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The role of agricultural sector on achieving food security in Algeria during the period 2005/2022- the cereal as a model-

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Abstract:

This study is intended to explain the role of the agricultural sector in achieving food security in cereals during the period 2005/2022. It found that Algeria is one of the world's leading grain importers, its dependence on importation has increased dramatically over the years , as a result of increased urbanization and population ,In addition to the decline of Algeria cereal production especially bread wheat, which represents between 75% -80% of wheat imports. Earlier wheat was mainly supplied to Algeria from France, now it is the Russian Federation that occupies a significant share. This is after Algeria modified its wheat import restrictions at the end of 2020 to raise the rate of permitted bug-damaged grain from 0.2 % to 0.5 % to allow wheat from Black Sea origin.

Wheat agriculture has long time suffer by problems such as adverse weather conditions especially drought , scarce water resources, primitive methods of production, and underemployment.

Keywords: The agricultural sector, food security, Self-sufficiency ratio ,cereal production ,wheat

JEL Classification Codes : Q1; Q17; Q18

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دور القطاع الزراعي في تحقيق الأمن الغذائي في الجزائر خلال الفترة 2005/2022 – الحبوب نموذجا

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ملخص:

تهدف هذه الدراسة إلى توضيح دور القطاع الزراعي في تحقيق الأمن الغذائي في الحبوب خلال الفترة 2005/2022. وقد توصلت إلى أن الجزائر تُعد من بين أكبر مستوردي الحبوب في العالم، حيث ازداد اعتمادها على الاستيراد بشكل كبير على مرّ السنوات، نتيجة لتزايد التحضر والنمو السكاني، بالإضافة إلى تراجع إنتاج الحبوب المحلي، وخاصة القمح اللين الذي يمثل ما بين 75% إلى 80% من واردات القمح.

في السابق، كانت الجزائر تستورد القمح أساسًا من فرنسا ، أما الآن فقد أصبحت روسيا تحتل حصة كبيرة من الاستيراد والسوق الجزائرية ، وذلك بعد أن عدلت الجزائر قيود استيراد القمح في نهاية عام 2020، فرفعت النسبة المسموح بها من حبوب القمح التالفة بالحشرات من 0.2% إلى 0.5%، ما سمح باستيراد القمح من منطقة البحر الأسود.

لطالما عانى إنتاج القمح في الجزائر من مشاكل متعددة من بينها: الظروف المناخية السيئة خاصة الجفاف،وشُح الموارد المائية، بدائية وسائل الإنتاج، وقلة فرص العمل في القطاع.

الكلمات المفتاحية: القطاع الزراعي، الأمن الغذائي، نسبة الاكتفاء الذاتي، إنتاج الحبوب، القمح.

تصنيف JEL: Q1; Q17; Q1

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المعرف الرقمي للمقال (doi): *https://doi.org/10.34118/jeemr.v9i1.4230*

1. INTRODUCTION

In recent years, the issue of food and nutrition security has gained heightened international attention, largely due to the compounded effects of climate change and adverse economic conditions, which have placed significant pressure on global food production systems. This challenge is not limited to a specific region, and Algeria is among the countries increasingly affected. The nation is experiencing a notable surge in domestic food demand, accompanied by a decline in local agricultural output. As a result, Algeria has become increasingly dependent on food imports, especially cereals. Cereals have served as a fundamental component of the human diet for thousands of years, providing essential nutrients and energy. They are consumed directly by humans and also play a crucial role in meat production, as they constitute a primary feed source for livestock. The most commonly consumed cereals include wheat, rye, rice, corn, oats, and barley.

Thus, we can pose the following problem statement: **What is the role of Algeria's agricultural sector in achieving food security in cereals?**

To address this research problem, the following key elements will be examined:

- The definition of food security
- The factors influencing food security
- The state of cereal production in Algeria during the period 2005–2018
- The current status of food security in cereals

2. The definition of food security

We will outline the definition of food security as provided by the United Nations' Food and Agriculture Organization (FAO): Food security is achieved when everyone, at all times, has physical and financial access to an adequate amount of safe and nutritious food that meets their dietary requirements and preferences, enabling them to lead an active and healthy life. **(FAO, Food Security-POLICY BRIEF-, 2006, p. 1)**

This definition encompasses four critical aspects of food security: availability, access, utilization, and stability. These dimensions of food security function in a sequential order: Initially, food must be available; subsequently, households must have access to it; it must be utilized properly; and ultimately, the entire system must maintain stability. The following graph illustrates these four dimensions of food security.

Fig .1. The components of food security

Source: (Gunaratne , R. B. Radin, & Rathnasooriya, 12 October 2021, p. 2)

3. The factors influencing food security

Securing food in its broad sense is influenced by various factors that impact the production, distribution, availability, use, and sustainability of food products. Among the most crucial of these factors are human and natural resources.

3.1. Human Resources:

Human resources serve as the cornerstone and driving force behind the development process, while simultaneously being the primary focus and ultimate goal of development itself. Therefore, the significance of human resources extends beyond mere numerical quantity, encompassing various dimensions such as economic, social, and cultural traits, stability, and the capacity for production.

• **Algeria's Population Growth:** While many people worldwide face food shortages, this issue is not solely attributed to low productivity or rising food prices. Demographic trends have also played a crucial role, adversely impacting global food security. Algeria, known for its high population density, is one of the most populous nations globally. In 2022, Algeria's population reached 44,903,225, marking a 1.64% increase from 2021. The country's population accounts for 0.57% of the world's total, ranking it 33rd in global population size. The following table provides further details.

