

Characterization of Some Varieties of Apricot Tree Located in the Area of Hodna, Zone of Boukhmissa, South-East of Algeria

¹Bahlouli Faycal, ¹Benniou Ramdane, ¹Tiaiba Ammar, ¹Zedam Abdelghani,
²Slamani Amel and ³Benkchida Messaoud

¹Department of Agronomy, ²Department of Biology, University Mohamed Boudiaf, M'sila, Algeria
³Seedbed El Boustan Area of El-Hamadia, Bordj Bou Arreridj, Algeria

Abstract: The apricot tree has a great capacity of adaptation to the dry climate of Wilaya of M'sila, this study with for goal to know the behavior of four varieties; apricot tree in the area of Boukhmissa (area of M'sila), through observations on the ground in order to follow the various stages phenologic of the tree. The results obtained show that the most adapted varieties are the variety Paviot and Red Louzi because their phenology is in harmony with the conditions of the medium of the arid area of M'sila. Two early varieties; Tounsi and Bulida are adapted to this area because of the coincidence of their flowering with the period of cold Spring which led to a disturbance of the output.

Key words: Apricot tree, Boukhmissa, varieties, behavior, characterization, Algeria

INTRODUCTION

For a long time, the botanists claimed an Armenian origin of the Apricot tree of its name Armenian plum (Hatil, 2004). According to Gilles (2003) on a worldwide scale one distinguishes three great groups from distribution of the varieties of apricot tree, the Asian group for which the requirements in cold and heat are very high and the European group for which the requirements in cold are high and the African Northern group for which the requirements in cold are weaker. The apricot tree is one of these fruit-bearing species, the most answered in Algeria cultivated primarily for its fruit which can be consumed in expenses or transformed.

Size of tree of apricot tree can reach between 10-15 m but in culture, the size is maintained <3.5 m, generally vigorous (Grimplet, 2004). According to Bussi *et al.* (1992), the most vigorous trees would be most productive. The wilaya of M'sila is one of the most important areas of Algeria which conceals the most appreciated varieties of apricot tree like Tounsi, Bulida, Paviot and Red Louzi. In this context, the contribution aims at studying the behavior of the trees of four varieties different of apricot tree to know, varieties best adapted in the arid area of M'sila as those which present the highest productions and outputs.

MATERIALS AND METHODS

The study was carried out on an orchard apricot tree located in the area of Boukhmissa. The trees of this

orchard are composed of 4 varieties; Tounsi, Bulida, Paviot and Red Louzi, the trees are 19 years old. In order to see the behavior of the trees of the various varieties, one followed weekly at Summer carried out of flowering until the maturation of the fruits. Irrigation is carried out each 20-25 days which began as from February with the use of the organic manures. There exist intercalated cultures between the trees inter aria cereals and the market gardening.

RESULTS AND DISCUSSION

Identification of the cultivated varieties: The area of Boukhmissa is characterized by the presence of several varieties of apricot tree, the old one of the trees is very variable 3 years up to 45 years. The various cultivated species are mainly Bulida (47% of the orchards), Paviot (21%), Red Louzi (17%) and Tounsi (15%). The Bulida variety is answered because it is a variety adapted to the arid, productive and early medium.

The farmers of the area prefer it because is among the first varieties to be appeared on the market, therefore they can make benefit easily and recover the expenses spent throughout the year. What gets an economic profitability and a commercial good quality to him (Fig. 1). According to Lamouarc (1985), more the share of the varieties of apricots are self-fertilizing, however it can prove very useful to cultivate several associated varieties because any cross fecundation increases fructification. This association of varieties, thus will increase fructification in the area of study.

