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# AGRICULTURAL DYNAMICS IN THE PROVINCE OF CONSTANTINE THROUGH THE EVOLUTION OF THE PRODUCTION

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## ABSTRACT

Algerian policy for economic development has taken the agricultural sector as pillars, which is not without risk because of the vulnerability of the sector (climate change, the immensity of desert areas, etc.) but also because of the failure of the various policies initiated until today. The challenge are high, and the benefits that can emerge are capable of guaranteeing sustainable development for the country. The current research aims to determine the impact of Agricultural and rural renewal in province of Constantine. Constantine is a proven agricultural center in eastern Algeria; the province has experienced agricultural dynamics since the beginning of the 2000s, which has resulted in increases in surface areas and yields. This increase did not have as a corollary an increase in production, which remains quite low compared to national efforts and ambitions; This analysis reveals that the main causes remain the low use of irrigation and the impact of climate change on annual rainfall.

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## 1. Introduction.

Algeria is an ancestral agricultural country and Although lots of researchers have denied the ancient granary of Rome myth, (Cote, 1993), Algeria did have its days of glory and agricultural prosperity, and even paid the price by succumbing to the greed of colonisers from overseas. However, nowadays, in sovereignty and serenity, and since independence, this sector has not really emerged from its inertia, thus suffering from historical legacies, unstable management and new policies almost every decade. Regrettably, this sector has borne the brunt of the various crises. Besides, Algeria's strategy for economic development has shifted from the industrial sector (which is cumbersome, costly and uncontrolled) to the agricultural sector, which has been consolidated by various public programmes and investments. Further, the interest shown by the public authorities in this sector does not need to be demonstrated, evidently, but rather synthesised, analysed and, why not, carry out a preliminary assessment of the obtained results.

### - Research Objective.

The choice of research topic is linked to the issue of the "results" and "impact" of the agricultural strategy on this sector, together with the reflection of this impact through the agricultural

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production figures for certain strategic sectors. As a study period, we have positively analysed data from 03 agricultural years: “2009/2010”, “2016/2017” and “2021/2022”, which gave us a period of 12 years to observe the evolution of production after the various agricultural and rural development policies initiated since the beginning of the 2000s, in a recognised cereal-growing centre.

In conclusion, we will endeavour to distinguish the impact caused, if any, by the climate change, and whether irrigation “the mainstay of the intensive economy” can be used as an alternative:

## **2. THE AGRICULTURAL POLICY IN ALGERIA: A PERPETUAL CHALLENGE.**

Indeed, the agricultural sector has become the No.01 strategic sector in the Algerian economy behind hydrocarbons, mainly after the deindustrialisation of the 90s (a sector which in the 70s absorbed the bulk of public spending, evaluated to 35 billion dinars compared with 02 billion for agriculture (Bord, 1981).

Notwithstanding all such facts, and the mobilisation of the majority of exploitable land for agriculture, “there is nevertheless a deficit in agricultural and food foreign trade, amounting to 03.5 billion dollars each year” (National Land Development Plan “SNAT” – Summary). Besides, this observation demonstrates the sector’s inability to regularise the country’s trade balance.

### **2.1 Policies prior to 2000.**

They can be recapitulated in several decades, each of which appears to be a corrective to the previous one, sometimes without any real assessment or consultation whatever.

Since the self-management in 1963, then the agrarian revolution in 1971, until the restructuration and reorganisation in 1987, this sector has been dependent on international political ideologies and contexts. More to the point, they have yet to stand out unless after the country’s severe crises, which resulted in a decade of darkness and a lack of initiative.

This period is characterized by state voluntarism, which was exercised within the policy of socialist economic planning (Cherrad, 2012), we can summarize it in several decades, and each of them seems like a corrective of what precedes it, sometimes without any real assessment or any consultation. The first phase began in 1963 which was of a national nature, called self-management, its objective was to take control of the vacant lands of the settlers and nationalize them, the surface area of the land was around 2.4 million ha, (Cote ,1993). For the second phase in 1972, which this time was of a social nature, it was called the agrarian revolution; the state nationalized the cultivable communal land, then all the land of absentee owners and the surplus land of large landowners. operators, with a total of 1.1 million ha (Cote, 1993).

The results of this interventionism in the agricultural sector have not given convincing results, worse, many rural people have left the sector for the benefit of industry.

In virtue of which, this period was characterised by:

Political, economic and management centrality.

Conversion of land use, every so often inappropriately.

Degradation of arid and semi-arid natural environments.

Social change, definitive sedentarisation of the nomadic population.

Demographic growth.

