ISSN: 2037-4445

Production of Winter Strategic Agricultural Crops in Iraq and the Factors Affecting Them for the Period (2004-2021) and Future Expectations for the Volume of their Production Until the Year (2031)

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Abstract

These crops suffer from fluctuation in the quantities of production, cultivated areas, and average yield productivity, especially after (2003), and this is due to many factors that affected the production of strategic winter agricultural crops (wheat and barley). Analytical and standard method for measuring production volume and estimating the production functions of strategic agricultural crops in Iraq for the period (2004-2021) , and future expectations for the volume of production of those crops, as this research dealt with two axes. The first axis included the reality of strategic agricultural crop production in Iraq and the factors affecting it for the period (2004-2021) As for the second axis, it dealt with estimating and measuring the functions of producing strategic agricultural crops in Iraq for the period (2004-2021) and their future expectations for the period (2022-2023), through the use of the standard model (Eveiws12) for a set of tests during which the researcher dealt with a quarterly series of (24) View based on official data and statistics issued by the relevant ministries. Where he used a set of standard methods and was the most important. Stability test (Extended Dickey-Fuller test, Phillips-Peyron test), cointegration test of the error-correction model, and the autoregressive distributed delay (ARDL) model test, so the results of this axis were the existence of a relationship between the quantities of production of strategic winter agricultural crops and the variables affecting them. As for future expectations, the study showed that the quantities of wheat production are heading towards an increase, while the barley crop is heading towards a decrease, which necessitated focusing on recommendations, the most important of which are: It is if we want to increase the volume of crop production, we have to control and control these factors now and in the future, in addition to the state's support for farms by providing agricultural production requirements and manufacturing them locally and preventing their import from abroad, and using modern and advanced methods of agricultural machinery and equipment that would raise the production of strategic agricultural crops winter.

the introduction:

The production of winter strategic agricultural crops (wheat and barley) is of great importance to the countries of the world as a major source of food for the population, as well as the employment of society in the agricultural sector represented by the labor force, whether they work in agriculture or who live in the countryside, as well as the economic profitability it provides for any country, except The lack of food for the community will lead to problems, whether in the past, present, or even the future, as well as an increase in imports in order to meet the population's food needs.

The importance of the research: The production of winter strategic agricultural crops is of great importance as the main source of food through what is provided from these crops to humans in terms of food and a necessary source of raw materials for the industrial sector. In order to obtain food and its current and future importance.

Research problem: The research problem is summarized in the following question: Is the production of strategic winter agricultural crops (wheat and barley) not enough to meet the local need, which leads to dependence on imports to fill the shortfall in this need?

Research hypothesis: The research stems from the hypothesis that the production of strategic winter agricultural crops in Iraq will be affected by many current and future factors or variables.

Research objectives: The study aims to: 1- Standing on the reality of the production of winter strategic agricultural crops in

Iraq for the period (2004-2021)

2- Clarifying the factors affecting the production of winter strategic agricultural crops

3- Estimating the production quantities of these crops until the year (2031).

search limits:

Temporal limits: The research deals with the production of strategic winter agricultural crops in Iraq for the period (2004-2021) and future expectations for their production until the year (2031).

Spatial boundaries: The study includes the production of strategic winter agricultural crops (wheat, barley) in Iraq.

Research Structure: First / the reality of the production of winter strategic agricultural crops and the factors affecting it in Iraq for the period (2004-2021)

Second/ estimating and measuring the functions of producing strategic agricultural crops in Iraq for the period (2004-2021) and their future projections for the period (2022-2031)

The first axis: the reality of the production of strategic winter agricultural crops (wheat, barley) and the factors affecting them in Iraq for the period (2004-2021)

The first requirement / the development of wheat production: the wheat crop is considered one of the oldest food crops and the first crop produced since nearly eight thousand years BC in the Middle East, and it is one of the grains that specializes in international trade because of its nutritional benefits due to the nutritional status of members of society This crop is considered one of the commodities for which demand is increasing globally, according to the economic systez .We will discuss the following:

1- The amount of production: It is noted in Table (1) that the amount of production witnessed a fluctuation of the wheat crop, and the fluctuation continued from the year (2004) until the year (2021).

2- Cultivated area: It is noted from Table No. (1) that the cultivated area witnessed a fluctuation from the year (2004) to the year (2021) due to the exodus of a lot of arable land that depends on rain from cultivation and the drying of agricultural land due to the scarcity of water.

3- Average Yield Productivity: The average yield of the wheat crop also fluctuated, as it was recorded for the same period due to government support for the agricultural sector on the one hand, or reliance on demi irrigation due to the lack of rain, and the decline in this productivity during the agricultural season on the other hand.

The second requirement / the development of the barley crop: This crop is one of the crops that has an essential nutritional value in production, especially as a healthy food, i.e. safe, and as a basic and excellent source of healthy food. across the countries, which was used at the time for world trade , The barley crop ranked fourth in the globally cultivated areas of strategic crops after wheat, rice and yellow corn We will discuss the following:

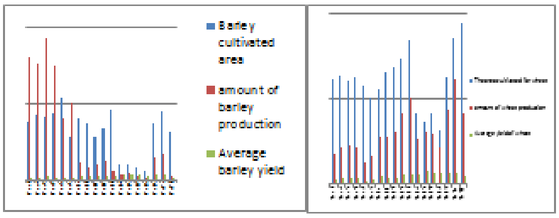
ISSN: 2037-4445

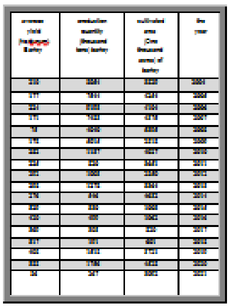
1- The amount of production: It is noted by those who found (1) that the quantities of the barley crop production in Iraq for the period (2004-2021) fluctuated due to the barley crop being affected by drought conditions, low water imports, low rainfall in the off-season and dust storms.

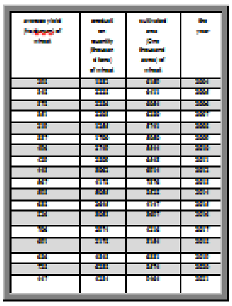
2- Cultivated area: Table No. (1) shows a variation in the cultivated area of the barley crop. The reason for this fluctuation is due to the decline in rainfall rates in Iraq. The decline is due to the fluctuation in the amounts of precipitation falling from year to year and the insufficient water share of the barley crop in Iraq.

3- Average yield: The average yield of barley also fluctuated due to drought conditions that afflicted some governorates, and the decline in barley production in most regions

Table and Figure No. (1) Production, cultivated area, and average yield of wheat and barley crops in Iraq for the period (2004-2021)







Source: From the researcher's work based on the data of Table No. (1).

The third requirement: the most important factors affecting the production of strategic winter agricultural crops (wheat and barley) in Iraq for the period (2004-2021).

1- Prices: It is noted from table (2), which shows the purchase prices of the two crops in Iraq. They are different prices from year to year in Iraq. This is due to the determination of the subsidized price by the government on the one hand, or because of the economic and political instability, which makes it difficult to determine a fixed price for it

2- Population growth: It is noted in Table No. (2). Population growth is one of the factors affecting wheat and barley through satisfying human needs The growing crops and the main driver of economic activity is the demand for the commodity, which is bought by the population

3- Temperature: These two crops are suitable for moderate climates, which tend to be cold and are not suitable for high temperatures.

4- Humidity: Wheat and barley crops are not suitable for cultivation in extreme humidity, because it leads to a decrease in the production of the two crops.

