Plant Archives Vol. 19, Supplement 2, 2019 pp. 118-122 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

ECONOMIC ANALYSIS OF THE EFFECT SOIL SALINITY LEVELS ON WHEAT PRODUCTION IN THE IRRIGATED AREA (WASAIT GOVERNORATE : A CASE STUDY)

M.Z. Rijib and S.A. Nassr
Al-Mussaib Technical Institute, University of Al-Furat Al-Awsat Technical, 51009 Babylon, Iraq
Corresponding author: inm.mrn@atu.edu.iq (RIJIB), inm.sad22@atu.edu.iq (NASSR)

Abstract

This study deals with the estimation of the linear production function of the wheat farms in the irrigated area in order to determine the most important factors affecting the production. The variable (cultivated area, compost, pesticides, and salinity) in the land respectively indicated a negative sign. This indicates that the quantity obtained from the wheat crop was inversely proportional to the above-mentioned variables. This means that these resources were used more than needed and that these resources were used in the third stage of production, making their use uneconomical. Preliminary data were obtained from their field sources by relying on a random sample of wheat farmers that included (100) farms for the production season (2015-2016), In addition, the partial and total production elasticity was estimated at (0.15) for the land. This means that there is a decrease in the amount of return to capacity. The total productivity of the total resources used in cultivated land is 0.61. This indicates that the use of these resources in society or it was an efficient use.

Keywords: Production function, irrigated area, Soil Salinity

Introduction

Cereal crops are one of the most important agricultural products in the lives of peoples through the ages and civilizations. Every growth in human civilization was linked to human efficiency and ability to produce grain crops, especially wheat. Food has become an economic and political force and a weapon of the state against each other. Iraq is currently facing a food challenge of great importance and danger, and the most prominent features of water scarcity and lack of food production to provide the needs of the main food commodities, particularly grain, and wheat is one of the main grains on which the Iraqi people depend on food. Bread made of wheat contains a proportion of proteins ranging from (12% -17%), it also contains a percentage of starches ranging from 76% to 78% as well as a percentage of fat ranging from 1.2% to 1.5%, so the issue of the development and modernization of the agricultural sector is of exceptional importance because it is the sector responsible for providing the food requirements of the population as well as to provide the need for industry raw materials, which strengthens the trend towards conducting many research and studies to develop wheat production in Iraq and give great attention to identify the most important obstacles to address and develop appropriate policies to stimulate producers to increase production and provide the appropriate conditions and the necessary inputs to reach growth rates Expected For the wheat crop, in order to find the best solutions to address the problems and imbalances experienced by this sector, especially in the production of wheat. Iraq is a developing country with many production constraints. This is often due to the low yield of one durum of wheat in Iraq as a result of the use of production elements without economic criteria, in addition to the high levels of soil salinity and scarcity be The availability of economic resources such as seeds, fertilizers, control materials and pesticides, as well as the high costs of production or import from outside the country, which led to low production on the one hand and high production costs on the other, which requires the optimal use of these resources and work To increase production by raising the level of efficiency that contributes in one way or another to control the productivity of the crop.

The study of the optimal size of the farm under different types of irrigation in Saladin for the season (2001-2002) Estimation and analysis of the long-term cost functions of traditional wheat varieties of wheat (Ibba 99, Abu Ghraib). The statistical estimates of cultivar cultivars indicated that the cubic formula is the best form to represent the relation between total costs and production. All functions have been passed the statistical and standard tests and fulfilled the hypotheses of economic theory. In his study (Mohamed *et al*., 2006), (estimating the production functions and costs of wheat yield in Hawija province, Kirkuk Governorate). The sample included 60 farmers. The researchers used mathematical models in estimating both functions. The effect of the labour and capital elements in the quantity produced from the wheat crop was determined by the fact that the work component has a positive significance on increase in the produced quantities. The results showed that the quadratic formula gave the best results in estimating the cost function of the wheat crop. The total output was reduced by 676 kg/dunum, The researchers recommended that the need to replace labour instead of the capital and reducing the amount of fertilizer used in order to minimize production costs and increasing the level of production of the greatest profits.

