

Economic Importance of Common Dates (*Phoenix Dactylifera* L) and Their Impact on the Sustainability of Palm Date's Biodiversity in Ouargla Oasis (Algeria)

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Abstract. This study carried out in Ouargla oasis which constitute an important genetic reserve in South-Est Algeria. It is aim to examine common date chain, dates from cultivars other than Deglet Noor; based on identifying production parameters, socio-economic environment; especially in terms of marketing. And to quote constraints that hinder its good functioning. It also aims to analyze biodiversity within oasis. Reasoned sampling was considered in order to have a certain representativeness by area. Surveys were carried out during direct interviews with farmers. Descriptive statistics have been used to find the results. Our results suggest that the production of common dates throughout the region is fluctuating. It often exceeds 77%. Indeed, the, Ouargla region is well known for its production in Ghars variety. Majority of the farms surveyed are small in size, less than 1ha, from 100 to 300 plant. Of middle age (40-60 years), irregular planting represented by 26% the type that dominates in old system. It also appeared predominance of an oligovarietal system, consisting of three varieties Deglet Noor, Ghars and Tafezouine, which receive a very important interest in terms of preservation because of their market value. The other common date varieties represent only a small percentage 7.80%. Many of these cultivars are rare and old, and the rate of endemism is high. The importance of this endemism is related to the dynamics of peasant selection and the state of the palm groves. However, these oases are increasingly experiencing an accelerating loss of agrobiodiversity. The research contributes to the empirical work by providing an evidence on importance of the common-dates as an alternative for safeguarding oasis ecosystem and their impact on the sustainability of palm date's biodiversity. Indeed, the environment is subject to multiple technical and commercial problems. Several varieties of dates are devalued and are subject to uprooting.

Keywords. Phoenicultural biodiversity, Common-date, Oasis ecosystem, Ouargla region.

1. Introduction

Despite the diversification of production in the Algerian Saharan regions, the palm date tree remains the main resource of the populations in these regions. This one extends over more than 167 663 hectares, planted with about 18.53 million feet, while the productive palm trees are estimated at 15.7 million or 84%. The production of dates is estimated at about 10.58 million quintals in 2017, a value of 332.4 billion Algerians dinars[1].

Geographically, the major part of the date palm patrimony is located in the northern and central part of the Algerian Sahara: The Ziban, the Oued Righ, the Cuvette of Ouargla, the Souf, the M'zab and El Menia. The Ouargla, region is considered one of the major producing regions of dates of different shapes, colours, consistency and tastes.

A production of 1 650 164 quintals of various varieties of dates has been recorded in Ouargla for the agricultural season (2018-2019). This harvest concerns 938 022 quintals of dates of Deglet-Noor variety (high quality), 476 584 quintals of Ghars variety and 235 558 quintals of Deglet Beida and other varieties at low market value [2]. In the commercial context, the appellation "Common Dates" is used to differentiate Deglet Noor from the rest of "varieties". It relates to all varieties other than Deglet Noor and only applies to dates from Tunisia and Algeria [3]. These varieties improperly called common have a real value, even if they are not traded in the sense that they are not formally marketed on a large scale. Generally, they are intended for family self-consumption or for exchange to sub-Saharan Africa; through border barter, even small quantities are officially exported.

Genetic resources of palm date represented by traditional cultivars (more accurate than the name common dates) are a real source of improvement and selection of the national palm-date cultivation heritage. This richness is subject to degradation (silting, lack of water, rural exodus, monovarietal cultivation, etc.) with regressive effects with regard to varietal diversity in particular and the fragile oasis ecosystem in general [4].

National and international market forces are also one of the causes of disappearance of several date varieties. Indeed, market preferences go to dates of high commercial value (generally good-appearance, soft and tasty), which are derived from known varieties. To satisfy this market demand, farmers are replacing the different varieties existing in situ with a very small number of varieties offering better commercial appeal.

