



The challenges of developing the strategic agriculture in Algeria as a mechanism to guarantee the sustainable food security –With reference to the experience of the Wilayas of El Oued and Mniaa-

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Abstract

This study aims at showing the importance of developing the strategic agriculture in Algeria because it is a new technique that achieves the agricultural growth. In this regard, because the Algerian Sahara takes the lion's share of the country's surface, the state adopted a national strategy to develop the strategic Saharan agriculture to guarantee the sustainable food security.

This study uses the descriptive analytical method. Findings show that Algeria has a set of qualifications that enable it to develop the strategic agriculture and achieve the sustainable food security. However, it still faces a set of challenges and risks.

✓ **Keywords:** Agricultural development; strategic agriculture; food security; Saharan agriculture.

1. INTRODUCTION

The reports of the World Bank confirm that agriculture is one of the main sources for the achievement of the sustainable development because it contributes to the common welfare and feeds the world population that is estimated to be 9.7 billion in 2050. The efficiency of this sector exceeds the other sectors two to four times. Besides,

agriculture helps fight social issues like unemployment and poverty, and improves the food security of 80% of the poor people worldwide. Thus, it is necessary to develop the strategic agriculture to achieve the food security and support the sustainable development in Algeria through the use of the modern agriculture techniques to increase the yield, mainly the cereals.

In this regard, the Algerian government must provide the necessary measures and the suitable infrastructure for a productive agriculture, according to unconventional strategies and policies, that faces the climatic changes, desertification, the low rainfall, and the high temperatures that negatively affect the crops and bring about food crises. In this context, the adoption of the modern agricultural technologies requires huge sums of money and skills; therefore, most of the plantations in Algeria use the conventional methods and face the risks of the unexpected climatic changes.

The Algerian government has to encourage and support the use of the modern agricultural technologies to face the climatic changes, lift up the agricultural sector, and achieve the sustainable food security. On the other hand, because the Algerian Sahara takes 80% of the mainland, the government adopted a national strategy to develop the strategic Saharan agriculture through laws that promote this agriculture to achieve the food security and avoid any rupture in the agricultural production throughout the year. This shall satisfy the customers' needs and deter the climatic threats. Based on what was said, we raise the following question: **to what extent can we say that the modern agricultural technologies can help lift up the strategic agriculture and achieve the sustainable food security in Algeria, in general, and in the Sahara, in particular?**

1.2 Sub-questions:

To answer the main question, we raise the following sub-questions:

- What is meant by the strategic agriculture?
- What is its relation with the modern agricultural technologies?
- How can we evaluate the status-quo of the food security in Algeria?

- What are the main risks and challenges that hinder the achievement of the food security in Algeria in general, and in the Sahara (El Oued and Mniaa) in particular?

1.3 Hypotheses:

- The strategic agriculture is a pattern that aims at achieving long-term strategic goals instead of the immediate ones. It relies on the modern technology to command the various plantations.
- Algeria seeks the food security through supporting the agricultural investment.
- The achievement of the food security in Algeria is not easy because the Southern Wilayas, mainly El Oued and Mniaa, which contribute much to the national food security, face lot of challenges

1.4 Method of the study:

The study uses the descriptive analytical method to describe and shed light on the situation of the food security in Algeria and on the related concepts to figure out how the government applies the requirements of the modern agricultural technologies to achieve the target objectives. Besides, the study aims at knowing the contribution of such investment in achieving the national food security through shedding light on the advantages of El Oued and Mniaa and on their crops that pour into the food security. Then, the study evaluates the efficiency of the agricultural policies used in Algeria to achieve a sustainable food security.

1.5 Structure of the study:

1. The conceptual frame of the modern agriculture.
2. The status-quo of the food security in Algeria during 2016-2021.
3. The experience of El Oued and Mniaa –the challenge of achieving the food security.

2. The conceptual frame of the modern agriculture:

The concept of the modern agricultural technologies is tightly linked to the strategic agriculture because the achievement of the strategic agriculture is tightly

linked to the use of the agricultural technologies. In this regard, the development of the strategic agriculture is necessary to achieve the food security. Therefore, we must increase the use of the modern agricultural technologies to increase the agricultural production. The importance of the strategic agriculture lies within the fact that it contributes to the food security and the environmental and economic sustainable development in the agricultural sector. Besides, it diversifies the foods, satisfies the local food needs, establishes the socioeconomic balance in the rural societies through creating job opportunities and developing the infrastructure, supports the sustainable development, and protects the biological diversity and the natural resources sustainability.