Table 1. Algeria Population by Year (Historical)

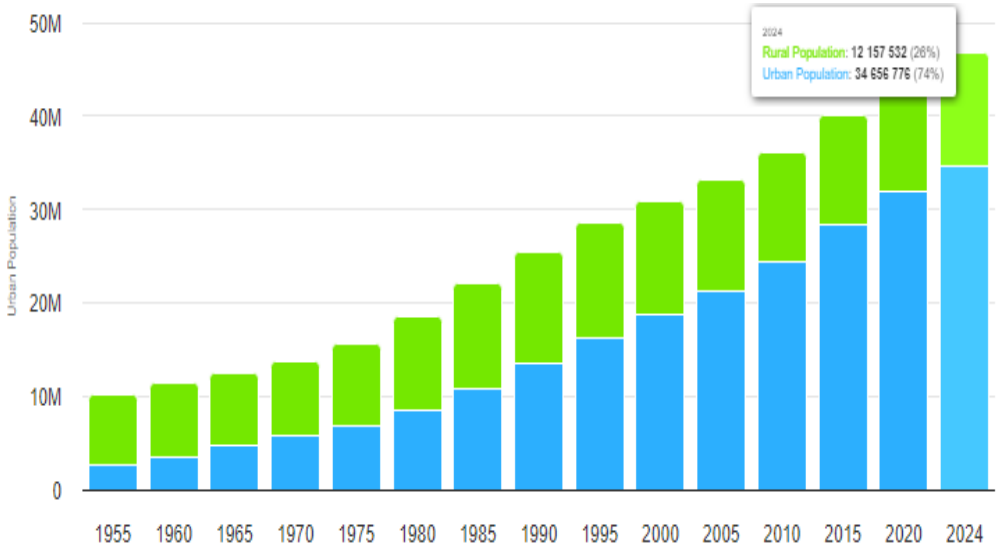
Year	Population	Growth Rate	Year	Population	Growth Rate
2022	44,903,225	1.64%	2013	38,000,626	1.99%
2021	44,177,969	1.67%	2012	37,260,563	1.96%
2020	43,451,666	1.75%	2011	36,543,541	1.92%
2019	42,705,368	1.86%	2010	35,856,344	1.88%
2018	41,927,007	1.92%	2009	35,196,037	1.81%
2017	41,136,546	1.98%	2008	34,569,592	1.72%
2016	40,339,329	2.01%	2007	33,983,827	1.64%
2015	39,543,154	1.98%	2006	33,435,080	1.45%
2014	38,760,168	2.00%	2005	32,956,690	1.37%

Source: (Macrotrends, 2024)

Following a significant low of 1.37% in 2005, the population growth rate increased rapidly, reaching around 2% by 2015. This rise was largely due to a "baby boom" — the third in 50 years, following similar surges in 1968 and 1982. During this period, the marriage rate doubled, from 177,000 marriages in 2000 to 369,000 in 2015, with the number of marriages rising from 5 to 9 per 1,000 inhabitants . **(CREAD, 2018, p. 22)**

The population, now estimated at 44.9 million, and the expanding urbanization, which has seen nearly 73% of the population move to urban areas, have resulted in higher food consumption, particularly cereals. This shift is expected to increase pressure on agriculture to meet the growing dietary demands.

Fig .2. Algeria Urban vs rural Population from 1955 to 2024



Source: (worldometer, 2024)

The data reveals a steady decline in the number of rural residents, largely due to the migration of many villagers, particularly the youth, in search of better employment opportunities in urban areas where a higher standard of living is available. This trend is expected to result in a negative population growth in these rural regions in the near future, contributing to a stagnation in agricultural development. Additionally, the limited size of agricultural land for many farmers exacerbates the issue, forcing them to shut down their farms

- **Agricultural Labour**

Over the past fifteen years in Algeria, more and more farmers have been complaining about the lack of labor. The following table shows the total employment in the agricultural sector as a percentage of the total labor force in Algeria during the period from 2005 to 2022:

Table 2. Employment in agriculture (% of total employment)

2005 – 2022

YEAR	2005	2006	2007	2008	2009	2010	2011	2012	2013
Employment	19.59	18,017	16,38	14,829	13,35	12,0	10,77	10,75	10,75
YEAR	2014	2015	2016	2017	2018	2019	2020	2021	2022
Employment	9,746	8,83	8,53	10,16	10,09	9,798	10,02	10,033	9,74

Source: (WORLD BANK GROUP, 2024)

Employment in the agricultural sector in Algeria witnessed a significant decline between 2005 and 2022, dropping by 9.85%—from 19.59% in 2005 to just 9.74% in 2022. Several interrelated factors contribute to this notable labor shortage in agriculture and livestock, **: (BEDRANI, TAIBI, CHAAMI, & Bochra BOUHENDJEUR, 2016, pp. 2678-2679)**

➢ Industrialization has played a major role in drawing rural labor toward urban centers, thus reducing the agricultural workforce. This phenomenon is particularly evident in Algeria. Moreover, the trade sector—especially its informal component, which dominates the field—has proven to be a strong magnet for labor, diverting

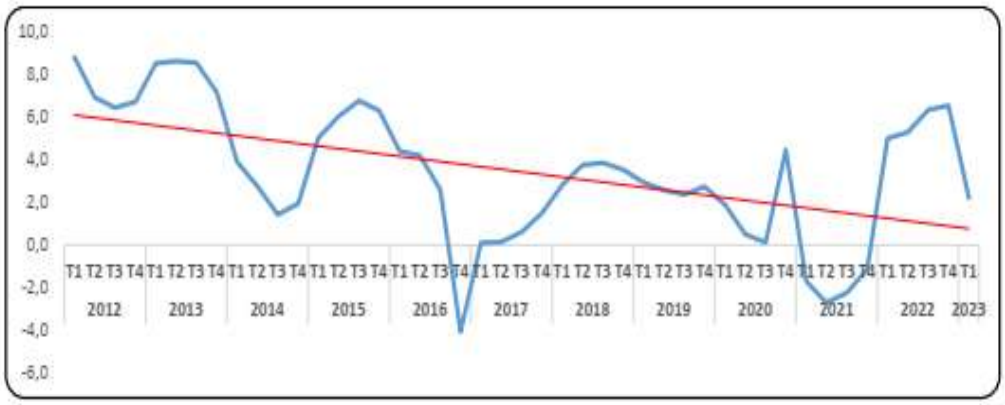
workers from agriculture to more accessible urban jobs.

