



The Impact of Agricultural Policy Implementation on Achieving Food Security in Algeria: A Case Study of the Saïda Region

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Abstract:

This study aimed to measure the impact of implementing agricultural policies on achieving food security in Algeria through an applied study of the municipalities of Saïda Province during the 2019–2020 period. The study adopted a descriptive-analytical approach and relied on statistical analysis using SPSS software.

The findings revealed a strong positive relationship between cereal production and several agricultural input variables, namely cultivated area, fertilized land, and pesticide use, with correlation coefficients of 0.914, 0.779, and 0.732, respectively. These relationships were found to be statistically significant. The results also indicated that the statistical model was significant ($\text{Sig} < 0.05$) and had a high explanatory power ($R^2 = 0.917$), meaning that 91.7% of the variation in cereal production can be explained by the variables included in the study, these findings confirm the effectiveness of agricultural support policies in improving production and strengthening local food security in the study area.

Keywords: Agricultural policies; food security; Saïda region; cereal crops.

JEL Classification: Q18, P32

Resumen:

Este estudio tuvo como objetivo medir el impacto de la implementación de políticas agrícolas en el logro de la seguridad alimentaria en Argelia mediante un estudio aplicado en los municipios de la provincia de Saïda durante el período 2019-2020. El estudio adoptó un enfoque descriptivo-analítico y se basó en el análisis estadístico utilizando el software SPSS.

Los resultados revelaron una fuerte relación positiva entre la producción de cereales y diversas variables de insumos agrícolas, a saber, superficie cultivada, tierras fertilizadas y uso de plaguicidas, con coeficientes de correlación de 0,914, 0,779 y 0,732, respectivamente. Estas relaciones resultaron ser estadísticamente significativas. Los resultados también indicaron que el modelo estadístico fue significativo ($\text{Sig} < 0,05$) y tuvo un alto poder explicativo ($R^2 = 0,917$), lo que significa que el 91,7% de la variación en la producción de cereales puede explicarse por las variables incluidas en el estudio. Estos hallazgos confirman la efectividad de las políticas de apoyo agrícola para mejorar la producción y fortalecer la seguridad alimentaria local en el área de estudio.



Palabras clave: Políticas agrícolas; seguridad alimentaria; región de Saïda; cultivos de cereales.

Clasificación JEL: P18, P32

1-Introduction:

Food security is considered one of the most strategic issues that has received increasing attention at the international level due to its direct association with the social and economic stability of nations. For developing countries, ensuring the availability of safe, sufficient, healthy, and nutritious food for all members of society on a continuous basis has become a major concern, whether through domestic production or imports. However, achieving this objective has become increasingly difficult in light of current challenges related to climate change, limited financial support, insufficient agricultural extension and training, and rising production costs.

Algeria is among the countries that have given significant importance to the agricultural sector, considering it a cornerstone for achieving food security, reducing the cereal import bill, and limiting food dependency. To this end, Algeria has adopted a range of agricultural policies aimed at supporting domestic production and providing production inputs, such as financial subsidies in the form of investment loans, expansion of cultivated land, development of irrigation systems, promotion of modern agricultural technologies, and farmer training. Despite these efforts, cereal production remains below the desired level due to several factors, including inefficient use of agricultural inputs, inadequate extension and farmer training services, limited water resources, and disparities in the level of development among regions.

The Saïda region represents an important case for analysis due to its agricultural characteristics and the diversity of its municipalities in terms of resources and production. Accordingly, this study aims to analyze the impact of agricultural policies on food security in the municipalities of Saïda Province during the 2019–2020 period by examining the relationship between agricultural production and a set of agricultural inputs such as cultivated land, irrigated area, fertilized land, pesticide use, and mechanization.

Research Problem:

The research problem of this study can be formulated as follows: To what extent do agricultural policies affect the achievement of food security in Algeria? A case study of the municipalities of Saïda Province.

This main research question gives rise to the following sub-questions:

1. What is the nature of the relationship between cultivated area and cereal production?
2. What is the effect of the use of fertilizers and agricultural pesticides on cereal production?
3. Is there an effect of agricultural mechanization and irrigation on agricultural production?