2.1 The concept of the agricultural technology- the strategic agriculture:

It is the agriculture that uses the modern technological tools to command the different agricultural actions. It helps the growth, the vegetal production, the harvest, the protection from the potential damages, etc. The technology must improve the productivity, efficiency, profitability, and sustainability of the agricultural production. The adoption of the modern agricultural technologies guarantees:

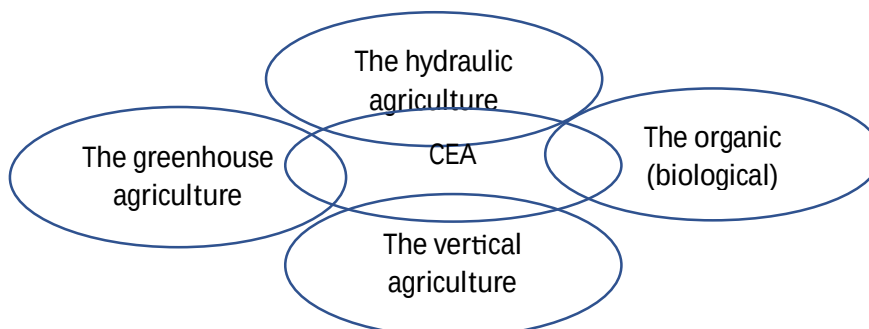
- The increase of the agricultural production rate.
- The decrease and rationalization of the water consumption.
- The preservation of the plants from the scourges.
- Saving the use of the agricultural inputs, such as the fertilizers and pesticides.
- The decrease of the gap in the agricultural products.
- The improvement of the quality and specifications of the agricultural crops.
- The decrease of the other operational fees¹.

The strategic agriculture with the modern technologies includes:

2.1.1 The Controlled-Environment Agriculture CEA:

It includes all the main factors that can be managed, such as the temperature, the light level, the shadow, the irrigation, the fertilizers, the humidity, etc. We can sum up the main CEA in the following chart:

Fig. 1: the types of CEA



Source: by the author based on many references

2.1.1.1 The hydraulic agriculture:

It is one of the agricultures that do not use soil. It is based on feeding the plants with the liquid solutions that are mixed in determined rates according to the needs of the plants. The soil is just an incubator for the roots and nutrients. Its use is not necessary as the plant can be put in a milieu that guarantees stability and good nutrition. This agriculture can be defined as:

- The hydraulic agriculture means the work of the water. It is derived from the Latin “hudor”, which means water, and “ponos”, which means work. The term refers to planting the crops without soil. This may seem illogical because the plants draw their food from the soil, and may die without it².
- It is a technique that allows agriculture without soil, using nutritional solutions that directly provide the plants with the food and hydrate it. It uses alternative solutions for the sun and takes place in green houses³.

Based on what was said, we can say that the aquatic plants get the needed nutritional substances from an aquatic solution⁴. Thus, the soil is not necessary for their lives. This agriculture can be used in small spaces.

2.1.1.2 The organic (biological) agriculture:

It provides the scientific methods that improve the soil fertility and increase the crops with limited chemical additions. It can be defined as:

- The US agriculture ministry defines it as the alternative agriculture in the productive system that integrates the natural processes such as the nutritional

elements cycle and the relations between the scourges and their natural enemies in the productive process. It adds that it is the reduction of the synthetic elements from the fertilizers, the pesticides, the additives, and the vital forces of the animals and plants. In addition, it is the development of the mixture between the crops, the productive potentials, and the natural determinants of the land to guarantee the continuity, high production levels, economic efficiency, developed agricultural management, and preservation of the soil and the vital resources⁵.

- It is a productive system that avoids and excludes the industrial fertilizers and pesticides. It uses the vital fight that includes the natural enemies and the plant's resistance to face the insects and scourges. Besides, it diversifies the crops through choosing the suitable timing for farming, the suitable plowing methods, and the suitable agriculture⁶.
- The food constitution board defines it as a comprehensive system for the management of the agricultural production that aims at promoting, strengthening, and improving the vital environmental health system, including the biological cycles and activity of the soil⁷.

From these definitions, the farmer must:

- Stop using the industrial chemicals and fertilizers.
- Contribute to the vital diversity through the optimal use of the energy and the natural resources such as the water, the soil, and the organic substance.
- Protect the natural systems and consider the agricultural soil a vivid system that must be protected and developed.
- Use the consecutive crops agriculture and produce quality products⁸.

2.1.1.3 The vertical agriculture:

Few decades ago, it was a science fiction. However, it is part of the agricultural technology today.

- It is a process based on planting the crops in strata to save land and increase the crops. It is an innovative agricultural practice that can solve the food crisis. In this regard, instead of planting the crops horizontally, they are planted in accumulated vertical strata. Thus, it requires less soil and increases the water efficiency⁹.
- It is planting crops above each other in a closed environment. It is generally made in cities because it requires limited space and the plants do not need soil as most of them are aquatic whose roots need to be regularly irrigated with water and nutrition¹⁰.