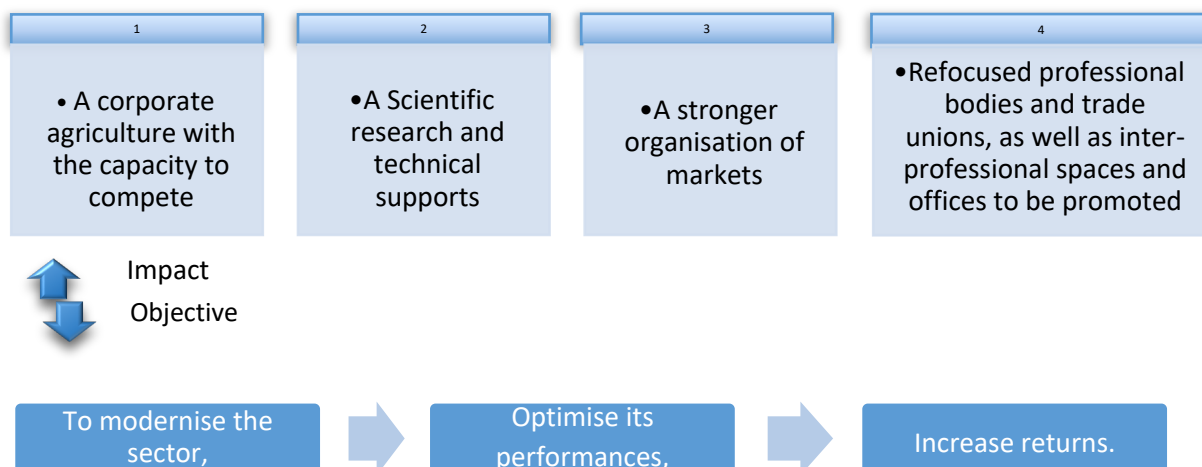
As for agricultural production, there has been a significant annual increase in the average growth rate: from 02.3% in the 80s (thanks to the first liberalisation measures) to 04% in the 90s, (rural renewal 2006).

### **2.2 Agricultural and rural renewal.**

Unquestionably, the period 2000/2004 witnessed the revival of agricultural activities and the beginnings of their coherence; it alike stands for that in 2006, there was a break with the prevailing system of administrative and centralised regulation of the agricultural economy throughout the previous decades (rural renewal 2006).

#### **The objectives.**

The policy introduced by the public authorities in the agricultural sector since 2006 has the following objectives:



For 20 years, the State support has provided undeniable assistance to all actors in the agricultural sector, whether farmers (development) or investors (agri-food industry), who have all of them benefited from tax and quasi-tax advantages, access to bank loans, inputs and agricultural equipment.....ex.

### 3. Production trends: A downward trend?

In actual fact, Algeria has a cereal area of 03.2 million hectares out of a total of 08.5 million hectares of Useful Agricultural Area, in addition to a livestock population of 19 million head. Until very recently, the latter figure was assessed to 30 million head, which means that Algeria has to face up to “its” figures and face an additional challenge in establishing its policy of agrarian and rural renewal.

Nevertheless, in the event that Algerian agriculture would be described as monotonous in its speculative aspect, it is even diversified in its territorial aspect, for the reason that, “taking into account rainfall patterns and water resources, each large area of the country has its own agricultural specificities: irrigated agriculture, livestock farming, market gardening, etc. (National Land Development Plan “SNAT” – Summary), which provides the same with advantages and many disadvantages. In this respect, considering 03 strategic products, we notice a drop in production and yields during the 2017/2021 period, for example:

**Cereals:** They sharply fell in the 2020/2021 season (-36.6%) compared with 2019/2020. Moreover, this downward trend began with the 2018/2019 season. In fact of matter, after recording a yield of **19.5 Qx/ha** in 2017/2018, successive decreases were marked during the following seasons to reach **14.3 Qx/ha** in 2020/2021. (Statistical report of 2021);

With regards to production, during the 2020/2021 season, it has shown to be assessed to 27.6 million quintals, down **37%** compared with 2019/2020, which it reached 43.9 million quintals;

As for production of durum wheat alone, which represents 66% of winter cereals, it reached 18.3 million quintals in 2020/2021 compared with 25.8 million quintals in 2019/2020; i.e., a considerable fall of 29%;

The same applies to barley, common wheat and oats, which witnessed a fall in their production by 54%, 37% and 42% respectively (Statistical report of 2021);

**Dried vegetables:** In fact, production in this sector has alike fell in the 2020/2021 season by 14%; i.e. 984,423 quintals, compared with 1,150,470 quintals in 2019/2020;

**Fodder:** Fodder production reached 46.1 million quintals compared with 50.7 million quintals in the previous season; i.e., a fall of 09.2%;

**Artificial fodder:** It reached 39.7 million quintals in 2020/2021; i.e., a drop of 07.7% compared with the previous season.