Research Hypotheses:

Main Hypothesis

Null Hypothesis (H0):



There is no statistically significant relationship between cereal production and each of the following variables: irrigated land, cultivated land, mechanization, fertilization, and pesticide use in the municipalities of Saída.

Alternative Hypothesis (H1):

There is a statistically significant relationship between cereal production and each of the following variables: irrigated land area, cultivated land area, mechanization, fertilization, and pesticide use in the municipalities of Saída.

Sub-Hypotheses

1. Irrigated Land (Irrigation)

H0: Irrigated land has no statistically significant effect on cereal production.

H1: Irrigated land has a statistically significant effect on cereal production.

2. Cultivated Land Area

H0: Cultivated land area has no statistically significant effect on cereal production.

H1: Cultivated land area has a statistically significant effect on cereal production.

3. Mechanization

H0: Agricultural mechanization has no statistically significant effect on cereal production.

H1: Agricultural mechanization has a statistically significant effect on cereal production.

4. Fertilization and Pesticides

H0: Fertilized land and pesticide use have no statistically significant effect on cereal production.

H1: Fertilized land and pesticide use have a statistically significant effect on cereal production.

Significance of the Study:

The significance of this study lies in highlighting the role of agricultural policies in supporting the agricultural sector and improving its productive efficiency. This is achieved by analyzing the impact of a set of policy-related factors, including cultivated area, irrigation, fertilizers, pesticide use, and agricultural mechanization on cereal production. The importance of the study is further reinforced by the selection of the Saída region, which is considered one of the most agriculturally active areas, particularly in the production of a strategically important crop, namely cereals.

Objectives of the Study:

The main objectives of the study are as follows:

- To analyze variations in cereal productivity across the municipalities of Saída Province.
- To assess the level of agricultural mechanization and its role in improving production and reducing costs and effort.
- To measure the impact of expanding irrigated land on increasing agricultural productivity and improving food availability.
- To identify the role of fertilizer use in enhancing crop yields and achieving productive efficiency.



- To analyze the impact of pesticide use on protecting production and improving product quality.

Methodology:

This study adopted the descriptive-analytical method. The data were statistically analyzed using SPSS software.

Study Sample:

The study sample included all 16 municipalities of Saïda Province.

Study Variables:

Dependent Variable:

- Cereal production quantities

Independent Variables:

- Irrigated land
- Cultivated land
- Agricultural mechanization
- Fertilized land
- Pesticide use

2-Previous Studies:

The study reviewed a number of previous works related to food security and agricultural policies in Algeria. These studies addressed the food gap, the effectiveness of agricultural support, and the factors influencing agricultural production. Overall, they indicate that achieving food security in Algeria remains constrained by structural challenges related to production, financing, water resources, and technological adoption despite the existence of several support programs.

2-1(bouzidi hafid, 2019) ,entitled : « A Benchmark study on how to address the food gap in cereals in alge to Address the Cereal Food Gap in Algeria and Morocco »

This study aimed to analyze the trends of the cereal food gap in both Algeria and Morocco. It relied on the time -serie approach (applies analysis). The results indicated that the food gap for various types of cereals would continue to widen until at least 2019. The study recommended the establishment of an agricultural production area, as well as food, and supporting industries.

2-2(Soufiane, H 2020) , entitled: « Environmental Policies to Address the Rising Prices of Essential Food Commodities in Global Markets and their impact on the Algerian Economy under food dependency »

This study aimed to identify the policies and programs adopted by Algeria to cop with the global fluctuations in the prices of basic food commodities, particularly cereals (wheat, milk, sugar, and vegetable oils). The results showed that Algeria relies on agricultural support in its formsand various levels ,in addition to proving soft loans granting agricultural subsidies .



2-3 (Boubakir,A 2021)entitled: « Measuring Sustainable Food Security in Rural Areas - A Field Study on a Sample of Farmers and Owners of Agricultural Investment in Algeria»

This study focused on explaining a set of key indicators that reflect the different dimensions of sustainable food security. It aimed to assess the food situation of a sample of farmers and Owners of agricultural investments. The study concluded that the nature of the crop production in general ,effects the degree of food security achieved. In also found that the geographical area in which the agricultural investments is located has significant effect on the variables related with the concept of food security sustainability.

