# The sustainable development of the Algerian steppe at the origin of sustainable food: Case of the cultivation of the olive tree in the region of Tiaret and Djelfa

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**Abstract:**

This work focuses on the role of sustainable agriculture in sustainable food. The main objective of our study was to analyze the possibilities and contraints related to the development of olive growing in the Djelfa and Tiaret regions. For this, a field survey allowed us to evaluate all the environmental, social and economic aspects of the sustainable development of olive growing in the steppe of western Algeria and its impacts on the consumption of olive oil.

The results revealed that the olive tree adapts well to the climatic conditions of the twowilayas of Djelfa and Tiaret. It can be said that despite the problems facing agricultural development in this area, it has significant assets that can preserve and improve the situation in a perspective of sustainability. The potential of the area and socio economic context, present great opportunities for development of the olive tree in this area ;

**Key word :** Sustainable development, Sustainable food, Olivier, Steppe, Algerian.

**Jel code** : Q01, L66.

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## 1. INTRODUCTION

Sustainable development has become a key concept in the development of government policies in developed countries. It is a new development approach wanting to break with the western concept which advocated Infinite economic growth without taking into account social and environmental aspects (Gendron and Réveret, 2000).

In Algeria, the cultivation of the olive tree with the date palm is an important component of the sustainable development process (SAHLI, 2009).

In this logic, the intervention of the State in the olive oil sector is due to the importance of this one as an alternative of diversification of the economy, and of the promotion of the exports except hydrocarbons.

Ranked seventh worldwide, in terms of olive oil production, Algeria reaches an estimated volume of 50,000 tonnes / year, compared to 19,000 t / year in 2000, and fifth worldwide for the production of the table olive with 220,000 t / year (Amarni, 2015).

Indeed, great hopes are based on the development of this sector, recalling that the ambitious program for the period 2010-2014 plans to extend the area of olive cultivation to 1 million hectares. Objective that will not only increase production, but also respond to market rules, through the promotion of investment and the development of an approach capable of combating poverty and desertification.

In the highlands, notably the wilayas of Djelfa and Tiaret, the cultivation of olive trees is beginning to gain momentum; several plantations have been carried out thanks to the agricultural policy and rural development; as well as the lack of employment, the plantation of the olive tree benefited from a great interest in these areas In recent years we have witnessed the extension of olive tree plantations across all arid and semi-arid areas of the country.

Faced with the extension of olive tree plantations in these steppe areas, many questions arise about the development of this crop and its contribution to sustainable development

The main objective of this study is to provide answers to the following question:

**Can the cultivation of the olive tree contribute to sustainable development in the steppe areas in Algeria?**

The specific objective is to know if the sustainable development of the olive tree in the regions of Djelfa and Tiaret can have a role in the development of sustainable food.

## 1. Material and Methods :

### 2.1 Choice of the region :

We have selected the province of Djelfa as a large study area for this survey, because it is considered a successful experience in the steppe zone in terms of olive growing with more than 2.5 million olive trees in 2015. In Indeed, the statistics issued by the direction of the agricultural services (DAS) of the wilaya show that the olive-growing surface to evolve very quickly, from 150 ha in 2000 to approximately 11000 ha in 2015.

The wilaya of Tiaret has known for a few years an important dynamic with regard to olive growing, this culture is booming, for this we considered it important to carry out this contribution in order to study the effects induced by this species in steppe zone and to display the limits and assets (economic, ecological and sociological) of this culture in the study region.
It should be noted that these two wilayas are for agro pastoral vocation, they are areas of production of small ruminants by excellence. The province of Djelfa is ranked first nationally by the size of its livestock. Also, the wilaya of Tiaret ranked 4th nationally, so sheep farming is the primary source of income for farmers in the region.