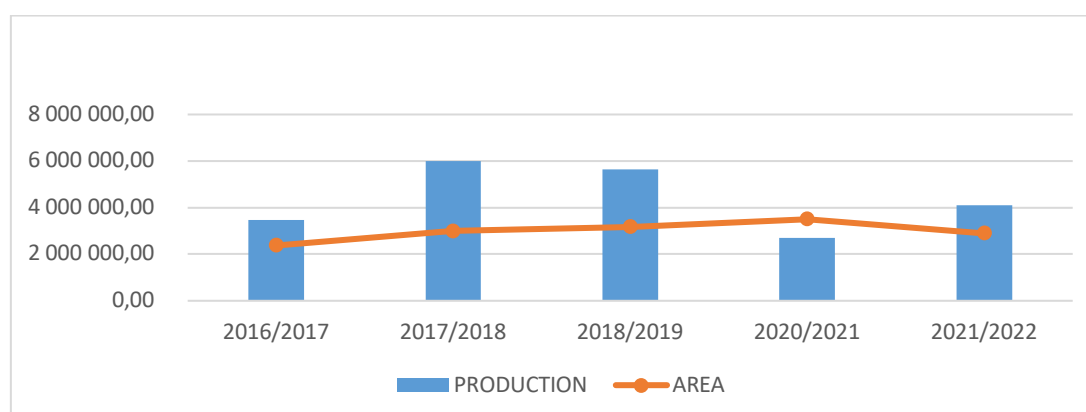
Table 1. Strategic products.

culture	production (millions qx)	
	2019/2020	2020/2021
cereals	43.9	27.6
drop	<b>29,00%</b>	
dried vegetables	1.15	0.98
drop	<b>14%</b>	
fodder	50.7	46.1
drop	<b>9.2%</b>	

Sources: Agricultural statistics of 2019/2021.

Importantly, these figures demonstrate that the downward trend, which may be cyclical and justified by the climatic variations, poses serious problems for the State. Indeed, despite the increase in areas (for example, cereals benefited from 73,534 ha between 2017 and 2018), yields and productivity remain far from the avowed ambitions. However, in 2009, cereals accounted for 40% of food imports, well ahead of milk (20.6%) and oils and fats (10%). (Djermoun, 2009)

Yields have increased from 05.7q/h in 1972/1973 to 10.3q/h in 1996/2000 (Djermoun,2009) and 15.4qx/ha (Bessaoud, 2018).



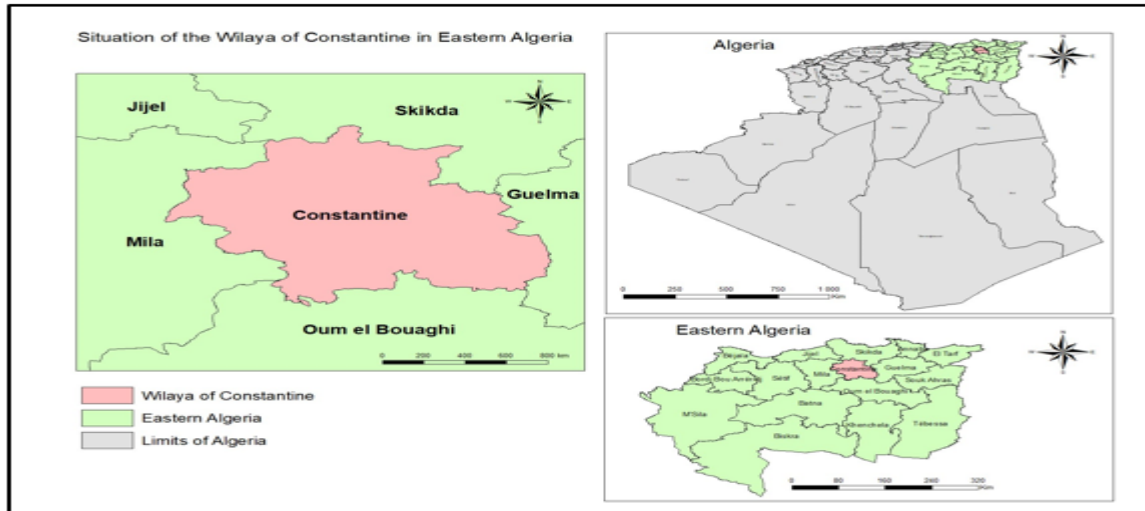
*Figures 1. Evolution of production and cereal area.*  
Source: Agricultural statistics – National Office of Statistics.

Unquestionably, this graph shows that the strategic sector, 20 years after the National Plan for Agricultural Development, is not showing the necessary trend towards self-consumption, even less for exports, notwithstanding a desire for sustainability and economic efficiency.