2-4(Hachemi & Mustapha, 2021) entitled: «Agriculture, after the agricultural renewal in Algeria 2015-2019»

This study aimed to analyze the reality of agriculture in Algeria after the implementation of the Agricultural Renewal Program during the period (2015-2019), relying on the latest available statistical data. The results showed that the agricultural sector continues to face persistent difficulties in overcoming the food crisis, despite the existence of food support systems ., especially in semi -rural area .

3-Theoretical Framework:

Agricultural policies are closely linked to the overall performance of the agricultural sector and are considered a core component of state economic policy. They consist of a set of interventions and programs adopted by public authorities to achieve specific developmental objectives such as increasing output, improving efficiency, supporting producers' incomes, and achieving food security.

Food security refers to the ability of all individuals, at all times, to have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs for an active and healthy life. This concept is associated with several related notions, including self-sufficiency, food sovereignty, the food gap, and nutritional security.

Agricultural Policies in Algeria:

First Axis: Theoretical Framework of the Study Variables

First: General Concepts on Agricultural Policies and Their Relevance

Section One: The Concept of Agricultural Policies

The concept of agricultural policy is closely linked to the performance of a country's agricultural sector, Agricultural policies are a considered one of the branches of economic policy, as they represent the methodological framework adopted by the state in directing and managing the agricultural in order to achieve a set of predetermined objectives within planned strategies. Agricultural policy primarily aims at achieving two main goals: first, ensuring food security, and second, maximizing producers' profits and improving efficiency in agricultural production .(Karar, 2019,p17)

agricultural policy also constitutes a connecting link between agricultural development strategies and the plans required to achieve the annual goals related to the agricultural sector.



Through state intervention , agricultural policy seeks to attain a set of objectives such as to regulating economic conditions and stabilizing markets, while also contributing to the achievement of economic welfare within society. (Adda, 2018,p36)

Second: Concepts Related to Food Security

There are several concepts associated with food security, this section focuses on identifying the basic concepts of food security, discussing its key principles and the requirements necessary for its realization to the dimensions and indicators related to it.

Section one: The Nature of Food Security

Food security is closely associated with various economic, political, and social sectors, several concepts may be highlighted, including the following:

□ According to the definition of the Food and Agriculture Organization of the United Nations (FAO):

food security exists when all people, at all times, have access to sufficient food that meets their nutritional needs, is safe, and healthy life, this is the considered the standard definition of food security .(Bougharda, 2015,p4)

□ **According to the definition of the World Bank in 1986:** " Food security refers to ensuring that all people at all times, have access to enough food to lead an active and healthy life -free from disease " .(Benyaza, 2018,p16)

Sustainable Food Security:

Sustainable food security can be achieved in any region or country through the guarantee of three essential factors: land and water resources by ensuring three essential factors: the sustainability of land and water resources, the sustainability of plant and animal biodiversity, and appropriate population growth.(Bougharda, 2015,p6)

Self-Sufficiency:

Self-sufficiency should be linked to the economic and living standards of individuals, as a country may achieve self-sufficiency if it secures an adequate level of food availability for society, whether at a minimum, average, or high level.

food Self-sufficiency is defined as "the ability of society to achieve complete food independence through its owns resources and capabilities in food production." (Ahmed, 2016,p9) Food self-sufficiency is the situation in which a society is capable of meeting the needs of all its population for food commodities and products by relying on domestic production in the required quantities. Achieving self-sufficiency requires full dependence on national capabilities and resources.,however Food security may also be achieved either through domestic production or through imports from abroad to bridge the food gap. (Soufiane, 2020,p48)

Self-sufficiency rate = (Domestic production / Production available for consumption) * 100

□ Food sovereignty:

Food sovereignty refers to the rejection of the fully liberalization of agricultural trade ,as a result of participation in the World Trade Organization countries agricultural products are



required to comply with conditions imposed by the economic and political system . (Bedrani, 2015,p7)

□ **Food gap:**

Food gap is related to domestic production and local consumption, and it refers to the inability to provide the quantity of production necessary to cover consumption needs in terms of food commodities and consumer goods, this situation compels the country to resort to imports. (Dabaz, 2019,p27)

Food gap = Food consumption - Domestic food production = Food imports

□ **Food security:**

Food security refers to the ability of all individuals to access appropriate food in sufficient quantity and quality, under acceptable health and sanitary conditions.

