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Ref. : ……..…

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Survey on the evaluation of organic farming practices applied in the East Ziban palm groves

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Dedication

My strength and my love to my amazing Padré

My idol and my best friend to the most loving mother

My musketeers : Yesmine & Nesrine

The best grandparents :

Benkhlif , Taybe , Fatna and Henia

My safe haven: MDEA

For you Rania … I am so proud of what we achieved so far

I dedicate this modest work

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Date palm *(Phoenix dactylifera L.*) is the main crop of both traditional and modern Algerian Saharan agriculture. The economy of the southern provinces is based primarily on date palm cultivation and utilization of its fruit by-products such as paste, flour, syrup, vinegar, yeast, and confectionery. This provides a major source of income for oasis inhabitants. All parts of the date palm are used, including the leaves and trunks which are used for basketry and house construction. The fruit is consumed in fresh and dry forms, processed to produce syrup **(Mimouni and Siboukeur 2011)**.

The region of Ziban is the most important phoenicicole region of Algeria, in quantity and quality, credit goes to the Deglet Nour variety. The idea of developing the production of organic dates has started in this region for a decade, but in a very timid way through some individual initiatives under the influence of some exporters based in Europe **(Benziouche, 2017).**

Organic farming is a specific mode of agricultural production, ensuring that a set of agricultural practices are respectful of the ecological balances and the autonomy of farmers aiming at the preservation of soils, natural resources, the environment and the maintenance of farmers. Organic agriculture is often seen as a leaven of sustainable agriculture. **(Laurence Bérard 2005).**

Consumers are increasingly interested in the quality of agricultural and food products, and in particular are looking for typical products in relation to their specificity from a nutritional, taste, visual point of view, or in relation to their production methods that differentiate them from the standard product on the same market **(Missipsa and lounis 2017).**

The farmers of ziban's groove follow the practices inherited by their ancestors for centuries; they introduced several tools and adapted different techniques to facilitate their work without having a clear database on the current state of different farming practices and the potential to develop organic farming. On the other hand, the state encourages the production of organic dates and installs many projects in this perspective. For these reasons we carried out our survey and did several visits to the grooves to see and compare the farmers practices to find out *how close are the traditional practices to the ones in organic farming.*

To get the answers we needed we did the following:

we started by bibliographic research that led to redaction of two chapters, the first in which we listed the conventional practices done in the grooves for years now, followed by a chapter listing the organic practices based on the IFOAM manual.

Then we formulated the questionnaire for the survey that would take place in the Eastern area of the Ziban that would lead to several visits to the grooves to see and compare the practices which led us to the results that we got at the fourth chapter that we discussed profoundly

Lastly, we chose the third chapter to represent the area of study and analyze whether the organic practices can work in such climate and whether it is a economically winning choice.

I. Chapter 1 : Palms and dates

A. Distribution of the date palm

1. In the world

The cultivation of date palms is concentrated in the arid regions of the southern Mediterranean and in the southern fringe of the Middle East from the south of Iran in the east to the Atlantic coast of North Africa in the west, between the altitudes of 35° North and 15° South. Spain remains the only country in Europe to produce dates mainly in the famous palm grove of Elche, located west of Alicante at 39 ° North. The date palm is also cultivated on a smaller scale in Mexico, Argentina and Australia. In the United States of America, the date palm was introduced in the eighteenth century but its cultivation really began only around the1900s with the importation of Algerian varieties, in particular Deglet-Nour, and Iraqi varieties **(Hilgeman, 1972).**

2. In Algeria

Date palm is grown in numerous oases spread over the southern part of the country, where the climate is hot and dry. The oases are living spaces which have been artificially established in the midst of a large arid area where water is present. In these locations, a ksar (a village made out of clay) was built and date palms were planted around it. These oases systems of complex intensive production are maintained with a very fragile balance. Given the geography of Algeria, it is possible to describe several regions of date palm cultivation **(Bouguedoura et al,2015)**:

- In the Atlas Mountains foothills (Ksour Ouled Naïl, Zibans, and Aures), there is an oasis chain that marks the gateway of the Sahara.
- In the east, Zibans (Biskra), Oued Ghir, Oued Souf (El Oued), and the basin of Ouargla especially with the Deglet Noor cultivar of high commercial value.
- In the west, Saoura (Beni Abbes), the Touat (Adrar), the Gourara (Timimoun), and the Tidikelt (Reggane) where palm groves include cultivars of relatively low commercial quality. It is in this area where the only truly bayoud-resistant cultivar, Taqerbucht, exists.
- At the center. El Golea, the M’zab (Ghardaïa), and Laghouat.

B. Taxonomy (classification)

The botanical classification of date palm given by **(Djerbi 1994)** is as follows:

Kingdom: Plantae

Phylum: Spermatophyta

Subphylum: Angiospermae

Class: Monocotyledonae

Order: Arecales

Family: Arecaceae

Genus: Phoenix

Species: *Phoenix dactylifera*

C. Cultivation practices

The Saharan zone is characterized by low rainfall (less than 150 mm or even less than 50 mm). The practice of agriculture in this area is only possible with the help of irrigation. The water needs of the crops are closely linked to climatic conditions, in particular evapotranspiration, but also to the nature of the soil, the biology of the plant and its place in the Sahara. The date palm tolerates drought longer than other fruit species, but if it is exposed to a lack of water for an intolerable length of time (several months), the palm reacts with a significant reduction in growth and production and sometimes even a stop of the production. Prolonged water stress on the vegetative organ results in the reduction of the size of the palms and the development of more spines. A palm tree whose palms are dried out is not automatically considered dead. The heart of the palm can survive for a long time (several months) and its growth can restart when the water conditions become favorable. **(Sedra,2003 b)**

1. Multiplication and planting of shoots or ‘djebbars’

It is a vegetative multiplication of the palm tree that allows a reproduction and a identical genetic transmission of the parents of the parents characters. The date palm produces, during its life in normal conditions 3 to 30 shoots depending on the varieties, the size, of the offsets and the way the palm growers. **(Sedra,2003 a)**

It is recommended to encourage the rooting of the shoots close to the ground, by surrounding the base with soil, or of the shoots after their next weaning with the following practices: **(Sedra,2003 a)**

- Clean the clump and thin out by cutting down the palms, in order to ease access to the shoots to be pulled out
- Choose straight, physiologically sound shoots (young and non-trapus), free of diseases and pests and 2 to 4 years old. The palms of these shoots should be cut back to 30 to 50 cm and pruned so that pruned in such a way that only 2 to 3 rows of palms remain around the heart of the around the heart of the shoot.
- Wean off discharges by professional workers using a sharp tool. tool. A clean cut is recommended to avoid cutting into the mother plant or the mother plant or the shoot.
- Brush the weaning wound of the reject and the mother foot with a healing fungicide.
- Check for disease and/or pest.
- A freshly cut djebbars weight 7 to 25 kg or more, length of 50 cm and diameter of 25 to 35 cm. The resumption in the field of of large shoots is always successful.

2. Land preparation and Planting density

As with all irrigated crops, it is necessary to level the soil. In leveling operations, all arable land must never be removed by exposing the bedrock. In the case of steep slope, we will proceed to drop to obtain a terraced area. **(Tourtain ,1967 a)**

Preparatory tillage must be carried out several months before planting. If the underground is of the same nature as the ground, it is possible to plow the soil, on the other hand, if the subsoil is clayey or finely sandy only the top layer will be ploughed. In light soils, instead of ploughing, holes of one cubic metre will be dug at the location of the trees. **(Tourtain ,1967 a)**

In phoeniciciculture, another factor comes into play: lighting. Date palms exposed to rain; great sunshine give the best yields. Thus, we recommend plantations with large spacings (10 m and more) oriented East-West. To encourage work (maintenance, underlying crops), square planting is preferred to staggered planting. **(Tourtain ,1967 b)**

Figure 1 : djebbar attached to the palm tree. Source: Palmier dattier - www.la-cle-des-oasis.fr

3. Irrigation

The irrigation dose per tree per month varies from 9 to 16 m ^{3} in cold periods (average 12.5 m ^{3}) and from 17 to 25 m ^{3} (average 21 m ^{3}) in hot periods. It also varies according to the age of the palm trees. In fact, the average annual irrigation dose for a hectare of 100 palm trees varies from 11,000 to 1,750 m ^{3}. In general, the annual irrigation water requirements per hectare vary according to the age of the palms, their density per hectare, the irrigation method and also the type of irrigation, the irrigation method and also the texture and salinity level of the soil**. (Sedra, 2003 d)**

Table 1 : Gravity irrigation dose and water requirements according to palm age and climatic conditions

(Sedra2003 c)

Irrigation dose	Young palms		Adult productive palms	
	Warm season	Cold season	Warm season	Cold season
Variation in requirements (m3/tree/month)	6 to 10	11 to 17	9 to 16	17 to 25
Average per m3/tree/month	8	14	12,5	21
Annual average per m3/ha (100 palms/ha)	11000		16750	

The most practiced irrigation methods are panel irrigation and trough irrigation. For an economy of water use, it has been shown that drip irrigation shown that drip irrigation and especially fertirrigation has given good results in some localities in traditional palm groves and especially in the areas of extension of the palm grove. **(Sedra,2003 e)**

a) Gravity irrigation method

There are two variants of the gravity irrigation method: **(Sedra,2003 e)**

- by individual circular or square planks: This method is recommended for This method is recommended for plantations where the distances between the palms are high (at least 10 m)
- by a single bed 1.5 to 6 m wide, depending on the age of the palms and 50 to 100 m long, depending on the soil structure. This method is recommended in the case of young plantations and/or when the distances between palms are small (less than 6 m) or the palms are relatively short.

b) Drip irrigation method

As in the case of tree species, localized drip irrigation of date palms allows saving water for several years after planting. However, as mentioned, the planted in an orchard watered by this irrigation method and developing a limited root system, require protection by installing

installation of windbreaks against strong winds and desert storms to avoid the eventual uprooting of the trees. The amount of water supplied to each palm tree varies according to the soil structure, climatic conditions of the environment and especially of the palm tree. **(Sedra,2003 e)**

4. Fertilisation

According to **Hass and Bliss (1935)**, a hectare of 120 palms exports 29 kg of nitrogen, 5 kg of phosphate and 70 kg of potassium

. **Embleton and Cook (1947)** estimated that pruning a one-hectare plantation results in a loss of 25 kg of nitrogen, 2 kg of phosphate and 74 kg of potassium. Fertilization of date palms with organic or mineral fertilizers plays an important role in increasing the productivity of the trees and improving the quality of production.

Its positive and significant effect requires an adequate schedule of complete fertilizer application, the frequency, quantity and quality of fertilizers vary according to the soil texture, irrigation method, age of the palms and the farming system.**(Sedra,2003 f)**

Table 2 : Quantities of organic and mineral fertilizers to be provide for the date palm tree

Fertilizers	Young non-productive palm(kg / tree)	Adult palm tree productive (kg / tree)
Manure or organic fertilizers	5-10 (7,5)	60-240* (150)
Super Phosphate (P2O3)	0,1-0,5 (0,3)	2-3 (2,5)
Potassium Sulfate (K2O)	0,3-0,5 (0,4)	4-6 (5)
Urea or ammonium sulfate (N)	0,1-0,2 (0,15)	2-3 (2,5)

5. Pollinisation

Flowering time: Generally, February - March - April for the females and from January for the males. The temperature influences the emergence of the spathes and their opening. An

alternation of cold and heat that occurs during the fruiting period could be detrimental to the regularity of floral receptivity and the spathes size. **(Sedra ,2003 g)**

Figure 2 : dhokar. Source: (Sedra,2003 i)

a) Methods of pollination

Traditional pollination

It is the most practiced technique in the Algerian palm groves: **(Sedra,2003 i)**

- Release the spikelets of the female inflorescences
- Deposit in the middle of these spikelets 2 to 3 spikelets of mature male flowers and fix them slightly by a lace.

In general, 2 to 4 male trees (good pollinators) are sufficient to pollinate 100 female trees.

Figure 3 : manuel pollinisation. Source :
(Sedra 2003 h)

Semi-mechanized pollination

This technique consists in bringing the pollen on the female inflorescences at the favorable stage of floral receptivity by powdering from the ground using special device or blower, a plastic bottle containing the pollen, a plastic c tube 5 to 8 meters long and finally a rigid metal tube made of aluminum which is used to fix the plastic tube. The pollen is expelled in the air stream produced and carried in the plastic tube to the inflorescences by repeated pressure on the pear. This method of pollination requires beforehand to **(Sedra,2003 i):**

Figure 4 : Usage of pollinator

Source :Nourani et al: Réalisation d'un pollinisateur du palmier dattier - crstra

- Collect ripe spikelets of good pollen
- Dry them in the shade for 2 to 4 days depending on the conditions of the environment
- Collect the powdered pollen grains, put them in the appropriate packaging and store it in good conditions.
- Mix the pollen powder during the pollination operation with a chemically inert powder support (preferably talc used in tires) at a rate of 10% in general. One gram of pollen grains mixed with 9 grams of talc (10%) are enough to pollinate 10 to 15 female spathes. This percentage can reach this percentage can reach 40% according to the varieties.