- Harsh working conditions and low remuneration further discourage agricultural labor. This is especially true for shepherds engaged in transhumance (seasonal livestock movement). These workers and their families often relocate frequently, living in tents far from healthcare services, schools, and administrative facilities. They endure severe weather conditions—both the cold of winter and the heat of summer—while sometimes lacking access to essential water sources for both livestock and domestic use.
- Low wages and lack of social protection are widespread among agricultural workers. Compared to employees in other sectors, those in agriculture are generally underpaid. They often do not receive social security benefits, including retirement contributions, health insurance, or coverage for work-related injuries.
- Government social policies have also contributed indirectly to the labor shortage in agriculture. These policies have created alternative opportunities for the unemployed—such as the ability to launch small businesses through loans and grants provided by institutions like the National Agency for Youth Employment Support (ANSEJ) and the National Micro-Credit Management Agency (ANGEM). In addition, unemployment benefits and temporary public sector jobs (which may become permanent over time) provide more stable and appealing alternatives. Overall, young people tend to prefer more comfortable and profitable ventures, avoiding the physically demanding work that agriculture requires.

3.2 Agricultural Production

In 2022, agricultural production recorded an estimated growth of 5.8%, reflecting a notable recovery compared to the previous year. In 2021, the sector had experienced a decline of 1.9%, largely attributed to the disruptions caused by the COVID-19 pandemic. This rebound in 2022 highlights the resilience of the agricultural sector and the effectiveness of post-pandemic recovery efforts, including improved weather conditions, increased investment, and supportive government policies

Fig.3. Evolution of The agriculture production during the period 2012-2022



Source : (ONS, LES COMPTES NATIONAUX TRIMESTRIELS-1er trimestre 2023, 2023, p. 3)

By examining the period from 2005 to 2022, agricultural production has shown a

notable upward trend, despite year-to-year fluctuations in growth rates. The most significant increase was recorded in 2009, when agricultural output grew by approximately 21%. However, despite this impressive performance, overall agricultural growth remains insufficient to fully meet the rising domestic demand for food, which has increased at an average annual rate of 15%. This mismatch suggests growing pressure on food security and highlights the need for enhanced productivity, modernization of agricultural practices, and more investment in agri-food value chains to close the supply-demand gap

3.3. Natural Resources

- **Soil Resources**

Algeria is a North African country covering an area of 2,381,741 km², making it the largest country on the Mediterranean sea, the largest in Africa, and the tenth largest in the world. Despite its vast territory, the country has a cultivated area of only 7.5 million hectares, of which 1.5 million hectares are irrigated.

Overall, agricultural land remains quite limited in relation to the country's total area. During the period 2005–2022, cultivated land accounted for only about 18% of the total agricultural area, as illustrated in the following table.

This reflects both the geographical constraints—such as the dominance of arid and semi-arid zones—and structural challenges in land use planning, water availability, and soil fertility. Therefore, sustainable land management and investment in irrigation infrastructure are essential to improving agricultural productivity and addressing food security challenges.

Table 3. arable land in Algeria during the period 2005/2022

Unit: 1000 hectares

	Total agricultural land	**arable land**	**arable land%**		**Total agricultural land**	**arable land**	**arable land%**
2005	41211	7511	18.23	2014	41431	7469.4	18.03
2006	41181	7470	18.14	2015	41456.4	7462.1	18
2007	41252	7469	18.11	2016	41360.2	7404.2	17.9
2008	41309	7489	18.13	2017	41335.14	7470.81	18.07
2009	41380	7493	18.11	2018	41338.85	7500.70	18.14
2010	41374	7502	18.13	2019	41316.07	7530.6	18.23
2011	41388	7502	18.13	2020	41287.89	7530.6	18.24
2012	41398.19	7506.5	18.13	2021	41277.04	7530.6	18.24
2013	41431.63	7496.2	18.09	2022	41310.12	7530.6	18.23

Source : (FAO, Total agricultural land, 2024)

- **Water resources**

Algeria is a desert country without rivers. The climate is semi-arid , it has one of the highest average population growth rates in the world, with scarce water supplies, Which was estimated about at 19.5 billion of m^3 .

Natural water resources in Algeria are diverse between surface water and groundwater.Surface water refers to all those water bodies that accumulate on the Earth's surface.It include streams, rivers, oceans, lakes, creeks. and ponds.The surface water resources are estimated to total 12.5 BCM.while groundwater is water that seeps deep into the ground. Groundwater resources are estimated to total 7 BCM(1.5 BMC in the north and 5 BMC in the south of Algeria).

Algeria are currently confronted with the major challenges related to water resources. According to the Falkenmark Index* Algeria suffers from water absolute scarcity, where dropped available renewable water in Algeria from an average of 998.3 cubic meters per person per year (m3/p/ y) in 1962 to 271 (m3/p/y) in 2020.

The minimum water endowment for food self-sufficiency is 912 m3/cap/y, more than twice the capacity seen in present-day Algeria. **(Kherbache, mars 2020, p. 142)**

Reduced water availability impacts agriculture, leading to lower crop yields and increased food prices. Which will negatively on food security.