In Algeria, there is some work aimed at inventorying date palm cultivars, which has made it possible to list the whole of the Algerian date palm cultivation patrimony. The varietal inventory carried out by Hannachi and al in 1998 lists more than 940 cultivars in the Algerian palm groves, the figure would attract the 1000 cultivars following the work of the RAB98/G31 project (between 2001 and 2005) carried out in the Mzab region, [5] worked on the characterisation, quality assessment of dates and identification of rare date palm cultivars in the Ziban region. Genetic resources of date palm; characteristics of date palm cultivars in the palm groves of South-Eastern Algeria [6] but not studies on the common date palm sector in Algeria itself as an alternative for the safeguard of oasis. However, [7] point out that oasis society as a whole is evolving and seeking to adapt to the new economic situation, and knowing that varietal diversity is a major asset for the selection and improvement of the heritage. This potential offers the following possibilities: ecological adaptation, resistance to diseases, valorisation of dates of minor varieties through agro-industrial processing and packaging, commercialisation of new varieties such as early varieties, it is in this context that this study is carried out. It aims to carry out a diagnosis to identify place of common dates in the Ouargla oasis and to perceive its impact on sustainability of palm date's biodiversity as well as its commercialisation through the date market and its valorisation.

2. Materials and Methods

2.1. Study Area

This study was conducted in Ouargla province, Algeria. It is located in the North-Est part of northern Sahara. Ouargla region is separated from the mountainous area by the limestone plateau of Tinrhert, it is a flat region of low altitudes; ranging from - 30 to 200 m. It is an oasis where diversity is considered

important with agricultural activity strongly dominated by palm date's cultivation, which constitutes until today a main source of life for several families in the Saharan [8]. Target areas characterised by the dominance of old palm groves where diversity is considered important in the Ouargla region and by their ingenuity with regard to date products. Thus, four (04) districts were selected to conduct our study in this case, Ksar, Mekhadema, Bamendil and Rouisset.

2.2. Sources of Data

In this study two sources of data were applied, the first was collected through a field survey by using questionnaires to interview date-palms farmers. The second data was collected from appropriate sources such as records of the State Ministry of Agriculture and rural development and previous studies.

2.3. Sampling and Survey

Reasoned sampling was considered in order to have certain representativeness by area. Surveys were carried out during direct interviews with farmers on their farms in order to know the real situation of the palm groves, to enable us to better understand the problems of the study area.

As for the survey guide, it is based on the bibliographical research and the pre-survey which was carried out over a period of three months (October-December 2019). This survey guide is based on a questionnaire, of the participatory type, which contains information on the following areas: identification of the farmers, characteristics of the farm, census of existing common date cultivars, different uses of dates, and marketing of common dates.

2.4. Data Analysis

Data collected are processed by the Excel software, SPSS 23 and graphic illustrations are produced for a better visualization of the analysis results

3. Results and Discussion

Importance of common dates in the Ouargla region

Ouargla region is ranking among the potential areas of palm dates cultivation in terms of quantity and quality, it has more than 2.6 million date palms trees, 92% of which are productive, cultivated on a surface of 24 140 ha[2].