6. Limitation and clarification of palms:

The operations of limitation and thinning of the bunches by chiseling must be carried out just 1 to 2 weeks after the fruit set (end of May - of beginning of June). They are recommended to **(Sedra,2003 j)**:

- Increase the dimensions of the date
- Improve its quality

- Prevent its late ripening.
- Alleviate the loads caused by the dates on the spadixes which pull at the apical part of the stem; this can lead to the breakage of the bunches and/or injuries in the apical bud area. These wounds are sites of infection for heart disease or entry points for pests.
- Restore a regular physiological balance to the tree, allowing a regularity of an adequate bloom each year. This allows to heal the phenomenon of alternation.

7. Limiting the number of bunches:

- For a young palm (4 to 6 years old), it is recommended to remove all the (spathes) during the first three years to avoid slowing down its growth.
- For an adult palm (10 years and older), it is recommended leave 8 to 9 functional green palms. In general, the recommended number of bunches varies from 8 to 12 per tree depending on the varieties and the maintenance conditions of the palm trees.
- Remove bunches that are too far from the upper and lower part of the spathe emission zone, preferably the ones that came out first and last in order to have a homogeneous homogeneity of the maturity of the dates and the size of the bunches.
- To take care on the balance of weight of the bunches, at the level of the bouquet of the tree by a good distribution of the bunches all around the tree. **(Sedra,2003 k)**

Figure 5: Limiting number of branches
source: ***(Sedra 2003 l)***

8. Thinning and chiseling of the bunches

This operation should preferably be carried out early, after 3 to 4 weeks after fruit setting, and it is advisable to carry out this operation at the same time as bunches bending, in order to save time, effort and cost. The objective of this cultivation technique is to reduce the number of spikelets in number and/or in length to promote fruit development, improve its physical quality (size), and reduce quality (dimensions), and to reduce the relative humidity of the air which is often harmful and causes rotting and molding of dates. **(Sedra,2003 m)**

Figure 6: thining the branches
source : (Sedra 2003 ***l)***

9. Protection of dates against rain and humidity

This operation is practiced at the stage "rateb" of the fruit, which corresponds to the last but one stage "tmar", in order to prevent and protect the bunches and dates at the end of the ripening period against rain and high humidity, which may occur at the end of the season. For that, it is advised to use covers in strong paper type Kraft, in the form of cloches. **(Sedra,2003 o)**

Figure 7: protecting the dates with kraft paper
*source : **(Sedra 2003n)***

10. Palm pruning and tree cleaning

For the palm tree, the practice of pruning or trimming the palms is not directly aimed at improving production, but consists in eliminating all the organs of the vegetative and reproductive systems that are drying out or have very limited physiological activity. This operation of cleaning is recommended generally, once a year after the harvest to eliminate **(Sedra ,2003 p)** :

- the old palms very leaning generally the most attacked by the white scale, the aerial diseases and the other pests
- deformed, bad or broken palms
- aerial shoots that encumber the mother palm
- the palms of the shoots adjacent to the mother trees to facilitate the cultivation practices
- the rest of the spathes, the bunches
- the fruits that have fallen or are stuck between the bases of the old palms pruned

11. Harvest

The harvest is an important step to ensure a production of good quality dates of good quality and an aptitude for its marketing

- Either the bunches are cut at ripe (>95% of ripe dates) and collected on a cover on the ground with the help of ropes or other means without harming the dates or contaminate them with soil

Figure 8: harvesting with robes
*source : **(Sedra, 2003r)***

- Or as soon as the dates ripen, is carried out by hand after climbing the tree on a ladder with the help of the pocket with handle. This device consists of a strong canvas bag,

held open by a metal frame, extended by a sleeve carried by a metal fork with hook. Applying a back and forth movement to the fork, shakes and detaches the ripe fruits, which are led by the handle to a box on the ground.

Figure 9: harvesting dates by climbing the palms.

source : ***(Sedra, 2003r)***

II. Chapter 2 : Organic agriculture

A. Definition

Organic agriculture (OA) is a management system that avoids the use of synthetic pesticides, inorganic fertilizers, and genetically modified organisms (GMOs) and that seeks to reduce pollution (air, soil, and water) and optimize the health and productivity of interdependent communities of plants, animals, and humans. OA has emerged as an option to the problems of chemical usage by conventional agriculture. To meet these objectives, organic farmers need to implement a series of practices that optimize nutrient and energy flows and minimize risk. Organic practices include crop rotations, enhanced crop diversity, different combinations of livestock and crop production, symbiotic nitrogen fixation with legumes, efficient utilization of organic manure and other crop waste streams, and biological pest control **(Müller-Lindenlauf 2009).**

Prior to the arrival of synthesized fertilizers, biocides, medicines, farm mechanization, and fossil fuels, organic agriculture was the sole option **(Kristiansen and Merfield 2006)**. Farmers had no alternative but to work within natural constraints.

B. History

The term "OA" was introduced by a British agriculturalist (Lord Walter Northbourne) in 1940 in his book "Look to the Land" **(Paull 2010a)**. Northbourne stated the idea that the agricultural space is a competitive space between organic farming and chemical farming.

Three decades after Northbourne's concept of OA, all streams of agriculture that eschewed synthetic fertilizers and pesticides—including biodynamic, organic, biological, and ecological were united in France under the auspices of the newly formed International Federation of Organic Agriculture Movement (IFOAM) **(Paull 2010b)**. This development laid the groundwork for sharing, extending, and harmonizing local innovations, including discoveries of agricultural practice, standards and certifications, labeling, training, and advocacy into the international arena.

The development of the organic movement continued during the 1960s and 1970s when there was increasing consumer activism associated with concern about anthropomorphic changes to the natural environment **(Pearson et al. 2011)**.

However, it was not until the 1990s that organic received formal recognition as a food production system in many countries. It was at this point that it started to move from the fringes into a significant activity in the mainstream food industry. In addition to becoming a possible

food production system for the masses, academic research on the organic production also started to gain attention **(Pearson et al. 2011)**

There is now a significant body of international research which includes comparisons of many facets of organic farming, including crop production, benefits to biodiversity and soil health **(Fuller et al. 2005; Mader et al. 2002),** and demographics and motives of organic consumers (**Hughner et al. 2007a, b)**. Rodale published the first edition of his periodical Organic Farming and Gardening in 1942. The Australian Organic Farming and Gardening Society were founded in Sydney in 1944 and published the periodical Organic Farming Digest **(Paull 2008).** A major milestone in OA occurred in 1972 with the founding of theIFOAM at Versailles, France, to unite and foster the organic cause **(Paull 2010b)**. The vision of IFOAM (2011) was the worldwide adoption of OA.

Table 3 **: Organic agriculture movements**

Period	Type of movement	Year	Milestones achieved
1900s to 1960	Reform movement	1924	Introduction of biodynamic farming soil association was founded, spiritual food production, healthy food production
1960 to 1990	Environmental	1962 1968 1972 1980s	"Silent Spring" by Carson was published, bio-organic farming was introduced International Federation of Organic Agriculture Movement (IFOAM) was founded definition as "eco-agriculture" against pesticides and pro-environment holistic food production standardization, lobbying for worldwide adaptation, marketing environmental superiority
1990	Political movement	1990	Government support promotion, subsidies, funding of research, currently being presented as a solution to the environmental problems caused by conventional agriculture

(Jones 2012; Kirchmann et al. 2008)

C. Principles of Organic Agriculture

OA is an alternative production system that avoids the use of synthetic pesticides and fertilizers, relies on biological pest control, and relies on crop rotation, green manure, compost, and other recycled wastes to maintain soil fertility **(Goh 2011).**

OA is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity **(Haas et al. 2010**). It emphasizes the use of management practices in preference to the use of off-farm synthetic inputs, taking into account that regional conditions require locally adapted systems **(Haas et al. 2010).**

This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system **(FAO 1999).** The fundamental aim and objective of OA is to enhance the effectiveness of health and productivity of interdependent communities of soil life, plants, animals, and people.

OA is based on certain principles as stated by **Lynch and Truro (2009)** :

- Protect the environment, minimize soil degradation and erosion, decrease pollution, and optimize biological activity and health,
- Maintain soil fertility by optimizing conditions for biological activity within the soil,
- Maintain biological diversity within the system,
- Recycle materials and resources to the greatest extent possible within the enterprise, and
- Rely on renewable resources in locally produced organic food systems.

D. Technical characteristics of organic agriculture:

Organic agriculture requires specific techniques and their good mastery, among these techniques we find**: (Nicolardot 2007)**

- The rotation of the cultures by alternating crops cleaning and dirtying in order to maintain the land clean, to improve the quality of the soil and reduce parasite and disease risks. Soil work is generally superficial in order not to alter the physical, chemical and biological fertility of the soil;
- The fertilization forbids the chemical fertilizers of synthesis and values organic matters from the farm (manure, compost, etc.).
- The use of mechanical or thermal mowing to control weeds and other pests.
- The use of genetically modified organisms, cloning and products that have undergone ionization treatment are prohibited
- The phytosanitary protection is a characteristic of organic agriculture through prevention, the choice of appropriate species and varieties, the right date of implantation the choice of rotation, and biological control through prophylaxis.

E. The IFOAM standard for organic production and processing:

1. Organic ecosystems

The following standers are according to (**IFOAM , 2014 a) :**

a) Ecosystem Management

General Principle

Organic farming benefits the quality of ecosystems.

Requirements

Operators shall design and implement measures to maintain and improve landscape and enhance biodiversity quality, by maintaining on-farm wildlife refuge habitats or establishing them where none exist. Such habitats may include, but are not limited to:

- extensive grassland such as moorlands, reed land or dry land;
- in general all areas which are not under rotation and are not heavily manured: extensive pastures, meadows, extensive grassland, extensive orchards, hedges, hedgerows, edges between agriculture and forest land, groups of trees and/or bushes, and forest and woodland;
- ecologically rich fallow land or arable land;
- ecologically diversified (extensive) field margins;
- waterways, pools, springs, ditches, floodplains, wetlands, swamps and other water-rich areas which are not used for intensive agriculture or aquaculture production;
- areas with rural flora;
- Wild life corridors that provide linkages and connectivity to native habitat.
- Clearing or destruction of High Conservation Value areas is prohibited. Farming areas installed on land that has been obtained by clearing of High Conservation Value Areas in the preceding 5 years shall not be considered compliant with this standard.

b) Soil and Water Conservation

General Principle

Organic farming methods conserve and improve the soil, maintain water quality and use water efficiently and responsibly.

Requirements

- Operators shall take defined and appropriate measures to prevent erosion and minimize loss of topsoil. Such measures may include, but are not limited to:minimal

tillage, contour plowing, crop selection, maintenance of soil plant cover and other management practices that conserve soil.

- Land preparation by burning vegetation or crop residues is prohibited.
- Operators shall return nutrients, organic matter and other resources removed from the soil through harvesting by the recycling, regeneration and addition of organic materials and nutrients.
- Stocking densities and grazing shall not degrade land or pollute water resources. This applies also to all manure management and applications.
- Operators shall prevent or remedy soil and water salinization where these pose a problem.
- Operators shall not deplete nor excessively exploit water resources, and shall seek to preserve water quality. They shall where possible recycle rainwater and monitor water extraction.

c) Inappropriate technologies

General Principle

Organic agriculture and aquaculture are based on the precautionary principle and should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones.

Requirements

- The deliberate use or negligent introduction of genetically engineered organisms or their derivatives is prohibited. This shall include animals, seed, propagation material, feed, and farm inputs such as fertilizers, soil conditioners, or crop protection materials, but shall exclude vaccines.
- Organic operators shall not use ingredients, additives or processing aids derived from GMOs.
- Inputs, processing aids and ingredients shall be traced back one-step in the biological chain to the direct source organism from which they are produced to verify that they are not derived from GMOs.
- On farms with split (including parallel) production, the use of genetically engineered organisms is not permitted in any production activity on the farm.
- The use of nanomaterials is prohibited in organic production and processing, including in packaging and product contact surfaces. No substance allowed under this standard shall be allowed in nano form.

2. Crop production

The following standers are according to **IFOAM , 2014 b**

a) Choice of Crops and Varieties and propagation of planting materials

General Principle

Species and varieties cultivated in organic agriculture systems are selected for adaptability to the local soil and climatic conditions and tolerance to pests and diseases. All seeds and plant material are organic.