An analytical study of the economics of wheat crop production in Wasit Governorate for the year 2008-2009 has been studied (Farhan *et al*., 2008). The objective of the study was to analyze the effect of the use of the elements of production (labour, land, capital) for the agricultural season 2008-2009, to determine the optimal levels of those resources, which would maximize profits according to the prices of those resources and sell prices of production. The

estimate of the efficiency of the use of resources indicates that there was a surplus in the used labour resource that exceeds the requirements for economic production. It was found that the optimum area of the land resource is 227, 27 dunums. The average area of the resource in the sample reached 112.2 dunums, they are less than the quantity available as for the capital resource, it was found that the optimum value was (132141) dinars, while the average value in the sample reached (82481) dinars, which is less than the optimum value. The optimum production reached 895.76 kg/dunum, more than that of (823) kg/dunum. Therefore it is better too working capital should be replaced by capital instead of work by increasing the use of mechanization in order to achieve economic efficiency which results in raising production to the optimum level.

According to (Segab, 2008), the economic costs of wheat production in Wasit Governorate has been studied based on a random sample of 151 farmers, shows that the variable production costs constitute 69.57 percent of the total costs, 997.025 kg / dunum. (Juffy,2009) study the production functions and their economic derivatives (average production, marginal production and elasticities), analysis of production costs and functions, estimating the general time trend, the civil hectic productivity of the costs and the maximization of profit, and the elasticity of production costs in the three production systems for producing the wheat crop (1.4), (2.8), and (3.4) tons, respectively, and the maximum productivity of about (1.56), (3.3) and (4.2) tons respectively, The cost elasticity was estimated at (1.27), (1.92) and (0.60) respectively. The results of the study showed that wheat production under the three production systems of the study subject is less than the optimum hectic productivity of each, Resources in wheat production According to the results derived from those estimates, especially the sustainable system, the agricultural inputs accounted for 17.2%, 43.6%, 45.3% of the total costs under the production systems mentioned and respectively.

(Al-Hiuly, Al igiely, 2009) studied of economic analysis for the production costs of the wheat crop in Rashidiya for the agricultural season (2007-2008). The study showed that the level of the gross profit reached (6003.85) Iraqi dinars, which is higher than the average (2554.5) ID, while the optimum product which achieves the low cost amounted to JD (4131.65), It is also higher than the average sample production. It is also shown that the elasticity of wheat supply is weak and this is a characteristic of agricultural crops whose production cannot be controlled. A study of (Al-Anbari *et al*., 2009), An experiment carried out in the laboratories of the Department of Life Sciences - Faculty of Science - University of Karbala, used three levels of saline water (2, 4, 8) Desmens / m, prepared using the water of the Husseiniya rarer, The seeds, according to the complete random design and three replicates during the winter season 2008-2009, to study the effect of saline water on the germination and growth of seedling, for five varieties of bread wheat (Iraq, Assyria, Abu Ghraib, Adenania, and 99) / Caused by a significant decrease in the height and dry weight of the broccoli and the root and the content of seedling leaves Of the chlorophyll and potassium, while the concentration of sodium increased, and recommended the study of the cultivation of the category of Assyria, there was a significant difference between it and other varieties, but from the research tables it became clear that after 15 days of agriculture were studied percentage of the germs and showed that the father 99 was the highest germination rate in The rate reached 74.68%.

The study of (Naser and al-Ukaili, 2012), which is the study of (The impact of the fragmentation of agricultural tenure on the cost and productivity of wheat crop in Baghdad governorate). It was found that the agricultural capacity does not prefer to be divided into agricultural holdings is less than the agricultural capacity, (7.75 - 12.5) hectares, because the division of property to less than (7.5) hectares, would decrease the economic efficiency of those farms. Studying of (Al-Abboudi, 2013), on the economics of wheat production in the province of Al-Hindi in Karbala Governorate find out that. The estimated production function is the double logarithmic function of Kubl Duklas, because it is more in line with economic logic, The variable cost contribution rate was 70.5% of total costs, which is higher than the 29.5% fixed cost contribution increasing capacity, and elasticity of production to work (0.755) and capital to about (0.248). The elasticity of replacement between human and capital hours (E = 3.004), wheat production is highly dense, and this is evident by the contribution of the cost items of the total costs since human working hours come first and then capital. The capital increase was JD (57.737) thousand dinars / dunum, and all categories achieved a return on the invested dinar at a rate of more than 2%. The period of capital recovery reached all categories the sample is less than 10 months. It is profitable for farmers to recover their amount in less than a year. The variable capital productivity was 3%, ie, it achieved a profit of 2% and for all categories. (Khalaf *et al*., 2012) studied the economic analysis of the production of wheat under sprinkler irrigation systems in Anbar Governorate.

