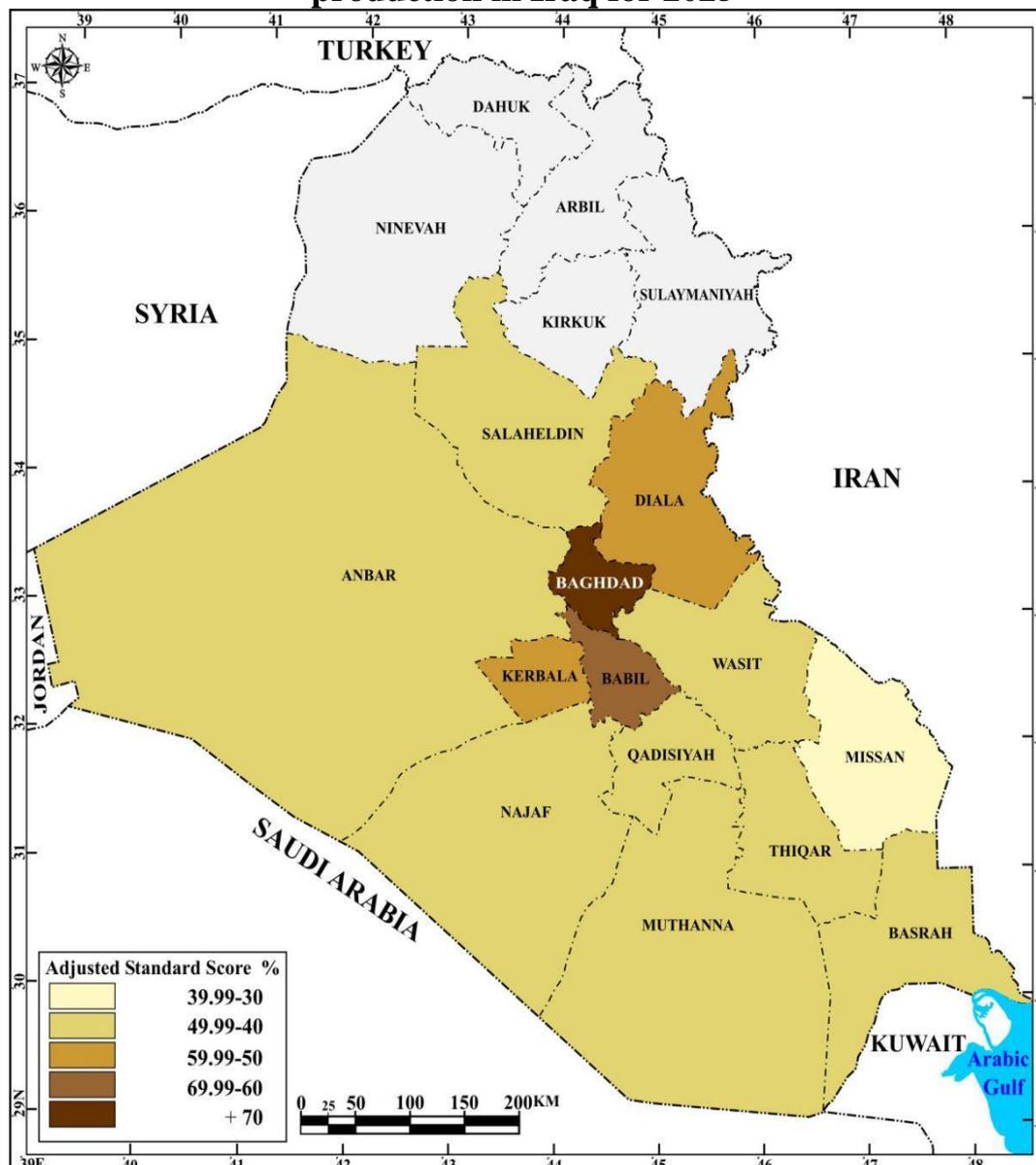


Source: From the work of the researcher based on the table (4).

### Secondly: Spatial variation of the predictive value of date crop al-Khistawi by the provinces of Iraq for the year 2025

The predictive value of the production of the Khistawi date crop in Iraq for the year 2025 was about (8439138 tons) distributed at five levels according to its revised standard grades, seen table (5) and map (3), namely:

**1- The first low level of (39%-30)** and its value represents the lowest rates and the level is in the province of Missan with a modified

standard score of (39%). This is due to the cultivation and multiplication of varieties, most of which are not economically profitable due to a traditional agricultural heritage that reduces the diversity of palm varieties, causing low product quality, as well as a lack of skilled labor in palm cultivation in this province.

**2- The accepted second level of (49%-40)** (its values represent the low rates of production of the production of the production of dates, the Khistawi category is represented by the governorates (Basrah, Qadisiyah, Salaheldin, Muthanna, Najaf, Wasit, Anbar, Basrah) and with adjusted standard grades ranging from (42-49%) This is due to the deterioration of the production of Khistawi palm suppall in these provinces, as a result of neglect and lack of care through the lack of agricultural operations of fertilization and control of diseases and agricultural pests, regular irrigation and other service processes such as pollination, crepes and others due to the scarcity of skilled labour and the high costs of these operations.