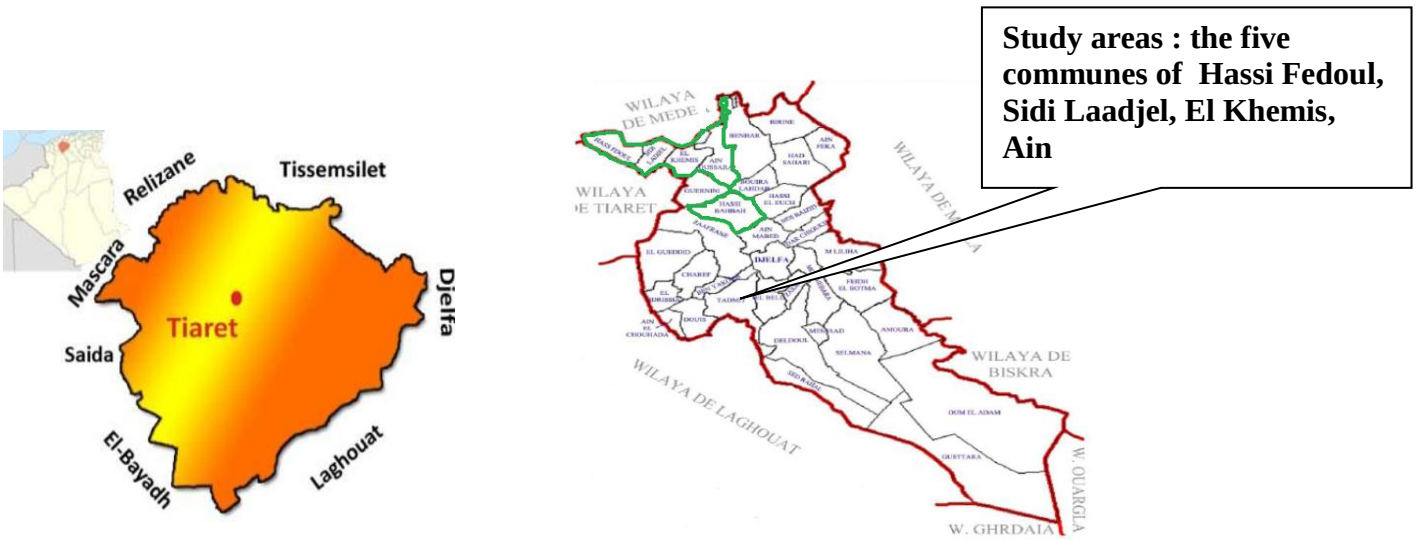
Public policy in agriculture and the environment is based on the introduction of crops with high resistance to salinity, drought andsoil poverty in arid and semi-arid areas.
This work can be divided into two parts:

- Study of the impact of olive cultivation on sustainable development in the wilaya of djelfa ( presentation and analysis of figuers :survey conducted in 2016)
- Study of the effect of the introduction of olive cultivation in Tiaret region on long abandoned soils and its role in the consumption of olive oil. (Survey conducted in 2019).

**2.2.Sample :**

In the region of Djelfa the most important municipalities in this term (5 municipalities): Hassi Fedoul, Ain Oussara, Hassi Bahbah, Sidi Laadjel and El Khemis). The study was carried out in 12 farms (after the distribution of 20 questionnaires we received 15 questionnaires, including 12 usable "reliable". Indeed, these five municipalities represent more than 20.5% (or 2239 ha out of 10898 ha ) of the total plantations, 25.68% of the olive-growing surface in production (that is 1681 ha out of 6546 ha), 30% of the olive production and more than 35% of olive oil produced in the wilaya according to the statistics delivered by the Directorate of Agricultural Services (DAS), which has an olive orchard of over 500,000 olive trees.

**Fig .1.** Geographical presentation of the two study areas




Wilaya of Tiaret Wilaya of djelfa

**Source** : DSA DE Tiaret et DSA de Djelfa, 2016/ 2018

In the wilaya of Tiaret, a sample of 20 farms was studied, distributed over 4 municipalities, namely, Frenda, Takhmert,… ..and Chellala. Note that in the commune of Chellala a farmer has an orchard of 180ha of olive plantation. This represents more than 50% of the total area of the 19 other farms. For this, our interest has generally focused on the latter. As for the consumer survey, we took a sample of 40 consumers spread over three municipalities, namely, Chellala, Frenda and Sougueur.