#### **4. AGRICULTURAL DYNAMICS IN THE PROVINCE OF CONSTANTINE.**

##### **4.1 Presentation of the study area.**

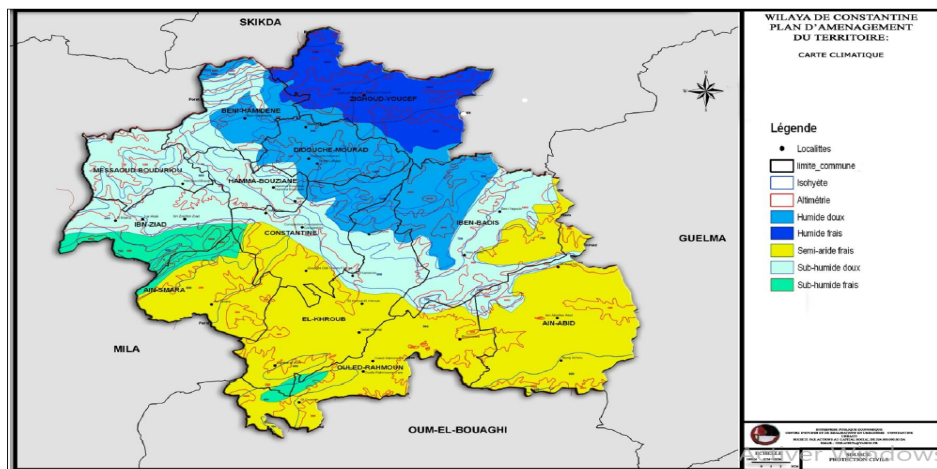
In reality, the position of Constantine as the capital of the East together with its heritage as an ancient medina, have yet to distract the same from its agricultural vocation. Above and beyond, Constantine has shown to this day to be a cereal-growing centre with a surface area of 86101 ha, and the Provincial Development Plan, it is stated in -the Provincial Development Plan of Constantine 2013: **“In recent years, it has taken a leading role in cereal-growing, thus making this sector the driving force behind the economic development for which Constantine has a vocation”**. As consequence, this sector has a major importance in the economic growth of this province.



*Figure 2. The location of the province of Constantine.*

#### **4.2 Natural factors.**

Indeed, Constantine is part of the high plains of the East, with a climate that varies from mild humid in the north-east to cool semi-arid in the south. Further, rainfall varies between 400 and 500 mm per year, becoming almost nil during the dry period, which lasts 04 months from the end of May to the end of October.



*Figure 3. Climate map.  
Source: Provincial Development Plan of 2013.*

Undeniably, these climatic factors, combined with the topography, favour the cultivation of arable crops and condition the extensive way in which the land is farmed. In fact, despite relatively low rainfall compared with inland areas of the country, the province is characterised by topography of over 12.5%. Therefore, if we combine these two factors together, we can highlight the agricultural potential of this province. However, this was prepared by the National Office for Rural Development Studies (BNEDER), which has illustrated, by combining two parameters alone, “rainfall indices and topography”, that the agricultural potential of this province is limited to the southern part of the province.

On the other hand, even if we consider that the two chosen parameters are insufficient, we can nevertheless demonstrate that the rainfall/platitude gradient is reversed in our study area:



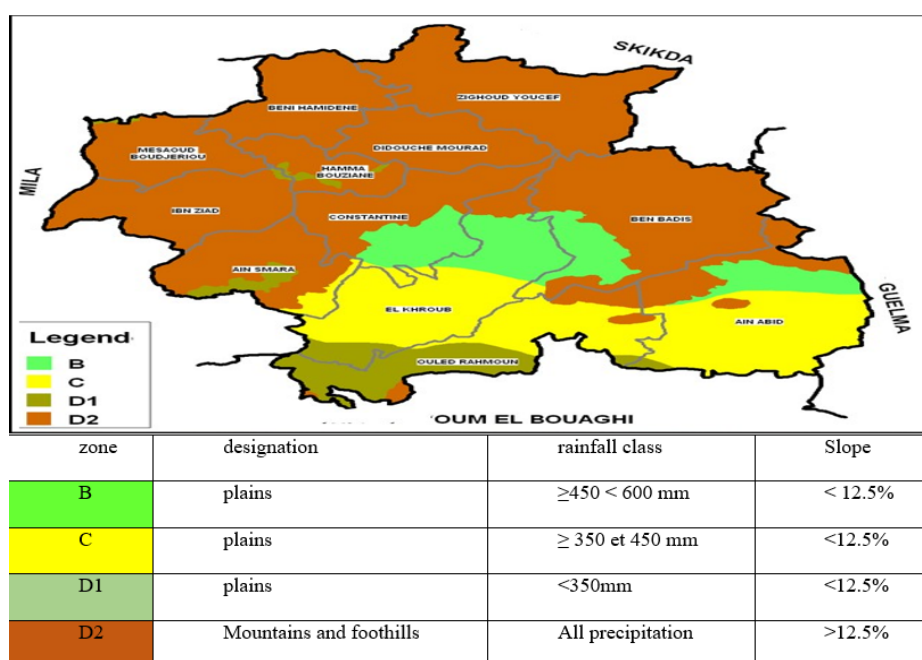


Figure 4. Agricultural potential of the province.  
 Source: National Office for Rural Development Studies “BNEDER” Constantine.

### 4.3 Demographic growth.

The Province of Constantine stands for a regional metropolis that continues to grow, with the population rising from 664,303 at the beginning of 2000 to 997.889 in 2011 (Provincial Development Plan of Constantine, 2013).

Additionally, the growth rate is 01.5%, close to the national average of 01.6%; the population density reaches around 582 inhabitants / km<sup>2</sup>. However, more than half of the population of Constantine (66%) live in the main towns of the municipalities; whilst almost 56% in the city of Constantine alone (Directorate of the Budget).

Besides, the municipalities of the province have an Overall Annual Average Growth Rate ranging from 01% to 07%, which classifies them as attractive or repellent municipalities.