3. **The third level is medium (59%-50)** and the values are below their average calculation, and are represented in the governorate (Kerbala, Diala) with a modified standard score ranging from (53-58%), due to the fluctuating numbers of palms in these provinces, because of urbanization towards orchards , because of urbanization towards orchards, resulting in the removal and reduction of the area cultivated by palmtrees.

4- **The good fourth level of (69%-60)** and its values above the arithmetic average is represented by the province of Babylon and with adjusted standard grades of (65%) This is due to the high productivity of the Palm Khistawi class in Babil province, compared to its counterparts in the Iraqi provinces, an indication of the existence of a regional specialization for the cultivation and production of dates in the province.

**5- The fifth level is very good (70% and above)** and its values represent the highest production rates and this level includes the province (Baghdad) and with a modified standard score of (74%). This is due to the fact that this category is characterized by its tolerance to harsh natural conditions compared to the rest of the varieties, in addition to the presence of inter-agriculture (vegetables and fruits), which led to increased interest of farmers in palm trees in terms of their joint access to service processes such as fertilization, loaves and fighting bushes, which reflected positively on the increase in the yield of dates Khistawi in Baghdad province.

**Table (5) Adjusted standard grades for the predictive value of date production, Khistawi class in Iraq for 2025.**

| The name of the province | Predictive value for Khistawi | Standard grade | Adjusted standard grade |
|---|---|---|---|
| Baghdad | 1916078 | 2.356037567 | 74 |
| Babil | 1480676 | 1.546334744 | 65 |
| Kerbala | 788302 | 0.258749518 | 53 |
| Missan | 71436 | -1.074382677 | 39 |
| Wasit | 433091 | -0.401824732 | 46 |
| Diala | 1059622 | 0.763314426 | 58 |
| Anbar | 499040 | -0.279181539 | 47 |
| Salaheldin | 342596 | -0.570115316 | 44 |
| Najaf | 452416 | -0.365886663 | 46 |
| Qadisiyah | 234878 | -0.770434949 | 42 |
| Muthanna | 383720 | -0.493638362 | 45 |
| Thiqar | 198896 | -0.837349494 | 42 |
| Basrahh | 578387 | -0.131622525 | 49 |
| Total | 8439138 | | 0 |
| Average Arithmetic | 1150938.308 | | |
| Standard Deviation | 2222524.232 | | |

Source: From the work of the researcher based on table (3).

**Cluster analysis of the production of dates In Al-Zahdi and Al-Khistawi in the provinces of Iraq for the duration (2010-2019)**

**Cluster Analysis:** A statistical method that includes a set of procedures aimed at classifying cases or variables in certain ways and arranging them within clusters so that cases classified within a given cluster are homogeneous in relation to specific characteristics and differ from (brown&tinsley, 2000, p.p.297-298), which is the core of the geo researcher's work, which categorizes phenomena or variables according to their spatial variations into homogeneous groups and then represents them on the map.