The production function of Kop-Duklas was estimated by considering the quantities of production elements as explanatory variables as well as technical variables. The use of quantities of elements of production was on levels of the limits technical. The impact of the technological constant on the function was examined using one imaginary variable for each case of technical development. Followed by a change in production of 6.2% The amount of production elements which increase the productivity of dunums in the case of the restriction of the cost allocated for disbursement by (300) thousand dinars (39) riyals, (79) thousand dinars to buy fertilizer, (172) thousand dinars on the rest of the elements of production, including extinction and work And the rest of the production requirements, and in light of these levels, the productivity of each dunum increases as the level of technical (technological), and the study also showed that the contribution of fertilizers in production amounted to about (25%) and the number of riyals (13%), and capital Production components (up to 62%). (Hussein, 2014), studied the problem of salinity in the district of Abu al-Khasib, agricultural risks and ways to combat them. The researcher depends on a time series (1998 - 2010) to monitor the low productivity of agricultural crops and decrease the number of trees and their density in dunums, especially palms characterized by salt tolerance, and changing the crop structure of the region. The researcher has been another also tested 22 sites for selected salinity levels Elimination. The study found out that high levels of salinity have led to a significant deterioration in the productive capacity of agricultural land in the judiciary. High salinity rates form a

real danger and a direct threat to the future of plant production in the judiciary.

The objectives of this study are:

1. Determination of the production function to find the effect of each (cultivated area, seeds, mineral fertilizers, pesticides, handwork, manual work, and salinity) on the production of wheat by using the equation of linear regression.
2. Measuring the partial elasticity for all the variables involved in estimating the model and measuring the overall elasticity of the production function.
3. Measuring the capacity returns of the estimated production function.
4. The research assumes if there is a clear and direct effect of soil salinity levels on the estimated production function or not.

Materials and Methods

1. By using of Econometrics method to derive the relationship between the variables by multiplying the linear regression model between the production as the dependent variable (Yi) Dependent (variable) and the independent variables (Xi) (Independent Variables) which are:

A- Planted Area X1.

B - Seeds X2.

C - Urea fertilizer X3.

W- Compound fertilizer X4.

C- Pesticides 5X.

p- Manual work X6.

H- Handwork X7.

D - Salinity levels X8.

More than one model of the production function was tested, and the linear function was the most accepted in terms of that agreeing on the variables involved in the economic theory of the parameters, size, and achievement of the moral. The data were analyzed by the SPSS program to derive the relationship between the variables studied by the linear regression of the linear function:

$$Yi = Bo + Bi\ Xi + Ei$$

1. The partial elasticity of each of the independent variables (Xi) in the estimated model was estimated, and then the overall elasticity was estimated.
2. Capacity returns were calculated based on the results of the total elasticity estimation for both the production function in the reclaimed and non-reclaimed land.
3. Estimated the impact of productivity resources on total production.

Data Sources

The data were obtained through the field survey according to the questionnaire prepared for this purpose according to the class sampling method, which divided the society into homogeneous sections known as classes. A sub-random sample of which size is proportional to the size of the class was chosen. This method is called proportional specialization method (1) a questionnaire (100) farms for the wheat crop.

Analytical and Practical Aspect

The effect of all independent variables (Xi) on the wheat production in the region was measured

a Production is the dependent variable (Yi).

b The cultivated area, seeds, urea fertilizer, compound fertilizers, pesticides, mechanical work, handwork, and salinity levels are considered to be independent variables and represent by (Xi).

c (Ei) represent the residuals in equations.

Estimation of the Production Function

The linear model was estimated based on the independent variables and the dependent variables which were mentioned above, where more than one model of the production function was estimated and the linear model was adopted because it is better in terms of representation of the relationship between production and its components than the independent variables. In the estimation, this is one of the most applied methods in estimating the econometric model, because of its characteristics, including the efficiency of the volume of variance and non-bias (Sefo W. Ismail).