Table 2. Growth rates by municipality 2011.

commune	Constantine	Khrub	Hamma bouziane	Ain smara	Didouche mourad	Ibn badis	Ouled rahmoun	Ain abid	Ibn ziad	Zigoud youcef	Beni hmidene	Messaoud boudjriou
T A A %	-0.7	7.3	3.3	4.3	3.1	3.1	2.5	2.1	2	1.5	1.4	1.3
Chef lieux		attractive					higher than the national rate			répulsive		

Source: Provincial Development Plan of Constantine, 2013.

In fact, these rates illustrate variability in growth from the metropolitan area to the outskirts. Nonetheless, only the municipality of Ibn Badis stands out with a high rate of 03.1% (the industrial zone is the main cause). Broadly speaking, there is considerable human potential, with 57.34% of the population of working age, 30.11% of whom are limited to the 19/34 age bracket (we are still a long way away from achieving a definitive demographic transition).

**5. AGRICULTURAL PRODUCTION THROUGH A NUMBER OF SECTORS.**

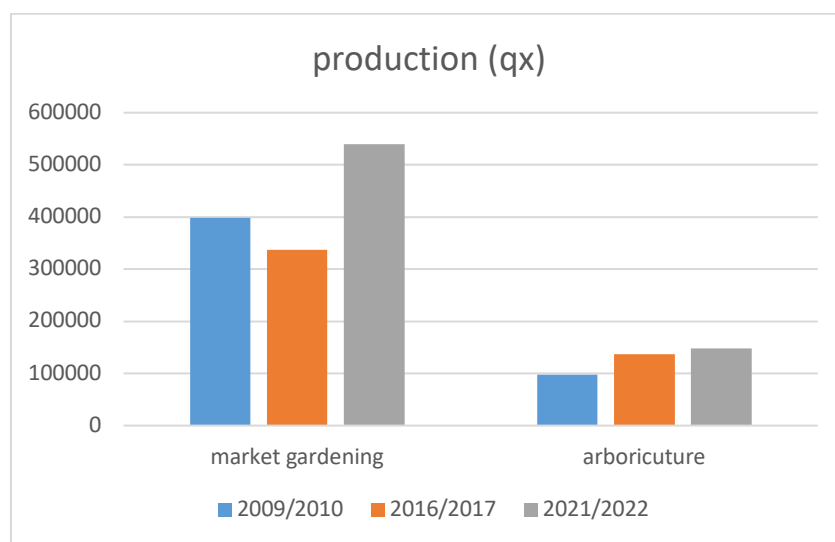
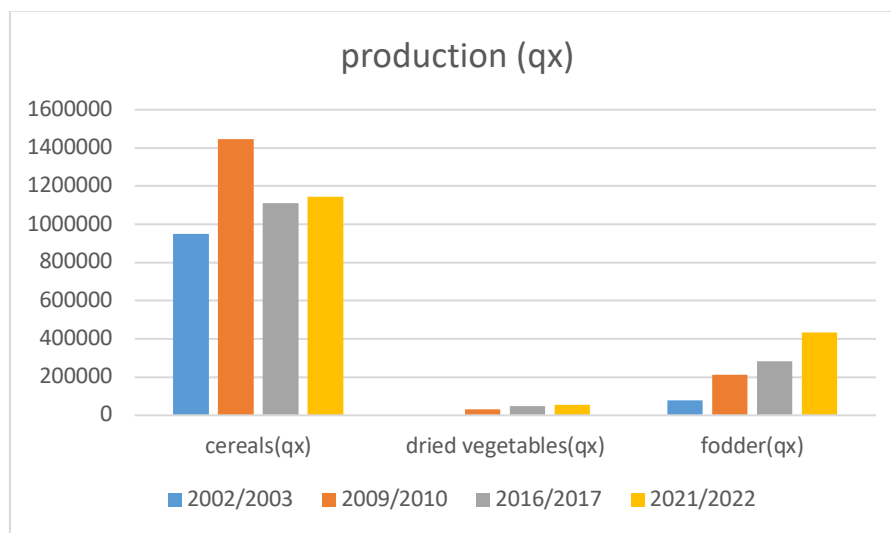
**5.1. At the province level.**

The Province of Constantine has a large production of agricultural products, with a diversity of agricultural productions from cereal crops, pulses, livestock.....Besides, its agricultural potential can be noticed in its yields, which are very close to the national average.

In 2016/2017, it had a yield of 14 qx/ha for cereals, compared with the national average of 14.65, and 10.36qx/ha for dried vegetables, compared with the national average of 10.67qx/ha.

In some seasons, it even exceeds the national average.

Between 2009/2010, its cereal and pulse yields exceeded the national figures: 28.81qx/ha compared with 14.01qx/ha for cereals, and 11.16qx/ha compared with 9.74qx/ha for dried vegetables (Directorate of Agricultural Services of Constantine).



