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The Use of The STEPWISE Method The Effect of Cultivated Area On Agricultural Production in Iraq

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Abstract : *One of the important problems addressed by researchers and specialists is the problem of agriculture and agricultural land and how to sustain or address them in the event that they need a certain treatment or work is being done to develop methods and agricultural tools and patterns used, which in turn affects production, and in this research has been working to study the impact of several factors on production and has been selected specific workers agricultural land, which is harvested land and affected land and total land and has Mathematical statistical methods were used in the analysis and the STIPWISE method of linear regression was used to determine the effect and any variables affecting and not affecting the dependent variable, which is agricultural production, and the results of the paper found that one of the variables does not affect the dependent variable, which is the harvested land variable.*

Opening Words: *Harvested Land, Damaged Land , Total Land , Linear Regression*

1. INTRODUCTION

Iraq is witnessing a variety of environmental and agricultural repercussions and many, most of which occur due to climatic and environmental changes, which affected the cultivated areas in Iraq and thus affected production, and researchers have addressed many studies and research on agriculture and agriculture is considered one of the important foundations in building civilizations and many countries are interested in agriculture, including India, which ranks second in the world in agriculture and is considered agriculture and related sectors such as Forestry and fisheries are responsible for 14.5% of GDP and Indian agriculture is affected by various factors such as climate, due to topography, historical, geographical, biological, political, institutional, social and economic factors. Over time, there are differences in natural factors and the nature of technology, so policies change as well. Agricultural production is mostly influenced by environmental factors. The weather affects crop growth and development, causing significant variation in yields within the season. In addition, the spatial variation of soil properties, which react to the weather, causes spatial yield variability. Agricultural crop management that includes cultivation, fertilizer application, irrigation, plowing, etc., can be used to compensate for the loss of yield due to weather impacts. Assessing climate change impacts cannot ignore simultaneous changes in the socio-economic context – the climate change context – because these changes may amplify or limit the impacts of climate change. The long time horizon of climate change and the difficulties of predicting even short-term social and economic changes means that the development of scenario approaches is widely

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used in many sciences (physical, economic, and social) in a variety of circumstances and for different purposes. (Mishra et al., 2016) (Abildtrup et al., 2006)

On the European side, the conversion of natural forests into pastures in the humid tropics of Central America has been criticized as the main cause of deforestation. Livestock, which are widely raised in tropical pastures with low nutritional values, labor inputs and low capital, exploit those nutrients accumulated in the soil by native plants. However, large-scale livestock production is an important activity in the rural economy due to its comparative advantages over other forms of production. Agricultural as its costs are low (Yamamoto et al., 2007)

The ratio between agricultural inputs and outputs constitutes agricultural productivity and in agriculture crop yields are measured by the degree of yield per unit area of cultivated land and seeds produced from the same crop and the reasons for the low productivity of agriculture are the human factor i.e. lack of training and efficiency among farmers, the huge number of people and traditional methods of farming, soil problems, pests, diseases, weak livestock, lack of credit facilities and inadequate irrigation facilities, unreliable monsoons, and improper marketing. for crops etc. To understand a country's economic development, monitoring crop yield conditions is absolutely essential. Crop yields have a direct impact on national and international economies annually, and projected yields play an important role in food management. Predicting the yield of planting before harvest is very useful , this process helps farmers plan their future activities. (Niranjan & Aradhya, 2016)

2. LITERARY REVIEW

The study by Abildtrupa and others revolved around the study on economic and social scenarios that are carried out by analyzing the impact of climate change on European agricultural land use and the scenarios are clarified from the reports described by the Intergovernmental Panel on Climate Change and climate emission scenarios. (Abildtrup et al., 2006)

While the study presented by Wataru Yamamoto et al. studied intensive livestock productivity and the impact of grazing areas on productivity, the aim of the study was to determine the effects in grazing areas on production in dual-purpose livestock farms in sub-humid lowlands. (Yamamoto et al., 2007)

Jianqiang Ren et al. aimed to test the suitability of the method based on expected crop yield to estimate crop yields using the MODIS-NDVI model and using data using the MODIS-NDVI model. (Ren et al., 2008)