Third: Agricultural Policies Adopted in Algeria to Achieve Food Security

Section One: Agricultural Policies (2000-2019)

Since the beginning of the first decade of the current century, Algeria has implemented a series of plans aimed at enhancing food security, these plans included major agricultural industries and the redistribution of land, they were implemented through several national programs developed in response to fluctuations in oil revenues, including the expand some key, and reallocate land were implemented through a number of national programs developed in response to changes in oil revenues, including the National Agricultural Development Program (PNDA) 2000-2010, the Agricultural and Rural Renewal Policy (PRAR) 2010-2014, and the 2014-2020 stage. (Bessaoud et al., 2019,p25)

Development Programs (2000-2019)

1- First Phase Programs (2000-2014):

This phase was characterized by high oil prices and included the following programs: (Adda, 2018,p204)

- 1- Economic Recovery Support Program (2000-2004)
- 2- Supplementary Growth Support Program (2005-2009)
- 3- Economic Growth Consolidation Program (2010-2014)

2- Second Phase (2015-2019):

This phase was characterized by the collapse of oil prices during 2014, which negatively affected Algeria's state budget, this situation required the continuation of previous development projects in the agricultural sector, in addition to supporting and stimulating the industrial sector as an alternative engine for economic development improving production This forced the state to support and attempt to activate for economic development, improving production, and increasing employment levels.

The five-year plan (2015-2019) was adopted, aiming to increase the average growth in the agricultural sector by 5%, with production value estimated at 4,300 billion Algerian dinars, a 13% increase in afforestation, a reduction in the value of agricultural imports by \$20 billion annually, an increase in exports by \$1.1 billion annually, and the creation of 1,500,000 jobs in the agricultural sector .(Hadi & Sari, 2024,p405)



The Economic Recovery Support Program was funded with 525 billion dinars, and approximately 60.2 billion dinars were allocated to the National Agricultural Development Plan .(Adda, 2018,p205)

• **Agricultural and Rural Development Axes within the Framework of the 2015-2019 Five-Year Program**

Five strategic axes for agricultural, rural, and fisheries development are: (Djorfi, 2020,p82)

Axis 1: Continuing efforts to improve and expand the production base by increasing the usable agricultural area and strengthening Mechanization, development of traditional fishing, and increasing the value of agricultural and fishery products;

□ **Axis 2:** Continuing to expand the production of strategic agricultural and fishery products, focusing on human resource development and support and financing policies, through sound management, improving the availability of inputs and production factors, restoring rural agricultural and fisheries infrastructure, improving the development of animal feed production, freshwater and marine aquaculture, and increasing the yield of products such as fruits, vegetables, and industrial crops;

□ **Axis 3:** Preserving natural resources through sound management and the implementation of agricultural programs targeting steppe and desert regions, protecting forest resources, and expanding tree planting;

□ **Axis 4:** Strengthening support for local production and establishing frameworks in the fields of agriculture and fisheries, activating preventive and phytosanitary controls against pests and natural disasters, to increase investment and raise production efficiency;

□ **Axis 5:** Modernizing the management of agriculture and forestry to further improve human skills and technical services. Training, research, extension, and the dissemination of technological advancements are essential for raising the level of agriculture.

Fourth: Factors Affecting Food Security in Related to Agricultural

Economists have identified a variety of elements that directly and indirectly affect food security, as follows:

First: Climate Change

Climate change and environmental degradation are the most serious environmental challenges facing humanity. They have far-reaching consequences, hindering the achievement of food security and causing hunger, poverty, and reduced incomes. Ecosystem-based crop production helps smallholder farmers adapt their production to climate change by strengthening their production systems to withstand environmental risks such as drought, high temperatures, floods, frost, pests, and diseases. Today, nearly 800 million people suffer from chronic hunger, and 2 billion people suffer from undernourishment .(Thomas & Ramsay, 2016,p85)