*Figures 5 and 6. Development of Production in some sectors*

*Source: Agricultural statistics of several seasons by the Directorate of Agricultural Services of Constantine.*

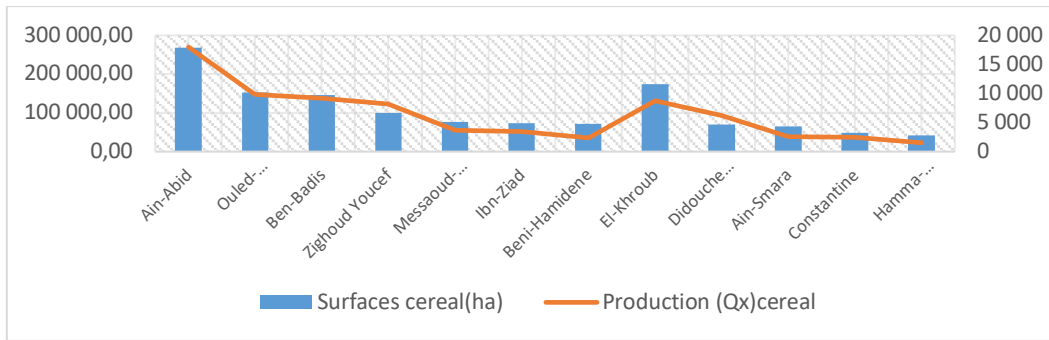
In light of these figures, the development of agricultural production after the government programmes of the 2000s has witnessed real growth, more than ever in the fodder, tree and dried vegetable sectors.



**5.2. At the municipalities' level.**

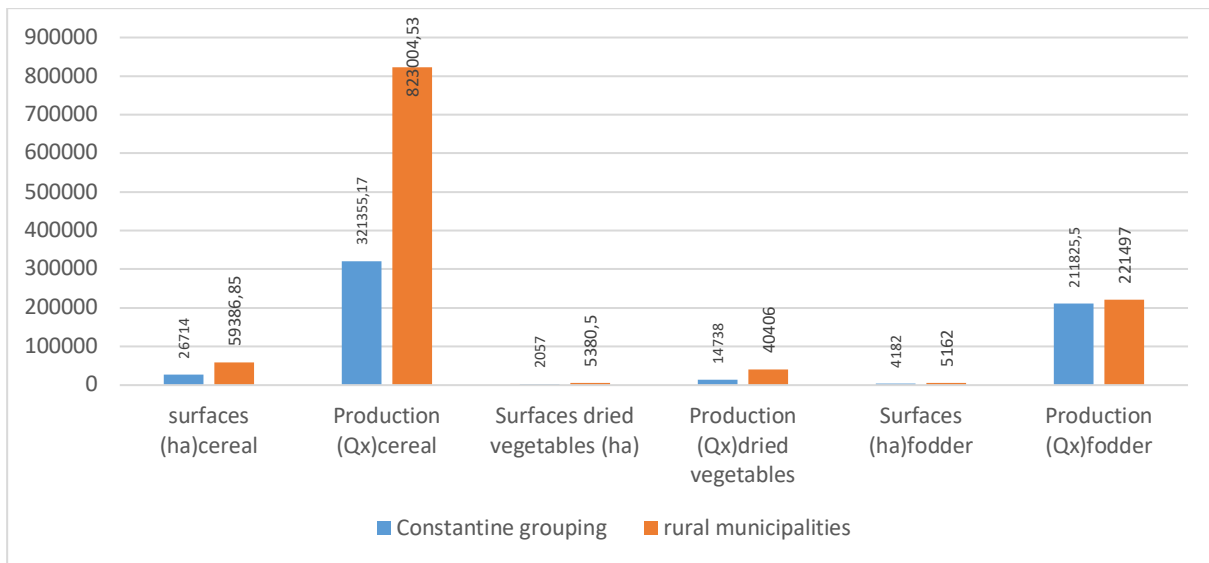
In fact, in case we take as an example the most important sector in the province (cereals), and through its distribution in the municipalities; we find that it is dominant in terms of surface area and production in the municipalities outside the grouping (or urban municipalities); most of which are considered to be repulsive in terms of the growth rates thereof.

The exception is for the municipality of El-Khroub, which is larger in terms of surface area but not in terms of production.



*Figure 7. Cereal area and production in the season of 2021/2022.*

The same applies to other sectors, the rural municipalities, in case we take into account the peripheral rural municipalities in comparison with the municipalities of the Constantine grouping, the weight of the territories “described as repulsive” has shown to be unequivocal.