5- Rain: Wheat and barley depend on annual rainfall and the need for it during the agricultural season, but barley requires less rain than wheat.

6- Chemical fertilizers: The quantities of fertilizers do not cover these crops, and thus cause a decline in crop production

7- Tractors: There is a decline in the machinery attached to the tractors (such as tipper, disc, pesticide sprayer, etc.), and this leads to a decline in the crops and their production.

8- Harvesters: Harvesters contribute to raising their production and reduce costs, and any delay in harvesting them will affect them.

9- Cultivated area, production quantity, and average yield: The cultivated area, production quantities, and barley are among the factors affecting the two crops.

10- Agricultural labor: they do not need large labor forces in the case of providing agricultural mechanization, but in the event that it is not available, it requires agricultural workers

Table (2) factors affecting the production of wheat and barley crops in Iraq for the period (2004-2021)

the year	purchase price of wheat	Barley purchase prices	population	temperature	Humidity	rains	Fertilisers	tractors	Combines	agricultural labor force
2004	250	110	27139	177.1	101.7	3121.1	661.23	63717	6155	1229.00
2005	300	165	27963	143.8	42	3115.6	661.23	64427	6205	1266.00
2006	450	235	28810	192.7	138	5029.5	661.23	64676	6265	1304.00
2007	540	282	29682	194.9	125	2773.5	661.23	72775	8366	1343.00
2008	625	400	31895	186.6	130	2500.4	661.23	72775	8366	1443.00
2009	850	725	31664	185.8	131	2879.5	661.23	72814	8402	1452.00
2010	650	450	32490	198.5	165	2611.1	661.23	73194	4966	1467.00
2011	720	520	33338	180.4	170	2990.9	661.23	73585	5111	1461.00
2012	720	572	34208	187.9	174	3852.9	661.23	75493	5291	1504.00
2013	792	572	35096	128.4	141	4840.3	661.23	75534	5300	1558.00
2014	792	572	36005	48.9	43	4094.3	661.23	75547	5343	1583.00
2015	792	572	35213	104.8	81	2371.6	661.23	73898	6806	1623.20
2016	700	500	36169	103.2	78	1639.3	102.54	1546	352	1664.42

2017	**560**	**420**	**37140**	**147.1**	**75**	**2153**	**154.60**	**1574**	**352**	**1644.32**
2018	**560**	**420**	**38124**	**194.8**	**51**	**4303.5**	**167.42**	**910**	**141**	**1666.91**
2019	**560**	**420**	**39128**	**147.3**	**146**	**3372.6**	**278.399**	**660**	**194**	**1668.77**
2020	**560**	**420**	**40150**	**92.5**	**95**	**2476.7**	**116.97**	**661**	**194**	**1806.00**
2021	**610**	**470**	**41190**	**195.9**	**120**	**761.7**	**187.60**	**743.7**	**176.3**	**1713.89**

Source: From the researcher's work, based on the Ministry of Planning, Ministry of Transport, Ministry of Commerce, and the Arab Organization for Agricultural Development

The second axis: estimating and measuring the functions of the production of strategic winter agricultural crops in Iraq for the period (2004-2021) and their future expectations for the period (2022-2031)

The first requirement: characterization and formulation of the standard model: First, the wheat crop production function model in Iraq: model variables:

1- Independent Variables: It includes eleven variables and is divided into seasonal (quarterly) data, which are:

− - The amount of rain and symbolized by the symbol X7. − - Chemical fertilizers and symbolized by the symbol X8. − - Tractors and symbolized by the symbol X9. − Harvesters, denoted by the symbol X10. − - Agricultural labor force and symbolized by the symbol X1	− The cultivated area is denoted by the symbol X1. − The average yield is denoted by the symbol X2. − - Purchase prices and symbolized by the symbol X3. − - Population number, denoted by the symbol X4. − The average annual temperature is symbolized by the symbol X5. − - The average relative humidity is denoted by the symbol 6X

2- Dependent Variables: It includes the variable of the amount of wheat production and is symbolized by the symbol Y1

3- Random Vriabels: They are real, random variables that include other factors that did not appear in the model**.**

4- Dependent variables and symbolized by the symbol U1

5- The theoretical relationship between the model variables.: In order to determine the nature of the relationship between the model variables and to indicate the impact of the independent variables on the quantity of wheat crop production in Iraq. The ARDL model was used, and the double logarithmic formula was the best estimation formula. The general form of the model consists of the following equation:

$\Delta\gamma_1 = \alpha. + \sum\beta_1 \Delta y_{t-i} + \sum\theta_i \Delta X_{t-i} + \lambda_2 X_{t-i} + \eta_t$

Where: Y1: represents the logarithm of the quantity of wheat production, ■(α_0): represents the intersection limit vector (fixed term) ∅_(i ,): represents the short-term coefficients

λ_i: represents the long-term coefficients, η_t: represents the random variable, and according to economic theory and economic literature, the relationship between the amount of wheat production and the cultivated area is a direct relationship, as well as the other independent variables, and the value of the parameters is expected to be positive.

Second / the barley crop production function model in Iraq: 1- Model variables: Independent Variables: It includes eleven variables and is divided into seasonal (quarterly) data, which are:

- The amount of rain and symbolized by the symbol X7 − Chemical fertilizers and symbolized by the symbol X8. − - Tractors and symbolized by the symbol X9. − Harvesters, denoted by the symbol X10. − The agricultural labor force is symbolized by the symbol X11	− The cultivated area is denoted by the symbol X1. − The average yield is denoted by the symbol X2. − - Purchase prices and symbolized by the symbol X3. − - Population number, denoted by the symbol X4. − The average annual temperature is symbolized by the symbol X5. − - The average relative humidity is denoted by the symbol 6X −

2- Dependent Variables: It includes the variable of the amount of barley production and is symbolized by the symbol Y2

3- Random Vriabels: They are real random variables that include other factors that did not appear in the model but affect the dependent variables and are symbolized by the symbol U2.

4- The theoretical relationship between the variables of the model: in order to determine the nature of the relationship between the variables of the model and to indicate the impact of the independent variables on the quantity of barley crop production in Iraq. The ARDL model was used, and the double logarithmic formula was the best estimation formula. The general form of the model consists of the following equation:

$\Delta\gamma_2 = \alpha. + \sum\beta_1 \Delta y_{t-i} + \sum\theta_i \Delta X_{t-i} + \lambda_2 X_{t-i} + \eta_t$

Where: Y2: represents the logarithm of the amount of barley production, ■(α_0): represents the intersection limit vector (fixed term) ∅_(i ,): represents the short-term coefficients

λ_i: represents the long-run coefficients, η_t: represents the random variable

According to economic theory and economic literature, the natural relationship between the amount of barley production and the cultivated area is a direct relationship, as well as other independent variables. It is expected that the value of the parameters will be positive.

The second requirement: Estimating the functions of producing strategic agricultural crops in Iraq for the period (2004-2021).