Second: Biofuels

Biofuels are fuels extracted from biomass, whether for transportation or combustion. it can be produced from agricultural products ,(Fatah, 2018,p33) or from industrial waste or byproducts. It is the energy obtained from the total agricultural crops, plants, and wood, and



is used as an alternative to fossil fuels (oil, gas, and coal). Its use is attributed to high oil prices, environmental pollution problems, and increasing greenhouse gas emissions. The increase in biofuel consumption leads to a reduction in agricultural land, causing food shortages and threatening the food security of countries that rely on food imports. (bouzidi hafid, 2019,p25)

Third: Technological Factors:

Technological factors refer to the reliance on biotechnology. The US Congressional Technology Assessment Office defined biotechnology as "a technology or production method that uses living organisms or materials from such organisms to make or modify a product" (Bougharda, 2015,p16)

4-Methodology

4-1 Study Area:

Saïda province is located in the northwest of Algeria, and is considered one of the high plateau regions. It is one of the seven Algerian provinces through which the Greenwich Meridian passes. It has a continental climate, cold in winter and hot in summer, which makes it an agricultural region. The total area of the province is 676,540 hectares, and it includes 16 municipalities

4-2 Study sample:

The empirical part of the study covered all 16 municipalities of saida region, namely: El Maamoura, Saïda, El Hassasna, Aïn El Hadjar, Hount, Aïn Sekhouana, Sidi Boubekeur, Sidi Amar, Tirsine, Ouled Khaled, Aïn Soltane, Youb, Dhoui Thabet, Moulay Larbi, Ouled Ibrahim, Sidi Ahmed.

The region is characterized by the diversity of its crops and the diversity of its geographical and climatic nature. However, grain cultivation and sheep breeding remain dominant in most agricultural activities. The province contains four homogeneous regions; (1) A grain and livestock farming area of 296,473 hectares (representing 44%), (2) A steppe agricultural area of 100,122 hectares (representing 15%), (3) A mixed-crop area of 152,612 hectares (representing 22%); (4) The steppe region, 127,333 hectares (representing 19%), The following figure shows the map of the state and its municipalities.

4-3 Study variable:

This study is based on set variables related to agricultural activity , the study variable were classified into one dependent variable and a set independent variables .

The dependent variable is represented by cereal crop production quantities ,as it constitutes the main indicator reflecting the level of agricultural output .

The independent variable include:

- cultivated land area
- irrigated land area
- fertilized land area
- pesticide use



-agricultural mechanization

These variables were selected due to their significant role in influencing agricultural production at the municipal level within the study area.

4-4 Data collection:

The data used in this study were collected from official statistical sources and relevant local institution during the year 2019-2020.

The collected data included cereal crop production quantities cultivated land area, irrigated land area, fertilized land area, pesticide use, agricultural mechanization across the municipalities of the province.

These data were subsequently organized, processed, and analyzed using appropriate statistical methods in order to examine the effect of these variables on cereal production and to explain the spatial variations among the municipalities.

4-5 Statistical methods:

The collected data were analyzed using a set of appropriate statistical methods in order to examine the relationships between the study variables and to assess their effect on cereal crop production across the municipalities of the province.

First, descriptive statistics were used to summarize the main characteristics of the variables under study, including measures such as the mean, standard deviation, minimum, and maximum value, this provided an initial understanding of the distribution and variability of data.

Second, correlation analysis was employed to measure the degree and direction of the relationships between the dependent variable and the independent variables.

This analysis helped identify whether the relationships were positive or negative, as well as their relative strength.

Third, multiple linear regression analysis was applied to assess the effect of the independent variables-namely cultivated land area , irrigated land area , fertilized land area , pesticide use , agricultural mechanization -on the dependent variable represented by. cereal crop production quantities, this method made it possible to determine the most influential factors affecting cereal crop production.

The statistical analyses were carried out using IBM SPSS STATISTICS, which facilitated data organization, processing, and interpretation.