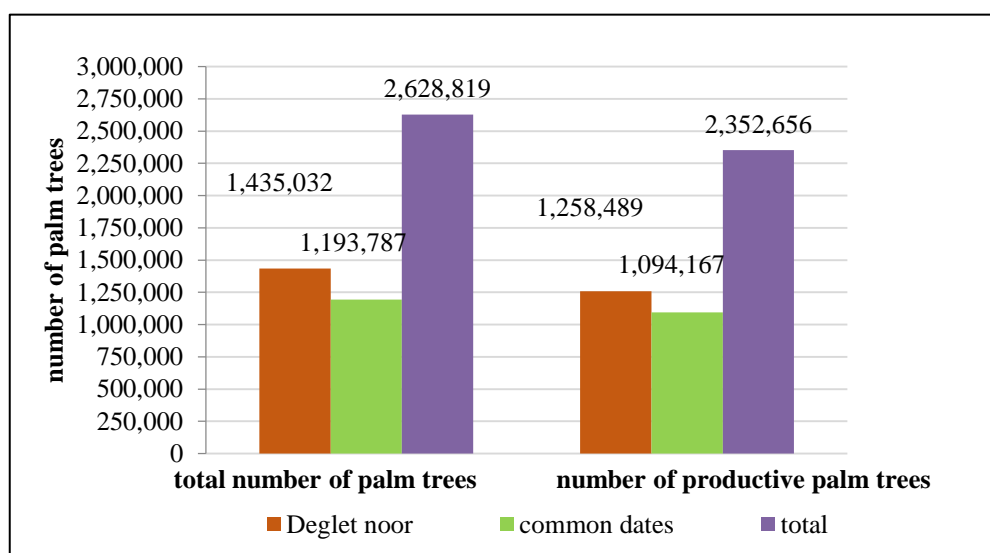


Figure 1. Number of palm trees in the Ouargla region for the 2018-2019 crop year, Source: Agricultural Services Department of Ouargla, 2019.

As illustrated in figure 01, Deglet Noor variety remains the most cultivated with 1,435,032 palm dates on 13 063 ha of which 1,258,489 are productive. While the common date varieties like soft (Ghars and

similar) and dry (Degla beida and others) total palms is 1,193,787 occupying an area of 11 077 ha, of which 91% are productive[9].

Common dates in Ouargla region represent 45% of the Palm date's patrimony. The average date production in Ouargla for the crop year (2018-2019) is 1650164 Qx. That 57% of Deglet Nour variety, is the most dominant. 43% of common date varieties of the total production, a large part of which is Ghars variety (Fig. 2). [2]

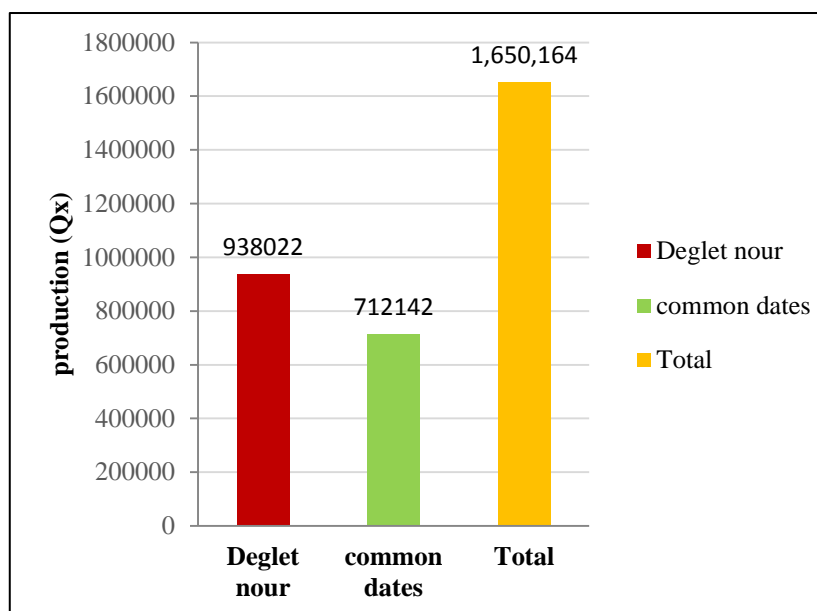


Figure 2. Production of dates in the Ouargla region , Source: Agricultural Services Department of Ouargla, 2019.

Figure 3 shows the evolution of the production of common dates in the three counties of the Ouargla region, during the last decade (2009-2019)