First, the first model, estimating the wheat crop production function in Iraq: 1 Matrix of multiple correlation coefficients between variables

Table (3) shows the matrix of multiple correlation coefficients between variables. We find through the table that there is a positive correlation of varying strength between the quantity of wheat production, Y1, and between the cultivated area X1, the average yield X2, purchase prices X3, the population X4, and the size of the labor force X11. The highest positive correlation strength was with the population, as the correlation strength reached about 70%, and the lowest correlation with purchase prices, as the correlation coefficient reached about 22% This is because of the support provided by the government to buy the wheat crop from farmers.. While the correlation was negative between the amount of wheat production and between each of the annual averages of temperature X5, humidity X6, amount of rainfall X7, chemical fertilizers X8, tractors X9, and harvesters X10, where the highest negative correlation was with the average The annual temperature and less strong correlation with the amount of precipitation -0.3%. As for the association of other variables with each other, they were uneven in strength and direction

Table No. (3) Matrix of correlation coefficients between the variables of the first model for the wheat crop for the period (2004-2021)

	Y1	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Y1	1	0.635	0.591	0.224	0.704	-0.632	-0.092	-0.034	-0.435	-0.406	-0.565	0.684
X1	0.635	1	-0.227	-0.011	0.1842	-0.168	0.205	-0.012	0.1123	0.097	-0.005	0.0735
X2	0.5914	-0.227	1	0.2763	0.7349	-0.594	-0.358	-0.097	-0.725	-0.671	-0.776	0.8055
X3	0.2249	-0.011	0.2763	1	0.4145	-0.269	0.2406	-0.022	0.0808	0.1875	0.0792	0.4741
X4	0.7042	0.1842	0.7349	0.4145	1	-0.341	-0.113	-0.303	-0.759	-0.721	-0.799	0.9755
X5	-0.632	-0.168	-0.594	-0.269	-0.341	1	0.5555	-0.008	0.1875	0.1273	0.2167	-0.436
X6	-0.092	0.205	-0.358	0.2406	-0.113	0.5555	1	0.077	0.3357	0.3197	0.2429	-0.169
X7	-0.034	-0.012	-0.097	-0.022	-0.303	-0.008	0.077	1	0.4253	0.3923	0.2757	-0.321
X8	-0.435	0.1123	-0.725	0.0808	-0.759	0.1875	0.3357	0.4253	1	0.984	0.9312	-0.761
X9	-0.406	0.097	-0.671	0.1875	-0.721	0.1273	0.3197	0.3923	0.984	1	0.9334	-0.699
X10	-0.565	-0.005	-0.776	0.0792	-0.799	0.2167	0.2429	0.2757	0.9312	0.9334	1	-0.763
X11	0.6848	0.0735	0.8055	0.4741	0.9755	-0.436	-0.169	-0.321	-0.761	-0.699	-0.763	1

2- Stagnation tests for the model variables of the wheat crop: To estimate the standard model, conducting static tests for the model variables has become an imperative necessity to ensure that the variables are free from the unit root, which, if present, causes the emergence of the problem of false regression upon estimation. In addition, conducting static tests determines the degree of integration of the variables that Help define tests and models that are used to measure and estimate the relationship between variables. There are several tests used to detect the unit root problem, including the expanded Dickie-Fuller test and the Phelps-Peron PP test at different ranks.

3–The expanded Dickie Fuller test ADF: Table (4) shows the results of the ADF test for the variables of the first model at the level of significance 1%, 5% and 10%. Which means that it is static of the degree (I~0), and the same is the case with the variable area of cultivation (X1) and the variable amount of rainfall (X7), where they were static at the original level at a significant level of 1% with a constant presence where the probability value was less than 0.05. As for the variables X2, X3, X4, X5, X8, X11) did not achieve stillness at the level, but it stabilized after taking the first difference for it at all levels of significance and in the case of a constant presence only, where the probability value of these tests was less than 0.05 m.Which means it is an I~1 static. This confirms the acceptance of the null hypothesis, that is, the absence of a unit root for these variables, and they enjoy rest. And there were variables that did not settle at the level and the first difference, namely X10 (harvesters, tractors, X9, X6 humidity rate), but rather stabilized after taking the second difference, meaning that it is of degree (I~2) which indicates the existence of a problem in these variables, so it will be deleted from all models and limited to integrated variables of degree (I~0) and I~1

Table No. (4) Results of ADF dormancy test for the first model variables of wheat crop

	At Level												
		Y1	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
n stant	t-Statistic	-2.0462	-5.3347	-1.6247	-2.5773	-0.3392	-2.3721	-2.6456	-2.9834	-0.9814	-0.6131	-0.9159	-2.00
	Prob.	**0.2663**	**0.0010**	**0.4491**	**0.1166**	**0.8995**	**0.1633**	**0.1037**	**0.0480**	**0.7349**	**0.8431**	**0.7573**	**0.2**
		n0	***	n0	n0	n0	n0	n0	*	n0	n0	n0	n0
n stant rend	t-Statistic	-3.6612	-4.7460	-1.4288	-1.9759	-2.5191	-2.3228	-2.6431	-3.3158	-2.3101	-1.8786	-2.7400	-3.18
	Prob.	**0.0414**	**0.0109**	**0.8133**	**0.5723**	**0.3159**	**0.4013**	**0.2682**	**0.0991**	**0.4072**	**0.6212**	**0.2348**	**0.1**
		**	**	n0	n0	n0	n0	n0	*	n0	n0	n0	n0
hout stant rend	t-Statistic	-0.2728	0.1370	-0.1997	0.2552	5.4221	-0.4791	-0.7360	-1.0272	-1.1365	-1.0723	-1.1677	3.2
	Prob.	**0.5726**	**0.7128**	**0.5995**	**0.7481**	**1.0000**	**0.4929**	**0.3826**	**0.2613**	**0.2221**	**0.2447**	**0.2117**	**0.9**
		n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0
	At First Difference												
		d(Y1)	d(X1)	d(X2)	d(X3)	d(X4)	d(X5)	d(X6)	d(X7)	d(X8)	d(X9)	d(X10)	d(X
n stant	t-Statistic	-4.4294	-2.5565	-3.4828	-3.8429	-4.9341	-3.8770	-6.1173	-3.6467	-4.5935	-3.8414	-4.6280	-5.9
	Prob.	**0.0042**	**0.1259**	**0.0231**	**0.0116**	**0.0015**	**0.0109**	**0.1202**	**0.0190**	**0.0028**	**0.1116**	**0.1026**	**0.0**

		***	n0	**	**	***	**	n0	**	***	n0	n0	***
n stant rend	t-Statistic	-4.2443	-3.5830	-3.4720	-4.6485	-4.7546	-3.6980	-6.0459	-3.1534	-4.4924	-3.8449	-4.5612	-3.92
	Prob.	**0.0224**	**0.0642**	**0.0772**	**0.0104**	**0.0086**	**0.0531**	**0.3010**	**0.1357**	**0.0136**	**0.2414**	**0.2121**	**0.0**
		**	*	*	**	***	*	n0	n0	**	n0	n0	**
hout nstant rend	t-Statistic	-4.3845	-2.7742	-3.6366	-3.8353	-0.9573	-4.0666	-6.2972	-3.7806	-4.5157	-3.7862	-4.5697	-1.39
	Prob.	**0.0003**	**0.0096**	**0.0012**	**0.0008**	**0.2867**	**0.0005**	**0.2014**	**0.0010**	**0.0002**	**0.1109**	**0.2202**	**0.1**
		***	***	***	***	n0	***	n0	***	***	n0	n0	n0

Source: The researcher's work based on the results of the Eveiws12 program

4- Phillips-Perron Test: To confirm more and enhance the results of stillness, the PP test will be conducted on the time series of the variables, as in Table (5). We note from the results of the table above that the results of the PP test are identical to the results of the ADF test, and some of the variables were stationary at the level, namely (Y1, X1, X7) and others were stationary at the first difference, which are (X2, X3, X4, X5, X8, X11)). As for the variables (X10, X6, X9), they did not settle at the first level and difference, but they stabilized after taking the second difference to them. The rest of the variables can be illustrated as stated in Figure (2).