Table 1: Date of appearance of the various phenologic stages of the four studied varieties

Phenologic stages	A	B	C	D	E	F	G	H	I
Tounsi	20/01/2011	25/01/2011	30/01/2011	07/02/2011	12/02/2011	17/02/2011	21/02/2011	28/03/2011	10/03/2011
Bulida	26/01/2011	02/01/2011	09/02/2011	14/02/2011	18/02/2011	23/02/2011	28/03/2011	06/03/2011	15/03/2011
Paviot	08/02/2011	14/02/2011	21/02/2011	24/03/2011	28/03/2011	03/03/2011	06/03/2011	09/03/2011	20/03/2011
Red Louzi	21/02/2011	28/2/2011	06/03/2011	10/03/2011	14/03/2011	18/03/2011	22/03/2011	27/03/2011	07/04/2011

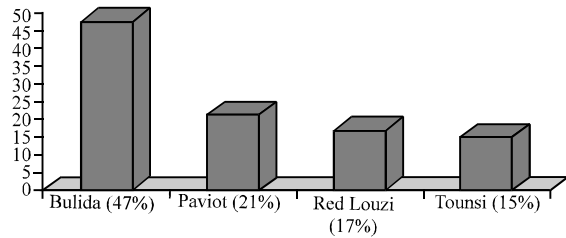


Fig. 1: Various varieties of apricot tree

Phenologic stages: The evolution of the floral button is divided into a certain number of stages generally represented by letters according to the method of Baggiolini in Bretaudeau (1979). The four varieties pass by same the phenologic stages with a difference in dates between the various varieties. Appearance of the various stages on the level the same branch is not done at the same period; indeed the most advanced stages appear in an decreasing order of the apical part to the basal part of the branch is a characteristic suitable for apricot tree. Moreover, the passage a stage with another is not made same speed; indeed on the same tree, researchers can meet all the stages; closed buds, stripped buds, tied flowers, fruits that are due to the position of the various buds of the various branches with respect to the source of nutrition (Table 1).

Flowering: According to Lichou and Audubert (1989), the precocity of the flowering of the apricot tree is variable according to the varieties and the areas, this exposes it to the risks of late frosts which are often at the origin of the irregularities of production. On the other hand, the low but non-negative temperatures do not prevent the apricot tree from bearing fruit.

Flowering is around the 15 at 20/02/2011 for the Tounsi variety, of the 21 at 27/02/2011 for the Bulida variety, of the 2 at 07/03/2011 for the Paviot variety and of the 16 at 21/03/2011 for the Red Louzi variety (Table 2). The percentages of flowering are more important at the Bulida varieties and Paviot with 92 and 95%, respectively, the two other varieties present less low percentages with 85 and 74% for Tounsi and Red Louzi, respectively (Fig. 2).

In general, the rate of flowering for all the varieties that is at least high is due to competition between the buds with flowers dimensioned and the position of each bud on the carrying branch other with dimensions.

Table 2: Period and percentage of flowering of the studied varieties

Varieties	Period of flowering	Percentage of flowering
Tounsi	15/02/2011-20/02/2011	84.43
Bulida	21/02/2011-27/02/2011	95.26
Paviot	02/03/2011-07/03/2011	93.93
Red Louzi	16/03/2011-21/03/2011	80.95

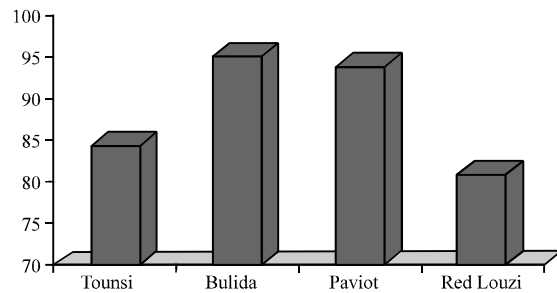


Fig. 2: Percentage of flowering of the four varieties

According to Chahbar (1990), the precocity and the difference in flowering between the varieties are due for a great part to the variation of the level of the needs for these varieties in cold and their duration of satisfaction during the period of the lifting of dormancy, appears the late varieties of course are most demanding in cold. What indicates the Bulida variety, considering its lateness is a very demanding variety in cold compared to the other studied varieties.

Setting: The setting was carried out of the 5 to the 12/03/2011 for the Tounsi variety, of the 10 to the 16/03/2011 for the Bulida varieties, of the 17 to the 24/03/2011 for the Paviot variety and more tardily of the 5 to the 14/04/2011 for the Red Louzi variety (Table 3). The highest percentage of setting is recorded at the Paviot variety with 93% while the smallest percentage is at the Red Louzi variety with only 59% (Fig. 3). This small percentage is due mainly to the important fall of the flowers which to coincide with the strong winds on February 7 and on 05, 06, 20, like with frozen of March 7 and the rain of the 4 and March 31.