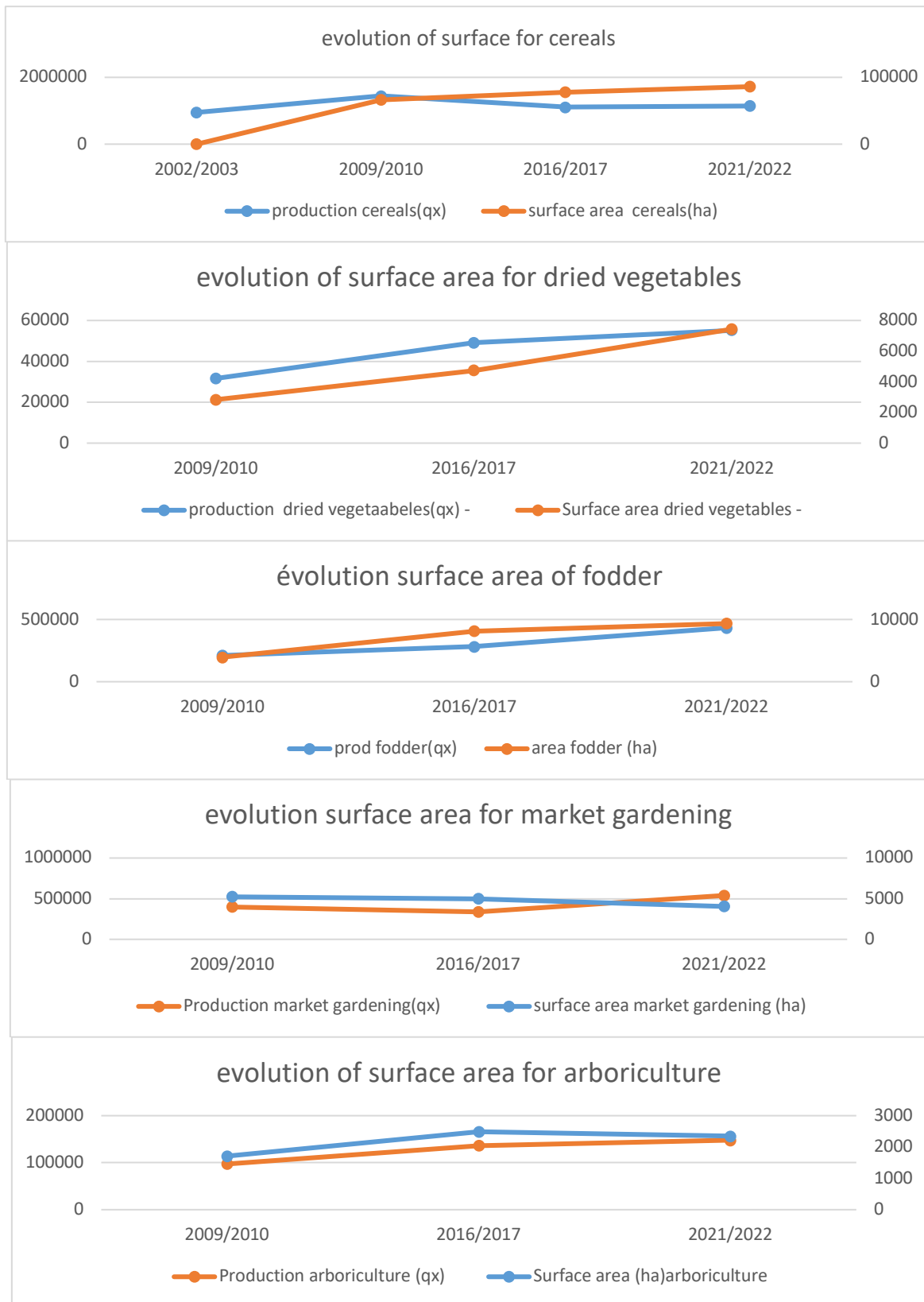
*Figure 8. Surface area and production of cereals, dried vegetables and fodder.*

**6. THE DETERMINING FACTORS IN THE EVOLUTION OF PRODUCTION.**

Our study pertaining to agriculture in the Province of Constantine has brought to light 04 major factors, which have marked the afore-mentioned years.

**An increase in surface area as a factor in agricultural growth.**

For optimisation purpose of agricultural production and attainment of satisfactory yields, the sector has benefited from an increase in agricultural land. Besides, this increase has had an effect mainly on fodder, but not on cereals.



*Figure 9. Evolution of surface areas for the different sectors.  
Source: Statistic data, Directorate of Agricultural Services of Constantine: 2009/2018 & 2023.*

**Accompanying the deliberate elimination of fallow land.**

In point of fact, the objective of the public authorities over the next few decades is to eliminate fallow land once and for all. Besides, the Province of Constantine stands for a case in point, with rates falling from 39.22% of the Utilised Agricultural Area (UAA) in 2012 to 10.93% in 2022.

Table 3. Distribution of agricultural land.

	total agricultural area	useful agricultural area	Fallow land	%useful agricultural area
2012	182760	128210	50296	39,22
2017	175945	125010	23682,89	18,94
2022	175939	126747	13 854,41	10,93
% (2012/2017)	-3,72	-2,49	-52,91	
% (2017/2022)	0,003	1,38	-41.5	

Source: Directorate of Agricultural Services of Constantine 2022.

These figures are set to fall over the next decade.

**But without any extension of the irrigated area.**

Although the public authorities have incited the province to move away from the extensive rain-fed model, there is a glaring lack of use of irrigation and supplementary irrigation, more than ever following the ban on irrigation from the main rivers (Rh’ummel, Boumazou and Smendou), which penalises agriculture and reduces its upstream potential – around 1,500 ha – (Provincial Development Plan of Constantine 2013). For instance, in the 80s, a study conducted by Jean Paul Bord indicated that: “The perimeter of Hamma Bouziane, with its 1320ha, 625ha of which is irrigated, highlights 06% of the irrigated arable area occupied by buildings and roads”. Mapping of land use in eastern Algeria: An attempt at agricultural zoning ( Bord , 1981). In the Provincial Development Plan of Constantine of 2013, an urban withdrawal of surface area to meet housing needs around 2030/2035 could reach 36,000 ha of the Utilised Agricultural Area (UAA); i.e., 50% of the total, including 1,670 ha under irrigation. Besides, these figures demonstrate the problems of conflict between different sectors (agriculture, urban planning, water resources, etc.). Between 2009 and 2022, the irrigated areas (which make up 02.04% of the Utilised Agricultural Area (UAA)) lost 303 ha.