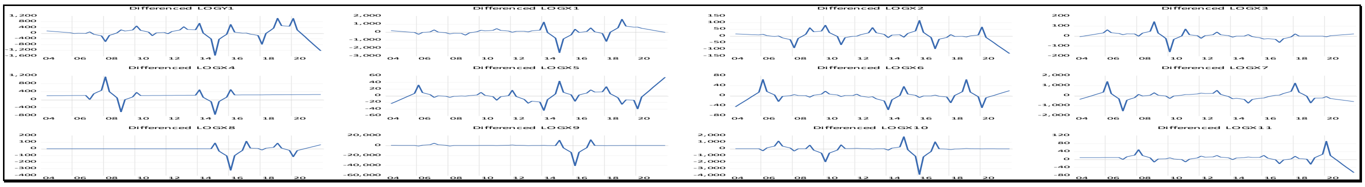
Table No. (5) the results of the PP test for dormancy for the first model variables of wheat crop

	At Level												
		Y1	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
n stant	t-Statistic	-1.9921	-1.7499	-1.5667	-2.6098	-0.2464	-2.4133	-2.6064	-1.8818	-0.9814	-0.6131	-0.9159	-2.1
	Prob.	**0.2870**	**0.3904**	**0.4770**	**0.1103**	**0.9145**	**0.1528**	**0.1109**	**0.3320**	**0.7349**	**0.8431**	**0.7573**	**0.2**
		n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0
n stant end	t-Statistic	-2.8188	-1.3998	-1.4720	-1.9660	-2.5074	-2.3724	-2.5844	-2.0798	-2.3101	-1.8935	-2.6398	-3.4
	Prob.	**0.2099**	**0.8227**	**0.7986**	**0.5773**	**0.3206**	**0.3785**	**0.2900**	**0.5197**	**0.4072**	**0.6138**	**0.2693**	**0.0**
		n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	*
hout stant end	t-Statistic	0.1609	0.1370	-0.1704	0.1911	6.8836	-0.1114	-0.5605	-0.9597	-1.1523	-1.0723	-1.1558	3.4
	Prob.	**0.7201**	**0.7128**	**0.6100**	**0.7292**	**1.0000**	**0.6307**	**0.4593**	**0.2876**	**0.2168**	**0.2447**	**0.2156**	**0.9**
		n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0	n0
	At First												

	Difference												
		d(Y1)	d(X1)	d(X2)	d(X3)	d(X4)	d(X5)	d(X6)	d(X7)	d(X8)	d(X9)	d(X10)	d(X
n stant	t-Statistic	-6.3544	-3.4698	-3.4302	-3.8580	-5.0321	-3.8510	-6.1173	-3.6391	-4.6363	-3.8410	-4.6838	-6.3
	Prob.	**0.0001**	**0.0236**	**0.0255**	**0.0113**	**0.0012**	**0.0114**	**0.2202**	**0.0171**	**0.0026**	**0.1116**	**0.2023**	**0.0**
		***	**	**	**	***	**	n0	**	***	n0	n0	***
n stant end	t-Statistic	-5.8036	-3.5827	-3.3717	-4.6485	-4.9236	-3.5981	-6.0459	-3.6967	-4.6878	-3.8402	-4.8081	-10.1
	Prob.	**0.0015**	**0.0643**	**0.0907**	**0.0104**	**0.0064**	**0.0627**	**0.1410**	**0.0532**	**0.0097**	**0.2417**	**0.3278**	**0.0**
		***	*	*	**	***	*	n0	*	***	n0	n0	***
out stant end	t-Statistic	-4.6506	-3.5432	-3.5655	-3.8449	-1.8325	-4.1466	-6.2972	-3.7212	-4.5157	-3.7862	-4.5697	-3.6
	Prob.	**0.0001**	**0.0015**	**0.0015**	**0.0008**	**0.0649**	**0.0004**	**0.2141**	**0.0010**	**0.0002**	**0.2109**	**0.1102**	**0.0**
		***	***	***	***	*	***	n0	***	***	n0	n0	***

Source: The researcher's work based on the results of the Eveiws12 program

Figure (2) Stagnation of model variables for wheat crop



Source: The researcher's work based on the results of the Eveiws12 program

5- C0-integration test: According to the results of the static tests, which showed that the variables were not static at the same rank, but rather some of them were static at the level and others at the first difference, so the Johanson test cannot be used because the variables are not static at the same rank and will be used Bounds Test within the ARDL model to test cointegration and detect the existence of a long-term equilibrium relationship between the variables. One of the conditions for applying this test is the possibility of testing with the similarity or difference of the degree of integration of the variables, provided that there is no static variable at the second difference. Table (6) indicates To the results of the cointegration test by applying the Bounds test

Table (6) Bounds test for co-integration for wheat crop

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

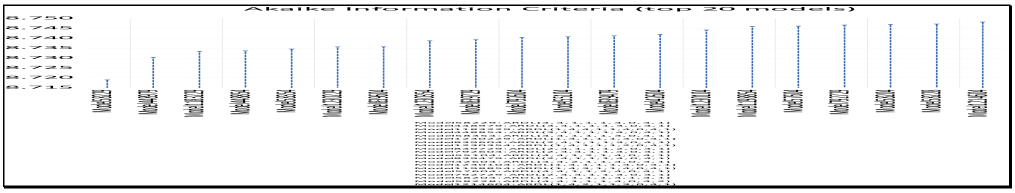
			Asymptotic: n=1000	
F-statistic	49.61018	10%	1.85	2.85
K	8	5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77
Actual Sample Size	68		Finite Sample: n=70	
		10%	-1	-1
		5%	-1	-1
		1%	-1	-1

Source: The researcher's work based on the results of the Eveiws12 program

We note from the above table that the calculated F-statistic value of 49.61018 was greater than the upper bounds of the tabular statistical value at all levels of significance, which means rejecting the null hypothesis and accepting the alternative hypothesis, which means the existence of a short and long-term equilibrium relationship between the variables of the model.

6- Estimating the ARDL model: Co-integration was tested according to the (ARDL) methodology through the Bound Test method developed by Pesaran et al (2001), as the Autoregressive model (AR) and the slowing periods models were combined. spreader. The estimated (ARDL) model is based on the independent variables represented by the cultivated area X1, average yield X2, purchase prices X3, population X4, annual average temperatures X5, amount of rainfall X7, chemical fertilizers X8, labor force X11, and quantity of wheat production Y1 as a dependent variable. The time lag period is (4, 4). , 1, 1, 1, 4, 0, 4, 1) respectively, based on the values of (Akaike) (AIC), which gives the lowest value for this criterion and is determined automatically by the program, as shown in Figure (3).