According to Legave and Richard (2006), the independent factors suspected to be implied in the fall of flowers for the fruit-bearing species are the rains at the flowering stage, the estival or winter dryness and the late frosts. This fall can be also caused by the very reduced growth of the buds with flowers or a floral induction

Table 3: Period and percentage of setting

Varieties	Period of setting	Percentage of setting
Tounsi	05 /03/2011-12/03/2011	65.05
Bulida	10/03/2011-16/03/2011	60.22
Paviot	17/03/2011-24/03/2011	93.54
Red Louzi	05/04/2011-14/04/2011	58.82

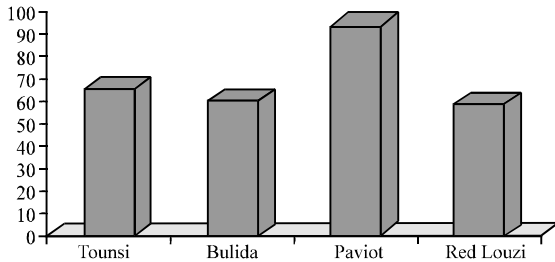


Fig. 3: Percentage of setting of the four varieties

reduced what will cause a disturbed growth of the flowers (Costes *et al.*, 2006). According to Legave *et al.* (2004), a fall of buds with flowers more frequent at the swelling stage at the beginning of Mars, sometimes associated with deteriorations with the floral parts inside the buds.

The fall of the fruits: The fall of the fruits is sometimes very important after the flowering and during the formation of the core. On the other hand, the premature falls are much weaker except in the event of excessive dryness (Coutanceau, 1962). Gautier (2001) in city three times of fruit fall; the first fall is at 3 weeks after flowering, the second fall is at 3 weeks after the first fall before the cores and the almonds are not formed. While the third fall from 4-6 weeks after the second is the fall of June.

During the study, only one period of fall was noted on the four varieties, it was produced 3 weeks after flowering which will correspond to the first period quoted by researchers (Table 4). The most important percentage of fall is recorded for the Bulida variety with 69%, the lowest rate is at Red Louzi with 50% (Fig. 4). The beginning of the fall of the fruits for the four varieties of two old tested located towards the beginning of March for the varieties Tounsi and Bulida and lasts roughly and respectively, 9 and 10 days (Table 4).

The fall of the fruits is considerable for the Bulida variety which will strongly decrease the output by tree. This fall is regarded as a natural polishing of the fruits which must be due to the lack; maintains the trees (plant health treatment, manures, etc.) and with complete absence of the various types of sizes (of formation, fructification, etc.). According to Bretaudeau (1979), all the varieties of apricots are self-fertilizing but the Bulida variety is slightly self-fertilizing with percentages of fructification varying from 20-35% only. This small

Table 4: Period and percentage of fall of the fruits

Varieties	Period of fall of the fruits	Percentage of fall
Tounsi	02/03/2011-11/04/2011	62.69
Bulida	08/03/2011-18/03/2011	68.81
Paviot	18/03/2011-18/04/2011	58.62
Red Louzi	25/03/2011-18/04/2011	50.00

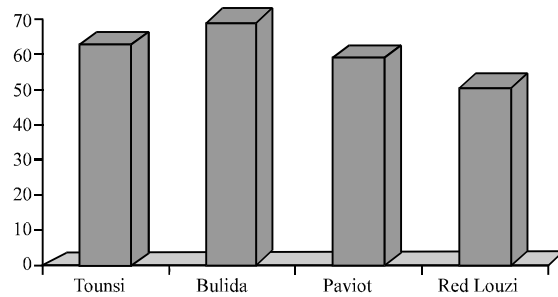


Fig. 4: Percentage of fall of the fruits

percentage will strongly influence fructification, a great number of flowers will not be fertilized what will cause their fall.

Maturation of the fruits: Time of maturity of the fruits at apricot tree is a specific characteristic to each variety and constitutes the first index of determination of the date of gathering (Gautier, 2001). This phase is characterized by a change of color of the fruits of green towards the green yellow with the green red and the fruit can achieve its maturation after harvest because the apricot is a fruit climacteric (Lichou and Breniaux, 2001).