Justin A.W. Ainsworth et al. studied the effect of pasture shade and farm management on milk production and individual body weight of dual-purpose cows in six forestry pastoral farms in Rivas Province in Nicaragua. (Ainsworth et al., 2012)

Researcher Jianshu Lv et al. also worked on the study of

Knowledge of spatial changes of heavy metals in soils and their relationships to environmental factors is important for human impact assessment and soil management . Topsoil from Rizhao City, eastern China with urbanization and rapid industrialization was analyzed for six key heavy metals and was described by parent material and land use using GIS-based data. (Lv et al., 2013)

While Ruisheng Li and others have shown that China's grain production has reached nineteen consecutive harvests, uncertainty about the current domestic and international environment has put more pressure on future grain production increases Over the past few years, agricultural socialization services have been crucial in boosting grain production and farmers' revenues by addressing the issue of land cultivation and farming methods. (Li et al., 2024)

While the research presented a study on cultivated and harvested land and total and its impact on agricultural production and used linear sequential regression, which between which variables have an impact and the variable that has no effect, and this is what distinguished the research from previous research .

3. MATHEMATICAL MODEL

Sequential steps method: (Edam Udokang , 2020)

This method is used to choose the best regression model If we assume that we have independent variables (X1,X2,.....,Xn) and that the response variable (dependent) is (Y), the sequential step method aims to choose the best model that contains the independent variables affecting Y and exclude the unimportant variables (not significant effective). Thus, obtaining the appropriate model that gives more accurate conclusions and predictions for the value of the dependent variable and this is done by calculating a series of regressions and on steps and through these steps the independent variable that enters the model is selected on the basis of the strength of its association with the dependent variable. As for installing or deleting this chosen variable in the model, it is done by testingF, and the steps of working in this way can be summarized as follows :

First Step:

In it, the independent variable that enters the model is selected by finding the simple correlation matrix of the independent variables with the dependent variable and X1, which is the owner of the largest simple correlation coefficient (negative or positive)

Its introduction into the proposed regression model is:

$$[Y= + X\beta_0\ \beta_{11+}Ei]....1$$

To test the significance of the effect of the presence of the independent variable X1 in the model, F1 is extracted where:

$$F1=MSR(X1)/MSE=b12(x-x^-)^2/MSE.....2$$

If the result is :

1- $F1>F_{tab,}$ this means that the variable X1 has a non-significant effect on the model, so X1 is excluded from the model and then we stop taking the other steps and the final model is as follows:

$$Y=Bo+Ei.....3$$

2- If $F1<F_{tab}$, this means that the variable x1 has a significant effect on the model, so we fix the variable x1 and the proposed model is model No. (1):

$$Y= + X\beta_0\ \beta_{11+Ei}\ .....4$$

In order to identify the percentage of change in the variable Y and to enter the variable X1 in the model, we extract the coefficient of determination as follows :

$$R2 = SSR/SST..... 5$$

Then we move on to the second step.

Second Step:

After the X1 variable is installed in the first step in the regression model, we extract the partial correlations of the independent variables with the dependent variable by fixing the variable X1, then we choose the independent variable with the largest partial correlation, let it be X6 to enter the regression model No. (1), so the proposed model is:

$$Y= + X\beta_0\beta_{11+}\beta_6\ X6+Ei.....6$$

Then we test the effect of adding the variable X6 to the regression model with the presence of variable X1 by finding F6 where:

$$F1=MSR(X6/X1)/MSE=SSR(X6/X1)/MSE....7$$

$$SSR(X6/X1) = SSR(X6/X1)-SSR(X1).....8$$

If it is:

1- F6 is not meaningless We exclude the variable X1 from the model and then stop working in the remaining stages and the proposed model is:

$$y= + x\beta_0\beta_{11+ei}.....9$$

2- If F6 is concerned, the variable X1 is fixed in the model (5) and the continuity of the effect of X1 in the model is chosen after the introduction of the variable X6 to it, and this is done by extracting a new F1 where:

$$F1=MSR(X1/X6)/MSE=SSR(X1/X6)/MSE.....10$$

$$SSR(X1/X6) = SSR(X1/X6)-SSR(X6).....11$$

If it is:

1- F1 is not meaningful, the variable in the model is excluded and the proposed model becomes:

$$Y= + X\beta_0\beta_{66+Ei}.....12$$

That is, the independent variable that is fixed in the regression model at any of the steps can be excluded in the subsequent steps when new independent variables are introduced as a result of the interaction effect between the independent variables.