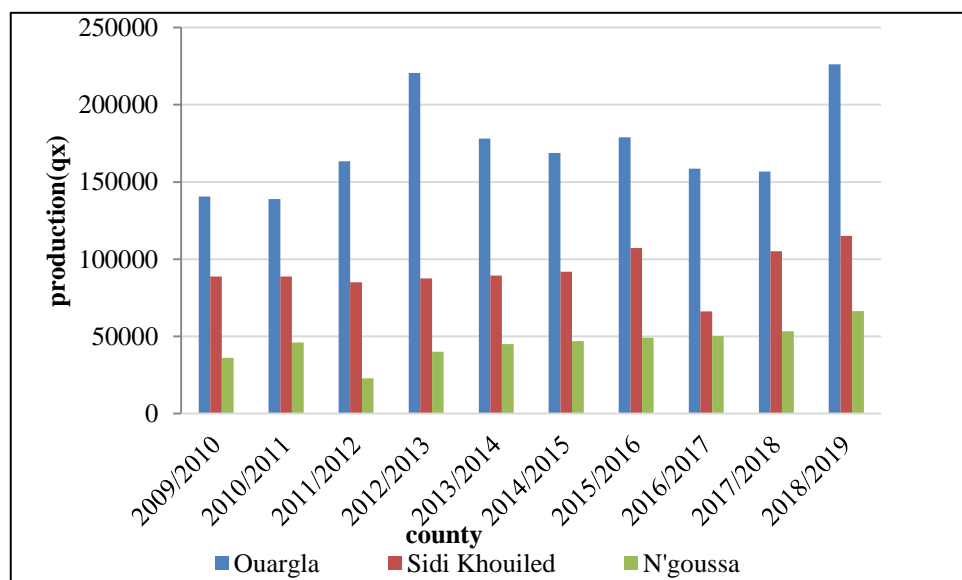


Figure 3. Production of common dates in 03 counties of Ouargla region , Source: Agricultural Services Department of Ouargla, 2019.

Analysis shows that production of common dates in all the counties is fluctuating due to climatic conditions, their conduct and alternation. The county of Ouargla is shown in first position in relation to the counties of Sidi Khouiled and N'goussa. This can be explained by:

Age of palm groves of Ouargla county compared to the 02 other counties where there are (new development lands), farmers are interested in cultivation of these common date varieties following the rapprochement of the market's province chief town and consequently the easy outlet for its production, The increase in market demand for these varieties (Ghars and Tafzouine).

Based on the production of common dates in the county of Ouargla (object of study) which often exceeds 59% and can reach 77%. Indeed, Ouargla region is very well known for its production in Ghars. Since this variety is considered as common dates. Production had decreased significantly, especially during the 2017/2018 crop year, due to the fires that damaged Ksar and Rouisset palm groves (in the old palm groves where most of the common date cultivars exist), as well as the spread of some diseases.

Analysis of socio-economic environment

Identification of farmers

The characteristics of date palm cultivator in the study zone are as follows:

A. Age of Farmers

We note that farms with more biodiversity belong to the old workforce (more than 45% of the farmers surveyed) whereas the opposite is to be expected (Fig. 04), since carrying out cultivation practices requires physical effort, this is the same finding in Biskra, [10] reports that the average age of producers is 60 years (it varies from 22 to 90 years, 25% have an age less than or equal to 50 years). Older farmers are an important source of information for 85% of producers (ancestral know-how). Through our surveys, we have observed that there is a direct relationship between the age of the farmer and varietal biodiversity.

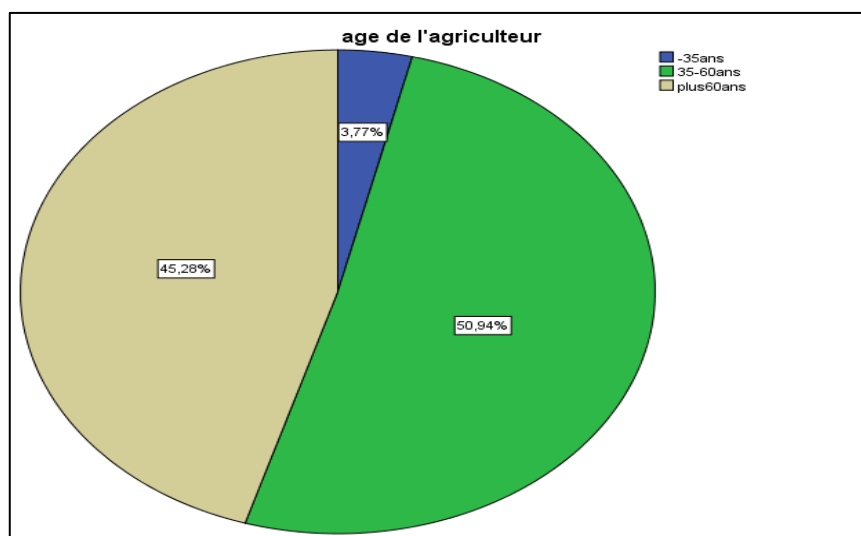


Figure 4. Age of farmers, Source: Field survey.