5- Results and discussion

- **Statistical description**

Table (4): Statistical description of the study variables related to cereal crops in saida region (2019-2020)

Variable	number	Min value	Max value	Mean	Standard deviation
Production quantity(q)	16	2700	136547	47491.69	34686.861
Cultivated land area	16	1500	17500	8261.25	4080.934



(hectares)							
irrigated land area (hectares)	16	67	5260	2017.50	1256.092		
fertilized land area (hectares)	16	450	3380	2322.25	881.954		
Quantity of herbicides used (L/ha)	16	200	3775	1847.56	961.756		
Mechanization (machine/ha)	16	21	308	126.63	68.883		

Source: Prepared by the researcher based on SPSS outputs

The results of the descriptive statistics for a sample of 16 municipalities in Saïda Province for 2019-2020 indicate a clear variation in the study variables. The average production reached 47,491.69 quintals, with a significant difference between the minimum of 2,700 and the maximum of 136,547, and a high standard deviation of 34,686.861, demonstrating variations in production quantities among the municipalities, the cultivated area recorded an average of 8,261.25 hectares, and the irrigated area 2,017.50 hectares, with notable variations reflecting differences in the utilization of agricultural resources and the availability of irrigation.

Irrigation is a fundamental tool for achieving sustainable agricultural development and conserving water resources in the municipalities of Saïda Province, the adoption of modern irrigation technologies, such as drip irrigation, contributes to rationalizing water consumption and reducing waste, especially in the production of cereal crops, which require considerable amounts of water, (Chekalil & Bagdadi, 2024,p79) as for fertilizers, an average of 2322.25 hectares was recorded, while pesticides, with an average calculation of 1847.56 liters/hectare, showed a moderate dispersion. Meanwhile, mechanization recorded an average of 126.63 with a standard deviation of 68.883, which indicates a clear disparity between municipalities in the use of mechanization, which explains the inadequate use and uneven distribution of mechanization at the municipal level.

- **Correlation**

Table (5): Correlation

N=16		production	Cultivated	Irrigated	Fertilized	herbicide	Mechanization
Production	Corréla-Pearson	1	,914**	,163	,779**	,732**	,397
	Sig blt		,000	,545	,000	,001	,127
Cultivated (land area)	Corréla-Pearson	,914**	1	,179	,783**	,840**	,575*
	Sig blt	,000		,508	,000	,000	,020
Irrigated (land area)	Corréla-Pearson	,163	,179	1	,452	,036	,761*



	Sig blt	,545	,508		,079	,896	,001
Fertilized (land area)	Corréla-Pearson	,779**	,783**	,452	1	,572*	,587*
	Sig blt	,000	,000	,079		,021	,017
Herbicide (land area)	Corréla-Pearson	,732**	,840**	,036	,572*	1	,398
	Sig blt	,001	,000	,896	,021		,127
Mechanization	Corréla-Pearson	,397	,575*	,761**	,587	,398*	1
	Sig blt	,127	,020	,001	,017	,127	

Source: Prepared by the researcher based on SPSS outputs

- **Correlation Analysis:**

The results showed a very strong positive relationship between cereal production and cultivated area ($r = 0.914$). Strong positive relationships were also found between production and both fertilized land ($r = 0.779$) and pesticide use ($r = 0.732$), all of which were statistically significant. The relationship between production and mechanization was moderate and positive, whereas the relationship between production and irrigation was weak and statistically insignificant in the bivariate correlation analysis.

- **Régression**

Table (6): model Summary^b

Model	R	R-deux	R-deux adjusted	Standard error of the estimate	Durbin-Watson
1	,958a	,917	,875	12244,026	1,688

a. Predictors: (Constant), Mechanization, herbicide, Fertilized, Irrigated, Cultivated

b. Variable dependent: production

Source: Prepared by the researcher based on SPSS outputs

The model summary results indicate that the multiple linear regression model has strong results strong explanatory power ($R = 0.958$) reflects a very strong relationship between the dependent variable and the set of independent variables, the ($R^2 = 0.917$) shows that approximately 91.7% of the variation in cereal production is explained by the explanatory variable included in the model.

Moreover, the adjusted $R^2 = 0.875$ confirms that the model retains a high explanatory capacity even after adjusting for the number of predictors.

The Durbin-Watson statistic (1.688) suggests that there is no serious autocorrelation problem in the residuals, indicating that the model is statistically acceptable.