2- F1 means that the variable X1 is fixed in the model with the variable X6 and the proposed model is**:**

$$y= = + x\beta_0\beta_{11+}\beta_6\ x6+ei....13$$

To identify the percentage of X6 effect on the dependent variable in the model before moving to a new step, it is as follows:

$$R = SSR\ (X1X6)/SST.....14$$

Then continue with the other steps until we reach the final model, which contains the independent variables with a moral effect on the dependent variable.

4. APPLIED ASPECT

The data was collected through the official website of the Statistics and Geographic Information Authority

Table (1) Data for the study

Production in tons	Affected area	Harvested area	Total Area	Governorate
773,411	1,712,145	2,032,568	3,744,713	Nineveh
480,155	12,262	616,989	629,251	Kirkuk

202,959	4,122	279,694	283,816	Diyala
261,260	2,639	371,763	374,402	Anbar
60,164	0	78,782	78,782	Baghdad
176,167	672	204,290	204,962	Babylon
112,910	283	127,384	127,667	Karbala
564,257	0	814,012	814,012	Wasit
558,076	0	649,201	649,201	Salads
190,337	1,013	221,366	222,379	Najaf
326,532	0	496,863	496,863	Qadisiyah
207,960	3,505	331,030	334,535	Muthanna
162,316	724	184,676	185,400	Dhi Qar
138,088	10,070	212,759	222,829	Maysan
33,134	106	50,932	51,038	Basra

The data was analyzed through the use of the statistical program SPSS.

Table (2) Correlation Relationships between Variables

Nature of the relationship	Production	Dependent variable / Independent variables	
The relationship is direct and medium by force	0.633	Spearman's correlation coefficient	Affected area
	0.000	Significance level	
The relationship is direct and excellent strength	0.908	Spearman's correlation coefficient	Harvested area
	0.000	Significance level	
The relationship is positive and good by force.	0.799	Spearman's correlation coefficient	Total Area
	0.000	Significance level	

The above table shows the correlation for each of the independent variables and the correlation relationship with the dependent variable, so the relationship of the affected area with the production was at the level of significance, whose value is (0.000), which is less than the value of the level of significance, which is (0.05), while the value of the Spearman test is equal to (0.633), which indicates a linear correlation between the affected area and production, and that the type of relationship is positive and medium forces, while the harvested area there was a linear correlation relationship between the harvested area The significance level of the test was (0.000), which is less than the level of morality of (0.05), while the value of the Spearman test was equal to (0.908), which is a positive relationship and excellent forces, while the total area was the results of the significance level (0.000), which is less than the value of the level of significance of (0.05), while the value of the Spearman test is equal to (0.799) Statistical analysis of it indicates that there is a positive relationship with production, which is very good for the forces

Impact test:

Table (3) Effect between variables under study

Production					
Sig	F	R2	R	B	
0.000	273.835	0.979	0.989	5847.360	Hard
				-1.158	Affected area
				.734	Total Area

The above table shows the value of R, which is the linear correlation between the variables, which is equal to its value (0.989), which is a strong correlation and is considered with a very high privilege power, and the value of R2, which is the coefficient of determination, is equal to (0.979), meaning that the independent variable explains 98% of the dependent variable, and the value of F is equal to (273.835) and since the value of SIG It is equal to 0.00, which is less than 0.05, which states that there are two variables that have an impact on the dependent variable (production), and the two variables are the affected arena and the total area, while the independent variable was excluded, the harvested area, as it does not affect the dependent variable (production), while the linear regression equation is equal.

$$\mathbf{Y = 5847.360 - 1.158X1 + 0.734\ X2}$$

It shows the negative relationship between the first independent variable (the affected area), where it was equal to (-1.158), meaning that the value of be in the affected area is

subtracted from the linear regression equation, i.e. the affected area is an adverse effect on production, while the second independent variable (total area) was the value in the linear regression equation equal to (0.734), meaning that it has a positive effect, i.e. any increase in units in the second independent variable is an increase of (0.734) on the intentional variable (production), while the variable was The third independent (harvested area) does not affect production, according to the statistical results.