4. The state of cereal production in Algeria during the period 2005–2018

Crop production plays a pivotal role in Algeria's agricultural sector, serving as a cornerstone of food security and a significant contributor to the national economy. Among the various crop categories, cereals—particularly wheat and barley—stand out as strategic commodities due to their central role in the Algerian diet and their impact on import dependency.

Between 2005 and 2022, Algeria's cereal production experienced considerable fluctuations, influenced by a combination of climatic conditions (notably rainfall variability), government agricultural policies, levels of public support and subsidies, and changes in global commodity prices. These dynamics underscore the sector's vulnerability but also highlight opportunities for reform and investment aimed at improving productivity and resilience.

The following figure illustrates the trend in cereal production during this period, offering insights into the structural challenges facing the sector and informing strategies for enhancing domestic output as part of broader efforts to strengthen national food sovereignty and reduce reliance on foreign markets.

* When describing water availability in a country, the Falkenmark Water Stress Indicator, which was developed by the Swedish water expert Falkenmark in 1989, is one of the most commonly used indicators. which measures the degree of water scarcity, and he proposes a threshold of 1,700 m 3 per person per year to identify the regions that suffer from water stress, Below this level, water scarcity arises in different levels of severity. Below 1,700m^3/capita/year water stress appears regularly,and below 1,000m^3/capita/year means there is water scarcity and below 500m^3/capita/year means the country is suffering absolute water scarcity.

table 4. Production of selected cereal crops during the period (2005 - 2022) unit : quintal

Production	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cereal	35,27	32,63	36,02	15,36	57,45	45,59	42,47	51,37	49,12
Durum wheat	15,69	13,11	15,29	8,14	23,36	20,39	21,96	24,07	23,32
common wheat	8,46	6,42	7,9	2,97	11,09	9,14	7,15	10,25	9,67
Barley	10,33	12,36	11,87	3,96	22,03	15,04	12,58	15,92	14,99
Oats	0,77	0,69	0,92	0,27	0,96	1,02	0,77	1,1	1,13
Maize and Sorghum	0,024	0,049	0,04	0,021	0,01	0,005	0,015	0,035	0,013
Production	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Cereal	34,34	37,62	34,45	34,78	61.19	56,33	43,92	27,82	47,17
Durum wheat	18,44	20,2	19,37	19,91	31,78	32.09	18,34		
common wheat	5,92	6,37	5,03	4,45	8.03	6.68	12,73	27.54	28.7
Barley	9,39	10,31	9,2	9,7	19,57	16,48	12,13	5,55	16
Oats	0,56	0,68	0,72	0,64	1,18	1,01	0,69	0,4	1,05
Maize and Sorghum	0,03	0,055	0,13	0,08	0,45	0,073	0,035	0,19	0,12

Source: Statistics of The Ministry of Agriculture, Rural Development and Fisheries

During the Economic Growth Support Program, cereal production experienced fluctuations between increases and decreases, with significant high production rates in 2006 and 2007 compared to 2005. In contrast, production saw a sharp decline in 2008, recording about 15.36 million quintals, which was the lowest level during the first decade of the 21st century. However, in 2009, cereal production reached its highest level during the development programs period (2001–2009), recording an increase of 274% over the year 2008.

Between 2010 and 2014, cereal production showed significant improvement compared to the previous period, except for the peak year (2009). In 2012, production reached about 51 million quintals, marking the best performance recorded by Algeria during the government spending programs of 2001–2014 (after the peak of 2009). These programs were accompanied by various reform policies in the agricultural sector, such as the National Plan for Agricultural and Rural Development (2000–2004), the Agricultural and Rural Renewal Policy (2008–2014), and other policies.

Starting in 2014, cereal production saw a significant decline. However, record levels were achieved during the 2018 and 2019 agricultural seasons, reaching about 6.1 million tonnes and 5.6 million tonnes, respectively. This improvement in production was due to favorable weather conditions.

Algeria experienced many droughts and unseasonably high temperatures, which significantly affected cereal production, as in the 2021 crop year, when only about 2.7 million tonnes of cereals were harvested. The vast majority of Algeria's cereal production depends on rain-fed irrigation, making cereal yields highly variable

depending on rainfall amounts and distribution **(FAO, GIEWS Country Brief , 24 SEPTEMBER 2018, p. 13)**

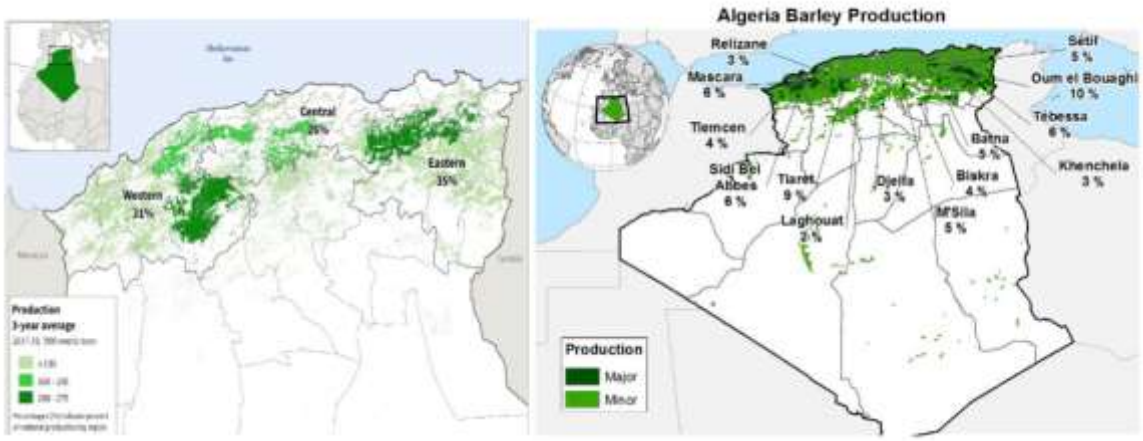
Despite improvements in Algeria's cereal production, it remains weak and insufficient, covering only a small percentage of local consumption. Algeria consumes about 1.95 million tonnes of barley, mainly used for animal feed, with a small portion used for bread and couscous for human consumption. Additionally, Algeria consumes about 11 million tonnes of wheat, which is the country's main staple food for over 44 million people, representing 60 percent of the food consumed in Algeria.