Thus, the vertical agriculture may yield a regular production and increase the crops thanks to its controlled environment, including the temperature, light, humidity, etc. In addition, it creates less pressure on the arable lands and saves the plants from pollution because the vertical farms are generally closed and the crops grow more rapidly.

2.1.1.4 The greenhouse agriculture:

It got the lion's share of the global digital agriculture in 2020. It is used to plant all the crops. In this context, Eden Project is the biggest project of the greenhouse agriculture in the world. It includes more than 100000 plants of more than 5000 species. It is planted using the digital techniques and the last innovations in the agricultural technology¹¹. It protects the crops from the external factors such as the rain, the wind, the temperature, and the scourges. The houses are equipped with algorithms, engines, and sensors that control the irrigation, warming, and light to provide the optimal atmosphere and improve the crops. The modern houses use LED bulbs and automatic control systems to protect the agricultural atmosphere from the external environmental effects¹². This agriculture contributes too much to a bigger market share of the sector in the global digital agriculture market.

2.2 The smart agriculture (the agricultural artificial intelligence):

- FAO defines it as an agriculture that sustainably increases the productivity and flexibility (adaptation), reduces the warm gas emissions, and strengthens the achievement of the national goals of the food security and development¹³.

Thus, the smart agriculture is a method, not a practice, that requires evaluation of the social, economic, and environmental conditions of the place to determine the suitable practices and technologies of the agricultural production¹⁴.

- It is a system that relies on the advanced technology in farming the foods sustainably and rationalizing the use of the clean resources, mainly the water. Besides, it uses the information management and analyses systems to take the best production decisions, with the least costs. In addition, it uses the agricultural processes such as irrigation, fighting the scourges, and controlling the soil and crops¹⁵. In other words, it is characterized with the possibility of providing more sustainable and productive crops through an efficient exploitation of the resources.

2.3. The importance of the modern agricultural technology:

We can sum up this importance in the following:

- The easy control of the big surfaces: its techniques cover big surfaces in short time thanks to the drones and the Internet of Things.
- The increase of the work efficiency: It saves time and executes the tasks with great exactness.
- The decrease of the human effort: Unlike the conventional agriculture, the farmer does not need to be in the plantation all the time because he can control the plantations afar with no human intervention.
- The environment preservation: The modern techniques reduce the trash and the chemical products in the rivers and the groundwater.
- The preservation of the water resources: the consumption of the water, fertilizers, and pesticides is rationalized to reduce the prices of food.

- The increase of the productivity: The modern techniques help protect the plants from the different diseases thanks to the early diagnosis of the diseases that affect the plants. Besides, they improve the productivity and control the water quality and all the changes that may happen. Besides, the data analysis enables taking the necessary decisions to increase the plants' quality¹⁶.
- More reliable management and control of the natural resources through the robots, such as the control of the water and air quality.
- More control for the producers over the vegetal production, processing, distribution, and storage to reach bigger efficiencies, less prices, better growth conditions, and food security¹⁷.

2. The status-quo of the food security in Algeria during 2016-2021:

Agriculture is the second biggest sector in Algeria, after the oil. It contributes with 12.4% of the GDP, with a value of 25 billion USD annually. In this regard, it achieved a growth rate of 2.7% in the last decade and covered 73% of the food needs. Therefore, the government set a national strategy to develop the agriculture in general, and in the Sahara in particular, through enacting laws and prioritizing the agriculture to encourage the farmers to bridge the gap in the foods, mainly in the cereals. The latter are among the most important goods worldwide, and in Algeria in particular, as they got the lion's share of the exploited lands. The following lines show an evaluation of the food situation in Algeria:

2.1 The main food products:

2.1.1 The wheat:

It is one of the main consumed cereals in Algeria. In this regard, the wheat flour and its products are in the top of the most consumed products. Around 94% of the wheat production in the Arab world is found in 06 countries, including Algeria that ranked in the 04th position after Egypt, Morocco, and Iraq in 2021. In this context, Egypt produced 9.02 tons with a contribution of 33.1% of the Arab production, Morocco produced 27.4%, Iraq produced 15.4%, Algeria produced 9.8%, Tunisia

produced 4.16%, and Syria produced 3.84%¹⁸. The wheat production in Algeria decreased in 2021 with 6.67% compared to 2020 due to the climatic changes, the decrease of the rainfall, the drought, the desertification, and the increase of the temperature. In general, we can say that the wheat production in 2016-2019 witnessed a remarkable increase of 24.66% because it is the first food in the food balance of the Algeria citizen, as shown in Table 01:

Table 1. The production of wheat in Algeria compared to the other Arab countries in 2016-2019 (1000 tons)

	2016	2017	2018	2019	2020	2021
Egypt	9250	8240	8230	9000	9000	9000
Morocco	2900	7000	7200	3000	2600	7500
Iraq	3000	3000	2100	4100	6050	4040
Algeria	2200	2200	4000	3900	3000	2800
Tunisia	1000	1000	1000	1000	1000	1000
Syria	1900	1900	1100	1000	1000	1000