The estimated function took the following formula.

$$Y=b0+b1X1+b2X2+b3X3+b4X4+b5X5+b6X6+b7X7+b8 +Ei$$

X1: cultivated area (dunums)

X2: Seeds (kg / dunum)

X3: Urea fertilizer (kg / dunum)

X4: DAP fertilizer (kg / dunum)

X5: Pesticides (L / dunum)

X6: Hand work (worker / dunam)

X7: Manual work (hour / dunum)

X8: Salinity levels (dec/cm^3)

Ei: The random variable

Table 1 : Results of the estimation of the half - logarithmic production function in reclaimed land.

Icon	Estimated parameters of the function	Independent variables
C	24.212 (7.012)**	Constant
X1	-0.107 (-4.856)**	Area (x1)
X2	0.20 (10.347)**	Seed(x2)
X3	0.22 (3.059)*	Urea fertilizer (x3)
X4	-0.32 (-3.521)*	DAP fertilizer (X4)
X5	-0.60 (-0.647)	Pesticides(X5)
X6	0.15 (2.691)*	Hand Work (X6)
X7	0.49 (5.286)**	Manual Work (X7)
X8	-1.754 (-6.649)**	Salinity levels (X8)
	0.94	R^2
	0.93	$R^{\backslash 2}$
	1.57	D.W
	202.738	F*

- The figures between the brackets indicate the t-test values; - *, **, at the level of 0.05.0.01

Analysis of the Results Based on Table

It was found that the estimated model was acceptable and can be used in the interpretation of the studied function. The function was tested based on three standards statistical, economic and standard criteria. It was found that it did not suffer from any problems related to the second-degree problems, (R / 2) has the explanatory power of the estimated models (0.93). This means that 93% of the changes in the dependent variable result from the change in the independent variables, and that (7%) of the changes in the dependent variable is due to the random factors that were not included or because of their deletion from the estimated model. Moreover, the estimated parameters were signs and values consistent with the economic logic and statistically significant except for some variables included in the estimated function which were (areas, compound fertilizers, and pesticides) were significant except pesticides, but the importance of these variables have been decided not to exclude them from the estimated function. In the table (1) we find that the estimated parameter of the cultivated area (X1) was negative and reached (-0.107) and was significant at (0.01) The estimated value of the x3 fertilizer was positive (0.20) and was significant at (0.01). The estimated value of the parameter of urea fertilizer (X3) was positive (0.22) 0.01). The estimated value of the compound fertilizer parameter (X4) was negative (-0.32) and was significant (0.05). The estimated pesticide parameter (X5) was negative (0-0.6) The estimated parameter of the manual work (X6) was positive and was 0.15 and was significant at (0.05), while the value of the automatic work parameter (X7) was also positively positive (0.49) (0.05). The estimated parameter of the salinity levels (X8) was negative (-1.754) and was significant at (0.01) level but with a corresponding signal. The value of (d *) Derben Watson calculated (1.57), which is greater than the value of (dl) (1.35) and smaller than the value of du (1.74) at 0.01. This indicates that the wheat farmers were producing within the non-decisive decision area, which indicates the absence of the estimated model of the problem of self-association.

Estimation of Partial and Total Production Elasticity of the Estimated Production Function.

The estimated linear output function, which took the following form:

$$Y=24.212-0.107X1+0.20X2+0.22X3-0.32X4-0.60X5+0.15X6+0.49X7-1.754X8+Ei$$

$$Ep=Xi / Y^{\backslash}$$

Ep = Production elasticity

Xi = Estimated parameter

Y= arithmetic mean

After applying the equation above, the estimated function took the following form