Requirements:

- Operators shall use organically produced seed and planting material whenever available in appropriate varieties and quality. When organic seed and planting materials are not available in sufficient quantity or quality for the required variety or equivalent varieties, in-conversion materials may be used. When none of these are available, conventional materials may be used provided that they have not been treated with post-harvest pesticides not otherwise permitted by this standard.
- Seeds and plant materials shall be propagated under organic management for one generation, in the case of annuals, and for perennials, two growing periods, or 18 months, whichever is the longer, before being certified as organic seed and plant material.
- Propagation may be based on generative propagation (seeds) as well as vegetative propagation derived from various plant organs :

  a. partitioned tubers, scales, husks;
  b. partitioned bulbs, brood, bulbs, bulbils, offset bulbs etc.;
  c. layer, cut and graft shoots;
  d. rhizomes;
  e. meristem culture

b) Conversion Period (Plant Production) :

General Principle

A conversion period enables the establishment of an organic management system and builds soil health and fertility.

Requirements:

- All the requirements of this standard shall be met for the duration of the conversion period.
- The start of the conversion period shall be calculated from the date that an application has been received and agreed to by the control body.
- The length of the conversion period shall be at least:

- 12 months before sowing or planting in the case of annual production
- 12 months before grazing or harvest for pastures and meadows

- 18 months before harvest for other perennials.

- Crops harvested less than 36 months after the application of a prohibited input to crop or soil shall not be used or sold as organic.

- Plant products may be used or sold as "in-conversion" provided that they have undergone a 12-month conversion period.

c) Diversity in Crop Production

General Principle

The development of living soils is the foundation of organic production. Soil health and quality are the basis of soil management practices, are critical to successful pest, disease, and weed management. Organic growing systems are soil based, care for the soil and surrounding ecosystems, provide support for a diversity of species, are based on nutrient recycling and mitigate soil and nutrient losses.

Requirements:

- Crop rotations for annual crops shall be established to manage pressure from pests, weeds and diseases and to maintain soil fertility, unless the operator ensures diversity in plant production by other means. Crop rotations shall be diverse and include soil-improving plants such as green manure, legumes or deep rooting plants.
- For orchards and plantations, there shall be managed floor cover and diversity or refuge plantings.

d) Soil Fertility and Fertilization

General Principle

Organic farming returns microbial, plant or animal material to the soil to increase or at least maintain its fertility and biological activity.

Requirements:

- Soil organic matter, microbial activity and general soil health and fertility shall be improved if low and maintained or improved if satisfactory. The operator shall prevent over accumulation of heavy metals and other pollutants in the soils.

- Material of microbial, plant or animal origin shall form the basis of the fertility program. Maintenance of fertility may not rely solely on off-farm inputs.

- Nutrients and fertility products shall be applied in a way that does not harm soil, water, and biodiversity.

- Fertility amendments that are rapidly available to the plants are exceptionally allowed only as a necessary complement when other fertility building techniques have been applied and are insufficient.
- Mineral fertilizers shall only be used in a program addressing long-term fertility needs together with other techniques such as organic matter additions, green manures, crop rotations and nitrogen fixation by plants. Their use shall be justified by appropriate soil and leaf analysis or diagnosed by an independent expert.
- Mineral fertilizers shall be applied in the form in which they are naturally composed and extracted and shall not be rendered more soluble by chemical treatment.
- Chilean nitrate and all synthetic fertilizers, including urea, are prohibited.
- The production of terrestrial plants shall be soil-based. The production of such crops in hydroponic systems is prohibited. "Soil-based" means that apart from the propagation or seedling stages, a plant must spend its life in the soil. For herbs, flowers and ornamentals in pots that are sold directly to the final consumer, the CB can allow production on permitted growing media.
- The removal of soil from the farm is prohibited. Incidental removal of soil when harvesting crops is permitted.
- For mushroom production, substrates shall be made of products of organic agriculture, or other non-chemically treated natural products such as peat, wood, mineral products or soil.

e) Pest, Disease and Weed Management

General Principles

Organic farming systems apply biological and cultural means to prevent unacceptable losses from pests, diseases and weeds. They use crops and varieties that are well adapted to the environment and a balanced fertility program to maintain fertile soils with high biological activity, locally adapted rotations, companion planting, green manures, functional biodiversity, habitat management, beneficial organisms and other recognized organic practices as described in this standard.

Requirements

- The organic production system shall include biological, cultural and mechanical mechanisms to manage pests, weeds and diseases. These include:

a. choice of appropriate species and varieties;

b. appropriate rotation programs, intercropping and companion planting;

c. mechanical cultivation;

d. protection of natural enemies of pests through provision of favorable habitat, such as hedges, nesting sites and ecological buffer zones that maintain the original vegetation to house pest predators;

e. natural enemies including release of predators and parasites;

f. mulching and mowing;

g. grazing by animals;

h. mechanical controls such as traps, barriers, light and sound.

i. on-farm preparations from local plants, animals and micro-organisms.

- When these measures are not sufficient, pest, disease and weed management substances permitted under table 2 may be used.
- Substances that do not appear on table2 are prohibited for use in organic production.
- Physical methods for pest, disease and weed management are permitted, including the application of heat.
- Thermal sterilization of soils is prohibited.
- Any formulated input shall have only active ingredients listed in Table 2. All other ingredients shall not be carcinogens, teratogens, mutagens, or neurotoxins.

Table 4 : crop protectants and growth regulators

Substances description, compositional Requirements	Conditions for use
Algal preparations	As far as obtained by: (i)physical processes including dehydration, freezing and grinding; (ii) extraction with water or potassium hydroxide solutions, provided that the minimum amount of solvent necessary is used for extraction; (iii) fermentation
Animal preparations and oils	
Beeswax	
Chitin nematicides (natural origin)	Not processed by acid
Coffee grounds	
Corn gluten meat	
Dairy products (e.g. Milk, casein)	
Gelatin	
Lecithin	
Natural acids (e.g. Vinegar	
Plant oils	
Propolis	
Pyrethrum (Chrysanthemum cinerariaefolium)	The synergist Piperonyl butoxide is prohibited
Quassia (Quassia amara)	
Rotenone (Derris elliptica, Lonchocarpus spp. Tephrosia	Not near waterways. Subject to approval by the CB
Ryania (Ryania speciosa)	
Sabadilla	
Chloride of lime (calcium chloride)	
Clay (e.g. Bentonite, perlite, vermiculite, zeolite)	
Copper salts (e.g. Sulfate, hydroxide, oxychloride,	Max 6 kg Cu/ha per year (on arolling average basis)
Diatomaceous earth	
Light mineral oils (paraffin)	
Lime sulfur (Calcium polysulfide)	
Potassium bicarbonate	
Calcium hydroxide (hydrated lime) For application on aerial	For application on aerialplant parts only
Silicates (e.g. Sodium silicates, quartz)	
Sodium bicarbonate	
Sulfur	
Fungal preparations (e.g. Spinosad)	
Bacterial preparations (e.g. Bacillus thuringiensis)	
Release of parasites, predators and sterilized insects	

Viral preparations (e.g. Granulosis virus)	
Biodynamic preparations	
Carbon dioxide	Shall not be the result of burning fuel
Ethyl alcohol	
Homeopathic and Ayurvedic preparations	
Iron phosphates (for use as molluscicide)	
Seasalt and salty water	
Soft soap	
Physical methods (e.g. Chromatic traps, mechanical traps)	
Mulches, nets	
Pheromones – in traps and dispensers only	

(IFOAM 2014)

f) Avoiding Contamination

General Principle

All relevant measures are taken to ensure that organic soil and organic products are protected from contamination.

Requirements:

- The operator shall monitor crops, soil, water, and inputs for risks of contamination by prohibited substances and environmental contaminants.
- The operator shall employ measures including barriers and buffer zones to avoid potential contamination and limit contaminants in organic products.
- All equipment from conventional farming systems shall be thoroughly cleaned of potentially contaminating materials before being used on organically managed areas.
- For synthetic structure coverings, mulches, fleeces, insect netting and silage wrapping, only products based on polyethylene and polypropylene or other polycarbonates, and biodegradable materials (e.g. starch based), are permitted. These shall be removed from the soil after use and shall not be burned on the farmland.

g) Protected cropping

General principle

All the rules on crop production apply to protected cropping, including those concerning conversion period ,diversity of crop production and soil fertility and fertilization. Natural light, air and water are essential components of organic plant production.

Requirements:

- Artificial light is only allowed for plant propagation and as a complement to sunlight to extend the day length to a maximum of 16 hours.
- Operators shall monitor, record and optimize any energy used for artificial light, heating, cooling, ventilation, humidity and other climate control.

h) Breeding of organic varieties

General Principles

Organic plant breeding and variety development is sustainable, enhances genetic diversity and relies on natural reproductive ability. It aims for new varieties particularly suited for organic production systems. Organic breeding is always creative, cooperative and open for science, intuition, and new findings. Organic plant breeding is a holistic approach that respects natural crossing barriers. Organic plant breeding is based on fertile plants that can establish a viable relationship with the living soil. Organic varieties are obtained by an organic plant breeding program.

Requirements

- To produce organic varieties, plant breeders shall select their varieties under organic conditions that comply with the requirements of this standard. All multiplication practices except meristem culture shall be under certified organic management.
- Organic plant breeders shall develop organic varieties only on the basis of genetic material that has not been contaminated by products of genetic engineering.
- Organic plant breeders shall disclose the applied breeding techniques. Organic plant breeders shall make the information about the methods, which were used to develop an organic variety, available for the public latest from thebeginning of marketing of the seeds.
- The genome is respected as an impartible entity. Technical interventions into the genome of plants are not allowed (e.g. ionizing radiation; transfer of isolated DNA, RNA, or proteins).
- The cell is respected as an impartible entity. Technical interventions into an isolated cell on an artificial medium are not allowed (e.g. genetic engineering techniques; destruction of cell walls and disintegration of cell nuclei through cytoplast fusion).

- The natural reproductive ability of a plant variety is respected and maintained. This excludes techniques that reduce or inhibit the germination capacities (e.g. terminator technologies).

3. Animal husbandry

The following standers are according to **IFOAM , 2014 c**

a) Animal Origin and Conversion Period

General Principle

Organic animals are born and raised on organic holdings. Animal husbandry systems that change from conventional to organic production require a conversion period

Requirements

- All the requirements of this standard for land and animals must be met for the duration of the conversion period before the resulting product may be considered as organic. Land and animals may be converted simultaneously.
- Offspring may be considered organic only if their mother has been organically managed throughout the pregnancy.
- Milk may be considered organic only if the dairy animal has been organically managed throughout the pregnancy preceding lactation.
- Eggs may be considered organic only if the poultry has been organically managed from 2 days old.
- Animals for meat shall be raised organically from birth.
- Breeding stock may be brought in from conventional farms to a yearly maximum of 10% of the adult animals of the same species on the farm. Nonorganic female breeding replacements must be nulliparous.

b) Breeds and Breeding

General Principle

Breeds are adapted to local conditions.

Requirements

- Breeding systems shall be based on breeds that can reproduce successfully under natural conditions without human involvement.
- Artificial insemination is permitted.
- Embryo transfer techniques and cloning are prohibited.
- Hormones are prohibited to induce ovulation and birth unless applied to individual animals for medical reasons and under veterinary supervision.

c) Animal Nutrition

General Principle

Organic animals receive their nutritional needs from organic forage and feed of good quality.

Requirements:

- Animals shall be fed organic feed.
- Animals shall be offered a balanced diet that provides all of the nutritional needs of the animals in a form allowing them to exhibit their natural feeding and digestive behavior.
- More than 50% of the feed shall come from the farm unit itself, surrounding natural grazing areas, or be produced in co-operation with other organic farms in the region. For the calculation of feeding allowances only, feed produced on the farm unit during the first year of organic management may be classed as organic. This refers only to feed for animals that are being produced within the farm unit. Such feed may not be sold or otherwise marketed as organic.
- The following substances are prohibited in the diet:

a. farm animal byproducts (e.g. abattoir waste) to ruminants;

b. slaughter products of the same species;

c. all types of excrements including droppings, dung or other manure;

d. feed subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents;

e. synthetic amino-acids and amino-acid isolates;

f. urea and other synthetic nitrogen compounds;

g. synthetic growth promoters or stimulants;

h. synthetic appetizers;

i. preservatives, except when used as a processing aid;

j. artificial coloring agents.

- Animals may be fed vitamins, trace elements and supplements from natural sources
- Young stock from mammals shall be provided maternal milk or organic milk from their own species and shall be weaned only after a minimum period as specified below:

a. Calves and foals: 3 months

b. Piglets: 6 weeks

c. Lambs and kids: 7 weeks

d) Veterinary Medicine

General Principle

Organic management practices promote and maintain the health and well-being of animals through balanced organic nutrition, stress-free living conditions and breed selection for resistance to diseases, parasites and infections.