Source: The Arab Organization for the Food Development, the Annual Book for the Arab Agricultural Statistics, different issues (2016-2021)

2.1.2 The barley:

It takes the second rank after the wheat regarding the contribution to the cereals in Algeria. As for the Arab world, Syria, Morocco, Algeria, KSA, and Tunisia are the most important producers of the wheat, with a total of 94% of the Arab production. In this regard, Syria contributes with 33%, Morocco with 31%, Algeria with 13%, KSA with 7%, and Tunisia with 5% of the total production in the Arab region¹⁹. Generally, because the barely is the main food for the cattle, its supply witnessed an increase of 28% in 2016-2019, as shown in the table:

Table 2. The production of barley in Algeria compared to the other Arab countries in 2016-2019 (1000 tons)

	2016	2017	2018	2019	2020	2021
KSA	40	600	500	700	450	700
Morocco	600	2450	2800	1000	600	2700
Algeria	900	1000	1950	1600	1200	1100
Tunisia	400	500	300	480	800	800
Syria	900	1000	450	3100	2300	2900

Source: The Arab Organization for the Food Development, the Annual Book for the Arab Agricultural Statistics, different issues (2016-2021)

2.1.3 The vegetables and fruits:

They increased during the study period. Potato ranks the 04th in the list of the available goods; its supply increased with 2%. Besides, the onion increased with 63% while tomato witnessed a fluctuation. As for the rest of the vegetables, they witnessed a slight increase in the same period while the cereals increased with rates that did not exceed 15%, as shown in table 03:

Table 3. The development of the production of vegetables in Algeria in 2015-2019 (1000 tons)

	2015	2016	2017	2018	2019
Potato	2300	2298	2779	3445	3979
Tomato	941	652	809	861	944
Onion	704	759	980	1001	1144
Main cereals	13	16	15	19	15
Other cereals	152	146	173	209	228
Other vegetables	2474	2609	3178	3542	3731

Source: By the author based on FAOSTAT

As for the fruits production, most of the fruits witnessed an increase of 40%. The citrus rank first with 65%, followed by the dates with 47%, the other fruits with 45%, and the grapes with 40%, as shown in table 04:

Table 4. The development of the production of fruits in Algeria in 2015-2019 (1000 tons)

	2015	2016	2017	2018	2019
Dates	484	550	594	650	712
Apples	366	355	389	490	534
Grapes	427	435	548	596	433
Citrus	688	712	872	811	1136
Other fruits	761	735	835	975	1103

Source: By the author based on FAOSTAT

2.1.4 The production of the oil seeds and olive:

The production of plant oils in the Arab world was 4.07 million tons in the Arab world in 2021; i.e., an increase of 7.8% compared to 2020. Algeria is among the important producers of plant oil in the Arab region. In this regard, Sudan produces 45.9%, Egypt 17.7%, while Algeria, Morocco, and Tunisia contributed with 8.2% to 6% of the total Arab production in 2021²⁰. In general, the industrial crops in Algeria witnessed fluctuations in the supplies during 2015-2019 because most of these crops are imported and their prices and availability cannot be controlled, as shown in table:

Table 5. The development of the production of some agricultural crops Algeria in 2015-2019 (1000 tons)

	2015	2016	2017	2018	2019
Sugar	1090	1132	1241	1348	1222
Oil plants	345	361	596	417	585
Plant oils	540	545	464	508	615
Some stimulators	138	170	163	110	168

Source: By the author based on FAOSTAT

2.1.5 The animal goods production:

This includes the animal and fish products that represent an important source of animal protein. In this context, milk ranks the second in the Algerian food balance, after the wheat, because it is a complete food for the individuals of different ages. The supply increases yearly and had redoubled with 2% during the study period. Besides, the chicken meat and eggs have been continuously increasing during the study period as they passed from 6%, 27%, to 49%. As for the red meat and fish, they witnessed

fluctuations from one year to another, as the fish decreased with 13.5% during the study period, as shown in the table:

Table 6. The development of the animal wealth in Algeria in 2015-2019 (1000 tons)

	2015	2016	2017	2018	2019
Red meat	402	388	420	392	456
Chicken meat	262	268	271	278	278
Animal fat	26	36	24	32	37
Fish	176	167	172	142	148
Eggs	179	185	195	261	266
Milk	4294	4409	4942	5053	6086

Source: By the author based on FAOSTAT

In general, most of the animal wealth in Algeria relies on the natural prairies, where there are no suitable systems for ranching to reach a good production and develop the added value of the animal production. As for the fish wealth, despite the big potentials to achieve a surplus for export, we still can develop the exploitation thanks to the long coast and the huge resources that include the watercourses, valleys, swamps, gulfs, etc, in addition to the aquaculture that is not completely exploited.