$$Y=24.212 -0.04X1+0.08X2+0.08X3-0.12X4-0.24X5+0.60X6+0.19X7 –0.70X8 +Ei$$

The elasticity of production for the variable area (X1) was (-0.04). This indicates that the area allocated for growing the wheat crop was more than required The expansion of cultivating unplanned land has led to the use of this resource to the extent required (overused) and this resource is used in the third stage of production. This indicates that the increase in this production resource by 1% will lead to a decrease in production by 0.04%. The elasticity of production for the seed variable and urea fertilizer (X2, X3) (1%) will increase production by 0.08%, while the elasticity of production of the compound fertilizer variable (X4) is a negative value of (-0.12) and because it is smaller than (1) correct, this means that the use of this resource is in the third stage of production, and the increase of this production resource by 1% (0.12%), while the production elasticity of the pesticide variable (X5) was (-0.24). This indicates that the quantity allocated to control the crop has been more than required, so that the increase in the use of pesticides not studied to use this resource to the extent required (overused) And that this resource is used in the third phase of production, making it non-economic use. This indicates that the increase infv this production resource by (1%) will lead to a decrease in production by (0.24%). The elasticity of the production of the manual labour variable (X6) was 0.60 and the smaller than (1) the correct, this means that the use of this resource is in the second stage of production and that the increase of this productive resource by 1% (0.60%). The elasticity of production of the mechanical work variable (X7) (0.19) and that it is smaller than (1) correct, this means that the use of this resource is in the second phase of production, and the increase of this production resource by 1% will lead to an increase of production by 0.19%). The output elasticity of the variable salinity levels (X8) was a value of (-0.70), which indicates that the levels of salinity. The salinity found in cultivated land is of high levels, which led to the negative impact of the third phase of production. This indicates that increasing salinity levels by 1% will result in a decrease in production by 0.70%. The total elasticity of these variables, which is expressed by the elasticity of the total output of the estimated function, is found to be 0.15, which is less than the correct one. This means that there is a decrease in the amount of return to capacity. This means that the increase in all used resources by 1% will lead to a decrease in production by 0.15%. This means that the total production elasticity reflects the inability to increase production by increasing the productive resources used in equal proportions.

Estimating the Rate of Resource Production

In order to determine the productivity of each resource used and involved in the wheat production process, Table (2) was calculated showing the production rates of each resource used. The table is calculated according to the following equation:

Producer output rate = Gross output/quantity of resource used

Table 2. The rate of production of resources used in wheat production for reclaimed and reclaimed land

No	Resource	Producer production rate/Kg	Measuring unit
1	Cultivated area (dunums)	0.37	Kg / dunum
2	Seeds (kg / dunum	0.33	Kg / kg
3	Urea fertilizer (kg / dunum)	1.14	Kg / kg
4	DAP fertilizer (kg / dunum)	0.96	Kg / kg
5	Pesticides (L / dunum)	0.67	Kg / l
6	Handwork (worker/dunam)	0.52	Kg/hour
7	Manual work (hour/dunum	0.63	Kg/hour
8	Salinity levels	0.26	dec/cm^3
	Average	0.61	

Results and Discussion

A variable signal (cultivated area, compost, and pesticides) came with a negative signal. This indicates that the quantity obtained from the wheat crop was inversely proportional to the above variables, ie, that these resources were used more than required (overused) and that these resources were used in the third phase of production, making their use uneconomical. The total productivity of the total resources used in the cultivated land was (0.61). This indicates that the use of these resources in the form of a community or each of them was more efficient use in cultivated land. But it was without the optimal use of economic resources. The total production elasticity in the reclaimed land (0.15) is smaller than the correct one. This means that there is a decrease in the amount of return to capacity. This means that the increase in all used resources by 1% will lead to a decrease in production by 0.15%. This means that the total production elasticity does not reflect the possibility of increasing production by increasing the productive resources used in equal proportions. The study proved the validity of the hypothesis. Salinity had a clear and direct effect on the reduction of the total production of the wheat crop in the cultivated land for the sample of the study.

It was found that the estimated model is acceptable and can be used in interpreting the studied function. The estimated function was tested using three statistical, economic and standard criteria, and it was found to be free of second-class problems.)R/ 2(reflected the explanatory power of the estimated models), Which means that (93%) of the changes occurring in the dependent variable (output) is due to the change in the independent variables And that (7%) of the changes occurred due to random factors or because of the deletion of some variables of the estimated model, moreover, the estimated parameters were signals and values consistent with economic logic and significant statistical except for some variables included in the estimated function, which were (spaces and fertilizer Compound and pesticides) This is consistent with most of the previous studies mentioned in the reference review, especially the study of Al-Anbari *et al*., 2009, Khalaf *et al*., 2012, and Al-Abboudi, 2013, Reached by the study presented.

Recommendations

- Given the emergence of the signal space is negative that means that there is excessive use of this resource cannot be expanded, which became the marginal land, and this indicates that the land began to deteriorate and does not bear the characteristics of the reclaimed land
- Conducting laboratory tests to determine the level of soil salinity in cultivated land, and the extent of deterioration.
- Work on the maintenance of networks of Balzl whose unsustainable soil degradation and a high level of salinity, which leads to a decline in annual productivity.

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