Requirements:

- The operator shall take all practical measures to ensure the health and well being of the animals through preventative animal husbandry practices such as:

a. selection of appropriate breeds or strains of animals;

b. adoption of animal husbandry practices appropriate to the requirements of each species, such as regular exercise and access to pasture and/or open-air runs, to encourage the natural immunological defense of animal to stimulate natural immunity and tolerance to diseases;

c. provision of good quality organic feed;

d. appropriate stocking densities

- If an animal becomes sick or injured despite preventative measures, that animal shall be treated promptly and adequately, if necessary in isolation and in suitable housing. Operators shall give preference to natural medicines and treatments, including homeopathy, Ayurvedic medicine and acupuncture.
- Use of synthetic allopathic veterinary drugs or antibiotics will cause the animal to lose its organic status. Producers shall not withhold such medication where doing so will result in unnecessary suffering of the livestock.
- Prophylactic use of any synthetic allopathic veterinary drug is prohibited.
- Substances of synthetic origin used to stimulate production or suppress natural growth are prohibited.
- Vaccinations are allowed only in the following cases:

a. when an endemic disease is known or expected to be a problem in theregion of the farm and where this disease cannot be controlled by other?management techniques, or

b. when a vaccination is legally required.

e) Bee Keeping

General Principle

Bee keeping is an important activity that contributes to enhancement of the agriculture and forestry production through the pollinating action of bees.

Requirements

- The areas within a 3 km radius of the hives shall consist of organically managed fields, uncultivated land and/or wild natural areas in a way that ensures access to sources of honeydew, nectar and pollen that meets organic crop production requirements sufficient to supply all of the bees' nutritional needs.
- The operator shall not place hives within a foraging distance (5 kms) of fields or other areas with a high contamination risk (e.g. conventional fields, industrial zones and highways).
- The hives shall consist primarily of natural materials and present no risk of contamination to the environment or the bee products. Use of construction materials with potentially toxic effects is prohibited.
- At the end of the production season, hives shall be left with reserves of honey and pollen sufficient for the colony to survive the dormancy period. Any supplementary feeding in response to unexpected need shall be carried out only between the last honey harvest and the start of the next nectar or honeydew flow period. In such cases, organic honey or organic sugar shall be used.
- Bee colonies may be converted to organic production. Introduced bees shall come from organic production units when available. Bee products may be sold as organically produced when the requirements of this standard have been complied with for at least one year.
- During the conversion period, the wax shall be replaced by organically produced wax, except where no prohibited products have been previously used in the hive and where is no risk of contamination of wax. In cases where all the wax cannot be replaced during a one-year period, the conversion period shall be extended to cover the full replacement of the wax.
- For pest and disease control the following are permitted:

a. lactic acid, formic acid; **b.** oxalic acid, acetic acid **c.** sulfur;**d.** natural essential oils (e.g. menthol, eucalyptol, camphor);**e.** *Bacillus thuringiensis*;**f.** steam, direct flame and caustic soda for hive disinfection.

4. Certification procedures

The major steps involved in the certification process are highlighted below **(Pamela 2012):**

Step 1 Submission of an application to a certifier by a farmer: This application contains several documents such as organic system plan; map of the farm; field histories; operator agreement; and report of organic yields and sales.

Step 2 Reviewing the application by the certifier: The certifier will read through the application and assess whether the farm meets the regulations and specifications.

Step 3 The inspector visits the farm: Organic farms are usually inspected annually. However, an impromptu visit may be carried out, usually at the discretion of the certifier. At the end of inspection, the inspector reviews any areas of concern. A report is written by the certifier which is forwarded to the certification agency.

Step 4 Reviewing the inspection report: A decision is made after reviewing the report by the certifier whether it conforms to the standards and regulations.

Step 5 Issuance of the organic certificate.

For a perennial crop, the conversion period is at least three years before the first harvest. The products harvested during the second and third year of conversion are marketed under the name of products in conversion to organic farming and bear the OA mark after the 4th year.

Certification: is a procedure by which a third party, the certification body gives written assurance that an organization system, a process, a person, a product or a service complies with the requirements specified in a standard or a reference system, any entity can engage in a certification process. In some cases, certification is a regulatory requirement. To deliver a certification, the certification body must be accredited. **(Ecocert, 2012).**

The certification body sends an inspector to visit the producers in the field in order to to grant the organic certification. Before certification can be granted, the farm must go through a a conversion period of two to three years between the conventional system, depending on the country **(IFAD, 2003).** Thereafter an annual inspection is conducted to ensure long-term compliance **(De Loel, 2009)**

A product may be labelled "organic" when the specific rules for organic production defined in one of the defined in one of the regulations recognized by the international community are respected, and that the operator has obtained a valid certificate for this product. For this, each operator must undertake to be inspected by an independent third-party organization accredited according to the ISO 65 guide standard. **(Ecocert 2012)**

The certifying bodies have the right to operate in several countries and their role is to inspect the production line and the examination of the finished product in order to be able to to obtain a certification.

Table 5 **: some of certifying bodies around the world**

Country	LOGO	Name of the organization
Algeria		Biocert Algeria
Tunisia		Boi-tunisia
Morocco		Bio-maroc
France		AB agriculture biologique)
Belgium		Biogarantie
Canada		Canada organic regime
USA		Usda organic

China		China Organic Product Certification Mark
Austria		AUSTRIA BIO GARANTIE
Australia		AUSTRALIAN ORGANIC
Germany		BIO SUISSE

III. Chapter 3:
Material and methods

A. the purpose of the survey

The purpose of the farmers' survey is to know the know-how and how organic farming practices are of the Biskra region , We conducted 60 interviews through the transfer of a 6-page questionnaire consisting of 46 question in which 35 are closed question and 8 are open question and the rest 4 questions are mixed

B. presentation of study area

1. Geographical location :

Biskra named «the capital of the Ziban», this region is known for its vocation covering an area of 216,671.2 km² and 425 km in the south -East of the capital, between 4°15’ and 6°45’ East of longitude and between 35°15’ and 33°30’ degree North of latitude **(Benziouche, 2016)**.

Because of the administrative division of Biskra in 1974, it currently has 12 daira and 33 communes. The wilaya of Biskra is delimited:

- In the North by the wilaya of Batna.
- In the East by the wilaya of Khenchela.
- Northwest by Wilaya of M'sila.
- West by Wilaya of Djelfa.
- South-east by the wilaya of El Oued.
- South by the wilaya of Ouargla.

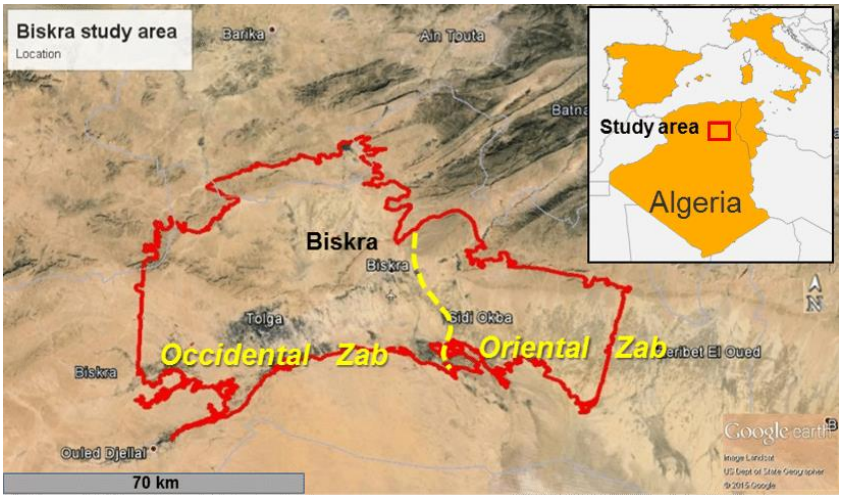

Figure 10 : Biskra study area (Gabriela Mihaela Afrasinei,2017)

2. The Soil of the Biskra region

The wilaya of Biskra consists of a sand silt-sandy alluvial accumulation plain (**Bedjaoui,2007)**. Its potential is not negligible, on the practical level a much of this potential is not yet exploited (**Bedjaoui ,2007)**

The following data according to the DSA in 2020:

- The Total area of the wilaya is 2.150.980 ha.
- The total agricultural area is 1,652,751 ha, representing 76.84%.
- Fallow and pastoral areas represent 65.07%.
- Useful Agricultural Area is 185,473 ha, at a rate of 8.62%.
- Irrigated area is 11,170 ha, representing 5.17%.

Soil characteristics in Biskra wilaya are **(Bedjaoui ,2007)** :

- Shallow depth
- Stony
- Low organic matter content
- A surface load

3. Water of the Biskra region :

According to the DSA, 2019 agriculture relies on the following water sources

In-ground resources DSA,2019

- Drilling: 10,845
- Wells: 3,610
- Sources: 20
- Ceds: 23

ABM Surface Resources DSA,2019

- Dams: 02 with a capacity of 73,000,000 m3

DSA Networks 2019

- Seguias: 59,500 Ha
- Drinkable: 55,381 Ha
- Spray: 2,314 Ha
- Basins: 6,636 with a capacity of 663,600 m3.

4. Reliefs of the Biskra region

We will summarize our intervention on the topography of the condition by presenting the components, which are the following. **(Aidaoui,1994)**

- **Mountains**

The mountains represent a small percentage of the state's superficie, 13%, most of which are located in the north, the majority of which are bare and poor in natural vegetation **(Bachar,2015).**

- **Trays**

It is lower than the mountainous region, represented in the foothills and extends to the south-west slope, forming what is called the Ouled Jalal plateau (the districts of Ouled Jalal and Sidi Khaled) **(Moussi,2012).**

- **Plains**

It extends along the axis of «El Outaya Tolga», extending to the east to the plains of Sidi Okba and Zribet El Ouadi (**Moussi,2012)**.

- **Depressions**

It is located in the southeast of the state. These are smooth clay surfaces that seize fines layers of water that represent the chotts, the most important of which is the «Chott of Melghir», The average fall is -33 m below sea level, it is therefore the main natural surface water complex of the Boussilaetal region (**Moussi,2012)**.

5. Temperature in Biskra

The hot season lasts for 3.1 months, from June 8 to September 10, with an average daily high temperature above 95°F. The hottest month of the year in Biskra is July, with an average high of 103°F and low of 83°F.

The cool season lasts for 3.8 months, from November 17 to March 9, with an average daily high temperature below 70°F. The coldest month of the year in Biskra is January, with an average low of 46°F and high of 62°F.

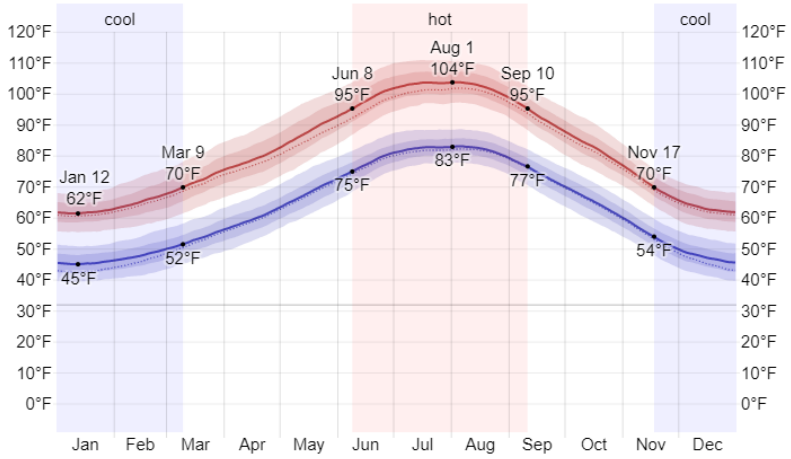

Figure 11: The daily average high (red line) and low (blue line) temperature

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6. Clouds

In Biskra, the average percentage of the sky covered by clouds experiences significant seasonal variation over the course of the year.

The clearer part of the year in Biskra begins around June 15 and lasts for 2.7 months, ending around September 7.

The clearest month of the year in Biskra is July, during which on average the sky is clear, mostly clear, or partly cloudy 93% of the time.

The cloudier part of the year begins around September 7 and lasts for 9.3 months, ending around June 15.

The cloudiest month of the year in Biskra is October, during which on average the sky is overcast or mostly cloudy 38% of the time.