The date of maturity of the fruits differs from a variety with another indeed the Tounsi variety earliest is followed of Bulida, Paviot and then Red Louzi which is latest. The shift between varieties is between 5-12 days (Table 5). According to Lichou (2001), the release of maturity is indicated by the beginning of the ethylene emission and is accompanied by specific biochemical process which involves an evolution much faster of the color and texture. The percentage of fructification is in general weak for the whole of the varieties with only 31% for the variety Bulida and the maximum is recorded at Red Louzi with 50% (Fig. 5).

The rate of the fruits become ripe is related to the physiological fall of the fruits which have occurred during the setting which is directly influenced by the climatic conditions and farming. This rate will condition the output by tree which is weak enough for the whole of the varieties. The period of harvest of the four varieties is spread out; the longest duration is 15 days at the Paviot variety, 11 days for the Bulida variety, 8 days for the Red Louzi variety and finally only 6 days for the Tounsi variety.

Table 5: Time of maturity, percentage of fructification and dates of harvest

Varieties	Beginning of maturity	Percentage of ripe fruits (%)	Go back to harvest
Tounsi	27/04/2011	37.31	03/05/2011
Bulida	09/05/2011	31.19	17/05/2011
Paviot	23/05/2011	41.38	09/06/2011
Red Louzi	28/05/2011	50.00	06/06/2011

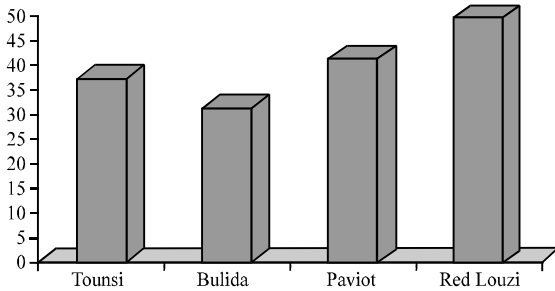


Fig. 5: Percentage of fructification of the four varieties

Organoleptic characteristics of the fruits: The gustatory appreciation of the fruit is variable and can be influenced by many parameters (Lichou, 1998).

The water content: The water content of the fruits of the four varieties is almost the same one with 86% for the whole of the varieties Paviot and Red Louzi and with 85% for the varieties Bulida and Tounsi. According to Lichou (1998), the apricot fruits are regarded as water rich person, the water content of the fruit lies between 80 and 90% in the case one can say that the fruits of the five varieties have a water content correct and sufficient.

Total acidity: The malic acids and citric are the two principal organic acids present at apricot, they come primarily from the metabolism of sugars in the fruit (Lichou, 1998). According to Coutanceau (1962), gustatory maturity is reached at the time the maximum of quality of the fruit is obtained before this period acidity is often excessive and the sugar content and the perfume are insufficient. If researchers refer to the values mentioned by concerning acidity in the apricot tree who according to him can represent until >3% of the fresh matter. The contents of acidity of the fruits of the four studied varieties are thus in the standards with 3.2% for the fruits of the Paviot variety, 3.1% for the fruits of the Bulida varieties and Tounsi and finally 2.8% for the fruits of the Red Louzi variety.

Sugar soluble total: According to Lichou (1998), enrichment out of sugar is ensured by the transport of assimilated produced in the sheets, the saccharose represents >80% of total sugars. The sugar content of the fruits has an antagonistic effect for the content of total

acidity if the sugar content increases that of acidity decreases which is a sign of maturity of the fruits. The apricots of Red Louzi varieties present the highest soluble sugar concentrations (27.5 mL kg⁻¹) followed apricots of the Bulida variety with a concentration to approximately of 23.5 mL kg⁻¹ and lastly the apricots of the two varieties Paviot and Tounsi with soluble sugar concentrations vary between 21 and 22 mL kg⁻¹.

CONCLUSION

The four varieties pass their phenologic stages to different periods with a shift of which the duration varies from a stage to another. The low productivity is at the origin of several factors; the coincidence of flowering with especially the cold ones for the Bulida variety which caused an important fall of the flowers, the lack of the maintenance of the trees, the diseases especially the gommose for the Paviot variety and the presence of the intercalated cultures between the trees of the orchard.