B. Education Levels

Symbiotic relationship between man and palm date tree is very important in order to ensure better productivity, the level of education of date palm cultivator is an essential element for the preservation of oasis biodiversity, it has been noted that the majority of the date palm cultivator questioned have an average level (47%), others are either illiterate due to the distance of the villages from the city centre which prevents them from attending school, or those who have attended the Quranic school. While those with a secondary or university level of education are less, despite their skills and knowledge are better placed for the development and promotion of the common date sector in the region.

C. Activity of the Farmer

Survey shows that 66% of farmers are exclusively engaged in agriculture. Most of them are pensioners or older farmers, where lack of qualifications does not allow them to take up jobs in other

sectors. For the second class, who are civil servants, palm date cultivation is only a secondary activity carried out in parallel. The intervention within the palm grove is limited to the period of pollination and/or harvest and more regularly during the round of water for the irrigation of the plots. This is a constraint, which accentuates the problem of abandonment, thus generating enormous losses in production. These mutations have led to genetic erosion, which favours the accentuated disappearance of certain varieties.

D. Identification of Holding

Dominant mode of ownership is inheritance, especially in area of ksar Ouargla and Mekhadema, where joint ownership represents about majority of the farms. 41.51% and which present an important varietal diversity, these authentic palm groves are small (less than 1 ha), because the area acquired before planting was small and density of plantations is high, so each farm is surrounded by other farms, which prevents their extension. Number of plants varies from farm to another (100-300 plants). According to analyses carried out, it can be seen that the use of different operations of crop management vary according to the importance of these operations, the availability of labour and the financial means of the owner.

In old palm groves, the majority only apply minimal operations (irrigation, pollination, organic matter amendment and pruning). Other operations, although technically and economically important, are not practised or are insufficiently practised by farmers (chiselling, limitation of regimes, protection) combined with insufficient washing, which has repercussions on the phytosanitary state of the palm groves, many farms have multiple phytosanitary problems either diseases or pest infestation (date worms, common spider mite pest) but despite all this, it has been noted that the old palm groves remain oasis farms where biodiversity is expressed in a broader sense, as much in cultivation techniques as in ecological management methods, social, economic and cultural modalities that constitute a real heritage that perfectly meets the very definition of sustainable development, oasis cultivator have exploited their environment in a rational way without losing their palm date's varietal biodiversity, consequently some varieties intended for exchange with other products, others for fresh self-consumption while others are easily preserved and left for conservation all year round.

E. Varietal Composition

Varietal composition of the 53 palm groves in Ouargla region located in four localities is appreciable. The most frequent cultivars in palm groves of Bamendil district are: Ghars, Tamsrite, Litim, Takrmouste, Bent Kbala. The ksar and Mekhadema palm groves are distinguished by Ghars, Tafzouine, Takrmouste, Litim, Mizite, Timjouhrete and Ammari, Rouisset area is characterised by the cultivars: Ghars, Tafzouine, Tamsrite, Litim, Takrmouste, Deglet Bieda, Tichrwine, Ali Wrached.