Figure (3) Optimum slowing periods for the wheat yield model



Source: The researcher's work based on the results of the Eveiws12 program

Table (7) shows the results of the ARDL model test for the wheat production function. It is clear from the statistical tests of the model the significance of these tests and the quality of the model estimated through the modified (R2) of (0.95), meaning that the independent variables explain about 95% of the changes in the amount of wheat production and 5% is Other variables not included in the model. In addition to the (F - Statistic) value of (15307.79) and a statistically significant level (0.0000). The value of D.W was about 1.9, which is a value close to 2, so we accept the null hypothesis (H0), that is, there is no problem of autocorrelation to the error limit in the estimator model

Table (7) results of the ARDL model for wheat production

Dependent Variable: LOGY1			
Method: ARDL			
LOGX5 LOGX7 LOGX8 LOGX11			
Selected Model: ARDL(4, 4, 1, 1, 1, 4, 0, 4, 1)			
R-squared	0.959909	Mean dependent var	3128.824
Adjusted R-squared	0.949844	S.D. dependent var	1304.893
S.E. of regression	16.31389	Akaike info criterion	8.718906
Sum squared resid	10379.57	Schwarz criterion	9.665460
Log likelihood	-267.4428	Hannan-Quinn criter.	9.093959
F-statistic	15307.79	Durbin-Watson stat	1.939804
Prob(F-statistic)	0.000000		

Source: The researcher's work based on the results of the Eveiws12 program

7- Error correction model ECM according to the ARDL methodology: Table (8) shows the results of estimating the impact of production factors on the quantity of wheat production. We note that the error correction coefficient is negative and significant, meaning that it met the acceptance conditions. Where its value amounted to about (-0.341207), which reflects the existence of a long-term equilibrium relationship between the amount of wheat production on the one hand, and the independent variables on the other hand. That is, about 34% of the errors in the short term can be corrected and re-adapted in the long term, meaning that the time required to return to the long-term equilibrium is about 2.94, or about three seasons, to enhance the quantity of production and return it to the long-term equilibrium position. This confirms the acceptance of the alternative hypothesis, which states that there is a equilibrium relationship in the short term.

Table (8) ECM model results for wheat crop production

ARDL Error Correction Regression				
Dependent Variable: D(LOGY1)				
ECM Regression				
Case 2: Restricted Constant and No Trend				
CointEq(-1)*	-0.341207	0.013808	-24.71006	0.0000
R-squared	0.959161	Mean dependent var		8.768842
Adjusted R-squared	0.948829	S.D. dependent var		429.6579
S.E. of regression	14.70514	Akaike info criterion		8.454200
Sum squared resid	10379.57	Schwarz criterion		9.106996

Log likelihood	-267.4428	Hannan-Quinn criter.		8.712858
Durbin-Watson stat	1.939804			
* p-value incompatible with t-Bounds distribution.				

Source: The researcher's work based on the results of the Eveiws12 program

As for the long-term parameters in their logarithmic form and as illustrated by the equation below, they indicate that the most important factors affecting wheat production are labor force in agriculture X11 and average yield X2, where the elasticity of production indicates that an increase of these two factors by 1% leads to an increase in the amount of production by (6.55% and 6.55%). 4.75) respectively, and this indicates that agriculture in Iraq is labor-intensive and has horizontal expansion and still relies on the labor force to a large extent and has not used technological development in agriculture. Then comes the chemical fertilizers, the cultivated area, the purchase prices, and the amount of rainfall, as they were flexible towards these factors (0.482, 0.483, 0.13, and 0.025)Respectively, these results were consistent with the economic logic of the impact of these factors on the quantity of production. As for the effect of the population and the annual rate of temperature, it had a negative response of about (-0.22, -3.8), respectively, meaning that an increase in population by 1% leads to a decrease in wheat production by 22% and the average temperature by 38%. All variables were significant as the probability value was less than 0.05

LOGY1 = (0.4825*LOGX1 + 4.7550*LOGX2 + 0.1322*LOGX3 -0.2234

*LOGX4 -3.8073*LOGX5 + 0.0254*LOGX7 + 0.4839*LOGX8 + 6.5522

*LOGX11 - 4540.6701)

8- Diagnostic tests of the model: Testing the autocorrelation problem

The results showed that the estimated model is free from the autocorrelation problem in terms of the LM test, as the value of Prob. Chi - square (0.0728) as shown in Table (9) which is greater than (0.05), i.e. we accept the null hypothesis which states that the residuals are not self-correlated**.**

Table (9) LM test for wheat yield

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	1.544997	Prob. F(2,37)	0.2268
Obs*R-squared	5.241196	Prob. Chi-Square(2)	0.0728

Source: The researcher's work based on the results of the Eveiws12 program

9- Instability of variance homogeneity: To ensure that the residuals do not suffer from the problem of instability of variance, we find that the value of Prob. Chi - square for the ARCH test, it amounted to (0.6422), which is greater than 5%, and accordingly we accept the null hypothesis that the residuals are homogeneous and that they do not contain the problem of inhomogeneity of variance.

Table (10) Breusch test for wheat yield

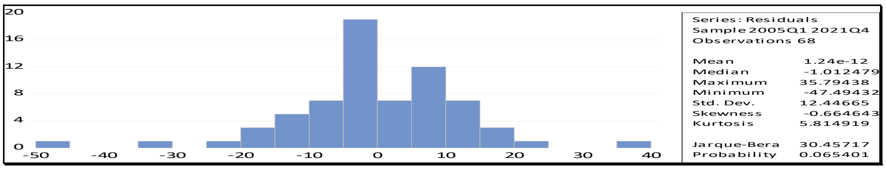
Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity			
F-statistic	0.796294	Prob. F(28,39)	0.7329
Obs*R-squared	24.73469	Prob. Chi-Square(28)	0.6422
Scaled explained SS	19.58740	Prob. Chi-Square(28)	0.8790

Source: The researcher's work based on the results of the Eveiws12 program

10- Normal distribution We notice from table (11) that the probability value of the Jarque-era test was (0.0654), which is greater than 5%, which means that the random variable follows a normal distribution and there is no problem in the model.

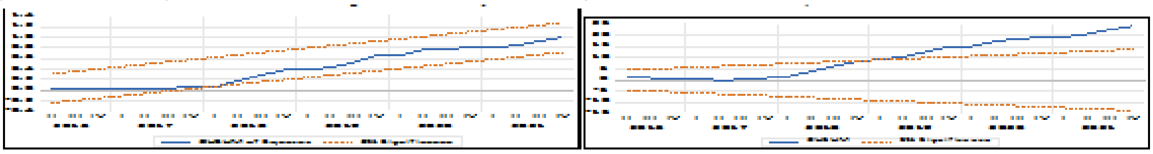
Table (11) test the normal distribution of wheat crop



Source: The researcher's work based on the results of the Eveiws12 program

11- The stability of the series of residuals: We notice from Figure (4) that the test of the cumulative sum of the squares of the residuals (CUSUM) and the test of the cumulative sum of squares of the residuals (SUSUMSQ) that they fall within the limits of stability, which means the stability of the residuals and thus the quality of the results of the ARDL model.