4.1. Production of Wheat and Barley in Algeria

In Algeria, the majority of wheat and barley planting occurs in the primary agricultural regions between September and December. The growing season typically spans from January to mid-May, with harvest commencing in early summer. In 2023, the Ministry of Agriculture (MOA) adjusted the planting schedule, moving it from October to September in hopes of taking advantage of potential early rains. However, consecutive years of drought have hindered farmers from planting early, with the exception of irrigated plots. This is primarily due to Algeria’s dependence on rain-fed irrigation for crop production, making the agriculture sector vulnerable to changing weather patterns and water scarcity. The vast majority of the nation's crops are still cultivated using rainfall, which highlights the significant challenges posed by climate change to the country's agricultural productivity. **(Hales, Grain and Feed Annual, 22march 2024, p. 2)**

The distribution of wheat production across different regions is as follows: the eastern region leads with the highest production, contributing 35 percent of the total wheat output. The western region follows closely behind, accounting for 31 percent, while the central region produces 26 percent of the total wheat. In contrast, barley production is concentrated mainly in the western regions, where it makes up 40 percent of total output. The eastern region contributes 31 percent, while the desert areas account for 14 percent. The central areas are the least involved in barley production, contributing only 12 percent to the overall total. **(Hales, Grain and Feed Update-algeria-, january 2024, p. 4)**

Fig .4. Algeria Wheat and Barley Crop Growing Land



Source:(Hales, 22march 2024, p. 3)

In 2022, the top wheat-producing counties in Algeria were Tiaret, Tebessa, and Sétif. Tiaret accounted for a little less than one-tenth of the total wheat production (7.77%), with its production level estimated at 0.223 million tonnes. Sétif was the next largest wheat producer, accounting for about 5.60% of total production, with a harvest of 0.161 million tonnes. As for Tebessa, its wheat production was estimated at 0.147 million tonnes.

Table 5. Production of Wheat in Algeria 2021/2022

City	Production 2021(tonnes)	Production 2022(tonnes)
TIARET	204,682.10	223,217.26
SETIF	141,822.46	160,768.01
Tébessa	130,445.60	147,026.31
OE.BOUAGHI	115,103.06	129,751.86
SOUK AHRAS	108,499.81	122,238.88

Source: (Ndeye , Khadim, Aïssatou, & Racine, April 2023, pp. 7-8)

In January 2022, in response to soaring international cereal prices and with the objective of boosting domestic procurement, the Algerian government raised the official purchasing prices for the 2022 cereal harvest. The procurement price for durum wheat increased significantly from 45,000 DZD to 60,000 DZD per tonne, while the price for soft (common) wheat rose from 35,000 DZD to 50,000 DZD per tonne **(FAO, GIEWS Country Brief ALGERIA, 1 AUGUST 2022, p. 3)**.. This policy intervention aimed to incentivize farmers to expand their wheat production and thereby strengthen national food security.

As for barley, it is primarily used as animal feed, consumed in grain form by livestock such as sheep, cattle, and camels. A smaller share is utilized as green fodder. Minor quantities are incorporated into traditional human foods, such as couscous and bread. In addition, Algeria's breweries use limited amounts of barley, typically imported from European countries **(AHDB, 2021, p. 1)**

In 2019, Algeria produced approximately 1.65 million tonnes of barley, representing a 16% decrease compared to the previous year. However, when compared to 2017, barley production increased by 69.9%, or about 678,000 tonnes. Over the 2005–2019 period, barley production experienced three significant peaks despite climatic challenges—most notably in 2009 (around 2.2 million tonnes), 2018 (about 1.96 million tonnes), and 2019 (1.65 million tonnes).

In terms of regional production, Oum El Bouaghi province contributed the largest share, accounting for 11.52% of the national barley output in 2019. Batna and Tiaret followed, with contributions of 8.25% and 6.89%, respectively—together making up just under one-third of the country's total production. Tlemcen was also among the top-producing provinces, with a share of 5.56%.

Table 6. Production of BARLEY in Algeria 2019

CITY	Production(quintal)
O.E.BOUAGHI	1 900 000
BATNA	1 360 170
TIARET	1 136 000
TLEMCEN	916 150
TEBESSA	877 650
SETIF	852 895
KHENCHELA	710 000
S.B.ABBES	676 268
MILA	597 836
MASCARA	558 430

Source: Statistics of the Ministry of Agriculture, Rural Development and Fisheries.