The Bulida variety is very appreciated by the farmers and consumers thanks to with the characteristics of these fruits but its productivity is in continual reduction that is due mainly to the climatic conditions because it is an early variety very sensitive to the frost which generally coincides with flowering. The varieties most adapted to the area of Boukhmissa, according to the study are the varieties: Red Louzi and Paviot which have a late flowering, thus being able to escape the late frosts but they are less productive than the Bulida variety.

The water content is almost identical for the four varieties and which borders 86%, total acidity are in the standards with percentages which vary from 2.8% for Red Louzi variety to 3.2% for the Paviot variety. The fruits of Red Louzi variety are richest in sugar; on the other hand the fruits of the varieties Paviot and Tounsi is poorest. One recommends to practice a size of formation adapted to the area which resists the winds according to Vidaud (1989), the goal of the size is the research of balance between the vegetation and fructification. As well as a good size of fructification and the polishing of the fruits to avoid the phenomenon of alternation of the production. As it is necessary to apply the plant health treatments which are completely absent in the arboricolous orchards of Boukhmissa. It is advisable to select adapted, productive varieties and having fruits with good physical and organoleptic characteristics.

REFERENCES

- Bretauudeau, J., 1979. Atlas fruit-bearing arboriculture Flight 3 (collection of the specialized horticultural techniques. ED: J.B. Bailliere Paris, pp: 167.

- Bussi, C., J.G. Hugguet, J. Besset and H. Defrance, 1992. Incidence of the farming techniques on the growth and the fructification of fishing in system localized irrigation: Effect of the factors maintenance of the grounds, nitrogenized fertilization and density of plantation. *Rev. Fruits*, 47: 485-494.
- Chahbar, T., 1990. Apricot tree, preliminary results: A test of varietal behavior. ED: INRA. Morocco, 32.
- Costes, E., D. Baker and J.M. Legave, 2006. Genotype, Hiring Interactions one architectural and floral features in apricot tree. Murcia proc. 13th ISHS. *Apricot culture*, 1: 33-36.
- Coutanceau, J., 1962. Fruit-bearing arboriculture. Techniques and Economies of the Cultures of Rosacees Woody. ED: J.B Bailliere and wire, Paris, 575.
- Gautier, M., 2001. Fruit-bearing productions, Flight 2. Ed: TECH and DOC., Paris. 665.
- Gilles, C., 2003. Effectiveness of the association of the varietal mixtures and a chemical fight reasoned in the fight against traveler of the apple tree. ED: Fruit-bearing arboriculture, Paris. 12-15.
- Grimplet, J., 2004. Functional genomic and markers of quality at apricot. Ph.D. Thesis, Agro INRA. Montpellier.
- Hatil, V., 2004. Inheritance off organoleptic milked of apricot. ED: INRA Paris. 52p.
- Lamonarca, F., 1985. Fruit-bearing cultures how to cultivate them to have beautiful fruits. ED: Vecchi.A, 221 p.
- Legave, J.M. and J.C. Richard, 2006. Inheritance off floral abortion in progenies off stark early orange apricot. *Proc. 12th ISHS. Apricot culture*, 1: 127-130.
- Legave, J.M., M.R. Calleja, N.R. Brisson and N.R. Moutier, 2004. Climate warming and effects on flowering. ED: Fruit-bearing arboriculture.
- Lichou, J. and D. Breniaux, 2001. Integrated protection of the stone-fruits. ED: C.T.I.F.L. 271
- Lichou, J. and P. Audubert, 1989. Apricot tree. ED: Garnier. J. CTIFL. Paris. 386.
- Lichou, J., 1998. Apricot: Varieties, directions for use. ED: CTIFL. Paris. 253-254.
- Lichou, J., 2001. Comparison off apricot tree growth and development in 3 French growing areas. *Proceedings of the International Congress, March 3, 2001, USA.*, pp: 1-1.
- Vidaud, J., 1989. Apricot tree: Control of the trees. ED: C.T.I.F.L, Paris. 267.