Table (7): ANOVA^a

Model		Sum of squares	Ddl	Mean square	F	Sig.
1	Regression	16548513544,869	5	3309702708,974	22,077	,000b
	de Student	1499161692,569	10	149916169,257		
	Total	18047675237,438	15			

a. Variable dependent: production

b. Predictors: (Constant), Mechanization, herbicide, Fertilized, Irrigated, Cultivated

Source: Prepared by the researcher based on SPSS outputs

The ANOVA results confirm the overall significance of the regression model.

The F-value = 22.077, significance level Sig = 0.00. Since the significance level is less than 0.05 indicates that the model is statistically significant as a whole.

This means that the independent variable, taken together, have a significant effect on cereal production.

Therefore, the regression model is appropriate for explaining variations in the dependent variable.

Table (8): Regression Coefficients^a

Model		unstandardized coefficients		Stand Coefficients- B	t	Sig.	Collinearity statistics	
		B	Stand error				Tolerance	VIF
1	(Constant)	-19437,912	9456,258		-2,056	,067		
	Cultivated	10,653	2,327	1,253	4,578	,001	,111	9,023
	Irrigated	9,763	5,211	,354	1,874	,090	,233	4,287
	Fertilized	1,886	7,156	,048	,264	,797	,251	3,986
	Herbicide	-4,884	6,327	-,135	-,772	,458	,270	3,705
	Mechanization	-285,343	102,427	-,567	-2,786	,019	,201	4,981

a. Dependent variable: production

Source: Prepared by the researcher based on SPSS outputs

At the coefficient level, the regression results show that findings showed that:

- **Cultivated land** has a positive and statistically significant effect on cereal production, indicating that an increase in cultivated land contributes directly to higher output.
- **Irrigated land also** shows a positive effect on cereal production; however, this effect is not statistically significant at the 5% level.

This suggests that ,although irrigation is theoretically importants ,it did not emerge as a decisive explanatory factor of production variation within the stady sample .

- **Fertilized land** and **herbicide** use do not appear to have statistically significant effects within the regression model, despite their observed correlations with production, which may



be explained by overlapping effects with other explanatory variables or by differences in the efficiency of their use across municipalities.

- **Mechanization** has a negative and statistically significant effect on cereals production, this suggests that a higher level of mechanization was not associated with increased output, but rather with lower production with the study sample.

This may be explained by the unequal distribution of machinery across municipalities, low efficiency in its utilization, or the failure to employ mechanization in a way that effectively enhances productivity, which may reflect inefficient allocation, inappropriate use, or technical mismanagement of agricultural machinery.

Regression equation Written as follows:

$$\text{Production} = - 19437.912 + 10.653(\text{Cultivated land}) + 9.763(\text{irrigated land}) + 1.886(\text{Fertilized land}) - 4.884(\text{herbicide}) - 285.343(\text{Mechanization})$$

Table (9): collinearity Diagnostics ^a

				Variance proportions					
Model	Dimension	eigenvalue	Cond-index	Const	cultivated	Irrigated	Fertilized	Herbicide	Mechanization
1	1	5,488	1,000	,00	,00	,00	,00	,00	,00
	2	,296	4,308	,00	,01	,11	,00	,05	,01
	3	,119	6,803	,62	,01	,00	,00	,02	,06
	4	,050	10,527	,16	,03	,00	,34	,21	,10
	5	,037	12,191	,13	,03	,44	,00	,42	,41
	6	5,488	22,163	,08	,92	,45	,66	,30	,42

a. Variable dependent: production

Source: Prepared by the researcher based on SPSS outputs

The collinearity diagnostics indicate that regression model does not suffer from severe multicollinearity, the maximum Condition index = 22.16 remains below the critical threshold of 30, suggesting that collinearity among the explanatory variables is present only a moderate level. This means that although some predictors may share overlapping explanatory information, the degree of multicollinearity is not high enough to invalidate the regression results.

Therefore, the model can be considered statistically acceptable for interpretation.



6- Conclusion:

The study concluded that agricultural policies in Algeria play an important role in supporting agricultural production and contributing to food security, particularly through the expansion of cultivated land, the improvement of irrigation systems, and the provision of agricultural inputs. However, the full achievement of food security remains constrained by several challenges, including inefficient resource use, disparities among municipalities in policy implementation, and the effects of climatic and economic factors.