In January 2022, the Algerian government also raised the official procurement price for barley as part of its broader strategy to enhance domestic cereal production and support farmers in the face of rising input costs and global price volatility. The purchasing price for barley increased from 25,000 DZD per tonne in the previous seasons to 34,000 DZD per tonne — a substantial rise aimed at making barley cultivation more profitable and attractive to farmers. This measure was expected to boost local barley output, reduce reliance on imports for animal feed, and strengthen food and feed security across the country. **(FAO, GIEWS Country Brief ALGERIA, 1 AUGUST 2022, p. 3)**

5. The current status of food security in cereals

Algeria is one of the world's largest cereal importers. Even in years of sufficient domestic production, the country continues to rely heavily on cereal grain imports from the international market. Wheat is considered a highly strategic commodity in Algeria and represents the most important food crop in the Algerian diet. Over the past five years, the country’s wheat import requirements have averaged around 7.6 million tonnes per year, primarily consisting of common wheat, which accounts for approximately 70 percent of domestic consumption.

Table 7. Self-sufficiency ratio for cereals during the period 2005/2022

Unit: 1000 tonnes

Years	**Exports**	**Imports**	**Balance Trade of céréals**	**AVAILABLE FOR CONSUMPTION**	**Self-sufficiency ratio%**
2005	13.98	8290.88	8276.90	11804.33	29.88
2006	8.35	7271.06	7262.71	11280.46	35.62
2007	7.18	7051.52	7044.34	10646.25	33.83
2008	12.13	8933.58	8921.45	10623.50	16.02
2009	6.03	7925.19	7919.16	13172.31	39.88

2010	8.34	7946.15	7937.81	12496.38	36.48
2011	8.3	7946	7938	11666	32.0
2012	8.3	9912.5	9904.2	15041.3	34.2
2013	0.75	7501.93	7501.18	12413.41	39.57
2014	1	12497,7	12496,6	15931,8	21,6
2015	4.4	13915,7	13911,3	17672,2	21,3
2016	3.4	13440,3	13436,9	16379,2	18,0
2017	0,9	16734,6	12892,2	16370,3	21,2
2018	12,4	16734,6	16722,2	22788,1	26,6
2019	38,0	17215,7	17177,8	22811,2	21,2
2020	36,5	13121,6	13085,1	17478,2	25,1
2021	40.4	13002,2	12961,8	15745,2	17,7

Source : (arab Organization for Agricultural Development, 2007- 2022)

Although the Algerian government has prioritized increasing domestic cereal production, cereal imports continue to dominate the country's overall food imports. The cereal import bill rose significantly from $2.74 billion in 2020 to $3.45 billion in 2021—an increase of approximately 25.74% during the period under review.

This rise in the cereal import bill is driven by higher international prices for cereals—especially wheat—a threefold increase in freight costs, the effects of climate change, and elevated fertilizer prices.

Despite ongoing efforts to achieve greater food security, Algeria's cereal self-sufficiency remained relatively low, fluctuating between 39.88% and 16.02% between 2005 and 2021. The lowest level was recorded in 2008, a year marked by poor domestic harvests. During that period, Algeria's heavy reliance on foreign markets made it particularly vulnerable to global price shocks. The surge in international cereal prices not only exacerbated the trade deficit but also placed a substantial strain on the country's public finances. **(FAO, GIEWS Country Brief Algeria, 24 september 2009, p. 56)**

This trend highlights the structural challenges facing Algeria's agricultural sector, particularly in terms of productivity, water management, and climate resilience. Addressing these issues is critical to reducing dependency on imports and ensuring long-term food sovereignty.

5.1. Trends of the wheat* self-sufficiency ratio

Algeria stands as one of the world's largest consumers of wheat and holds the position of the leading wheat consumer in the Maghreb region. Over the past decade, the average per capita consumption of durum wheat in Algeria has been approximately

* Durum wheat is used to produce pasta and couscous.Bread (common) wheat is mainly used to produce bread.

100 kg per year, while bread wheat consumption averages around 170 kg per capita annually. This high level of consumption is largely driven by substantial government subsidies on bread and semolina, which, although making these essential staples more accessible to the population, have inadvertently constrained the growth and competitiveness of the private sector in the wheat industry.

Table 8. Self-sufficiency ratio for wheat during the period 2005/2022

Unit : tonnes

Years	Imports	Exports	Production	AVAILABLE FOR CONSUMPTION	Self-sufficiency ratio%
2005	5683349	0	2414728	8098077	29,82
2006	4966229	0	2687930	7654159	35,12
2007	4855881	0	2318963	7174844	32,32
2008	6486531	0	1111033	7597564	14,62
2009	5719728	0	3445099	9164827	37,59
2010	5057377	0	2952700	8010077	36,86
2011	7454603	0	2910890	10365493	28,08
2012	6347232	0	3432231	9779463	35,10
2013	6304734	0	3299049	9603783	34,35
2014	12497655	1000	3435230	15931885	21,56
2015	13915659	4400	3760948	17672207	21,28
2016	8225654	0	2440097	10665751	22,88
2017	8079164	200	2436503	10515467	23,17
2018	6987300	800	3981200	10967700	36,30
2019	7911400	200	3876900	11788100	32,89
2020	6665700	18600	3106000	9753100	31,85
2021	8295600	22600	2168400	10441400	20,77
2022	7900000	10000	2872113	10762113	26,69

Source : (arab Organization for Agricultural Development, 2007- 2022)

Although domestic wheat production has made significant strides in recent years, Algeria remains heavily dependent on wheat imports to meet its domestic consumption needs and maintain its national strategic reserves. Historically, Algeria has consistently imported more bread wheat than durum wheat, primarily due to the unfavorable climatic conditions for bread wheat cultivation in the country. As a result, bread wheat has typically accounted for 75 to 80 percent of the total wheat imports, reflecting the country's ongoing reliance on external sources to fulfill its wheat requirements. **(Hales, Grain and Feed Annual ALGERIA, 30March 2023, p. 15)**

The Algerian government has set a strategic objective to reduce its reliance on bread wheat imports. As part of this effort, it continues to promote reduced bread consumption among citizens, aiming to minimize waste and, consequently, lower the demand for bread (common) wheat. This policy direction is expected to influence future consumption patterns **(AHDB, 2021, p. 1)**