2.2 The food availability in Algeria:

Food availability is one of the main axes of the food security. It reflects the ability of the state to provide the necessary supplies of food to its inhabitants from the local or external markets. In this vein, the Algerian state has relative advantages in producing some main products such as cereals, fruits, and vegetables, and some animal and fish products. Moreover, it relies on the import to provide high quantities of cereals, sugar, and some plant oils.

2.2.1 The index of food availability in Algeria:

This index is measured based on:

- The sufficiency of the national food supplies.
- The risk of the supplies cut.
- The ability of the state to distribute the foods.
- The general expenditure on food and agricultural researches.
- The agricultural infrastructure.

- The agricultural production fluctuation.
- The risks of the political instability²¹.

In this context, the General Food Security Index GFSI classified Algeria among the first African states in 2021. It has achieved an additional score of 10.7 points in the last decade and ranked 43 worldwide with a balance of 6.66 points. Besides, there had been a clear development since 2012 until 2021, as shown in the table:

Table 07: the food availability index in Algeria during 2012-2021 according to GFSI (0-100 degrees)

Years	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Degree°	53.2	51.3	57.4	58.2	62.9	63.5	63.3	63.7	61.6	63.9

Source: By the author based on FAOSTAT

The GFSI during 2019-2021 show a degree of 27.6° to 31.6° in Yemen, Syria, and Sudan, between 51.8° and 60° in Morocco, Tunisia, Jordan, Oman, Algeria, and Egypt, and between 67.5° and 74.4° in the rest of the Arab states, as shown in table 08:

Table 08: The degree of food availability in Algeria and some Arab states during 2019-2021 (0-100 degrees)

States	2019	2020	2021	Changes between 2020 and 2021
Egypt	74.3	62.8	60.0	4.5-
KSA	70.7	73	67.8	7.1-
Qatar	69.5	70.7	74.4	5.2+
Kuwait	60.0	68.3	72.3	5.9+
UAE	66.8	66.5	71.3	7.2+
Oman	63.9	59.1	57.3	1.3-
Bahrain	56.2	56.8	67.5	18.8+
Tunisia	59.6	56.7	54	4.8-
Algeria	59.0	55.7	58	4.1+
Morocco	51.9	51.4	51.8	0.8+
Jordan	51.7	48.2	55.2	14.5+
Syria	42.4	41.3	30.1	27.1-
Sudan	37.5	30.8	31.6	2.6+

Source: The Arab Organization for the Agricultural Development, the situations of the Arab food security, Arab League, annual book of Arab agricultural statistics, different issues (2016-2021), p. 31

In general, we can say there is a clear improvement in the general food security index in Algeria during 2020-2021. However, it does not exactly reflect the situation

because it does not show the real demand and consumption of the food products in Algeria.

2.2.2 The possibilities of getting food and the affecting factors:

The factors that affect getting food include the incomes, goods prices, demographic growth, the food production growth, the development of the marketing systems, etc. This index is calculated based on 06 secondary indices, as follows:

- The consumption of the food from the total expenditures.
- The rate of people living under or near the poverty line.
- The GDP per capita.
- The customs tariff on the agricultural imports.
- The food security programs.
- The possibility of the farmers' access to funding²².

The following table shows the average value of the food access index in Algeria and some other Arab states:

Table 09: The index of the possibility of food access in Algeria and some Arab states in 2021 (0-100 degrees)

States	Egypt	KSA	Qatar	Kuwait	UAE	Oman	Bahrain
Degree°	66.5	75.0	83.8	80.1	75.9	88.8	79.2
States	Tunisia	Algeria	Morocco	Jordan	Syria	Sudan	
Degree°	74.4	77.9	75.1	80.4	34.0	31.8	

Source: The Arab Organization for the Agricultural Development, the situations of the Arab food security, Arab League, annual book of Arab agricultural statistics, different issues (2016-2021), p. 32

As previously said, many factors affect the possibility of food access, namely:

- The income: World Bank statistics in 2021 show that the annual growth rate of the incomes in Algeria increased compared to 2020 and 2019. This fluctuation is due to the change in the oil prices since 2014 and Covid-19.
- The agricultural product per capita: Algeria ranked 3rd after KSA and Morocco regarding this point, as shown in the table:

Table 10: GDP per capita in Algeria and some Arab states in 2021

States	2018	2019	2020	2021
Egypt	280.17	333.5	285.4	299.7
KSA	519.16	550.3	568.1	578.4
Qatar	120.69	113.5	118.2	121.7
Kuwait	149.33	221.5	216.7	225.9
UAE	315.09	330.8	340.9	349.2
Oman	367.92	318.9	345.9	368.1
Bahrain	69.38	83.1	86.4	86.8
Tunisia	363.12	235.6	201.5	266.7
Algeria	487.55	477.1	475.5	480.1
Morocco	400.5	429	419.9	416.4
Jordan	208.7	325.7	368.6	371.9
Syria	199.4	70.9	70.6	70.8
Sudan	347.7	616.8	473	445.8

Source: The Arab Organization for the Agricultural Development, the situations of the Arab food security, Arab League, annual book of Arab agricultural statistics, different issues (2018-2021).