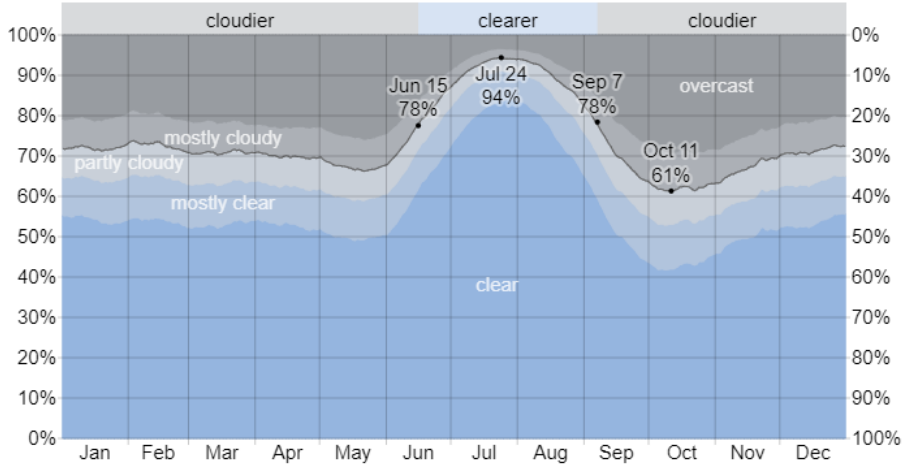

Figure 12:Chart of the cloud distrubution during 12 months in Biskra

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7. Precipitation

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Biskra varies throughout the year.The wetter season lasts 9.6 months, from August 23 to June 10, with a greater than 8% chance of a given day being a wet day. The month with the most wet days in Biskra is September, with an average of 3.7 days with at least 0.04 inches of precipitation,The drier season lasts 2.4 months, from June 10 to August 23. The month with the fewest wet days in Biskra is July, with an average of 0.8 days with at least 0.04 inches of precipitation.Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Biskra is September, with an average of 3.7 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 14% on September 16.

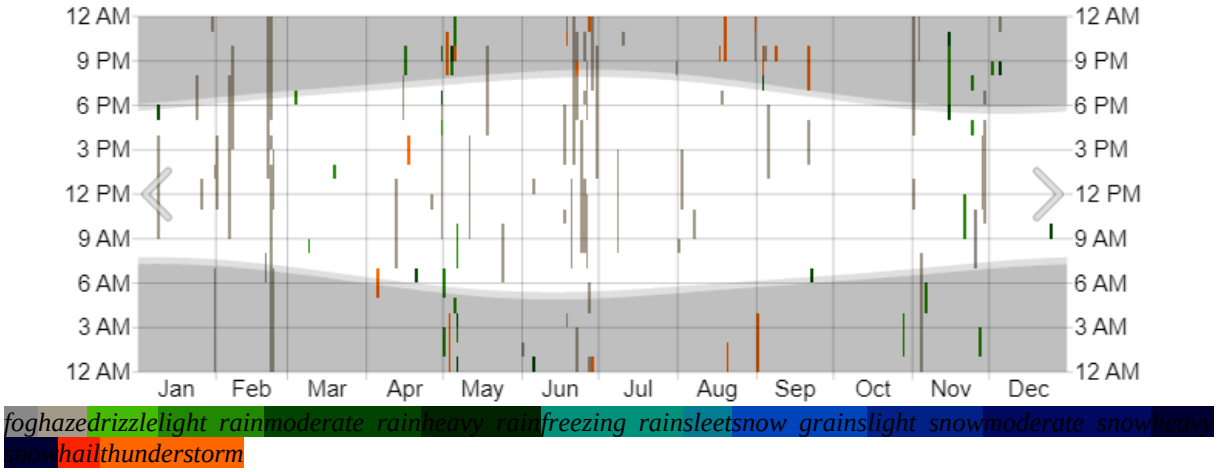

Figure 13:Observed Weather in 2021 at Biskra Airport

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8. Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

The perceived humidity level in Biskra, as measured by the percentage of time in which the humidity comfort level is muggy, oppressive, or miserable, does not vary significantly over the course of the year, staying within 2% of 2% throughout

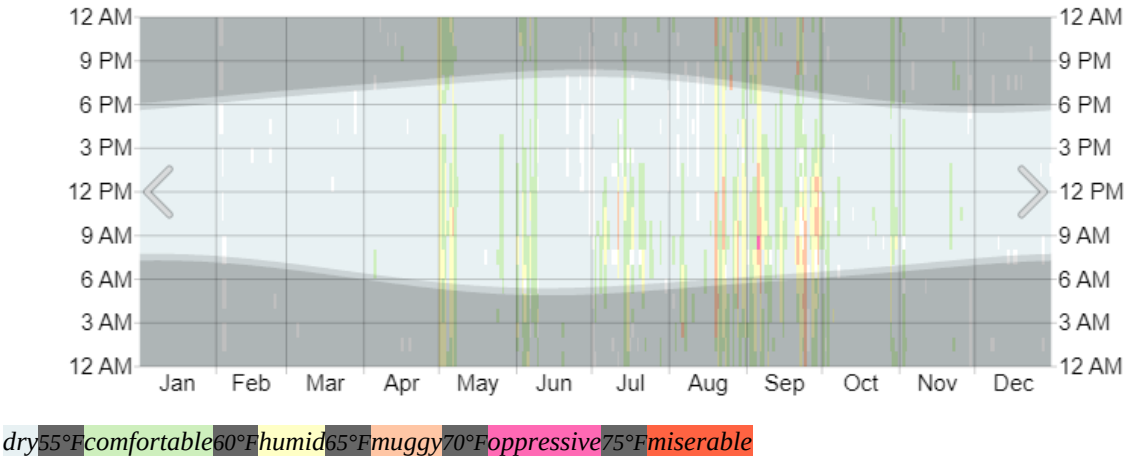

Figure 14:The hourly reported humidity comfort level

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9. Wind

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Biskra experiences mild seasonal variation over the course of the year.

The windier part of the year lasts for 3.8 months, from February 15 to June 10, with average wind speeds of more than 8.1 miles per hour. The windiest month of the year in Biskra is April, with an average hourly wind speed of 9.1 miles per hour.

The calmer time of year lasts for 8.2 months, from June 10 to February 15. The calmest month of the year in Biskra is October, with an average hourly wind speed of 7.1 miles per hour.

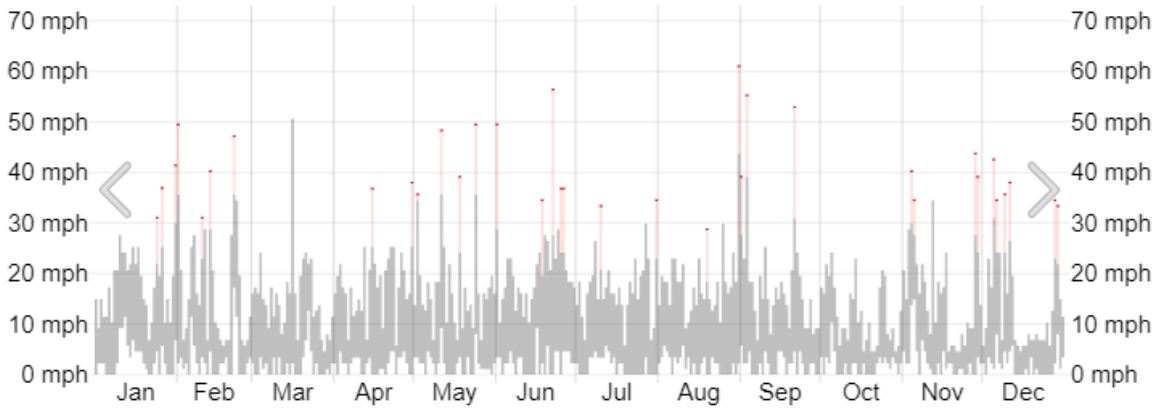

Figure 15:The daily range of reported wind speeds (gray bars), with maximum gust speeds (red ticks). Copy right :(climate-data.org)

10. Climatic context

According to the National Meteorological Office (ONM) 2018, the region of Biskra belongs to the arid bioclimatic stage with hot winter. The average rainfall is 114.78mm / year, with maxima of 49.53mm in winter and minima of 0 mm in summer, temperatures are very high in summer (40°) and moderate in winter (8 °).

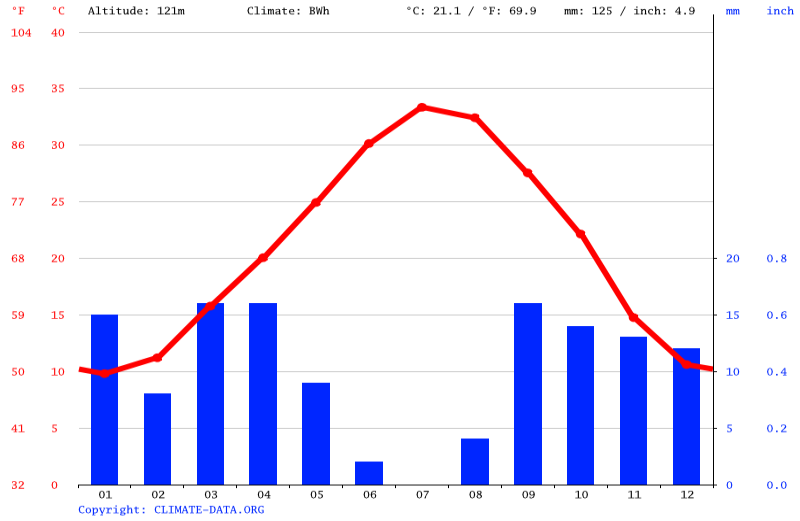

Figure 16: Graph of the climate according to the altitude during the year

The driest month is July. There is 0 mm | 0.0 inch of precipitation in July. With an average of 16 mm | 0.6 inch, the most precipitation falls in March.

Average temperature of Biskra

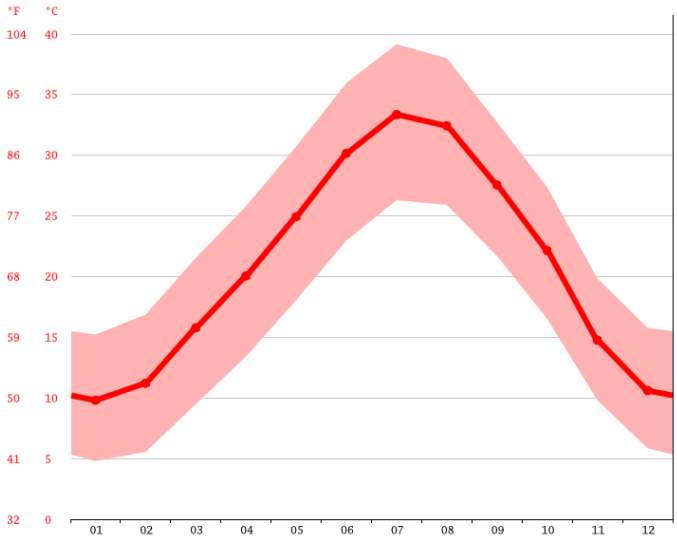

Figure 17: Chart of the average tempature during the year in Biskra

copyright (climate-data.org)

With an average of 33.4 °C | 92.0 °F, July is the warmest month. January has the lowest average temperature of the year. It is 9.8 °C | 49.7 °F.

In Biskra, the summers are sweltering, the winters are long and cool, and it is dry and mostly clear year round. Over the course of the year, the temperature typically varies from 45°F to 104°F and is rarely below 39°F or above 111°F.

C. Background to the study

Our survey was carried out on peasant practices in the palm trees of Eastern Ziban and more particularly in the communes (Sidi-okba, Chetma, Seryana , Djemoura , El faydh, Derrouh)

This questionnaire, which contains some 40 questions on which information has been collected from date palm producers during direct discussions, contains the following highlights:

• Improve soil fertility by using chemical or green fertilizers, manure or compost.

• Crop health by focusing on pest, disease and weed control and how they manage phytosanitary issues and using preventive or curative measures.

• Increase on-farm diversity and crop rotations.

• Farm animal well being .

D. the process of the survey

The survey is conducted from December 2021 to February 2022, with farmers in the study area according to direct contact (Face-to-face), and the questionnaire was structured in the vernacular dialect, based on a questionnaire designed for the purpose of the study.

This survey was conducted with 60 farmer in the following communes: Chetma - Derouh – El faydh –Djemourah –Seryana –Sidi okba .

The sample of 60 farmer was supposed to be equally divided between the communes , unfortunately that is not our case cause not all the farmers agree to give some informations about their practices :

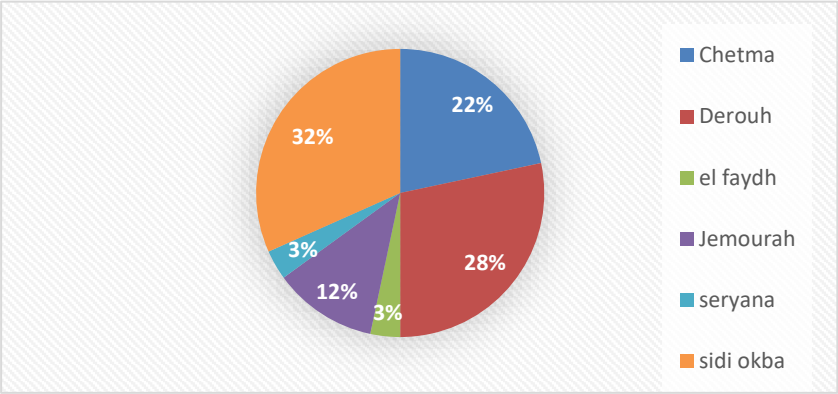

Figure 18:Pie chart of the distribution of farmers in Eastern Ziban

1. Sample presentation

We conducted 60 direct interviews on the basis of a simple and short questionnaire, with 56 questions. The majority of questions are closed and have multiple choices and some are open.