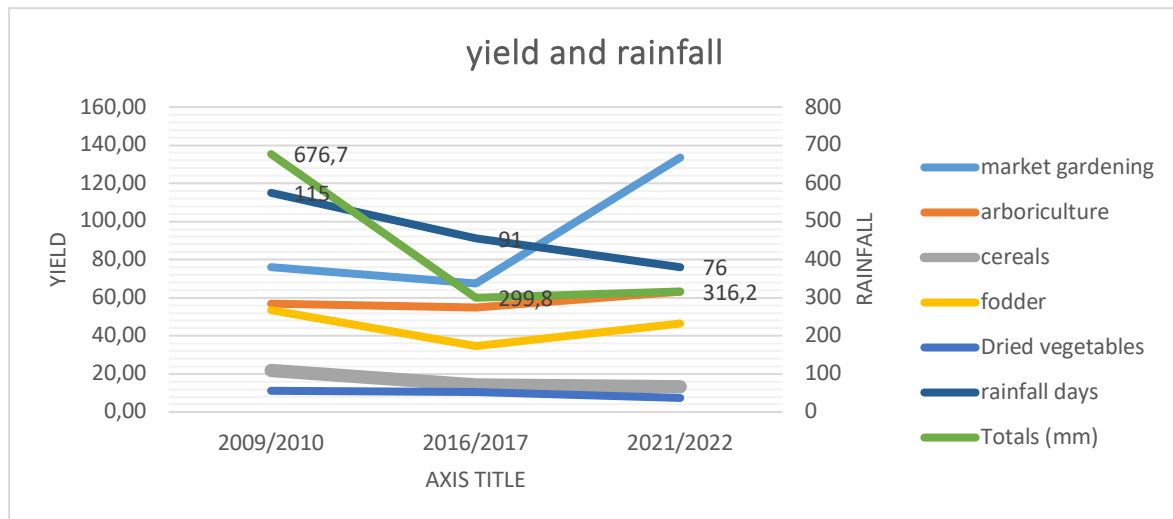
Table 4. Irrigated lands in Constantine.

	2009/2010	2021/2022
Irrigated lands	2889	2588
%	2.20	2.04

Source: Directorate of Agricultural Services of Constantine

**Finally, a drop in rainfall and the number of rainy days as a result of climate change.**

For assessment purpose of the impact of climate change on agricultural yields, we should first point out that engineers at the weather station of Ain Bey have emphasised the flagrant drop in rainy days in the province, which in recent years have fallen from 200 days to 66 days, being aggravated by increases in temperature and strong spring winds. As consequence, we have compared yields for herbaceous and permanent crops, using 02 parameters: Rainy days and total annual rainfall.



*Figure No.10: Yield and rainfall.  
Source: Directorate of Agricultural Services of Constantine.*

### CONCLUSION.

The Province of Constantine is a recognised agricultural centre, with yields often equal to or higher than national levels.

With public ownership predominating, and due to its position as a national metropolis, the Province of Constantine has witnessed a decline in the Utilised Agricultural Area (UAA) of 1,463 ha, and the Total Agricultural Area (TAA) of 6,821 ha, between 2012 and 2022.

For remedying purpose of this situation, the public authorities have opted for a gradual and deliberate abolition of fallow land.

The majority of surface areas and production are in rural municipalities, which are experiencing average or low growth rates, but which manage to feed the province and its region; nevertheless, the peri-urban municipalities have a high total production in the fodder sector.

This exception can be explained by the high level of livestock farming in urban and peri-urban areas; for instance, in 2022, the grouping counted 85,064 heads of sheeps compared with 98,102 heads in peripheral municipalities (Directorate of Agricultural Services of Constantine), and by the State's support for the sector.

For optimisation purpose of the agricultural production, the use of the new areas is far away from giving satisfactory results, the fact of which demonstrates that the impact of production factors on productivity, in respect such as inputs, seeds, water and capital...., should be taken into consideration.

Climate change, which is apparent in the drop in rainfall and the number of rainy days, is having an impact on rain-fed production such as cereals and dried vegetables. Moreover, the sectors that have yet to be affected by this phenomenon are the municipalities in the north and north-west (Hamma Bouziane, Zighoud Youcef and Didouche Mourad), as they benefit from a certain amount of rainfall and irrigation.

The irrigated market gardening and arboriculture sectors, despite the drop in rainfall, continue to grow due to other factors (seeds, irrigation sources, etc.).

The development of agricultural production, after the State's programmes of the 2000s, has seen real growth, chiefly in the fodder, tree and dried vegetable sectors.

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