**Map (3) Revised standard grades of the predictive value of date crop al-Khistawi by provinces of Iraq for 2025**
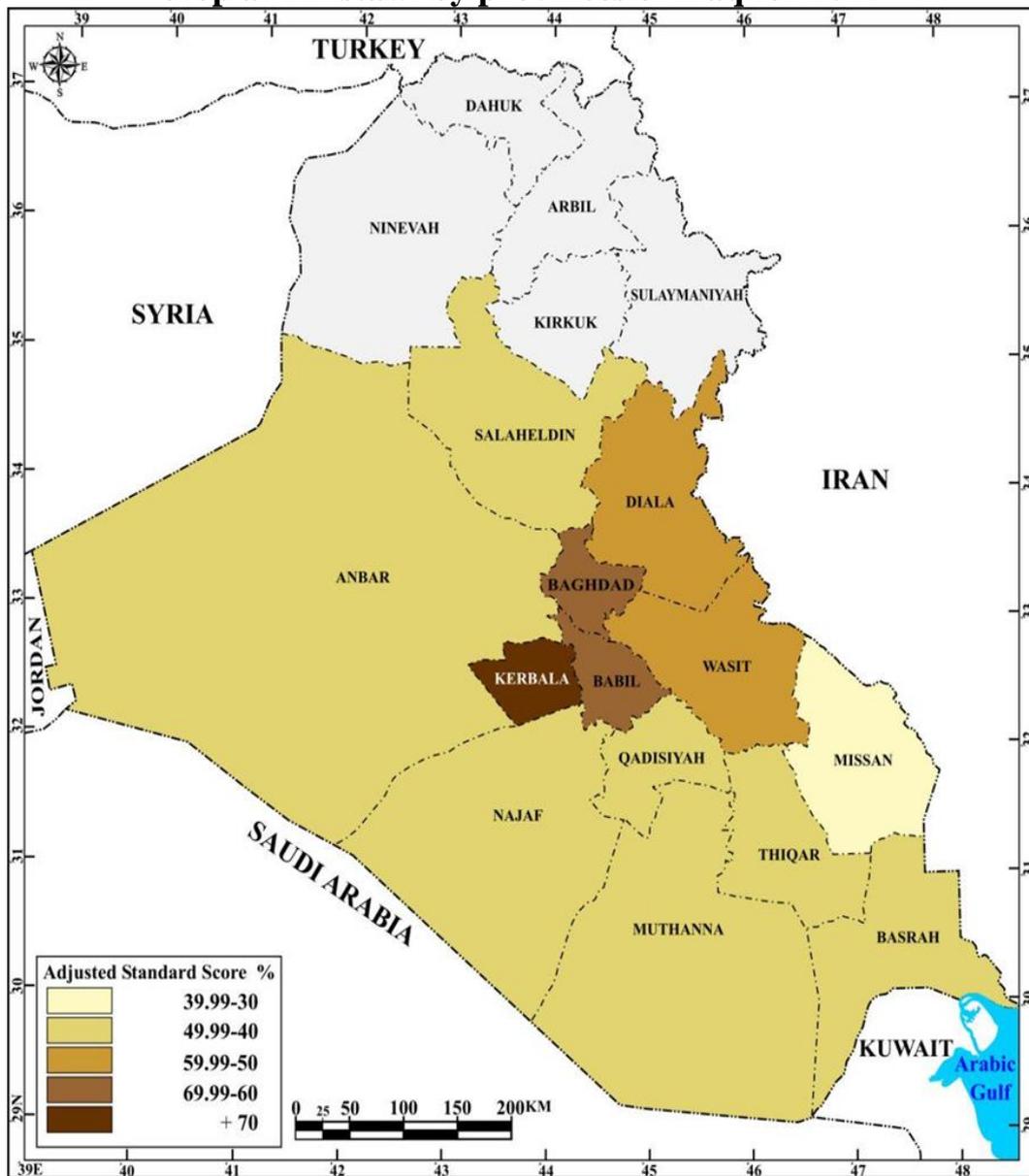


Source: From the work of the researcher based on the table (4).

**Hierarchical Clustering**

This method is based on the formation of the assembly tree, the first formation occurs for the closest variables, and the further away the variables from the cluster shaping processes in its first branches, the more it shows its independence or its distancing in the light of its characteristics (variables) from other clusters (Akasha, 2002, p. 594), and that the process of aggregation (variables) is carried out through a series of mathematical processes that take into account the variables contained in the analysis and when two variables are healed to form a single branch, this is done by measuring the distances of the distance between them against each variable of the variables (here we have 13 variables, which are the provinces producing the crop of dates, Sanfi

Zahdi and Khistawi) and after processing these distances mathematically, we adopt the lowest distance rate (the nearest) to integrate the variables on the basis of them (Mahmoud, 2014, p. 11).

**First: Application of cluster analysis of the amount of production of the production of the production of dates category Zahdi in the provinces of Iraq for the year 2019**

From the agenda of the assembly steps (Agglomeration Schedule) in annex No. (3) on the quantity of production of the production of the crop of dates in the provinces of Iraq for the year 2019, it is possible to identify the variables or provinces that were linked together in each step of the analysis, in the first step was grouped with the province of Diala with wasit province, i.e. formed The first is a close-up factor of 1.0609 and these two provinces are adjacent and home to the palm plantation of the old, followed by the one (Diala and Anbar provinces) with an approach factor of (3.1044) because the two provinces suffer from high palm levels The old age, then came the insinuation of the provinces (Diala and Qadisiyah) with the factor approach (21.2984) because the two provinces suffer from the lack of water quota allocated to the irrigation of palm groves, and then the provinces (Baghdad and Kerbala) were severely affected by the factories approaching (48.4416) two adjacent provinces, and the yield of the date crop is high the category of al-Zahdi for the interest of farmers in palm trees as mentioned earlier. Thus, until we reach the end of the table, and from our observation of the details of the cluster in the table of the provinces according to the stages of cluster (Agglomeration Schedule) in annex (3), we notice that the geographical neighborhood has a clear effect in the formation of clusters for the resulting similarity in production patterns and the natural environment and Humanity and the lower the value of the approach coefficient, the lower the value of the approach coefficient, so the values of the approach factor are progressive with the progress towards the late stages of the fissure of the illustration (Dendrogram) the shape of the tree for the baptism, we notice that the provinces (Diala, Wasit, Anbar, and Qadisiyah, Najaf) has been stubborn lying in the provinces of Missan, Basrah, Salaheldin, Muthanna and Thiqar) . The production of the crop of dates is the category of Zahdi, as it did not meet with other communities to a long distance, which reflects the independence and specificity of this province in the production of the Zahdi variety, due to the availability of natural and human factors that help to plant palms of this class, and is clustered late as a result of the impact of these factors.