2. Questionnaire presentation

The questionnaire is structured into three categories:

a) About the farmer :

It contains questions related to the farmer, the name , age ,level of education ,agricultural education ,main activity , experience ,residency, location. The majority of questions are closed and have multiple choices.

b) About the farm :

It contains questions related to the farm and the techniques used there , it is divided into 3 parts :

- The first one is the surface both used and unused .

- The second part is about the irrigation(water source ,irritgation system , frequency of irrigation and most irrigated stage).
- The last part is about activities divided into crop production (palms production , arboriculture and low grad culture) ,and animal production (manure usage, animal well being).

c) About the organic production

We asked about the farming neighbors and there uses to chemicals then we asked them if they know about the organic farming, the obstacles … .

3. The data and information collected

After completing the questionnaire, a statistical database was used to analyze data from the questionnaire and integrate the analyzed data into curves, histograms and proportional circles For the processing and statistical analysis of the data, we used excel software.

4. Data analysis

We used excel software to illustrate and analyze our data.

IV. Chapter 4: Results and discussion

In this chapter we will present the main results we obtained from the survey with the farmers, the results are as follows:

A. About Farm and Farmer

1. About farmer

a) Age :

The histogram shows the difference of age between the sample of 60 farmer, we can notice that:

the majority by 25 out of 60 farmers are between the ages of 30 and 50 years old, right behind them comes the category of age between 50 and 80 years old who are 23 out of 60 farmer, then comes the minority by 11 out of 60 farmer that aren't older than years old.

From the results we can say that the majority of the farmers in our sample are old (30 years old and above) it means that the introduction of organic agriculture might be difficult because these farmers grow up using the practices, they inherit from their ancestors so introducing a new concept comes with challenges

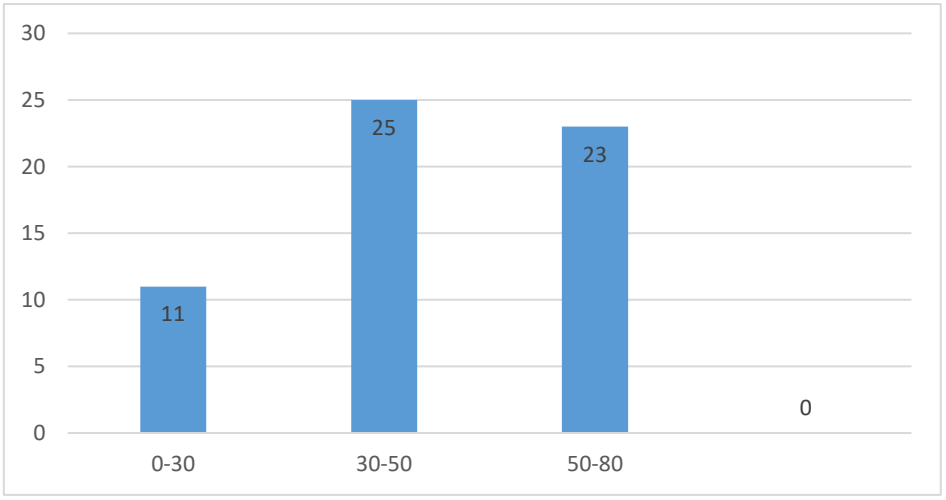

Figure 19:Histogram of the age difference between agricultures

b) Education

The pie chart above shows the education level among the sample of 60 farmers as following :

- 32 % of them has been to high school
- 22 % has been to the secondary school
- 20 % hasn't received any kind of education
- 15 % has been or finished university
- 11 % finished or went to primary school

This results shows that the majority of our sample has received a high school education which can allow the farmers makes good judgments and choices concerning their farms.

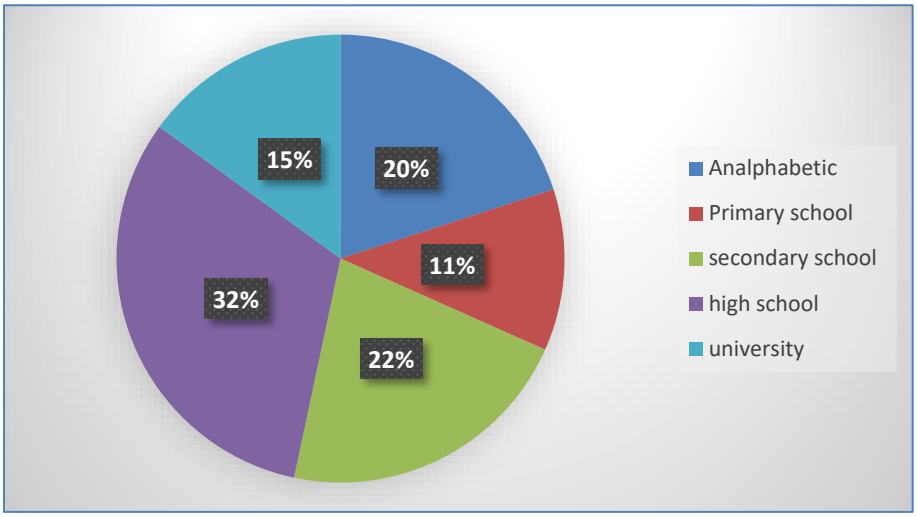

Figure 20:Pie chart of the education level among the farmers

c) Agriculture education

The histogram shows that 52 out of 60 farmers do not have any agriculture related education and only 8 out the 60 farmers had agriculture education.

The factor of the agriculture education can influence the decision making and problem solving in the farm, especially since the organic practices fix the phytosanitary problems with solutions that requires some kind of knowledge in this field.

d) Main activity

The histogram shows that 33 out of 60 farmers have their mainly income from agriculture activities and 27 out of 60 farmers rely on steady jobs for their income

This factor influences the risk rate of the farmers, meaning the farmers won't risk their main income for a new concept

e) Years of experience

The years of experience among farmers varies as fallow:

- 16 farmers have less than 10 years of experience in field
- 19 farmers have between 10 and 30 years of experience
- 11 of them have between 30 and 50 years in the field
- 2 farmers only have less 70 years of experience

This factor is important when facing challenges and can make the conversion step in organic agriculture easy

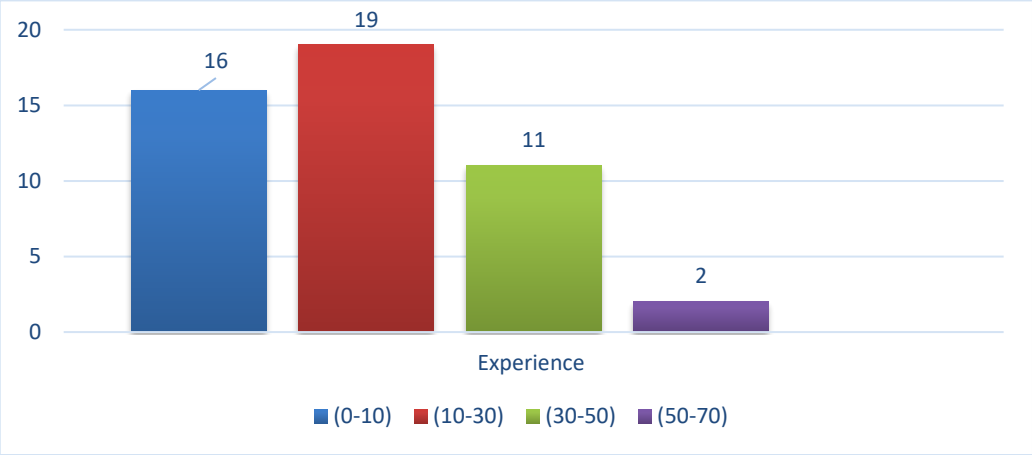

Figure 21:Histogram of the years of experience in agriculture field among farmers

2. About the farm

a) Surfaces

Unlike seasonal cultivation, which requires large areas, the cultivation of date palm according to currently approved methods does not require large areas, particularly in view of limited resources.

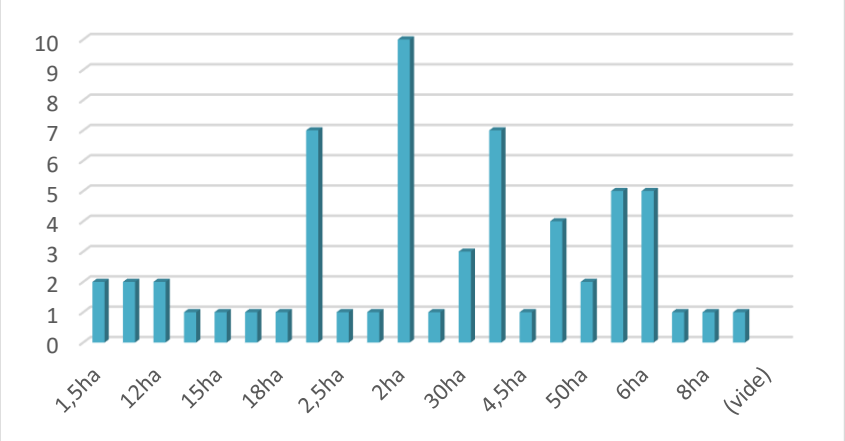

Figure 22:Histogram of the visited farms surface's

b) Irrigation

Characteristics of irrigation water that define its quality vary with the source of the water. There are regional differences in water characteristics, based mainly on geology and climate. There may also be great differences in the quality of water available on a local level depending on its source: wells can be contaminated with chemicals that has been on the surface and got to the well when it rained dams also can have doses of minerals that can be toxic , and whether the water has been chemically treated. Deep wells generally provide the best water source for organic practices. Chemical treatment of water may be required when pollutants such as iron, sodium, dissolved calcium and magnesium or bicarbonates are present. **(Bartok et al. 2009)**

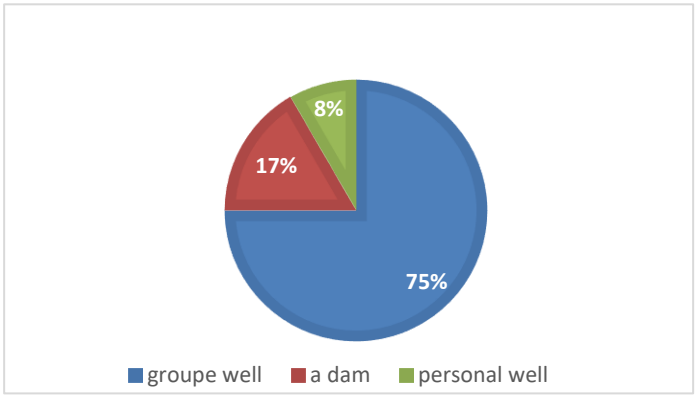

Figure 23:Pie chart of the irrigation water source

In organic farming, conservation is important in irrigation practices, as is sustainability; overall water usage must be rational.

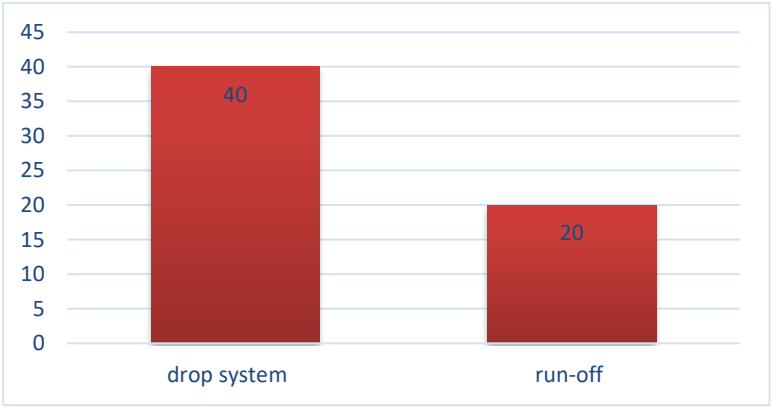

Figure 24:Irrigation systems in the visited farms

The farmers in the Ziban grooves use two methods: the old one that is the run off in which we submerge the grooves in water in times of drought only the rest of the palms needs in water are fulfilled with the precipitation. The somewhat new method that is the drop system in which we give the palms their needs in specific times based on experience and studies.