Figure 4: Stability of the residual series of wheat crop



Source: The researcher's work based on the results of the Eveiws12 program

Second: The second model is to estimate the function of barley production in Iraq: 1- Matrix of multiple correlation coefficients between variables

Table (12) shows the matrix of multiple correlation coefficients between variables. We find through the table that there is a positive correlation of varying strength between the amount of barley production, Y2, and each of the cultivated area X1, the annual rate of temperature X5, humidity X6, the amount of rain X7, chemical fertilizers X8, tractors X10 X9, and harvesters. The highest positive correlation strength was with the number of harvesters, as the correlation strength was about 57%And less correlated with the rate of humidity, as the correlation coefficient was about 0.3%.. While the correlation was negative between the quantity of barley production and between each of the average yield X2, purchase prices X3, population X4, and the size of the labor force X11, where the highest negative correlation was with purchase prices and the least strong correlation with average Yield -44%. As for the association of other variables with each other, they were uneven in strength and direction

Table No. (12) Matrix of correlation coefficients between the variables of the second model for the barley crop for the period (2004-2021)

	Y2	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Y2	1	0.476	-0.44	-0.683	-0.829	0.3132	0.0295	0.2651	0.4675	0.3918	0.5799	-0.826
X1	0.476	1	-0.43	-0.311	-0.362	0.0046	0.2764	0.1803	0.4734	0.4376	0.444	-0.406
X2	-0.44	-0.43	1	0.1889	0.4314	-0.555	-0.17	0.1596	-0.486	-0.442	-0.561	0.5462
X3	-0.683	-0.311	0.1889	1	0.5036	-0.225	0.1986	-0.073	-0.032	0.0603	-0.04	0.5463
X4	-0.829	-0.362	0.4314	0.5036	1	-0.319	-0.108	-0.296	-0.752	-0.716	-0.794	0.9696
X5	0.3132	0.0046	-0.555	-0.225	-0.319	1	0.5625	-0.032	0.1853	0.1147	0.1991	-0.436
X6	0.0295	0.2764	-0.17	0.1986	-0.108	0.5625	1	0.0732	0.3238	0.3033	0.2285	-0.172
X7	0.2651	0.1803	0.1596	-0.073	-0.296	-0.032	0.0732	1	0.4104	0.3826	0.266	-0.303
X8	0.4675	0.4734	-0.486	-0.032	-0.752	0.1853	0.3238	0.4104	1	0.9823	0.928	-0.757
X9	0.3918	0.4376	-0.442	0.0603	-0.716	0.1147	0.3033	0.3826	0.9823	1	0.9322	-0.693
X10	0.5799	0.444	-0.561	-0.04	-0.794	0.1991	0.2285	0.266	0.928	0.9322	1	-0.754
X11	-0.826	-0.406	0.5462	0.5463	0.9696	-0.436	-0.172	-0.303	-0.757	-0.693	-0.754	1

The source is from the researcher's work based on the results of the Eveiws12 program

Unit root tests for the variables of the second model for the barley crop:

1- The expanded Dickie Fuller test ADF: Table (13) shows the results of the ADF test for the first model variables at the level of significance 1%, 5% and 10%, and we note that the dependent variable the amount of barley production (Y2) was static at the level without a categorical and time trend and at a level of significance 5 %, which means that it is inhabitant of the degree (I~0). As for the variables X1, the cultivated area X2, average yields X2, and purchase prices X3 It did not achieve stillness at the level, but it stabilized after taking the first difference for it at all levels of significance and in the case of a constant presence only, where the probability value of these tests was less than 0.05 m. Which means it is an I~1 static. This confirms the acceptance of the null hypothesis, that is, the absence of a unit root for these variables, and they enjoy rest. As for the variables from (X4-X11), they are identical to the results of what came in the first model, so we chose not to repeat the results. The integral variables of degree (I~0) and I~1) will be confined.

2- Phillips-Perron Test

To be more sure and to enhance the results of static, the PP test will be performed on the time series of the variables, as shown in Table (14). We note from the results of the above table that the results of the PP test are identical to the results of the ADF test. The rest of the variables can be illustrated as stated in Figure (5)

Table No. (13) Results of the ADF dormancy test for the variables of the second model of the barley crop

	At Level				
		Y2	X1	X2	X3
With Constant	t-Statistic	-1.5986	-2.3581	-1.7876	-2.5272
	Prob.	**0.4603**	**0.1669**	**0.3705**	**0.1268**
		n0	n0	n0	n0
With Constant & Trend	t-Statistic	-1.1106	-3.2920	-0.4715	-2.1099
	Prob.	**0.8943**	**0.1080**	**0.9706**	**0.5045**
		n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-2.2055	-0.9830	-0.5347	-0.0403
	Prob.	**0.0304**	**0.2784**	**0.4668**	**0.6551**
		**	n0	n0	n0
	At First Difference				
		d(Y2)	d(X1)	d(X2)	d(X3)
With Constant	t-Statistic	-4.5110	-4.7893	-3.7360	-4.8220
	Prob.	**0.0032**	**0.0019**	**0.0151**	**0.0018**
		***	***	**	***
With Constant & Trend	t-Statistic	-4.6713	-4.6573	-3.5202	-5.2449
	Prob.	**0.0099**	**0.0102**	**0.0737**	**0.0037**
		***	**	*	***
Without Constant & Trend	t-Statistic	-4.2076	-4.9600	-3.9962	-4.8225
	Prob.	**0.0003**	**0.0001**	**0.0006**	**0.0001**
		***	***	***	***

Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

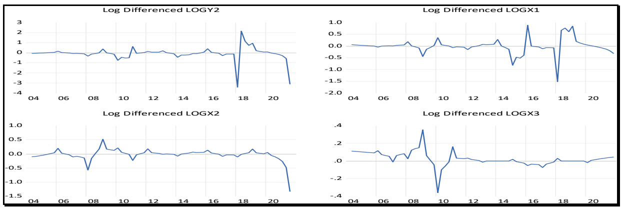
*MacKinnon (1996) one-sided p-values.

Source: The researcher's work based on the results of the Eveiws12 program

Table No. (14) the results of the PP test for dormancy for the variables of the second model for the barley crop Figure (5) Stagnation of the variables of the second model for the barley crop

	At Level				
		Y2	X1	X2	X3
With Constant	t-Statistic	-1.6180	-2.3556	-1.7865	-2.5967
	Prob.	**0.4523**	**0.1676**	**0.3738**	**0.1128**
		n0	n0	n0	n0
With Constant & Trend	t-Statistic	-1.4705	-2.6851	-1.5262	-1.9730
	Prob.	**0.7991**	**0.2533**	**0.7787**	**0.5738**
		n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-2.6746	-0.7683	-0.8216	0.1179

	Prob.	**0.0108**	**0.3684**	**0.3452**	**0.7068**
		**	n0	n0	n0
	At First Difference				
		d(Y2)	d(X1)	d(X2)	d(X3)
With Constant	t-Statistic	-4.5110	-5.7961	-1.9111	-4.8370
	Prob.	**0.0032**	**0.0003**	**0.3192**	**0.0018**
		***	***	n0	***
With Constant & Trend	t-Statistic	-5.3558	-5.7108	-0.6770	-7.1256
	Prob.	**0.0031**	**0.0017**	**0.9568**	**0.0002**
		***	***	n0	***
Without Constant & Trend	t-Statistic	-4.2062	-5.9743	-2.0379	-4.8225
	Prob.	**0.0003**	**0.0000**	**0.0431**	**0.0001**



Source: The researcher's work based on the results of the Eveiws12 program

3- C0-integration test: According to the results of the static tests, which showed that the variables were not static at the same rank, but some were static at the level and others at the first difference, so the Johanson test cannot be used because the condition of the static variables at the same rank is not available and will be used Bounds Test within the ARDL model to test cointegration and detect the existence of a long-term equilibrium relationship between variables. One of the conditions for applying this test is the possibility of testing with the similarity or difference of the degree of integration of variables, provided that there is no static variable at the second difference. The table indicates (15)To the results of the cointegration test by applying the Bounds test. We note from the above table that the value of the calculated F-statistic value of 27.88403 was greater than the upper limits of the tabular statistical value and at all levels of significance, which means rejecting the null hypothesis and accepting the alternative hypothesis, which means the existence of a short and long-term equilibrium relationship between the variables of the model.