- Prices of the food products: with the increasing trend of the main food prices worldwide between 2020 and 2021, the possibility of food access was affected, mainly regarding the cereals, oil, sugar, and the animal products. The increase rate between 2015 and 2021 was relatively high for the plant oils, wheat, meat, rice, and cows.

In addition to these points, we find the decrease of the purchasing power with the economic recession due to Covid-19. Moreover, the food products trade was affected by the epidemics and crises such as the Russian Ukrainian war that brought about shocks in the supply and demand, and difficulties of access. Thus, the market was destabilized and the prices of storage and cooling increased. Furthermore, the devaluation and inflation widened the crisis²³.

4. The experience of El Oued and Mniaa- the challenge to achieve the food security:

In the light of the continuous debate about the international increase of the food prices, the economic strategies of all the states aimed at supporting the local agriculture, mainly in the Saharan regions. Therefore, Algeria started a set of awareness

campaigns to encourage the strategic agriculture by focusing on the agricultural scientific research and encouraging the youths to adhere to the agricultural programs. The main points in the Algerian plan to achieve the food security are:

- The future plan aims at developing the agricultural sector in the rural regions and apply the rural agricultural renovation policy.
- The last report of the global food security program by the UN ranked Algeria 1st in Africa regarding the food security. It got a rate of 63.9%, which puts it among the states that can support the UN project that aims at zero hunger in 2030.
- The records of the Algerian economy show that the contribution of the agriculture to the GDP does not exceed 13%; i.e., about 25 billion USD.
- Algeria looks at the ecological agriculture as a main pillar for the organic agriculture and the local products²⁴.
- The government provides big facilitations to the youths willing to invest in agriculture.
- Algeria succeeded in overcoming the obstacles that face the development of the agriculture in the isolated regions.
- The state funds the food security projects that invest in chickens and the main food products, and supports the export²⁵.

4.1 The experience of Oued Souf in the strategic agriculture:

The region of El Oued in the Algerian Sahara is a legend because it turned into a land whose products are exported; some parties aim at making it a green heaven.

4.1.1 The geographic position of El Oued:

It is located 630 km in the Eastern South of Algiers. It is also known as the city of 1001 domes and the city of the golden sands. The first name is because the tribe of Msifa put the domes on the houses to refresh the weather while the second is because of the quality and brilliance of the sands in the dunes²⁶. Its surface is 44.586.80 Km², i.e., a rate of 1.87% of Algeria. It was established by the administrative division of 1984 and holds now 3 municipalities and 12 Dairas. Naturally speaking, it is in the

Northern side of the big Eastern Irq, which is a sedimentary basin characterized with high dunes in series²⁷.

4.1.2 The agricultural production in El Oued:

The projects initiated in the last years made the region hugely contribute to supplying the national market with the important crops, such as the fruits, vegetables (mainly potato and tomato), and the high quality dates thanks to the state facilitations and support as shown in the table:

Table 11: The development of the agricultural production in El Oued during 2000-2020 (quintals)

	2000	2005	2010	2015	2020	National rank
Cereals	34.280	98.843	98.258	488.000	302.440	1 st
Potato	131.380	1.550.704	6.206.320	11.180.000	11.965.000	1 st
Tomato	22.730	50.590	66.975	1.023.000	2.675.000	5 th
Dates	1.074.687	1.236.190	1.674.950	247.000	27.521.000	2 nd

Source: Yahi Jamel & Yahyaoui Hadia, the policies of the agricultural support in the Algerian South and their reflections on the achievement of the national food security: “case study of El Oued”, freedoms and rights journal, Vol. 11, No° 1, 2023, p. 903

The table shows that the potato ranks 1st with great production thanks to the support of the government, which turned the region into a great agricultural pole. In this regard, it is one of the main potato exporters in the state, with a contribution of 40% of the national production. This encourages the export, building a strong national economy, and maintaining the market stability²⁸. In 2020, the production of potato was 11.965.000 quintals in 36.500 acres. It equals 40% of the total planted land in Algeria. The potato agriculture is based in the municipalities of Hassi Khelifa, Remmas, and Taghzout where there are national markets for potato, because these regions make 60% of the production of the region.