The consumption survey was carried out in different regions, the differences are regional, cultural and social. The study sample is made up of 26 women and 14 men, the age of the respondents, we tried to vary the age group, in order to target all ages, and we took different professional categories.

## 2. Results and discussion :

### 3.1 Structure of farms surveyed :

The 20 farms are almost small and practice olive growing as family farming.

**Table 1 :** Area of holdings surveyed in Tiaret region

| Area (Ha) | 0 - 10 | 11 – 50 | + 50 | Total |
|---|---|---|---|---|
| Number | 14 | 5 | 01 | 20 |

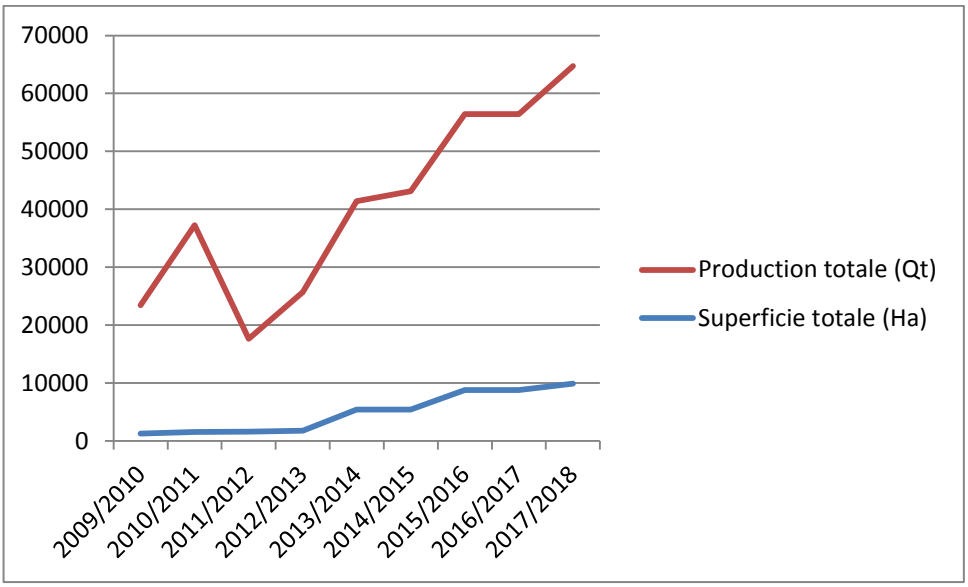
**Source :** Own development from our 2019 surveys

We note that more than 50% of farms are small, which explains why the olive growing project is a recent idea. Farmers in the steppe region are not used to this type of crop. However, they voluntarily join, especially since investment in this type of operation is supported by the state.

### 3.2 Evolution of the olive-growing area in the region :

The olive growing area in the Tiaret region has experienced significant growth. The The increase in this area is due to the promotion of investment in this sector and the implementation of agricultural development programs such as the National Agricultural Development Plan (NADP).