Table (15) Bounds test for co-integration for barley crop

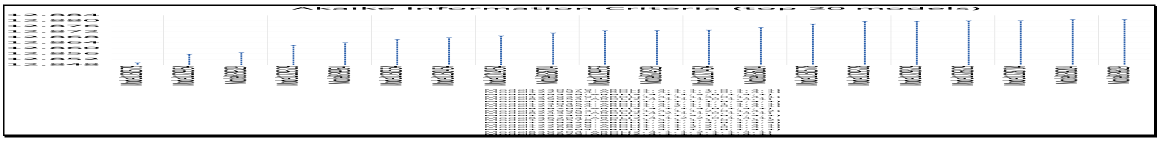
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	27.88403	10%	1.85	2.85
K	8	5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77
Actual Sample Size	68		Finite Sample: n=70	

		10%	-1	-1
		5%	-1	-1
		1%	-1	-1

Source: The researcher's work based on the results of the Eveiws12 program

4- Estimating the ARDL model: Cointegration was tested according to the (ARDL) methodology through the Bound Test method developed by Pesaran et al (2001), as the Autoregressive model (AR) and the slowing periods models were combined. spreader. The estimated (ARDL) model is based on the independent variables represented by the cultivated area X1, average yields X2, purchase prices X3, population X4, average annual temperatures X5, amount of rainfall X7, chemical fertilizers X8, labor force X11, and the amount of barley production Y2 as a dependent variable. And the time lag time is (1, 4, 1, 1, 1, 0, 1, 4, 1) respectively based on the values of (Akaike) (AIC), which gives the lowest value for this criterion and is determined automatically by the program, as shown in the figure (6)

Figure (6) Optimum slowing periods of the model for barley crop



Source: The researcher's work based on the results of the Eveiws12 program

Table (16) shows the results of the ARDL model test for the barley production function. It is clear from the statistical tests of the model the significance of these tests and the quality of the model estimated through the modified (R2) of (0.93), meaning that the independent variables explain about 93% of the changes in the amount of wheat production, and 7% is Other variables not included in the model. In addition to the (F - Statistic) value of (1518.815) and a statistically significant level (0.0000). The value of D.W was about 1.8, which is a value close to 2, so we accept the null hypothesis (H0), that is, there is no problem of autocorrelation to the error limit in the estimator model.

Table (16) results of the ARDL model for barley production

Dependent Variable: LOGY2			
Dynamic regressors (4 lags, automatic): LOGX1 LOGX2 LOGX3 LOGX4			
LOGX5 LOGX7 LOGX8 LOGX11			
R-squared	0.938655	Mean dependent var	2524.882
Adjusted R-squared	0.927998	S.D. dependent var	2923.761
S.E. of regression	130.8348	Akaike info criterion	12.84937
Sum squared resid	770298.2	Schwarz criterion	13.60009
Log likelihood	-413.8787	Hannan-Quinn criter.	13.14683
F-statistic	1518.815	Durbin-Watson stat	1.859363
Prob(F-statistic)	0.000000		

Source: The researcher's work based on the results of the Eveiws12 program

5- Error correction model ECM according to the ARDL methodology: Table (17) shows the results of estimating the impact of production factors on the quantity of barley production. We note that the error correction coefficient is negative and significant, meaning that it met the acceptance conditions. Where its value was about (-0.300362), which reflects the existence of a long-term equilibrium relationship between the amount of barley production on the one hand and the independent variables on the other hand. That is, about 30% of the errors in the short term can be corrected and re-adapted in the long term, meaning that the time required to return to the long-term equilibrium is about 3.33, or about three seasons, to enhance the quantity of production and return it to the long-term equilibrium position. This confirms the acceptance of the alternative hypothesis, which states that there is a equilibrium relationship in the short term**.**

Table (17) ECM model results for barley production

ARDL Error Correction Regression				
Dependent Variable: D(LOGY2)				
Selected Model: ARDL(1, 4, 1, 1, 1, 0, 1, 4, 1)				
ECM Regression				
Case 2: Restricted Constant and No Trend				
CointEq(-1)*	-0.300362	1.98E-05	-18.29230	0.0000
R-squared	0.938492	Mean dependent var		-120.5083
Adjusted R-squared	0.928500	S.D. dependent var		526.2924
S.E. of regression	119.4353	Akaike info criterion		12.58467
Sum squared resid	770298.2	Schwarz criterion		13.04162
Log likelihood	-413.8787	Hannan-Quinn criter.		12.76573
Durbin-Watson stat	1.859363			

Source: The researcher's work based on the results of the Eveiws12 program

As for the long-run parameters in their logarithmic form and as illustrated by the equation below, they indicate that the most important factors affecting barley production are the average yield X2 and the population X4, where the elasticity of production indicates that an increase of these two factors by 1% leads to an increase in the amount of production by (750 and 722) over respectively, that is, there is an increase in yield and a significant impact of the population increase on barley production. Then comes in second place the chemical fertilizers X8 and the cultivated area X1, as they are highly flexible towards these factors (109 and 20)Respectively, these results were consistent with the economic logic of the impact of these factors on the quantity of production. As for the effect of purchase prices, it was negative, as the increase in the purchase price of one ton of barley leads to a decrease in the quantity of its production to (439.0), which indicates that despite the price support, the current price level does not cover the costs of barley production, which leads to a decrease in its production. The annual rate of temperature, the amount of precipitation, and the labor force had a negative impact as well. The response rate was about (-334.9, -30.1, -149.14), respectively, meaning that an increase in population by 1% leads to a decrease in wheat production by 22%, and the average temperature by 38%. All variables were significant as the probability value was less than 0.05

LOGY2 = (20.61722*LOGX1 + 750.53297*LOGX2 -439.91826*LOGX3 +

722.8666*LOGX4 -334.92084*LOGX5 -30.1605*LOGX7 + 109.19609

*LOGX8 -149.147043*LOGX11 - 2221.9266510)

6- Diagnostic tests of the model: 1- Autocorrelation problem test: The results showed that the estimated model is free from the autocorrelation problem in terms of the LM Test, as the value of Prob. Chi - square (0.3530) as shown in Table (18) which is greater than (0.05), i.e. we accept the null hypothesis which states that the residuals are not self-correlated.

Table (18) LM test for barley yield

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.679218	Prob. F(2,43)	0.5124
Obs*R-squared	2.082438	Prob. Chi-Square(2)	0.3530

Source: The researcher's work based on the results of the Eveiws12 program

2- Instability of variance homogeneity: To make sure that the residuals do not suffer from the problem of instability of variance in Table (19), we find that the value of Prob. Chi - square for the ARCH test, it reached (0.3642), which is greater than 5%, and accordingly we accept the null hypothesis that the residuals are homogeneous and that they do not contain the problem of inhomogeneity of variance.

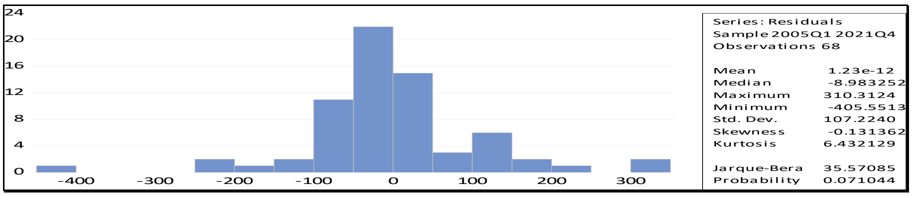
Table (19) Breusch test for barley yield

Heteroskedasticity Test: ARCH			
F-statistic	0.808644	Prob. F(1,65)	0.3718
Obs*R-squared	0.823283	Prob. Chi-Square(1)	0.3642

Source: The researcher's work based on the results of the Eveiws12 program

3- Normal distribution: We note from Table (20) that the probability value of the Jarque-era test was (0.071), which is greater than 5%, which means that the random variable follows the normal distribution and there is no problem of non-normal distribution.