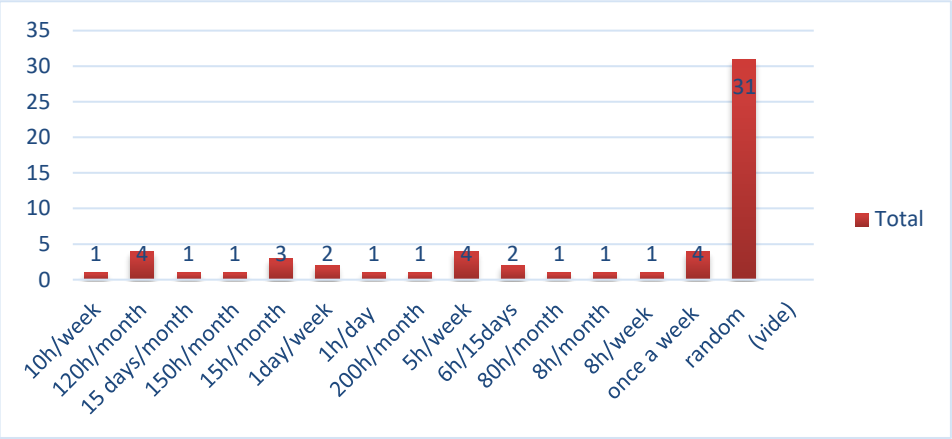

Figure 25:Frequency of irrigation in the visited grooves

Random usage of water can be the cause of many cryptogrammic diseases and damages to the blooming spikelet

B. About the grooves

1. soil *fertility*

For organic cultivation of dates, soils are fertilized with green and animal manures and compost. Manure may be applied by digging a trench around the tree to bury the manure. Nitrogen can be provided by intercropping with alfalfa (and other appropriate leguminous plants). At least once every four years, compost should be applied around the date palm. Such regular applications of organic material improve water holding capacity, and also theefficiency of irrigation **(Mahmoudi et al, 2008)**

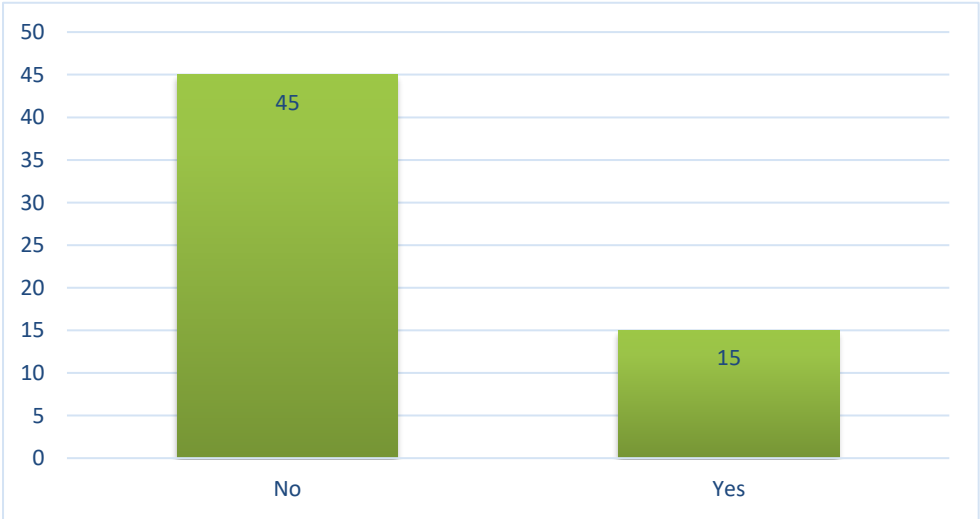

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Figure 26:the usage of fertilizer among farmer

As said in the third chapter the usage of fertilizer is strictly prohibited in the organic practices, from the grooves we visited only 15 used the different fertilizers shown in **table 6** , the rest either use animal manure **figure26** or don't use any fertilizer of any kind , none of the grooves we visited used compost or green manure .

Table 6:the fertilizers used in the visited grooves

Used fertilizer	Substance	Density	Period
15/15/15	N.P.K.	1-3 kg per palm	March/April/May
46	N	1-5 kg per palm	December/March
20/20/20	N.P.K.	1-4Kg per palm	May/June
28/28/28	N.P.K	1-3kg per palm	April/ May/June
15/15	N.B	2-5kg per palm	May/June

When the farmer uses animal manure whose source is unknown with a bad application that makes his groove not following the organic farming standers, because the composition of the manure must be known to know the minerals it will provide.

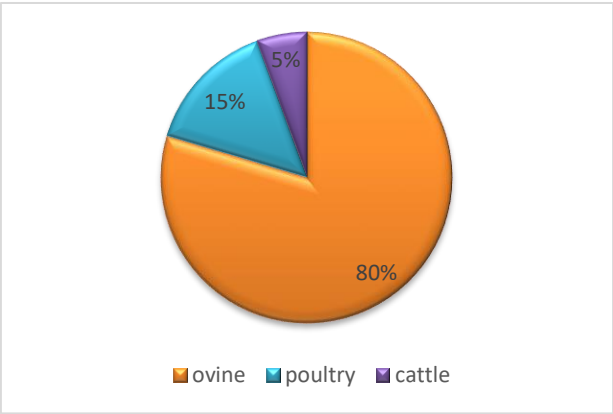

Figure 27: Source of animal manure used in the visited grooves

2. Pest, disease and weed control

Diseases, pests and weeds are one of the major problems that effects the grooves; among the most common pests in the study area, *Oligonychus afrasiaticus* Old World date mite, *Lepidoptera Pyralidae* Carob Moth, *Hemiptera diaspididae* White Date Scale **(Bedjaoui,2021)**

In the 60 grooves we visited the only pest they suffered from is *Oligonychus afrasiaticus* and the 60 of them use chemicals to fight this pest

Weed control can be done by several methods some are mechanic others are chemical, as we already seen in organic practices the chemical methods are prohibited **(IFOAM ,2014 b)** , in the 60 farmers 28 uses chemicals as it is easier and doesn't cost much and more effective . **figure 28**

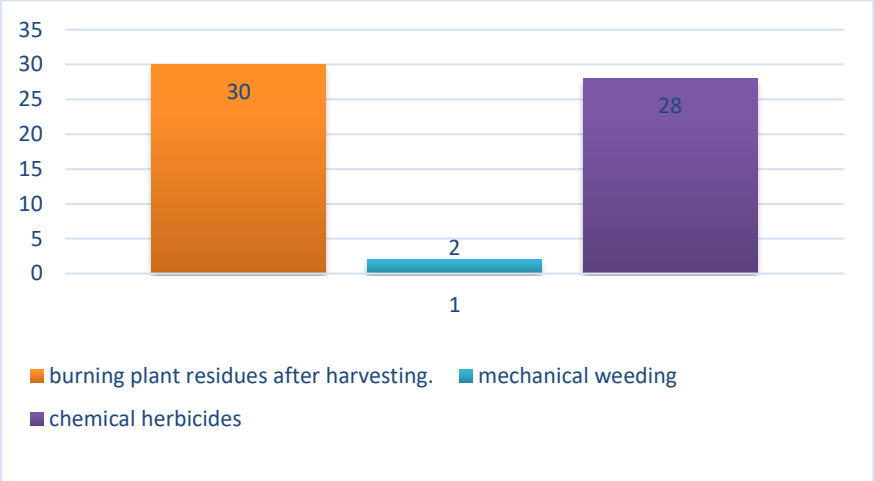

Figure 28:Histogram of weed control in the grooves

3. On-farm diversity and crop rotations

When diversity is encouraged, locally adapted plant and animal breeds which are more appropriate to local ecosystems can be used. Most importantly, agricultural genetic diversity is a basic insurance against crop and livestock disease outbreaks. **(Fao,2010)**

Organic systems encourage the preservation and expansion of older, locally bred and indigenous varieties and breeds. Farmers who save their own seeds can gradually increase crop resistance to pests and diseases by breeding for "horizontal resistance". Horizontal resistance is the ability of a crop to resist many or all strains of a particular pest (which differs from breeding for "vertical resistance" to have a gene to resist one specific strain of a disease). By exposing population of plants to a certain disease or pest (or to several pests at one time), then selecting a group of the most resistant plants and interbreeding them for several generations, a given population becomes more resistant than the original population. Horizontally resistant cultivars

are well adapted to the environment in which they were bred, but may be less suitable for other growing conditions. **(Fao,2010)**

The most common cultivars on these farms are: Deghlet Nour, Ghars, Mech Degla, Male and rarely Tentboucht, Larechti, Halouai,. The percentage of these cultivars is shown in **Figure 29**.

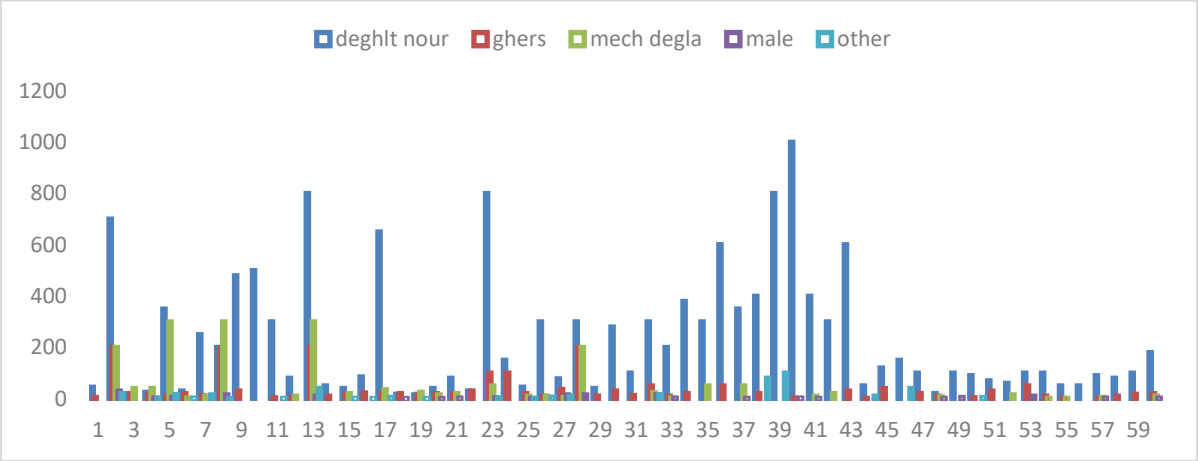

Figure 29:Number of cultivars among the visited grooves

Deghlet noor is the dominant cultivars in the grooves for its economic value, its taste and its popularity.

In the grooves we visited there is also other fruitful trees **figure 30** and low grade cultures which if maintained well can be an uptake in diversity, if not well maintained it can be home for many transmittable diseases to the palms.

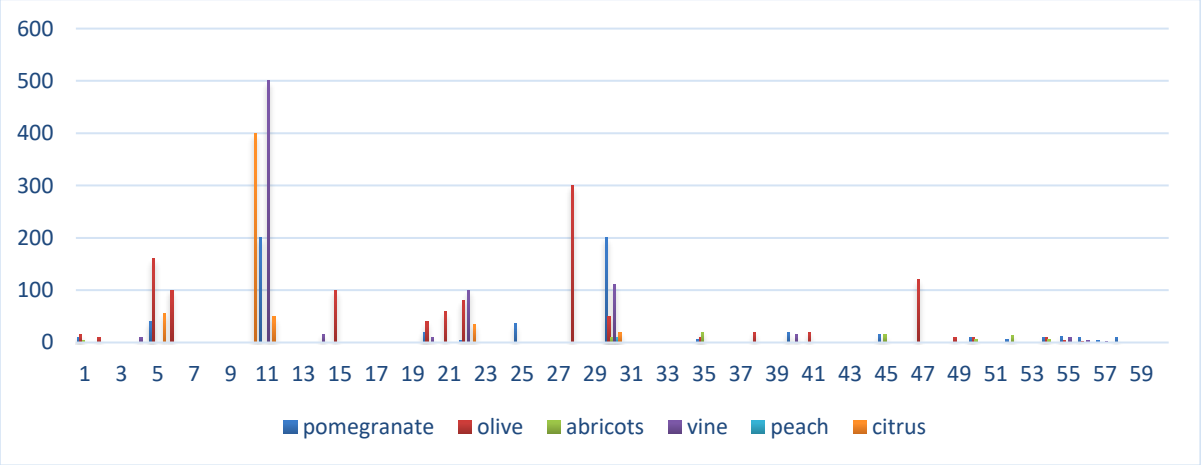

Figure 30:Diversity in fruit trees in the grooves we visited

rotation also can play major factor in soil fertility and breaking the chain of the diseases andpests (**Figure 31)**.