**Fig 2 :** Evolution of olive-growing area and olive production in the region of Tiaret

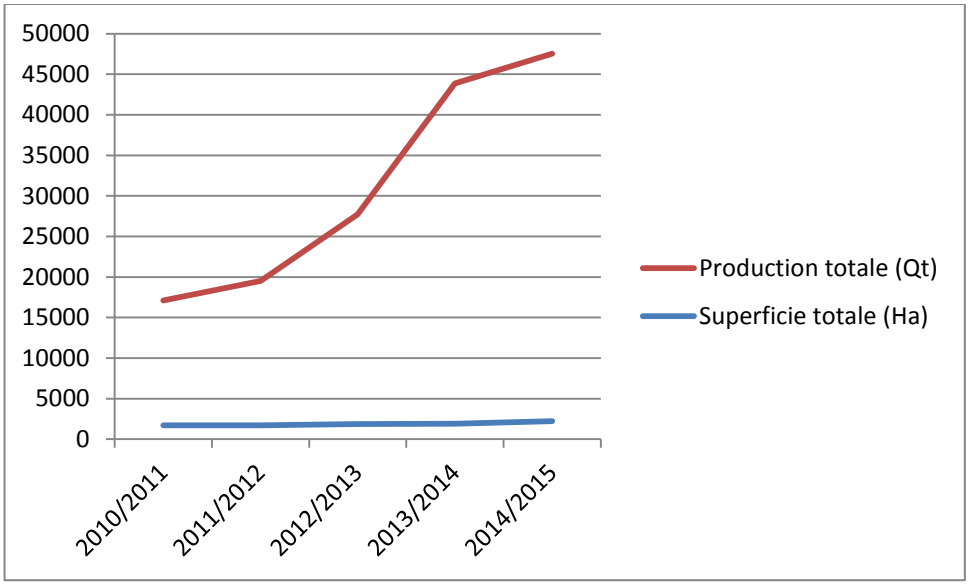



**Source** : DSA Tiaret 2019

The graph above gives us a good idea of the evolution of the olive plantation area in the Tiaret region. Indeed, with an area of 1,500 ha in 2010 increasing to almost 10,000 ha in 2018 which explains the farmers' interest in this crop and the encouraging harvests which are illustrated in particular on the graph by production ranging from 22,000 quintals to a production of 54,800 quintals, is an increase of almost 150%, with an average yield of 5 quintals per hectare.

Note that the production of olives is only really effective from the 8th year of planting, so be patient if you want financial profitability.

**Fig 3** : Evolution of olive-growing area and olive production in the region of Djelfa




**Source** : DSA Djelfa 2016

Same observation for the region of Djelfa, the trend of the increase in production is beautiful and well seen here as well ,except that for the region of Djelfa the average yield is around 12 qt / ha, more than double that recorded in the Tiaret region. This is explained by the fact that the plantations in the Tiaret region are still young and production is not yet fully mature.

From these results it appears that for the two regions, identical constraints are noted and which in a way block the normal development of olive cultivation in these steppe areas. Indeed, the action of the climate which is generally manifested by thunderstorm-type precipitation, strong wind, frosts …….

Land tenure presents a great problem as nationally, the use of cropping systems and traditional production techniques, lack of appropriate technology. Note also the high costs of production factors (fertilizers, phytosanitary products), stresses sometimes linked to the soil (salinity, fertility, erosion), lack of maintenance, neglect of size and an unskilled hand.

### 3.3 Consumers Behavior :

It is important to carry out a field survey on the consumption patterns of olive oil. That said, the objective of this survey is to identify consumer behavior in order to know the characteristics of demand.

The survey took place in the Rechaiga region where the most olive farmer is found, as well as in several other municipalities in the wilaya.

It must be said that, financial, human and material constraints forced us to limit the size of the sample. In fact, 40 questionnaires were completed and analyzed. This sample is made up of 26 women and 14 men, these people from different regions, different cultures, different ages and different social levels.

**Table 2 :** Characteristics of 40 consumers surveyed

| **Place** | **Sex** | | **Age** | | | **Total** |
|---|---|---|---|---|---|---|
| | Women | Man | 20 to 30 years | 30 to 40 years | More than 40 | |
| Different municipalities in the wilaya of tiaret | 17 | 09 | 14 | 07 | 05 | 26 |
| Commune of Rachaiga | 09 | 05 | 03 | 06 | 05 | 14 |
| **Total** | 26 | 14 | 17 | 13 | 10 | 40 |

**Source:** survey data 2019

From this table we can see that more than 50% of the people surveyed are from the region where the production of olive oil is the most important, but that does not mean where there is no production there n there is no consumption. People who are used to consuming this product can get it but buy it from very remote areas. We also note that more women than men consume olive

oil because they take better care of their health and aesthetics than men. Indeed, olive oil is used as a care for the skin, hair, nails ……

**Table 3:** Professional categories of the surveyed sample

| Place | Employe | Farmer | CoMe | EtStudent | FeHousewife | SaUnemployed | RetRetired | Total |
|---|---|---|---|---|---|---|---|---|
| Different municipalities in the state of tiaret | 05 | 02 | 03 | 10 | 04 | 0 | 02 | 26 |
| Commune of Rachaiga | 04 | 03 | 02 | 03 | 0 | 0 | 02 | 14 |
| Total | 09 | 05 | 05 | 13 | 04 | 0 | 04 | 40 |