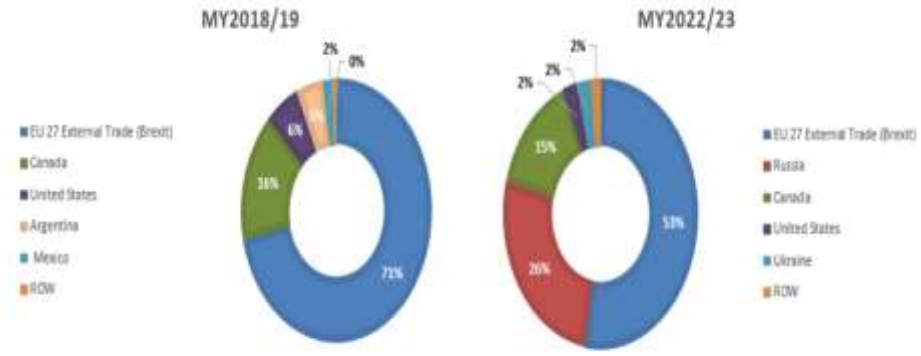
In the fiscal year 2021, Algeria’s wheat self-sufficiency ratio declined to a historic low of 20.8%, marking an 11 percentage point decrease compared to the previous year(2020) and representing the lowest level since the 2008 downturn. During the

same period, Algeria imported approximately 8.3 million tonnes of wheat, while domestic production was limited to 2.17 million tonnes—a 30.19% reduction relative to the previous season. The increase in the wheat import bill was driven by a combination of rising global prices for oil and fertilizers, along with elevated freight costs. For context, wheat imports amounted to 6.66 million tonnes in 2020 and 7.91 million tonnes in 2019.

During the period 2005 to 2022, Algeria was only able to meet between 14% and 38% of its wheat requirements and therefore had to import between 5 million tonnes and nearly 8.5 million tonnes of wheat.

Regarding bread wheat, in the past, the country mostly imported it from France, Canada, Germany, the United States, Spain, and Mexico. **(FAO, GIEWS Country Brief ALGERIA, 03 ACTOBER 2023, p. 2)**.

Figure N° 05: Top Five bread Wheat Suppliers to Algeria by Market Share MY 2018/19 vs MY 2022/23



Source:(Hales, Grain and Feed Annual, 22march 2024, p. 11)

Algeria is among the ten largest importers of bread wheat in the world. It was traditionally a major market for French wheat. However, since the onset of the war in Ukraine, Algeria has intensified its efforts to diversify its suppliers and has also been seeking to procure wheat at lower prices.

As a result, Algeria has become one of the top five buyers of Russian bread wheat, attracted by its quality and competitive pricing. Russia resumed wheat exports to Algeria in June 2021 after a five-year hiatus. In 2022, Russia exported approximately 1.3 million tonnes of wheat to Algeria—four times the volume Algeria imported from Russia in 2021.

The OAIC (Office Algérien Interprofessionnel des Céréales) confirmed that the protein levels of Russian wheat deliveries were satisfactory and that the specific weights were, on average, higher than those of wheat from the EU. The OAIC also expressed satisfaction with the bug damage rates, which ranged between 0.3% and 0.4%. It is worth recalling that Algeria amended its wheat import regulations at the end of 2020, raising the allowable percentage of bug-damaged grain from 0.2% to 0.5% to permit imports from the Black Sea region. Since then, Russia has regularly exported

wheat to Algeria, and Algeria has continued to import Russian bread wheat throughout the ongoing conflict in the Black Sea region. **(Hales, Grain and Feed Annual, 22march 2024, pp. 10-11)**

As for durum wheat, it has accounted for an average of 15.5% of Algeria's total wheat imports over the past five years. Durum wheat imports decreased by 25.88%, from approximately 1.4 million tonnes in 2017/2018 to around 1.1 million tonnes in 2021/2022. These imports typically increase only when the domestic crop is affected by drought. Notably, durum wheat is usually sourced from Canada and Mexico, with smaller quantities coming from the United States

Table 9. Algeria Durum Wheat Imports by Origin

Reporter	2017/18	2018/19	2019/20	2020/21	2021/22
Canada	934,758	1,125,360	372,615	968,874	614,183
Mexico	320,422	122,335	255,638	218,470	209,100
United States	113,494	130,672	62,723	125,127	33,900
Australia	-	-	-	-	52,148
Kazakhstan	5,000	-	-	-	-
Ukraine	-	-	-	5,400	136
EU 27 (Brexit)	64,139	61,486	8,650	41,097	156,223
Total	1,437,813	1,439,853	699,626	1,358,968	1,065,690

Source:**(Hales, Grain and Feed Annual ALGERIA, 30March 2023, p. 15)**

Algeria's durum wheat imports are lower than those of common wheat due to abundant domestic production, which covers a large proportion of local demand. The country's climate is also more suitable for growing durum wheat. In addition, the consumption of durum wheat in Algeria is lower than that of bread wheat.

5.2. Self-sufficiency ratio of barley

Algeria's barley imports are significantly influenced by weather conditions. Typically, when pasture conditions improve due to favorable weather, the demand for barley decreases. This relationship highlights the strong connection between climate factors and agricultural supply needs in the country.