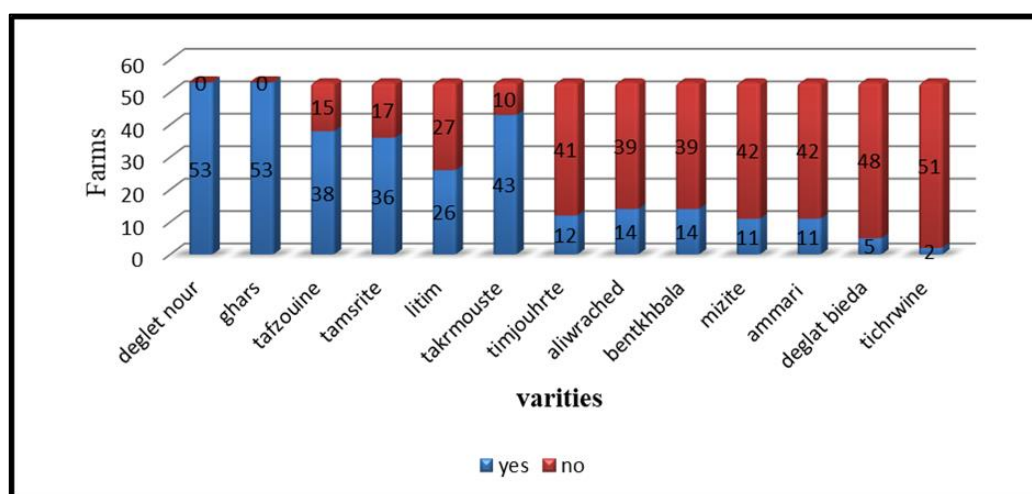


Figure 5. Varietal composition of holdings, Source: Author's calculation, 2019.

According to results of our surveys, we found a predominance of Ghars and Deglet Noor variety in all the farms with a marketing purpose (Fig.5). The other common varieties represent only a small percentage (7.80%).

This mainly concerns old farms, whose production is consumed by the local population. Those of lower quality are intended for cattle feed. The results of prospecting throughout the study region have enabled us to identify about ten cultivars (17), which appears low when comparing our results with those of the Tamentit oasis in Adrar with 29 identified cultivars [11], as well as the Sidi Okba palm grove in Biskra which shelters 112 cultivars [12]. According to [13], the Ouargla region has 59 cultivars compared to that of Oued Righ (121) and 115 in Ziban, while that of Mزاب is 139 [14]. Noting that the region of Gourara ranks first with 229 cultivars.

This decline in the varietal component in Ouargla oasis in particular and the region in general is an indication of the loss of traditions and habits of valuing dates and date palm organs. Main common date cultivars found in Ouargla oasis are: Ghars, Tafzouine, takrmouste degla bieda, Litim, ammari, Tamsrite, Ali W'rached, timjoughrete, Mizite and bent k'bala (see characteristics details in table 01). Most of them are of soft consistency with an often ovoid fruit shape, and are not widely traded.

Table 1. Characterisation of some common date cultivars in Ouargla oasis.

Cultivars	consistency	Date of maturity	marketing	Comments
Ghars	Molle	June-july	Important	Early Productive
Tafzouine	Half-soft	August	Important	Exported in Asian countries
Deglat bieda	Dry	October	Important	Exported to Sahel countries
Litim	Molle	August	Average	Excellent taste, very fleshy mesocarp
Ammari	Molle	July	Very low	Early
Bent khbala	Molle	August	Low	More appreciated and marketed at ^a M'zab region
Ali wrached	Molle	August	Low	Highly appreciated
Takermouste	Molle	July	Average	Tolerant to ^b Boufaroua
Timjoughrete	Half-soft	August	Average	Productive
Mizite	Half-soft	Septembre	Low	Often produces parthenocarpic dates
Tichrwine	Molle	September	Very Low	Used for the traditional production of vinegar

Notes:
^aM'zab : palm date's region in south west Algeria
^bboufaroua : the date palm mite (*Oligonychus afrasiaticus*), commonly known Boufaroua is one of the main pests of palm date.

Ksar area followed by Rouissat is best endowed with varietal diversity (housing all the cultivars listed), the three varieties Ghars, Tafzouine and Takermouste are more abundant (with a rate of more than 75%). Tichrwine variety is almost absent in study area (less than 5% abundance). Many of these cultivars are rare and old, the rate of endemism is high. The importance of this endemism is related to the dynamics of farmer selection and the state of the palm groves.

Data show that genetic diversity is found much more in old palm groves than in new palm groves. These tend to

focus on the most marketable varieties. it is the same observation of [15] who showed that, in the new palm groves of Oued Righ, 84 % of farms are occupied by 80% of DegleNour variety. The remaining 20% are occupied by the Deglet-Beida and Ghars varieties, and rarely other varieties like Tinissine and Tantboucht.