**Source:** survey data 2019

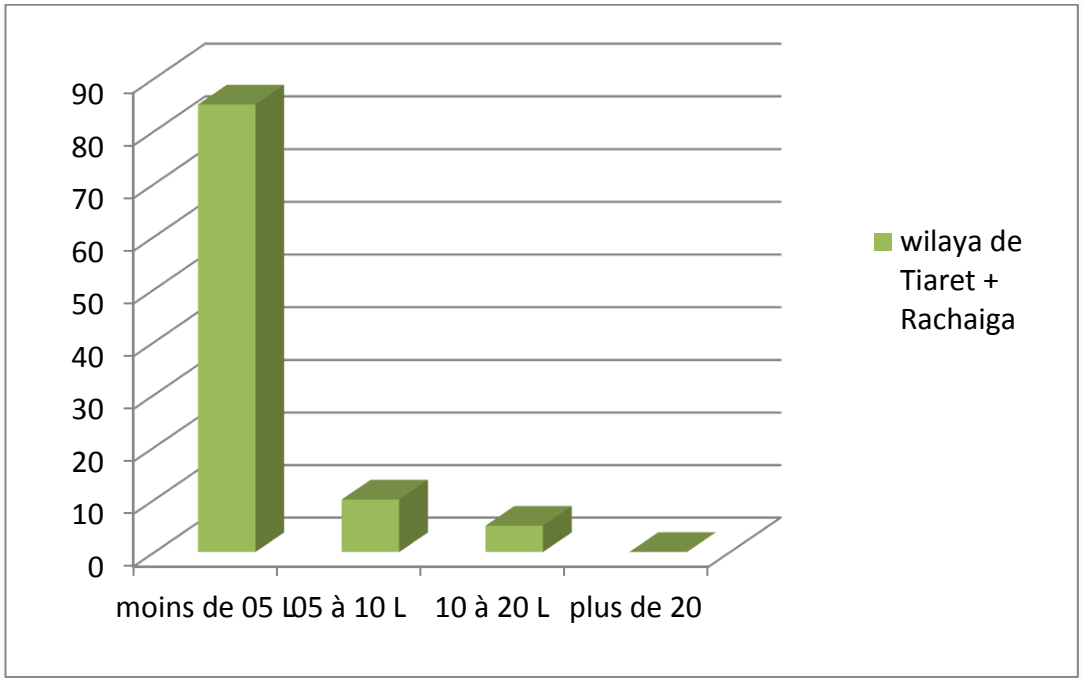
Table N ° 3 can tell us a lot about the category that consumes this oil the most. More than 50% of the sample shared between employees and students is recorded. It is therefore much more about financial means than other reasons. The farmers and traders in our sample consume less olive oil. The present case is explained by eating habits only by price or taste.

### 3.4 Annual consumption of olive oil :

Sustainable diets help protect and respect biodiversity and ecosystems, food and nutrition security and healthy living for present and future generations. They are culturally acceptable, economically fair and accessible, affordable, nutritionally safe and healthy, and help optimize natural and human resources (FAO / Bioversity, 2010).

The consumption of olive oil by most of the respondents does not exceed 05 liters per year. We note that about 90% of the population surveyed do not consume more than 10 liters of this precious product because of its high price and not because they prefer other oils (sunflower, soybean and rapeseed ...). We also note that 5% consume between 10 and 20 liters per year, on the other hand the well-off and who can afford to buy olive oil at more than 1000 DA per liter are just a limited number and represents little nearly 5% of the population surveyed. Figure N °… illustrates this level of consumption.

**Fig 4 :** Annual consumption of olive oil of the surveyed sample.




**Source** : Developed from our survey ,2**019**

### 3.5. Consumption modes :

The use of olive oil differs from region to region. We have classified different modes of consumption of olive oil according to culinary uses (salad, cooking, side dishes.) and medicinal uses.