To explain the implications of the Ddrogram, the horizontal axis represents the distances that the provinces travel (horizontally) to express their privacy before meeting other provinces, the longer this

distance is, the more specific it is to the province in terms of (production).

**Secondly: Application of cluster analysis of the amount of production of date Khistawi crop in the provinces of Iraq for the year (2019)**

It appears from the table (Agglomeration Schedule) in the supplement (4) for the quantity of production of the crop of dates Khistawi, where it is possible to identify the provinces that have been linked together in each step of the analysis, we notice in the first step that the province of Qadisiyah was grouped with the province of Thiqar, and formed the first cluster factor Approaching (1.9881) and these two provinces are adjacent, and they suffer from the deterioration of production as a result of neglect and lack of skilled manpower, followed by the inactivity of the provinces (Wasit, Najaf) with an approach factor (3.3489) because the two provinces suffer from the fluctuation of the number of palm trees from Khistawi class, because most of them are older as we mentioned earlier. The provinces (Salaheldin and Basrah) were then clustered with a coefficient approaching (14.44) because these two provinces suffer from the deterioration of the production of Khistawi palms as a result of negligence and lack of care for the service processes provided to them, and the high salinity of irrigation water, which led to the high salinity of the soil, which led to its destruction, and so on until we reach the end of the table. From our observation of the details of the clustering in the table of assembly steps in annex (4), we also note that the effect of geographical proximity has a clear effect on the formation of clusters and the lower the value of the approach coefficient, the less this is evidence of the homogeneity and similarity of the conditions, quantity and quality of production between the provinces, whether high or low.

It is illustrated by the shape of the tree (Dendrogram) of the cluster, we note that the provinces (Qadisiyah, thiqar, Missan, Wasit, Najaf, Salahaldin, Basrah and Muthanna) are clustered, and the provinces (Diala, Kerbala, Anbar) are clustered with a second cluster. While the province (Baghdad, Babil) is clustered in a third cluster, and the province of Baghdad is unique in the high quantity of the production of dates variety Khistawi, as it did not meet with other gatherings to a long distance, which reflects the independence and specificity of this province in its production for this category because of the availability of natural and human conditions, which led to the high productivity of the palm one in them as we mentioned earlier.

**Conclusions and recommendations:**

**First: Conclusions:** The study showed many conclusions that can be summarized as follows:

1- We conclude that Baghdad province is the highest province by producing Al-Zahdi dates in the study area for the duration (2010-2019), according to the results of the statistical analysis.

2- The value of (F-test)calculated in the equation was about (48.181) with a p-value probability value equal to (0.000) less than (0.05%) That is, there is a moral relationship between the Y variable (the production of the dates of the Zahdi class in Baghdad province) and the independent variable (t) years.

3- The value of (t-test) calculated for morale (6.941) in morale (0.000) which is less than (0.05%) That is, the more one year the production of dates increases the Zahdi variety in Baghdad province by (1434.630 tons).

4- While the value of the correlation coefficient $R$ date production was the category of Zahdi in Baghdad province and time as an independent variable (0.92%) It is a very strong relationship, which indicates that the independent variable (years) has a very strong effect on the dependent variable (production quantity). while the value of the $R^2$ selection coefficient for the equation (0.858%) This means that the variable in the equation, which is time, is interpreted by (85%) The production of dates is the category of al-Zahdi in Baghdad province or in other words (85%) of the production of al-Zahdi dates in Baghdad province is determined by the independent variable (years) and the remaining percentage (15%) It occurred because of factors other than the general trend attributed to it.

5- Al Muthanna province was the highest-growing province with the Khistawi date crop in the study area for the duration (2019-2010).

6- The value of (F-test) calculated in the equation was about (209.997) with a morale of (0.000) which is less than (0.05%) This means that the regression coefficient is different from zero.

7- The value (t-test) calculated or so-called partial moral test of the model was about (14.491) morally (0.000) which is less than (0.05%), i.e. the correlation factor d statistically.

8- The value of the $R$ correlation coefficient between date production was Khistawi in Muthanna province and time as a separate variable (0.98%) It is a very strong relationship, which indicates that the independent variable (years) has a very strong effect on the dependent variable (production of dates is a Khistawi class), while the value of the $R^2$ selection coefficient for the equation (0.963%) This means that the variable of the years explains( 96%) of the production of Khistawi dates in Muthanna province, in other words, (96.3%) of the production

of Khistawi dates. Is the ability of the independent variable (years) to predict the dependent variable (production of dates Khistawi in Muthanna province) and the rest of that is (4%) Factors other than the general trend are attributable to them.

9- The spatial variation of the predictive value of the production of the 2025 study area of Al-Zahdi and Al-Khistawi date sands showed that there were five levels each according to their revised standard grades.

10- The study found that the highest predictive value for the production of the date crop of al-Zahdi for the year 2025 was the share of Kerbala province by about (80,199) tons with a modified standard score of about (70%), while the lowest predictive value for the production of the date crop was the Zahdi category of about (729 tons) in Missan province and with a modified standard score of (39%).