7- Recommendations:

- Expand cultivated land, as it appears to be one of the most influential factors in raising agricultural output.
- Strengthen agricultural research and development and encourage the use of modern technologies such as smart irrigation, mechanization, and digitalization.
- Improve the social conditions of farmers and rural living standards to reduce rural migration.
- Develop clear, realistic, and strategic agricultural policies that contribute to food security and the development of agricultural exports.
- Reduce the effects of climate variability through early warning systems and proactive planning.
- Improve the distribution mechanisms of agricultural inputs to ensure timely and affordable access for all farmers.

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9- Appendices

Corrélations

		production	cultived	Irrigated	Fertilized	Herbicide	Mechanization
Production	Corrélation de Pearson	1	,914**	,163	,779**	,732**	,397
	Sig. (bilatérale)		,000	,545	,000	,001	,127
	N	16	16	16	16	16	16
Cultived	Corrélation de Pearson	,914**	1	,179	,783**	,840**	,575*
	Sig. (bilatérale)	,000		,508	,000	,000	,020
	N	16	16	16	16	16	16



Irrigated	Corrélation de Pearson	,163	,179	1	,452	,036	,761**
	Sig. (bilatérale)	,545	,508		,079	,896	,001
	N	16	16	16	16	16	16
Fertilized	Corrélation de Pearson	,779**	,783**	,452	1	,572*	,587*
	Sig. (bilatérale)	,000	,000	,079		,021	,017
	N	16	16	16	16	16	16
Herbicide	Corrélation de Pearson	,732**	,840**	,036	,572*	1	,398
	Sig. (bilatérale)	,001	,000	,896	,021		,127
	N	16	16	16	16	16	16
Mechanization	Corrélation de Pearson	,397	,575*	,761**	,587*	,398	1
	Sig. (bilatérale)	,127	,020	,001	,017	,127	
	N	16	16	16	16	16	16

** . La corrélation est significative au niveau 0.01 (bilatéral).

* . La corrélation est significative au niveau 0.05 (bilatéral).

Régression

Récapitulatif des modèles^b

Modèle	R	R-deux	R-deux ajusté	Erreur standard de l'estimation	Durbin-Watson
1	,958 ^a	,917	,875	12244,026	1,688

a. Prédicteurs : (Constante), Mechanization, herbicide, Fertilized, Irrigated, cultivated

b. Variable dépendante : production

ANOVA^a

Modèle		Somme des carrés	Ddl	Carré moyen	F	Sig.
1	Régression	16548513544,869	5	3309702708,974	22,077	,000 ^b
	de Student	1499161692,569	10	149916169,257		
	Total	18047675237,438	15			

a. Variable dépendante : production

b. Prédicteurs : (Constante), Mechanization, herbicide, Fertilized, Irrigated, cultivated



Coefficients^a

Modèle	Coefficients standardisés	Erreur standard	Coefficients standardisés	t	Sig.	Statistiques de colinéarité		
						B	Bêta	Tolérance
1	(Constante)	-19437,912	9456,258		-2,056	,067		
	Cultived	10,653	2,327	1,253	4,578	,001	,111	9,023
	Irrigated	9,763	5,211	,354	1,874	,090	,233	4,287
	Fertilized	1,886	7,156	,048	,264	,797	,251	3,986
	herbicide	-4,884	6,327	-,135	-,772	,458	,270	3,705
	Mechanization	-285,343	102,427	-,567	-2,786	,019	,201	4,981

a. Variable dépendante : production

Diagnostics de colinéarité^a

Modèle	Dimension	Valeur propre	Index de condition	Proportions de la variance					
				(Constante)	cultive	Irrigat	Fertilize	Herbici	Mechaniza
1	1	5,488	1,000	,00	,00	,00	,00	,00	,00
	2	,296	4,308	,00	,01	,11	,00	,05	,01
	3	,119	6,803	,62	,01	,00	,00	,02	,06
	4	,050	10,527	,16	,03	,00	,34	,21	,10
	5	,037	12,191	,13	,03	,44	,00	,42	,41
	6	,011	22,163	,08	,92	,45	,66	,30	,42

a. Variable dépendante : production