The diagram below shows the distribution of the data under study through the drawing that shows where the curve of the chart is observed on the chart where it starts (from 2-3)

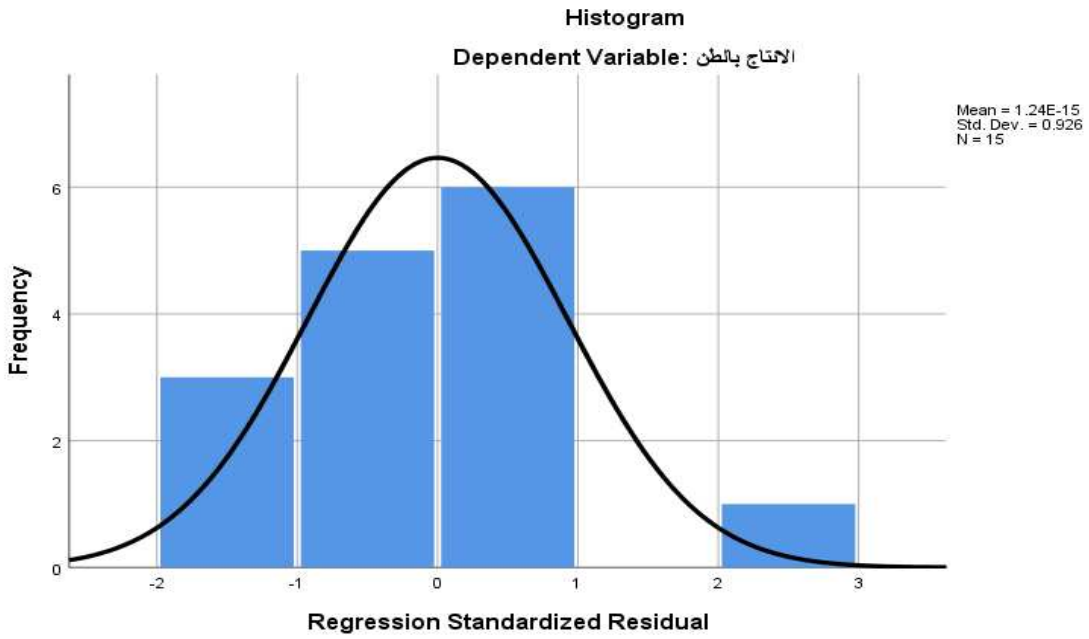

Figure (1) Normal distribution test scheme

The graph below shows the spread of data about the line of linear regression equation, which notes that the data are spread closely around the line, which indicates the convergence of independent variables with the dependent variable.

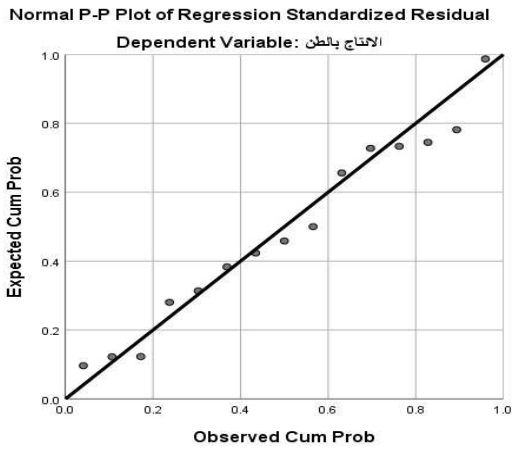

Chart (2) Diffusion of data about the line of regression equation

5. CONCLUSIONS AND PAPER FUTURE

After the data collection and analysis process was done statistically through the sequential regression method, and it was known which variables have an impact and which variables have no effect, as it was found that there are two variables included in the study, while there is a third variable that is not effective, as the study showed that the variables of the affected land and the total land are variables affecting the dependent variable (production), while the third variable (harvested land) is not affecting agricultural production, which must Those concerned work to focus on cultivated areas and work to improve the quantities produced through techniques or studied agricultural plans and suggested to researchers to conduct papers on the impact of modern technologies on agricultural production or foggy and the production process and other research that is concerned with agricultural production.

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