As for tomato, the production was 2.675.000 quintals in 3.925 acres in 2020. Tomato plantation is based in the municipalities of Hassi Khelifa, Dbila, al Magran, al Trifaoui, al Rgiba, and Taleb al Arbi. They are municipalities with fertile spaces that

have high yields. As for the cereals, the production was 308.440 quintals in 2020. It is a remarkable increase since 2015 to 2018, when the production was 488000 quintals in 8000 acres, 528800 quintals in 8000 acres, 570000 quintals in 10000 acres, and 302880 quintals in 103000 acres, respectively, according to the Directorate of Agriculture in El Oued.

Concerning the dates, the production was 27.521.000 quintals in 2020. It marks a continuous increase, as the production was since 2015 to 2018 as follows: 2474000 quintals in 36680 acres, 2533100 quintals in 37070 acres, 2624400 quintals in 37440 acres, and 2731200 quintals in 37750 acres. Based on what was said, we conclude that the development of the strategic products is thanks to the agricultural estate availability in the region. Among the new technical data that contributed to the increase of the agricultural lands, the size of the agricultural production is increasing with the increase of the arable lands thanks to the governmental policies that support the activity. Thus, the region ranks 1st nationally and monopolizes the biggest production of many crops.

4.2 The experience of Mniaa in the strategic agriculture:

The region of Mniaa has big agricultural potentials and promising horizons to develop the strategic agriculture, mainly the cereals, maize, and olives.

4.2.1 The geographic position of Mniaa:

It is in the center of Algeria with a surface of 55870 Km² and a population of 7000 inhabitants. It is surrounded in North by Ghardaia, in the South by Ain Salah, in the East by Ouergla, and in the West by Timimoune. It has 01 Daira (Mniaa) that includes the municipalities of Mniaa, Hassi al Kara, and Hassi al Fehal²⁹. It is characterized with an arid climate and low rainfall, and relies on agriculture for the local economy.

4.2.2 The agricultural production in Mniaa:

Agriculture witnessed a great success in the region thanks to the intensive movement brought about by the state programs to develop agriculture. Thus, the sector is a source of income and jobs for the local inhabitants. In this context, the government

focuses on the groundwater for irrigation and the expansion of the agricultural surface and the plantations. The agricultural authorities launched many programs to develop the agricultural production and increase the exploited lands to 121.500 acres in 2024. Besides, they target developing the palm agriculture, the cereals, the oils, peanut, soya, and olives, sugar beet, and industrial tomato. Furthermore, the production of the fodder (clover and maize) is expected to rise to feed the cows and develop the milk production in the surrounding regions, mainly Ghardaia that produces 30 million liters annually, and red and white meats. Besides, the agricultural authorities expected a record in 2021 in the cereals thanks to the mechanical seeding, digitalization, and the planning of all the agricultural processes. Thus, around 50 quintals per acre is expected for the hard wheat, 70 quintals per acres for the soft wheat, and 40 quintals per acre for the barley.

The agricultural engineers of the Directorate of Agriculture believe that the strategic agriculture may develop in Mniaa with the smart management of the “non-renewable” ground water. In addition, the agriculture in the region was characterized with small plantations in the oases and with big sub-Saharan surfaces that used to be prairies; however, the region turned into big agricultural spaces that produce various vegetables and fruits. Despite the arid weather and the rain shortage, the region attracts many investors thanks to the facilitations of getting lands and the groundwater projects that include 6.270 wells with a flow rate of 10.465 liters/second, 3.000 basins with a total storage capacity of 215.100 m³, an electrical net of 500 km, and 500 km of agricultural tracks, as the statistics of the Directorate of Agriculture show.

In order to support the investment in agriculture, the authorities have lately established the office of developing the industrial agriculture in the Saharan lands (by Executive Decree 20-265 of 22 September 2020) to fight bureaucracy and allow the investors in the strategic agricultures to overcome the obstacles that face them. This office is in charge of accompanying the investors in possessing the agricultural lands, increasing the “strategic” agricultural production, transforming the industrial agriculture, and marketing the products in the local and foreign markets. Many

investors submitted requests to get estate via an electronic application to facilitate the process of increasing the strategic agricultural lands and create jobs³⁰.

Thus, the Southern Wilayas, mainly El Oued and Mniaa, are the source of food in Algeria; they launched a real agricultural revolution. Therefore, they managed to rank first nationally in many crops such as potato, tomato, peanut, and garlic, and produced very considerable amounts of high-quality dates, onion, olive, lettuce, melon, pepper, pumpkin, etc. This made the region shift from a consuming region into an agricultural pole that supplies all the country and exports the best products to the foreign countries.