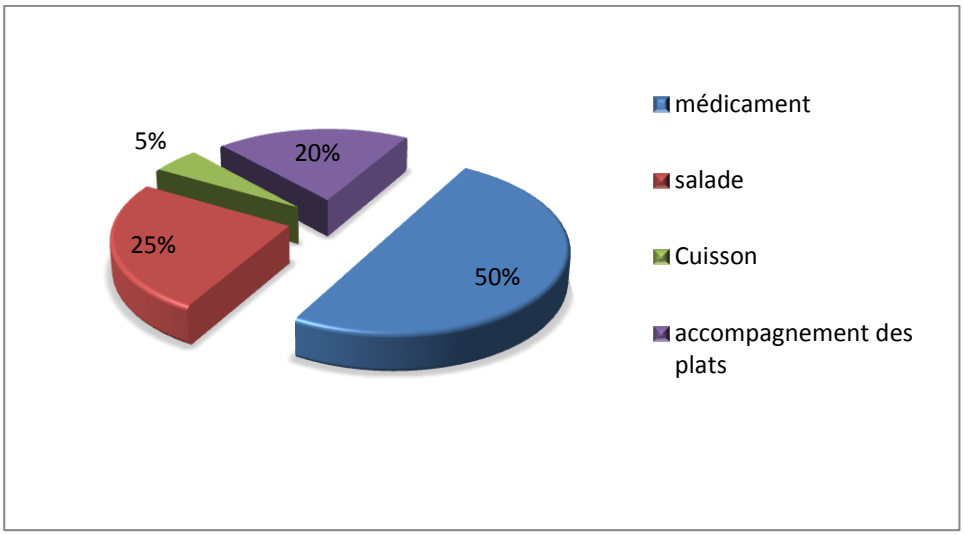
#### 3.5.1. The consumption of olive oil allows :

- Lower cholesterol levels
- Prevent tumors (breast, prostate, ...) thanks to fatty acids
- Prevents drying of the skin and calcification of the skeleton
- Protects and tones the skin (vitamin E content)
- Eliminates toxins and Promotes digestion (Adoul, 2011 cited by Gharabi. 2018)

#### 3.5.2. The use of olive by-products :

- The residue from the pruning is used as food for cattle and sheep and as a natural fertilizer after grinding.
- Olive pomaces are used as natural fertilizer (50% - 50%) with straw And after drying as fuel.

**Fig 5 :** Different consumption modes :




**Source :** Developed by ourselves from survey data .2019

The figure above provides information on the ways in which olive oil is used. In fact, 50% of our sample uses this product as a medicine against cholics, abdominal pain, dermal problems and many other diseases. 25% of the population surveyed use it as a condiment to season salad. It should be noted that grilled meats are always washed down with a drizzle of olive oil. Baby dishes such as mashed vegetables are also washed down with olive oil instead of butter or margarine, used before to learn the virtues of this miracle product.

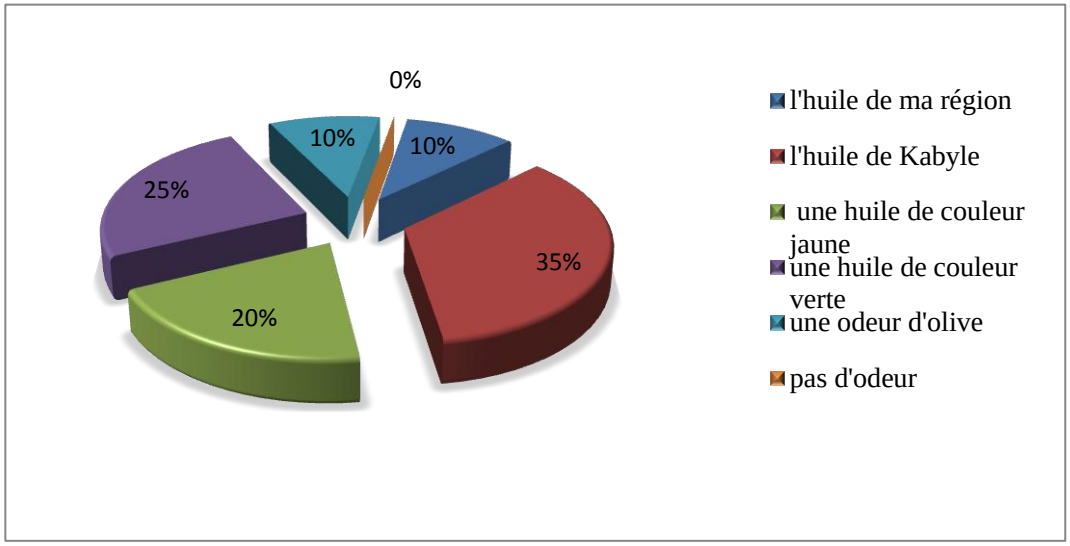
### 3.6. Purchasing preferences :