11- While the highest predictive value for the production of the production of the production of dates, the Khistawi class for the year 2025 was the share of the province of Baghdad by about (1916078 tons) and with a modified standard score of (74%) The lowest predictive value for the production of the 2025 Khistawi crop was about (71.436 tons) and a modified standard (39%) In Missan province.

12- Shown from the assembly steps table (Agglomeration Schedule) in Annex 1 on the amount of production of the production of the production of the production of the Zahdi dates in the provinces of Iraq for the duration (2010-2019), in the first step was grouped with The Province of Diala with Wasit province, i.e. formed the first cluster with an approach factor of (1.0609) and these two provinces Adjacent and home to the cultivation of palms of the foot, followed by the criticism (Diala and Anbar provinces) with a factor approaching (3.1044) because the two provinces suffer from the high percentage of old palms, and then came the criticism of the provinces (Diala and Qadisiyah) with a coefficient approach (21.2984) to the universe The two provinces suffer from the lack of water quota allocated to the irrigation of palm groves, and then the provinces (Baghdad and Kerbala) are heavily indebted to the nearby factories (48.4416) which are adjacent provinces, and the productivity of the date crop increases the category of al-Zahdi for the interest of farmers in palm because of the presence of inter-agriculture as mentioned earlier.

13- From our observation of the details of the clustering of provinces according to the stages of clustering (Agglomeration Schedule) in annex (1), we note that the geographical proximity has a clear effect in the formation of clusters for the resulting similarity in production patterns and the natural and human environment and the lower the value of the approach factor, the lower the value of the approach

factor, therefore the values of the approach coefficient are progressive with progress towards the late stages of the clusters of fissure.

14- From the illustration (Dendrogram) the shape of the tree for the clustering, we note that the provinces (Diala, Wasit, Anbar, Qadisiyah and Najaf) are clustered with clusters, and the provinces (Missan, Basrah, Salaheldin, Muthanna and Thiqar) are clustered with a second cluster, The provinces (Baghdad, Kerbala, and Babil) are clustered with a third cluster, and Kerbala province is unique in producing the crop of dates of the Zahdi class, as they did not meet with other gatherings to a long distance, reflecting the independence and specificity of this province in the production of the Zahdi class, due to the availability of natural and human factors that help to plant palms of this class, and it is belatedly stubborn as a result of the effect of these factors.

15- As for the results of the cluster analysis of the crop of dates Khistawi, appears from the table (Agglomeration Schedule) in the supplement (2) for the quantity of production of dates Khistawi class, we note in the first step that the province of Qadisiyah was grouped with the province of Thiqar, and formed the first cluster with an approaching factor of (1.9881) These two provinces are adjacent, and suffer from the deterioration of production as a result of neglect and lack of skilled manpower, followed by the inactivity of the provinces (Wasit, Najaf) with an approach factor (3.3489) because the two provinces suffer from the fluctuation of the number of palm trees of the class of Khistawi, because of the fact that Most of them are older as we mentioned earlier. The provinces (Salaheldin and Basrah) were then clustered with a coefficient approaching (14.44) because these two provinces suffer from the deterioration of the production of Khistawi palms as a result of negligence and lack of care for the service operations provided to them, and the high salinity of irrigation water, which led to the high salinity of the soil, which led to its destruction.

16- From our observation of the details of the clustering in the table of assembly steps in annex (2) we also notice that the effect of geographical juxtaposition has a clear effect on the formation of clusters for the production of the crop of dates of the Khistawi.

17- It is an illustration of the shape of the tree (Dendrogram) for the clustering, we note that the provinces (Qadisiyah, Thiqar, Missan, Wasit, Najaf, Salaheldin, Basrah and Muthanna) are clustered, and the provinces (Diala, Kerbala, Anbar) are clustered. The province of Baghdad and Babylon is clustered in a third province, and Baghdad province is unique in the high amount of production of the crop of dates, the Khistawi category, because of the availability of human and natural conditions, which led to a rise in the productivity of the palm

in it, and as mentioned earlier, and suffered late as a result of the impact of these conditions.

18- The importance of predicting the production of dates, Sunfi Al-Zahdi and Al-Khistawi, lies in guiding the Ministry of Agriculture to make appropriate decisions, because good forecasting leads to good planning to invest the production of this crop and all its varieties.

**Secondly: Recommendations:**

1- pay attention to the production of date sorority in terms of quality and quality by establishing farms and orchards dedicated to export.

2- Linking the production of date varieties to the needs and requirements of the international market to ensure the absorption of surplus quantities produced from dates.

3- Supporting and encouraging local investment in the construction of modern factories and presses to fill and encapsulate dates in attractive bottles in preparation for export.

4- Organizing promotional campaigns for dates in Iraq in the international markets, especially since Iraq has rare varieties and types of dates that do not exist in any other country.

**References:**

1. Abdul Majid Hamza Al Nasser, Zafer Hussein Rashid, Records and Time Series Analysis, Baghdad University, University Of Printing and Publishing, Baghdad, 2013.