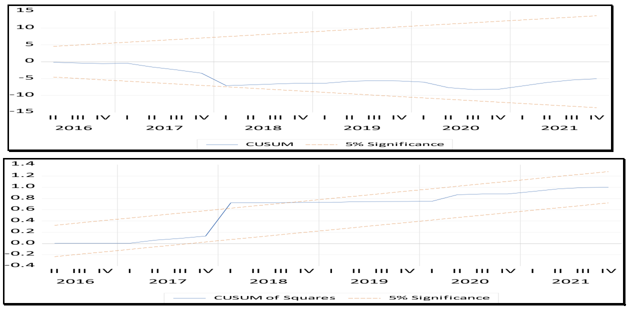
Table (20) test for the normal distribution of barley crop



Source: The researcher's work based on the results of the Eveiws12 program

44- Stability of Residual Series: We notice from Figure (7) that the cumulative sum of squares test (CUSUM) and the cumulative sum of squares test (SUSUMSQ) that they fall within the limits of stability, which means the stability of the residuals and thus the quality of the results of the ARDL model.

Figure (7) Stability of the residual series of the barley crop



Source: The researcher's work based on the results of the Eveiws12 program

Third: Predicting future expectations for the production of strategic agricultural crops in Iraq for the period (2022-2031)

1- Forecasting the wheat production function for the period (2022-2031): We note table (21), which shows that there is a general trend for wheat production during the expected period, heading towards an increase, at a compound annual growth rate of about (11.22%).

2- Forecasting the barley production function for the period (2022-2031): We note in Table (22), which shows that there is a general trend for barley production during the expected period, heading towards a decline, at a compound annual growth rate of about (-6.991%).

Table (21) The expected production quantity of the wheat crop for the period (2022-2031) Table (22) The expected production quantity of the barley crop for the period (2022-2031)

the years	**Amount of wheat production (thousand tons)**	**the years**	**Amount of wheat production (thousand tons)(**	**the years**	**Quantity of barley production (thousand tons)**	**the years**	**Quantity of barley production (thousand tons)**
2022Q1	1282.562	2027Q1	39302.85	2022Q1	1560.583	2027Q1	176.5698
2022Q2	181.1725	2027Q2	41822.98	2022Q2	1487.518	2027Q2	140.5735
2022Q3	1747.487	2027Q3	44383.61	2022Q3	1410.408	2027Q3	108.1665
2022Q4	3394.356	2027Q4	46984.06	2022Q4	1329.819	2027Q4	79.19149
2023Q1	5107.601	2028Q1	49623.69	2023Q1	1246.401	2028Q1	53.47228
2023Q2	6876.284	2028Q2	52301.89	2023Q2	1161.435	2028Q2	30.81352
2023Q3	8696.753	2028Q3	55018.08	2023Q3	1076.156	2028Q3	11.00464
2023Q4	10567.88	2028Q4	57771.74	2023Q4	991.7804	2028Q4	6.174382
2024Q1	12490.32	2029Q1	60562.34	2024Q1	909.1803	2029Q1	20.94751

2024Q2	14464.21	2029Q2	63389.42	2024Q2	828.9667	2029Q2	33.53862
2024Q3	16489.09	2029Q3	66252.53	2024Q3	751.5105	2029Q3	44.16942
2024Q4	18563.79	2029Q4	69151.25	2024Q4	677.0937	2029Q4	53.05856
2025Q1	20686.94	2030Q1	72085.21	2025Q1	605.9671	2030Q1	60.42107
2025Q2	22857.25	2030Q2	75054.05	2025Q2	538.3899	2030Q2	66.46749
2025Q3	25073.73	2030Q3	78057.46	2025Q3	474.6012	2030Q3	71.4024
2025Q4	27335.58	2030Q4	81095.12	2025Q4	414.7891	2030Q4	75.42276
2026Q1	29642.18	2031Q1	84166.77	2026Q1	359.0606	2031Q1	78.71618
2026Q2	31992.89	2031Q2	87272.15	2026Q2	307.4397	2031Q2	81.45963
2026Q3	34387.06	2031Q3	90411.02	2026Q3	259.8815	2031Q3	83.81858
2026Q4	36823.96	2031Q4	93583.17	2026Q4	216.2963	2031Q4	85.94655
compound annual growth rate	11.32			compound annual growth rate	-6.991%		

Source: The researcher's work based on the results of the Eveiws12 program

conclusions

1- The production of strategic agricultural crops in Iraq has been affected by many factors, whether by increase or decrease, which are natural, economic and technological factors.

2- Through future projections for the production of strategic agricultural crops, the results showed that the quantities of wheat production tend to rise, with an annual growth rate of 11.22%. As for the quantities of barley production, the results showed that they tend to decrease, with an annual growth rate of -6.991%.

Recommendations

1- The need to control and control the factors that affected the production of strategic agricultural crops, whether they are present or in the future

2- Increasing state support for winter strategic agricultural crops because they are linked to food security and sustainable development to ensure that the actual need for food commodities from these crops is met in line with the population increase.

References

1. Abd al-Hussein Nuri al-Hakim, Studies in Iraqi Agriculture, Future Agriculture, Dar al-Kutub and Documents, first edition, Baghdad, 2013
2. Abd al-Razzaq Hamad Hussein, Huda Raad Hashem, Measurement and Analysis of the Demand Function for the Wheat Crop in Iraq for the Period (2004-2018), Tikrit Journal of Administrative and Economic Sciences, Volume (15), Issue (46), 2019
3. Caterina Tricase, Vera Amicarelli, Emilia Lamonaca and Roberto Leonardo Rana ،Economic Analysis of the Barley Market and Related Use25،
4. G Recory Makiw, Principles of microe economic msecondedtion, Harvaard uniresity, 2001

5. Khairy Khalil Salim Al-Satori, Ghusun Telfan Madlol Al-Azzawi Estimating the size of the food gap for wheat and rice crops in Iraq for the period (1990-2012), Anbar University Journal of Economic and Administrative Sciences, Volume (7) Issue (13), 2015
6. Muhammad Riyad, Kawthar Abdel Rasoul, Economic Geography and Bioproduction Geography, United Kingdom, Hindawi Publishing Corporation, fourth edition, 2015
7. Republic of Iraq, Ministry of Planning - Central Statistical Organization, Directorate of Agricultural Statistics, Reports on Wheat and Barley Production for the Years (2004-2021
8. Sahab Khalifa Al-Samarrai, Preparing a Map of Environmental Suitability for Wheat Cultivation in Samarra District Using Geographic Information Systems, University of Tikrit, College of Education, Volume (3) Issue (7), 2007
9. Sarah Ali Hussein, Mohsen Owaid Farhan, An economic study of the response to the supply of wheat and barley crops in the irrigated region of Iraq for the period (1980-2009), Wasit Journal for Human Sciences, Volume (8), Number (21), 2013
10. Sondos Muhammad Alwan, Kawthar Nasser Alwan, The Effect of Temperature and Rain on the Production of Wheat and Barley in Diyala and Maysan Governorates, Journal of the College of Education (Wasit University), 2020