Several criteria related to the purchase and consumption of olive oil have been cited by consumers. Most of them choose olive oil in relation to the region of origin, and others their choice is linked to the quality, namely an oil with an olive smell and yellow color which is used in culinary mode, and green in color for sanitary and cosmetic use. It should be noted, moreover, that all Algerians think of Kabylia as soon as we talk about olive oil. For this reason in particular, we tend to confuse quality with the region. Any olive oil from Kabylia is good, but olive oil produced in another region is difficult to accept. Figure No. illustrates this data well, with 35% of the sample preferring Kabylian oil.

Second is the green oil, which represents an old oil. That is, an oil which is produced a few years ago becomes greenish in color.

The yellow color represents the oil of the current year.

**Fig 6 :** the criteria for purchasing preferences for olive oil




**Source :** Developed by ourselves from survey data .2019

## 4 Conclusion

The olive tree is a tree well adapted to the dry climate and poor soils of the Mediterranean regions; it often represents the only means of agricultural development of these. Throughout history, some Mediterranean regions have specialized in the production of olive oil (Benlarbi, 2004).

The olive tree is a salinity resistant plant which is characteristic of arid and semi-arid areas. It is a promising alternative for improving the productivity of land marginalized by brackish water. Its genetic origin, its hardiness, its adaptation to arid conditions and its specificity to Mediterranean regions, gives it the ability to constitute a means of combating desertification and salinization of soils. However, to contribute to the sustainable development of olive growing we recommend the use of olive plants grafted on oleaster taking into account its lifespan and production compared to those of plants from cuttings. (Gharabi, 2018)

**Resistance of the olive tree to drought:**

The olive tree withstands periods of drought thanks to an adapted root system and the regulation of its metabolism. Indeed, the olive tree presents a shallow root system (from 1.25 m to 1.80 m) with lateral development. However, the root hair is limited to the first meter of soil and beyond, there are roots allowing the tree to feed in case of drought. (Manrique and al., 1999. In Gharabi, 2018). Furthermore, in order to limit water competition between olive trees, the spacing of trees is less important in dry pipe compared to that of trees in irrigated pipe.

**The Mediterranean Diet:**

The concept of the Mediterranean Diet, recognized as intangible cultural heritage by UNESCO, revolves around the different dimensions, nutritional, economic, environmental and socio-cultural. Several scientific studies confirm that the Mediterranean Diet represents a healthy food model and stricter adherence to this diet has been associated with significant benefits in terms of

nutrition and health (Willett and al., 1995; Nestle, 1995; ITFPCHD, 2000; Serra-Majem and al., 2006; Sofi and al., 2008; Maillot and t al., 2011 in Abidi and al, 2019)

The Mediterranean Diet is characterized by a nutritional model that has remained constant over time and space. Olive oil and olives are in the main ingredients of the Mediterranean diet.

In the end, the olive tree is gradually expanding around the world. During the last years, several non-Mediterranean countries have tended to develop this culture in certain specific regions of their territory. Some estimate that there are more than a billion olive trees in the world. Most are located around the Mediterranean basin, two olive-producing countries, Spain and Italy. But today we find the olive tree in the USA, in Latin America in North Africa and all over the world. The reputation of olive products, with beneficial nutritional and health virtues and confirmed physico-chemical properties, has crossed traditional consumption borders to conquer new markets in North America, Asia, the Middle East and Australia (Saad, 2009).

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