Moreover, we agree with the observation of [16] on the reconversion of the palm groves of Gabés oasis which has led to a severe genetic erosion of the genetic diversity of palm date heritage. This

reconversion has favored the gradual disappearance of certain varieties with significant socio-economic and even technical interests [17].

F. Harvest and Yield

Common date varieties found in study area are harvested from July to November. All of these varieties have the advantage of maturing over 6 months of the year from June to November. Indeed, while some early cultivars that mature in July (Ghars, Takarmoust, Ammari ,etc.), which is found mainly in the palm groves of ksar, and Mekhadema which have a more ancestral character favoured by the microclimate conducive to this, Others begin to mature between August and early October (litim, Tafzouine, in all the zones studied as well as bent kbala which is very popular in Bamendil), the late ones remain until November such as (Deglet Beida, Ali w Rached, ...) considered rare in the oasis of Ouargla [9].

Yield per palm is variable according to the variety and cultural management of palm date grove (Takermouste and Timjoughrete varieties present in the majority of the prospected areas are the most productive among varieties inventoried at 76 and 72 kg/ plant respectively), for Ghars variety yield can reach about 80 kg per palm in the study region. Average yield of common date varieties found is quite similar in the four areas surveyed, which varies between 65-75 kg although. these yields are higher than those found by [18] in Oued Righ region which are 53 kg/plant, 38 kg/plant, 44 kg/plant and 28 kg/plant respectively for Deglet Noor, Ghars, Degla Beida, and common varieties successively and on average. they are higher too than those of Tozeur in Tunisia (41 kg/plant) but remains low compared to the yields recorded in the oases of the Coachella Valley in California where they exceed 91 kg/ plant.

G. Method of Storage

Dates are stored according to their varieties, Ghars dates are often stored in Btana (dates packed in cloth bags). Dates of other varieties are marketed directly and gradually during the ripening period in Routab stage generally to be consumed directly in a fresh state because of the difficulty of its conservation (soft dates), a small part will be stored by refrigeration (Litim, Takrmouste and Ben Kbala), some are stored in Btana also or in buckets (Ali w Rached, Timjoughrete). Deglet Noor's dates are marketed directly, sometimes on spot. Part of the Deglet Noor dates is stored in cold rooms.

H. Becoming Dates

Majority of date's production in study area was destined for marketing in local, regional (common varieties which are more widely sold; ghars, bent kbala, litim) or national markets (in principle Deglet Noor and Ghars presser) and a lesser quantity exported to the outside after harvest or during storage period; this mainly concerned dates of three cultivars: Deglet Noor (cold storage) for the European market, Tafzouine for Asian market (Malaysia) and Degla Bieda for Sahel countries.

According to the farmers surveyed, processing of these dates remains low and is limited to the areas of Ksar and Bamendil in our study region (it is felt that ancestral traditions are still being safeguarded) common dates for: Traditional/artisanal processing on the scale of the date family; Ghars, Hamraya, Harchaya, Litim in date paw or robb (date syrup), jam (ali w rached variety), date flour, date vinegar. Industrial processing: Mainly date paste (some processing units), palm by-products (knowledge and know-how exist but are not very much valorised), crop waste, such as date scraps and sorting discrepancies, are destined for livestock feed.

Significant quantities of dates therefore remain undervalued and even unused and can exceed 30% of total date production. This is mainly due to interruption in date processing technology.

I. Date Market

In study area, the survey of date sellers in local markets showed that the people surveyed are date-palm cultivator and traders. Dates are sold from July to December generally after each harvest through the local markets in Ouargla which are: Daily markets (05 markets) and weekly markets (04 markets such as Ain Bieda and El Bour market).

Collection and collection grounds also play a very important role in the marketing of dates in the region, which are estimated at more than 150 premises of varying sizes (small to medium) where most of these premises do not meet hygiene standards. A date preservation factory and two cold rooms only in the region.

Table 2. selling prices and market demand for dates.