2. Abdul Wahab al-Dabbagh, Palm and Dates in Iraq Geographical Analysis of Palm Cultivation, Date Production, Industry and Trade, Umma Press, Baghdad, 1956.

3. Ali Al Azzawi, Statistical Quantitative Methods in Geography, Dar Al-Yazouri, Amman, 2019.

4. Brown; S & Tinsley; H; 2000, Hand Book of Applied Multivariate Statistics and Mathematical Modeling, USA.

5. Graig.A.Mertler, Interpreting Standar Dized Test Scores, Bowling Green States University , United States of America, 2007,P.120.

6. Hassan Khalid Hussein Al-Akidi, Palm of Dates - Lady of the Trees and Dora al-Thmar, 2008.

7. Hassan Yassin Touma, Iman Hussein Hanoush, Methods of Applied Statistics, Dar Al Safaa, Jordan, 2009.

8. Iraqi Ministry of Planning, Central Bureau of Statistics, Agricultural Statistics Directorate, Date Production Data for The Duration (2010-2019), Published Data.

9. Jassim Mohammed Al-Medares, Atlas of Dates in the Gulf, First Edition, Kuwait, 2010.

10. Joel.F.Lubar, Robert Thatcher, Z Score Neuro feed bake, Academic press, London, UK,2014,P.4.

11. Mahmoud Khaled Okasha, Use of spss system in statistical data analysis, first edition, Gaza University, Palestine, 2002.

12. Mahmoud Shaker Mahmoud, Statistical Analysis of The Reasons for Not Enrolling, Ministry of Planning, Iraq, 2014.

13. Manash Dutta, Cost Accounting Principles and Practice, India, 2009, P.14.14.

14. Ministry of Water Resources, Directorate General of Area, Iraq Administrative Map Scale 1/1000000, 2020.
15. Mohammed Al Nuaimi, Hassan Touma, Applied Statistics, Wael Publishing House, First Edition, 2008.
16. Pauls.P.GowP ertwait, Andrew Metcalf, Introductory Time Series With R, Hopkins University, New York, USA, 2009, P.1.

**Appendix (1) Date Production Matrix, Sinfi Al-Zahdi and Al-Khistawi**

| The province | Production of al-Zahdi dates (ton) | Production of al-Khistawi dates (ton) |
|---|---|---|
| **Diala** | 453930 | 101983 |
| **Anbar** | 158084 | 36400 |
| **Baghdad** | 576008 | 130081 |
| **Babil** | 710342 | 134515 |
| **Kerbala** | 609555 | 83293 |
| **Wasit** | 255732 | 56373 |
| **Salaheldin** | 55318 | 13669 |
| **Najaf** | 214521 | 37415 |
| **Qadisiyah** | 225922 | 12865 |
| **Muthanna** | 97125 | 19248 |
| **Thiqar** | 74214 | 14639 |
| **Missan** | 13986 | 6030 |
| **Basrah** | 24212 | 22476 |
| **total** | 3468949 | 668987 |