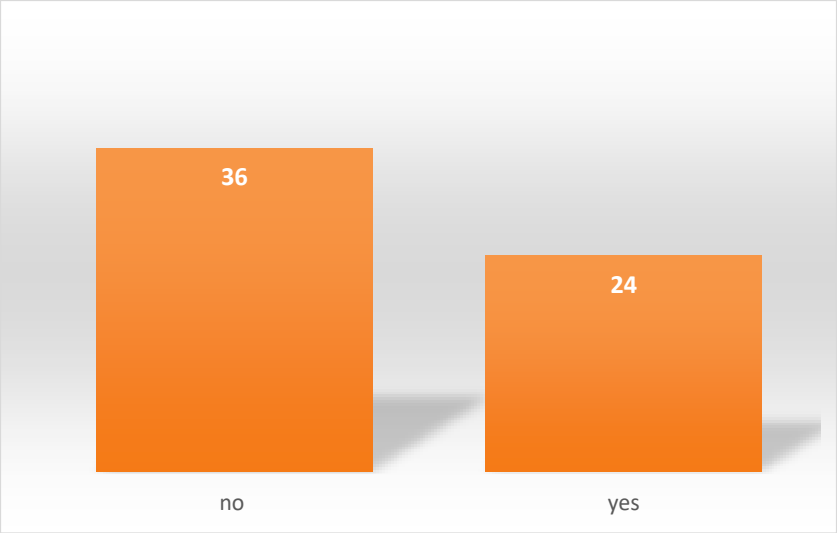

Figure 31:Rotation of low-grade cultures among the visited grooves

4. Farm animal well being

animals	Poultry	Apiculture	Ovine	Cattle	Caprine
Farmers	18	0	16	1	18

Table 7: diversity in animals in the visited farms

Animal welfare is one of the central principles in organic agriculture. Awareness of animal welfare issues has been growing in recent years. According to the Food and Agriculture Organization of the United Nations, about 70 billion animals were slaughtered in the world in meat, dairy, and egg industry in 2014. Majority of these animals are raised in the conventional, industrial agricultural system, known as confined animal feeding operations. These systems are designed to maximize the productivity and profit of the producer but create serious welfare problems to the animals. In organic farming, animals must be provided high-quality feed, adequate space, fresh air, natural light, exercise, access to outdoors. (**Ahsan Kabir, 2019)**.

Organic farming emphasizes on organic feeds, which are nutritious and natural. Feed must not contain any substances that artificially promote growth, synthetic amino acids, or genetically modified organisms (GMOs). When buying the feed from an unknow source some of the ingredient can be toxic. (**Ahsan Kabir, 2019)**. (**Figure16).**

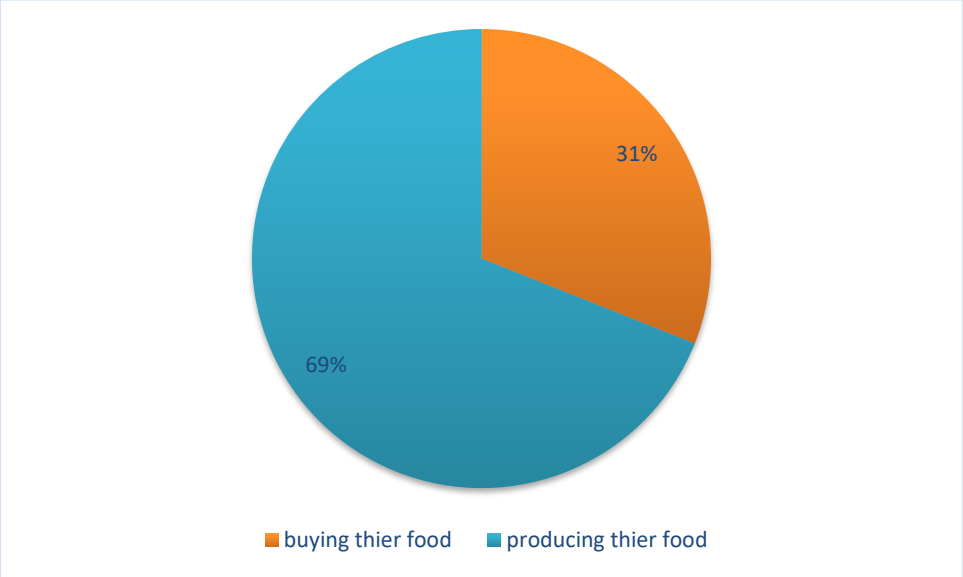

Figure 32:Source of the animal feed in our samples

From **figure 32** we can see that 69% of the farmers produce the food of their animals and 31% buy it, the unknown sources of food contain some of the prohibited substance mentioned in organic standers.

Healthy animals are one of the most important requirements of organic farming. High-quality feed and management must be given to the animal to ensure health and well-being. Some vaccines may be allowed against specific prevalent diseases. Limited chemicals and drugs may be used in case of emergency according to veterinarian concern, but chemicals and drugs must not be used routinely. Homeopathic treatments are preferred in case of drug treatment. Organic farming strengthens animals' natural resistance against diseases as it provides them suitable high-quality feed, exercise, and free-range access to the appropriate pasture. (**Ahsan Kabir, 2019). (Figure 33)**

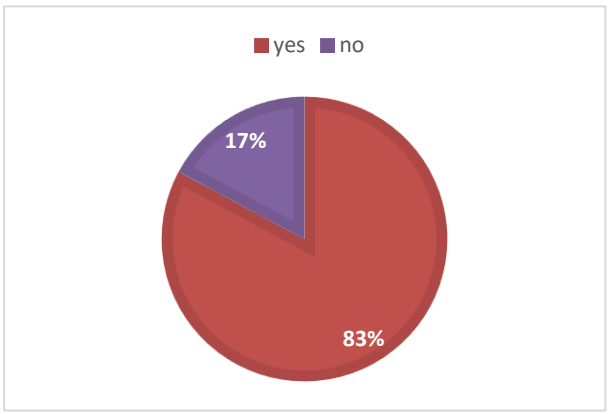

Figure 33:Animal healthcare in the visited grooves

C. Neighborhood

The grooves in the area can have huge impact in the organic practices and that in the usage of chemicals that can be carried by water or win and can potentially leave some residue of some prohibited substance. **(FAO,1999)**

In our sample 100 % of the grooves have neighbors and 99 % of these neighbors uses chemicals which can make getting the organic certification almost impossible.

D. Organic agriculture

Certification includes inspection of farm field and processing facilities. Farm practices inspected include long term soil management buffering between organic farming and any conventional farms, product labeling and record (**Safwat, 2007)**

Some of the farmers we visited heard about organic agriculture, but all of them don't consider taking the path of organic practices because they face so many problems and difficulties:

- There is no market for organic products in Algeria
- Organic practices require a lot of man power which is expensive and not available
- Lack of informations about the organic practices
- The difficulties to obtain the organic certification

Conclusion

Palm cultivation has been practiced for several centuries in the region of Biskra and it is in constant slow but steady progress. The farmers inherited their practices from their ancestors; therefore, they apply these practices without giving them a second thought nor see the need to take some insight from researches even though date production is economically important in the area.

The survey in East Ziban, the visits to different grooves and the bibliographic reading led us to the conclusion that organic farming is having a rough start in Biskra , even though the practices are so familiar to the organic farming practices yet the lack of guidance , informations and welling put the farmers away from the tracks

Most of the farmers have been doing the same practices for almost 25years without thinking of changes because their way works and is efficient, we notice this in the irrigation methods, fight the pests and diseases and weed control and therefore we conclude that:

- No farmer in the whole sample uses neither compost nor green manure.
- All farmers prefer deghlet nour on other cultivars, which creates a problem in diversity.
- All the grooves suffer from bouferoua and weed and the farmers use pesticides and chemicals to fight it.
- All farmers use manure with unknown sources which makes fertilization difficult and soil fertility in danger.
- They used pesticides and herbicides without the constructions and with random doses.
- Fruitful trees that are planted in the grooves are in 6 varieties mostly they are host for pests and diseases that can influence the production of palms or they consume water and nutritional elements and become competitors to the palms.
- Most famous irrigation system is drop system that is practical in season of drought.
- The mindset of some farmers is strictly traditional and refuses the changes the organic farming purposes.
- The main raison no one consider organic farming is the none existing market for the production.
- Neighbors who refuse to stop using chemicals is another problem that is facing some who are considering going organic.

When talking to the farmers they also mention a major problem that they faced when they had intentions and curiosity about organic production and that is the certificate.

In Algeria there is no certification organism, which make the producers go to a foreigner organism that are extremely expensive.

Another point that we noticed in the bibliographic reading that there are phytosanitary products that can be used in organic farming yet in the grooves, we visited none of them heard of these products neither in the market.

The consumer also isn't interested in the organic products hens there is no market for it, their mindset isn't there yet.

The organic practices can be pricy labor wise and the fact that no one talks about is that going organic means losing 1-5 % of the production, which is a huge convenient for many farmers.

Based on the results we got from the survey and the reading we have done on organic farming we think that a further investigation must be done on why there is no certification bodies in Algeria and we highly recommend spreading awareness and knowledge about the subject

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Abstract

The aim of this study is to see how close the traditional and conventional practices to those in organic farming are. Based on a questionnaire, we conducted a survey in six communes of East Ziban. Our results show that the age of the majority of farmers is comprised between 25 out of 60years, 20 % of them hasn't received any kind of education and only 8 farmers had agriculture education. Groves's surfaces varied significantly and the drop system is the most used for irrigation. None of the grooves we visited used compost or green manure and the most common pests in the study area is *Oligonychus afrasiaticus*. Concerning the biodiversity, the most common cultivars recorded are: Deglet Nour, Ghars, Mech Degla, Male and other fruitful trees as pomegranate, citrus and vine. The main animals recorded are: Poultry, caprine and ovine. Our study revealed that many obstacles that face the farmers willing to follow organic agriculture such as the lack of the information on this practices, the pricy labor workers that are so much needed in organic practices and most importantly the absence of local market and the certification organism.

Key words: date palm, organic agriculture, conventional agriculture, farmer's practices, Est Ziban

ملخص

الهدف من هذه الدراسة هو معرفة إلى أي مدى تقترب الممارسات التقليدية والتقليدية من ممارسات الزراعة العضوية. بناء على استبيان أجرينا مسحاً في ست بلديات في شرق زيبان. تظهر نتائجنا أن عمر غالبية المزارعين ما بين 25 و 60 سنة ، 20٪ منهم لم يتلقوا أي تدريب و 8 مزارعين فقط تلقوا تدريبًا زراعيًا. تختلف أسطح المزارع اختلافًا كبيرًا ونظام التنقيط هو الأكثر استخدامًا للري. لم تستخدم أي من البساتين التي زرناها سمادًا أو سمادًا أخضر ، وأكثر الآفات شيوعًا في منطقة الدراسة هي Oligonychus afrasiaticus. فيما يتعلق بالتنوع البيولوجي ، فإن الأصناف الأكثر شيوعًا المسجلة هي: دجلة نور ، غرس ، مش دجلة ، ذكر وأشجار الفاكهة الأخرى مثل الرمان والحمضيات والكروم. الحيوانات الرئيسية المدرجة هي: الدواجن والماعز والأغنام. كشفت دراستنا أن العديد من العقبات تقف أمام المزارعين الراغبين في الشروع في الزراعة العضوية ، مثل نقص المعلومات حول هذه الممارسات ، وارتفاع تكلفة العمالة اللازمة للممارسات العضوية ، وخاصة عدم وجود سوق محلي وهيئة إصدار الشهادات.

الكلمات الرئيسية: نخيل التمر، الزراعة العضوية، الزراعة التقليدية،ممارسات المزارعين, شرق الزيبان

Résumé

L'objectif de cette étude est de voir dans quelle mesure les pratiques traditionnelles et conventionnelles sont proches de celles de l'agriculture biologique. Sur la base d'un questionnaire, nous avons mené une enquête dans six communes de l'Est des Ziban. Nos résultats montrent que l'âge de la majorité des agriculteurs est compris entre 25 et 60 ans, 20 % d'entre eux n'ont reçu aucune formation et seulement 8 agriculteurs ont reçu une formation agricole. Les surfaces des plantations varient considérablement et le système de goutte à goutte est le plus utilisé pour l'irrigation. Aucune des palmeraies que nous avons visitées n'utilisait de compost ou d'engrais vert et le ravageur le plus commun dans la zone d'étude est *Oligonychus afrasiaticus*. Concernant la biodiversité, les cultivars les plus courants sont : Deglet Nour, Ghars, Mech Degla, Male et d'autres arbres fruitiers comme le grenadier, les agrumes et la vigne. Les principaux animaux recensés sont : la volaille, les caprins et les ovins. Notre étude a révélé que de nombreux obstacles se dressent devant les agriculteurs désireux de se lancer dans l'agriculture biologique, tels que le manque d'informations sur ces pratiques, le coût élevé de la main d'œuvre nécessaire aux pratiques biologiques et surtout l'absence de marché local et d'organisme de certification.

Mots clés : palmier dattier, agriculture biologique, agriculture conventionnelle, pratiques des agriculteurs , Est Ziban