Variety	selling prices (^a DA/kg)	Market demand	comments
Deglet Noor	150-600	Forte	vary according to quality and sales period
Ghars	60-150	Forte	conferring to raw or packaged
Tafzouine	70-180	Medium	According to quality
Autres	50-150	Medium	For most of common dates

source: Author's surveys, 2019
 Notes: ^aDA: means Algerian dinars (Algerian currency unit)

Table 2, shows prices and demand for dates in the year (2019). Prices of common dates are often fluctuating, depending on its availability, earliness, quantity and quality of dates offered for sale on the market, but they remain low compared to Deglet Noor's price. Noting that selling prices in the Bamendil zone are quite low compared to other zones (ksar, Rouisset and Mekhadema) because of the distance from markets and the lack of competition from collection premises (only one collector who buys from the palm date's cultivators).

The study of date market in Algeria has shown a low penetration of common dates in the international market [19], as well as the existence of an important, but poorly known, flow of common dates towards sub-Saharan African countries.

J. Consumption of Dates

Consumption can be in two forms: fresh as is (harvested by grappling, generally at the Routab and Tamar stage), or crushed into reserves outside the date period.

The consumers surveyed are made up of those with palm groves and those without, all of whom are from the study area. First category, which are those with palm groves; consume average quantities of dates, around 80 kg/year, as most dates are commercialised.

The second category, which does not have palm groves, consumes average quantities of around 67 kg/year, this is due to prices of dates which are considered to be increasing from one year to another and the purchasing power and eating habits which have been changing recently. In order of date consumption rankings/study area, the surveys show that people from ksar come first in consuming more than 80 kg/year. Followed by those of Bamendil, Rouisset and Mekhadema.

Constraints on the development of common date cultivars

- Low market value for the majority of these cultivars,
- lack of skilled staff (loss of know-how among youth),
- Absenteeism of strategies for genetic heritage safeguard of certain cultivars,
- ageing of most cultivars
- Oasis workforce is becoming increasingly rare, especially the youth one
- acts of incivility (theft of production, fires, etc.) caused by the abandonment of farms,
- marginalisation of the benefits of common dates,
- change in eating habits (loss of traditions) observed nowadays means that even within families;
- date-based products are rarely (or no longer) produced. This is a serious obstacle to the development and dissemination of traditional know-how in date processing.

K. Statement

Outside the study region, we observe that marketing of common dates on a national scale is marginalized, it is the time to think about the creation of alternative markets for common dates for : Shift the demand for dates from the most popular varieties currently consumed (fine dates) to "common varieties", promotion of processed products made from dates (flour, paws, vinegar, honey, alcohols, syrup, jam, biofuel, etc.) and integration of dates in various forms in other food products: cereal paws, yoghurts, biscuits, juices, chocolates, sauces, infant formula, food compliments, etc.). This requires a real organisation of the common date sector by: creation and implementation of a fund for the promotion of partnerships for the export of common dates and the study of date flows to Sahel countries and Asian markets. Creation of collection, packaging and processing centres for common dates and especially labelling of some common cultivars: Ghars Ouargla, Tafzouine and Deglet Bieda.

Conclusion

At the end of this approach, carried out in the Ouargla oasis, and which concerns the importance of common dates, the following emerges: predominance of an oligovarietal system consisting of three varieties Deglet Noor, Ghars and Tafzouine, which are of particular interest in terms of preservation and its dominance on the market. The other common varieties represent only a small percentage. Generally, the harvest stretch from July to November. All of these varieties have the advantage of maturing over 6 months of the year from June to November. This advantage allows the local populations to produce fresh dates for months, a factor of balance and socio-economic stability in the oasis environment.

Many of these common cultivars are rare and old, and the rate of endemism is high. However, these oases are increasingly experiencing an accelerating loss of agrobiodiversity. Also, market economy has favoured the over-extension of Deglet Noor dates at the expense of other varieties.

Given the importance of common date cultivars in climate change, its power to adapt to different natural regions and its resistance to diseases and its earliness, and in order to promote the common date sector in the Ouargla region, it is necessary to increase diversity, especially in the new development farms, develop the food industry for the valorisation of by-products date, and finally labeling and certification of certain common varieties that are presentable and very appreciable such as Ghars of Ouargla and Tafzouine variety.

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