4.3 The problems and challenges facing the Saharan agriculture:

Algeria aims at a successful policy to develop the Southern Saharan agriculture thanks to the vital role of this sector in the food security. Because Algeria has a big Sahara, and with the urgent need for the agricultural development, the theory had to be applied in reality. Consequently, the strategy of developing agriculture was launched and enabled the Saharan society to produce various unprecedented products in Algeria. Besides, the authorities adopted various methods to achieve the food security. However, the outcomes do not meet the expectations due to the lack of the necessary requirements and to the various obstacles such as:

- Difficulties in the geographic region such as the water shortage, climate change, drought, desertification, lack of arable lands, lack of the labor force, production waste, etc.
- The high costs of the technology due to the environmental diversity because the regions in Algeria differ regarding the soil, climate, temperature, humidity, etc. All this leads to the unsuitability of the technique used. Thus, it is necessary to find techniques that suit the characteristics of the environment. This shall require additional costs to update and adapt the techniques to the regions³¹.

- The absence of a clear agricultural policy that determines the goals, the weakness of the policies of agricultural research and guidance, and the inability to guide the research activities.
- The weakness of the agricultural policies, which affects the agricultural products and does not contribute to encouraging the investment in the sector³².
- The partial understanding of the research practices that neglect the coordination between the natural dimension (soil and climate), the technical dimension (quality of the plants, animals, and agricultural techniques), and the socioeconomic dimension (social fabric, agricultural structure, estate, support mechanisms, and the producers).
- The low ability of managing the agricultural research, as we witness successive reforms without positive reflection, and the bureaucratic management of the agricultural research structure, which means the dominance of the administration on the scientific vision³³.
- The weak storage despite the strong and diverse production, as the cold rooms do not exceed 60 while the yield exceeds 16 million quintals. Thus, much of the yield is damaged.
- The lack of markets for marketing the local agricultural products. Despite the abundance of the crops to cover the local and national markets, the absence of big commercial structures for the fruits and vegetables in the region hinders the marketing. In this regard, the wholesalers of each region make contacts to look for farmers to buy their products, or head to unorganized markets established by the farmers and traders in collaboration with the local assemblies. This is an obstacle facing the promotion of the agricultural products.
- The low labor force negatively affects the investment in the sector. Statistics show that in 2022, about 1.3 million job vacancies had to be filled. Thus, the investors face a high crisis in planting and in harvesting³⁴.

5. Conclusion:

Agriculture is the 2nd sector in Algeria after the oil. It contributes to 12.4 of the GDP (25 billion USD). In the last decade, it increased with 2.7% and covered 73% of the food needs of Algeria. Thus, the state set a national strategy to develop agriculture, mainly in the Sahara. The interest of the public authorities in prompting the Saharan agriculture is increasing to achieve the food security and avoid any rupture in the crops throughout the year far from the climatic threats and water shortage. The agriculture in the Sahara is positive, sustainable, and faces the climatic changes such as the drought because it relies on the groundwater and the direct irrigation.

Upon this study, we found out that:

- The strategic agriculture with all its types aims at long-term strategic goals, instead of the immediate ones only. It uses the modern technology in commanding the various agricultural processes.
- The role of the state manifests in its work to achieve the food security through supporting the agricultural investment.
- The achievement of the food security in Algeria is not easy because of many problems.
- The Algerian Sahara makes 80% of its landmass and witnesses a real agricultural revolution as the farmers ranked 1st in many crops and made a very considerable yield of other crops. Thus, it can be an agricultural pole that supplies the various Wilayas and foreign states.
- The modernization of the agriculture in the Saharan regions is necessary as it is the only tool to increase the quantity, improve the quality of the crops to achieve the food security.
- The current challenges of modernizing the Saharan agriculture require collaboration with the university to exchange experiences and find solutions to the problems that negatively affect the quality and quantity of the crops. In this

context, the university laboratories are the only body that can find scientific solutions to such agriculture.

Recommendations and suggestions:

- The Algerian government has to invest in the sustainable food security through supporting the food systems to face the crises, climate, epidemics, diseases, etc and balance between the short and long-term needs.
- It is necessary to integrate the modern agricultural technology in irrigation and production to increase the crops and reduce the costs. Thus, the prices shall improve and the food security will be guaranteed.
- It is necessary to give importance to the university, its laboratories, and the technical institutes of the Ministry of Agriculture and the Rural Development thanks to their pivotal role in the field experiments that allow accompanying the investment activities, mainly through the agricultural guidance and training.
- The government must support the investment in the agricultural substances that help achieve the food security through adopting the policy of research and development of the agricultural sector, reducing the risks of the food shortage through developing and strengthening the ability of the arable lands to produce, and enabling the consumers of the permanent access to food.
- Developing the agricultural marketing policy to increase the national agricultural exports through new markets and commercial structures.
- Supporting the storage through granting licenses and financial support to the investors to establish cold rooms, control the amounts and prices of crops, distribute the products during the seasons, and protect the agricultural products of the Saharan regions.
- Organizing training sessions for the farmers to discuss the agricultural aspects that develop the activity, mainly the strategic agriculture and the farmers' abilities.
- Adopting a national strategy to transform the agricultural surplus into food.

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