**For supplement (2) cluster analysis of Al-Zahdi and Al-Khistawi in Iraq for the year 2019**

| Production | The province | Max | Min | 95% Confidence Interval for Mean | | Std. Error | Std. Deviation | Mean | N |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Upper Bound | Lower Bound | | | | |
| Production of al-Zahdi(ton) | Diala | 51698 | 22640 | 52216.95 | 38569.05 | 3016.569 | 9539.227 | 45393.00 | 10 |
| | Anbar | 34887 | 0 | 27964.99 | 3651.81 | 5373.893 | 16993.743 | 15808.40 | 10 |
| | Baghdad | 64740 | 51696 | 60956.06 | 54245.54 | 1483.211 | 4690.324 | 57600.80 | 10 |
| | Babil | 76764 | 61710 | 74621.37 | 67447.03 | 1585.732 | 5014.523 | 71034.20 | 10 |
| | Kerbala | 69658 | 51679 | 65401.10 | 56509.90 | 1965.204 | 6214.519 | 60955.50 | 10 |
| | Wasit | 28875 | 22537 | 27259.69 | 23886.71 | 745.521 | 2357.545 | 25573.20 | 10 |
| | Salaheldin | 12893 | 0 | 9732.77 | 1330.83 | 1857.065 | 5872.554 | 5531.80 | 10 |
| | Najaf | 24007 | 19729 | 22380.98 | 20523.22 | 410.616 | 1298.481 | 21452.10 | 10 |
| | Qadisiyah | 24317 | 20546 | 23508.13 | 21676.27 | 404.893 | 1280.384 | 22592.20 | 10 |
| | Muthanna | 10666 | 8510 | 10132.30 | 9292.70 | 185.574 | 586.835 | 9712.50 | 10 |
| | Thiqar | 7928 | 6398 | 7798.33 | 7044.47 | 166.626 | 526.917 | 7421.40 | 10 |
| | Missan | 1658 | 1079 | 1572.70 | 1224.50 | 76.964 | 243.380 | 1398.60 | 10 |
| | Basrah | 3523 | 944 | 2966.68 | 1875.72 | 241.132 | 762.527 | 2421.20 | 10 |
| | Total | 76764 | 0 | 30841.68 | 22526.77 | 2101.292 | 23958.416 | 26684.22 | 130 |
| | Diala | 11653 | 7875 | 11020.06 | 9376.54 | 363.265 | 1148.746 | 10198.30 | 10 |
| | Anbar | 8399 | 0 | 6428.48 | 851.52 | 1232.664 | 3898.025 | 3640.00 | 10 |
| | Baghdad | 14980 | 10218 | 14335.06 | 11681.14 | 586.592 | 1854.968 | 13008.10 | 10 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Production of al-Khistawi (ton) | Babil | 15347 | 10978 | 14359.97 | 12543.03 | 401.596 | 1269.959 | 13451.50 | 10 |
| | Kerbala | 9303 | 7244 | 8726.67 | 7931.93 | 175.660 | 555.485 | 8329.30 | 10 |
| | Wasit | 6686 | 3812 | 6339.65 | 4934.95 | 310.478 | 981.818 | 5637.30 | 10 |
| | Salaheldin | 3034 | 0 | 2402.96 | 330.84 | 457.998 | 1448.316 | 1366.90 | 10 |
| | Najaf | 4038 | 3195 | 3917.99 | 3565.01 | 78.021 | 246.723 | 3741.50 | 10 |
| | Qadisiyah | 1880 | 828 | 1579.35 | 993.65 | 129.458 | 409.381 | 1286.50 | 10 |
| | Muthanna | 2623 | 930 | 2326.72 | 1522.88 | 177.670 | 561.842 | 1924.80 | 10 |
| | Thiqar | 1731 | 1153 | 1585.27 | 1342.53 | 53.651 | 169.658 | 1463.90 | 10 |
| | Missan | 682 | 549 | 635.90 | 570.10 | 14.546 | 45.998 | 603.00 | 10 |
| | Basrah | 3846 | 988 | 3023.56 | 1471.64 | 343.017 | 1084.715 | 2247.60 | 10 |
| | Total | 15347 | 0 | 5950.32 | 4341.79 | 406.497 | 4634.775 | 5146.05 | 130 |

**Appendix (3) Cluster Analysis of The Zahdi Class in Iraq for 201**
**Case Processing Summary[a,b,c]**

| Cases | | | | | |
|---|---|---|---|---|---|
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| 13 | 100.0 | 0 | .0 | 13 | 100.0 |

a. year = ٢٠١٩
b.  Squared Euclidean Distance used
c. Average Linkage (Between Groups)



Dendrogram using Average Linkage (Between Groups)

**Appendix No. (4) Cluster Analysis of Khistawi in Iraq for 2019**
**Case Processing Summary[a,b,c]**

| Cases | | | | | |
|---|---|---|---|---|---|
| Valid | | Missing | | Total | |
| N | Percent | N | Percent | N | Percent |
| 13 | 100.0 | 0 | .0 | 13 | 100.0 |

A year = 2019
b.  Squared Euclidean Distance used
c. Average Linkage (Between Groups)

**Average Linkage (Between Groups)**
**Agglomeration Schedule[a]**
**Agglomeration Schedule[a]**

| Stage | Cluster Combined | | Coefficients | Stage Cluster First Appears | | Next Stage |
|---|---|---|---|---|---|---|
| | Cluster 1 | Cluster 2 | | Cluster 1 | Cluster 2 | |
| 1 | 126 | 128 | 19881.000 | 0 | 0 | 7 |
| 2 | 123 | 125 | 33489.000 | 0 | 0 | 6 |
| 3 | 124 | 130 | 144400.000 | 0 | 0 | 5 |
| 4 | 118 | 122 | 364816.000 | 0 | 0 | 10 |
| 5 | 124 | 127 | 397301.000 | 3 | 0 | 6 |
| 6 | 123 | 124 | 886812.500 | 2 | 5 | 9 |
| 7 | 126 | 129 | 1258250.500 | 1 | 0 | 9 |
| 8 | 120 | 121 | 2157961.000 | 0 | 0 | 12 |
| 9 | 123 | 126 | 4325402.333 | 6 | 7 | 11 |
| 10 | 118 | 119 | 6256493.000 | 4 | 0 | 11 |
| 11 | 118 | 123 | 24709821.875 | 10 | 9 | 12 |
| 12 | 118 | 120 | 108453813.409 | 11 | 8 | 0 |