Table 10.Self-sufficiency ratio for barley during the period 2005/2022

Years	Imports	Exports	Production	AVAILABLE FOR CONSUMPTION	Self-sufficiency ratio%
2005	142528	0	1032819	1175347	87,87
2006	143863	0	1235880	1379743	89,57
2007	56821	0	1186658	1243479	95,43
2008	324034	0	395922	719956	54,99
2009	105336	0	2566614	2671950	96,06
2010	160000	0	1503900	1663900	90,38
2011	385153	0	1258080	1643233	76,56
2012	401781	0	1591715	1993496	79,85

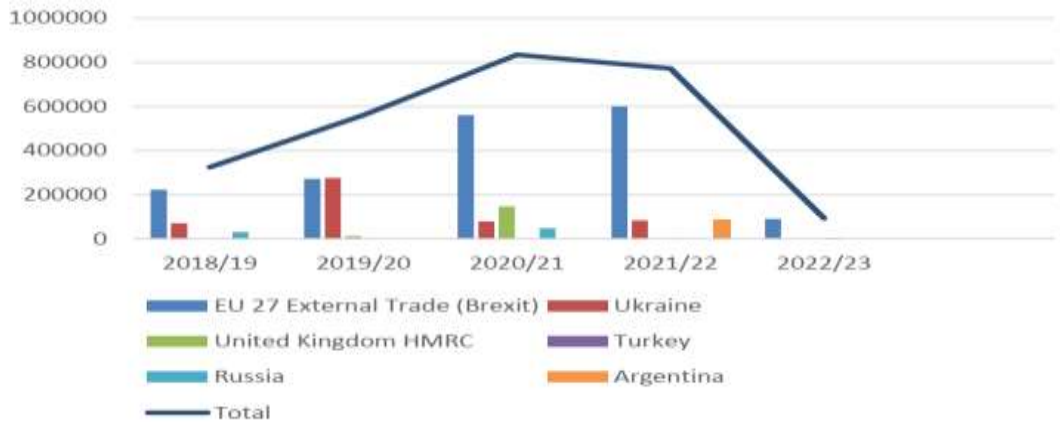
2013	514798	0	1498639	2013437	74,43
2014	770222	0	939401	1709623	54,95
2015	756143	0	1030556	1786699	57,68
2016	879215	0	919907	1799122	51,13
2017	541558	0	969696	1511254	64,16
2018	356400	0	1957300	2313700	84,60
2019	696100	0	1647700	2343800	70,30
2020	876900	0	1213100	2090000	58,04
2021	730200	20	555400	1285580	43,20
2022	400719,99	298	1600000	2000421,99	79,98

Source : (arab Organization for Agricultural Development, 2007- 2022)

Barley imports have continuously increased over the period from 2005 to 2022 due to poor crop yields, which were significantly affected by dry years. As domestic production remains insufficient to fully meet domestic demand, especially with the rise in livestock numbers, particularly sheep, consumption of barley has steadily increased. On average, Algeria imported approximately 600,000 tonnes annually over the past five years. Despite this, Algeria recorded relatively high self-sufficiency rates in barley during the period 2005-2022, with rates fluctuating between 64% and 96%.

In the 2021/2022 period, barley output was favorable, leading to a reduction in imports. Additionally, barley has partially been replaced by corn as a primary feed ingredient. This shift is reflected in the decline in barley imports. The European Union (EU-27) remained the dominant supplier of barley to Algeria over the past five years. In contrast, imports from the United Kingdom have completely ceased. Notably, Argentina emerged as the second-largest supplier of barley to Algeria in the 2021/2022 marketing year, but its exports to Algeria dwindled to zero in the 2022/2023 period **(Hales, 22march 2024, pp. 13-14)**

Fig .06. Algeria Barley Imports by Origin in (MY & MT)



Source : (Hales, 22march 2024, p. 14)

In general, it can be said that Algeria's cereal sector faces significant challenges, primarily due to insufficient productivity, which stems from various factors. These include a lack of skilled human resources, inadequate infrastructure, extreme weather conditions, and water scarcity. Additionally, Algerian agricultural areas still rely on traditional irrigation methods, consuming an average of 3,500 m³ of water per hectare.

The under-mechanization of farms also contributes to the low productivity of Algeria's cereal sector. Furthermore, low levels of investment and inefficiencies in agricultural practices exacerbate the situation.

One might assume that improving production capacity is the only key to food security; however, managing consumption is equally important. Among the many challenges related to cereal consumption are food loss and waste, with overstocking being a notable cause.

Moreover, Algeria's rapidly growing population makes it increasingly difficult to ensure both the security of cereal production and consumption. To address this challenge, it is crucial to focus on improving cereal yields and overall efficiency in the sector.

6. CONCLUSION

In conclusion, food security has emerged as a strategic priority for nations across the globe, and agriculture remains at the heart of achieving this goal. Algeria, recognizing the critical role of this sector—particularly cereal production—has made efforts to enhance its performance. However, despite these efforts, the cereal sector continues to face considerable challenges, including low productivity, limited skilled labor, underdeveloped infrastructure, climate-related adversities such as prolonged droughts and temperature fluctuations, water scarcity, insufficient mechanization, weak investment levels, and outdated farming techniques.

As a consequence, Algeria remains heavily dependent on cereal imports—especially common wheat—to meet the needs of its rapidly growing population and urban centers. This dependency has deepened over time, making Algeria one of the largest cereal importers in the world, with bread wheat accounting for the majority of its imports.

To reduce this reliance and strengthen food sovereignty, Algeria must adopt a comprehensive approach focused on modernizing its agricultural practices. Key recommendations include: investing in agricultural research and development, enhancing irrigation infrastructure, promoting mechanization, offering targeted training for farmers, and creating favorable conditions for private and public investment. In addition, developing national strategies to mitigate the effects of climate change and expanding access to agricultural credit and inputs are essential. By addressing these issues, Algeria can move toward a more resilient and self-sufficient cereal production system capable of meeting future food demands.

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