a . year =2019

Dendrogram using Average Linkage (Between Groups)
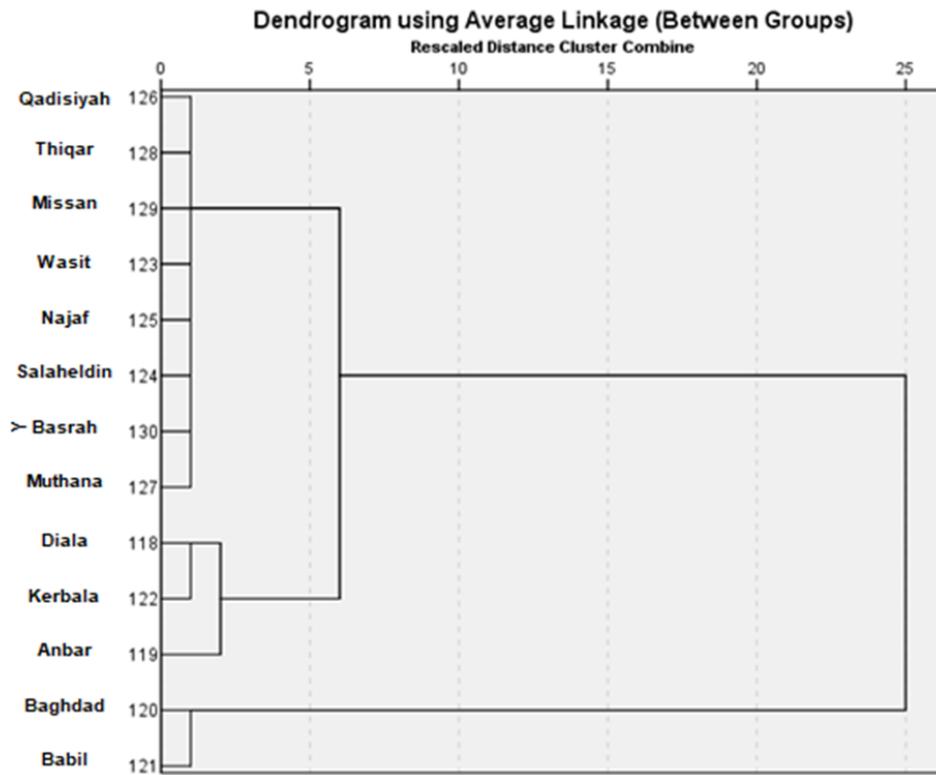
# التباين المكاني للإنتاج التمور صنفي الزهدي والخستاوي في العراق للمدة (٢٠١٠-٢٠١٩) وتنبؤاته المستقبلية

م.د. آمال صباح حسن كاظم

جامعة بغداد/ كلية الآداب

قسم الجغرافية ونظم المعلومات الجغرافية

amalsabaah@coart.uobaghdad.edu.iq

**الملخص:**

تندرج الدراسة ضمن الدراسات الزراعية التي تعالج مشكلة إنتاجية أبرز صنفين من التمور في مناطق عرفت بزراعته ومنذ القدم. إذ تعاني زراعة النخيل وإنتاج التمور من تدهور مستمر في أغلب مناطق انتاجه، لذا اختصت الدراسة بتحليل التباين المكاني لإنتاج صنفي الزهدي والخستاوي في محافظات العراق المنتجة للمدة (٢٠١٠-٢٠١٩)، للوقوف على حجم الإنتاج والتنبؤات المستقبلية باستخدام أساليب إحصائية معتمدة.

اتبع في الدراسة منهجين أساسيين (منهج التحليل المكاني الجغرافي) لتحديد التباينات المكانية في الانتاج (ومنهج التحليل الاستدلالي) إذ تم اختيار انموذج الانحدار الخطي البسيط للوصول الى ايجاد القيمة التنبئية لإنتاجه في منطقة الدراسة من خلال الاعتماد على سلسلة زمنية لكمية الانتاج من (٢٠١٠-٢٠١٩) بحسب المحافظات وللصنفين من خلال مجموعة من النتائج مثل قيمة معامل الارتباط وقيمة (F) للمعنوية الكلية لمعادلة الانحدار وقيمة (t) للمعنوية الجزئية للمعلمات. ووفقا لهذا الانموذج تم التنبؤ بإنتاج الصنفين حتى سنة (٢٠٢٥)، وبينت النتائج وجود تباين مكاني وزماني في الإنتاج على مستوى المحافظات المنتجة. وتم استخدام التحليل العنقودي الهرمي لتقسيم المحافظات الى مجموعات (عناقيد) تتمتع بعناصر وخصائص مشتركة في الانتاج وأيها تتفرد عن باقي المحافظات بإنتاج أحد الاصناف ما يدل ذلك على خصوصية هذه المحافظات في انتاجها كماً ونوعاً. اعتماداً على البيانات المتوفرة من (وزارة التخطيط/ الجهاز المركزي للإحصاء/ مديرية الإحصاء الزراعي) عن كميات الإنتاج على مستوى المحافظات المنتجة للمدة المحسوبة.ضمت الدراسة العديد من الجداول والاشكال البيانية والخرائط التوضيحية، أيضاً خرجت الدراسة بجملة من الاستنتاجات والمقترحات، واعتمدت الدراسة على العديد من المصادر المهمة في الموضوع.

**الكلمات المفتاحية:** انتاج التمور صنفي الزهدي والخستاوي، الانحدار الخطي البسيط، السلاسل الزمنية، التحليل العنقودي.