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Research Article

Evaluation of bio-agronomical characteristics of olive fruits (*Olea europaea* L.) of the introduced varieties and local types grown in the Ouazzane areas (Northern Morocco)

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ABSTRACT

The objective of this study was to evaluate the major fruit characteristics of olive tree genetic resources. The foreign table varieties (Picholine du Languedoc, Picual, Ascolana Tenera, Gordal) and indigenous varieties (Bakhboukh Beldi, Bouchouk Laghlide), with a very high fruit fresh weight had presented a high pulp stone ratio (in the order of: 8.25; 7.26; 6.89; 6.42; 6.79, 6.07).

The Moroccan Picholine local type, M1, M6, G10 and S2, suitable both to table and oil use, with a high fruit fresh weight has presented a pulp stone ratio higher than 6. The types of oleasters (BM2, BM3, BM4, BMR, BMM), with a small fruit size and a low fruit weight (1.86 to 2.49 g), have given pulp kernel ratio adjacent to that obtained in the dual aptitude variety Manzanille (4.40).

These characters will be use to define the final destination of cultivated varieties and local types for oil production, table olives (green, black) or canned fruits.

Keywords: Olive tree (*Olea europea* L.), genetic resources, pulp stone ratio.

1.INTRODUCTION

The mediterranean basin protects rich autochthonous genetic resources, considered a very distinctive and original refuge of biological diversity[1]. The identification and selection of the olive varieties performances are an essential and an important step to study the behavior of varieties (table, oil) in a specific region. They are usually based on bio-agronomical descriptors of performance as well as pomological characteristics of fruits [2,3,4,5].

In fact, the genetic constitution of a variety influences the production of olives[6], the alternance degree[7,8] and the ripeness. Tolerance and /or susceptibility to biotic and abiotic stresses (diseases, pests, regional climate conditions)[9], the beginning of production and the capacity of root development also depends on the genetic constitution.

The genetic constitution of a variety also has a significant impact on fruit characteristics as fruit size and pulp stone ratio. These characteristics define the capacity of the variety for fruit treatment (oil, table). In general, table olive cultivars should have a large fruit size with low oil content in order to favor its preservation, by contrast, in the oil cultivars, a high fruit oil content is a criterion of primary importance to be envisaged during varietal selection[10,11].

It's urgently required to complete and reorganize the best knowledge of the high diversity of the olive tree genetic resources concerning the aspects reliable to

the fruit size and shape, where round or oval-shaped fruits and high pulp stone ratio are preferred at table olive varieties. In the rich heritage regional olive Moroccan germoplasm, a very interesting genetic pool has been identified and resulted in the accurate identification of a number of old local genotypes which causes hugely of problems in the germoplasm collections management and traceability and authenticity of produced olives.

The aim of this work is the evaluation of major bio-agronomical characteristics of this Moroccan material as fruit weight and pulp stone ratio, enabled to construct a full database for the reference collection of genotypes, its domestication and its large diffusiveness to olive farmers to future improving of varietal profiles of the national olive orchards and olive oil sector [12,13,2;14,15,16;3].

2. MATERIALS AND METHODS

2.1 Plant materials:

The study focuses on 4 local varieties (Bouchouk Laghlide, Bouchouk Rkike, Bouchouika, Bakhboukh Beldi), 6 types of Oleaster (BM2, BM3, BMK, BMM, BMR, BM4), 6 types of Morrocan Picholine (M1, M6, G9, G10, S1, S2), traditional Moroccan variety Dahbia and 7 exotic or foreign olive cultivars, the most present and widely dispersed in Ouazzane areas (Picual, Gordal, Cucco, Manzanille, Picholine du Languedoc, Ascolana Tenera, Ascolana Dura).

2.2 pulp stone ratio:

The pulp stone ratio was determined at full maturity (fruit fresh weight- stone fresh weight / stone fresh weight)[17].

3. RESULTS AND DISCUSSION

The flesh stone ratio showed a very greater variation between studied autochthonous, foreign varieties and local types. For cultivated olive, it's generally varying between 4 and 8. By against, in studied oleasters types, it presented values less than 4.

Thus, it's showed that four table foreign varieties (Picholine du Languedoc, Picual, Ascolana Tenera and Gordal) and two table indigenous varieties (Bakhboukh Beldi ;Bouchouk Laghlide), with a very high fruit weight have presented the best pulp stone ratio(respectively in the order of 8.25; 7.26; 6.89; 6.42; 6.79 and 6.07).

The oil variety Picual and table variety Gordal with a thick fruit have presented in Spain (Jaen) a pulp stone ratio of 4.90 and 7.3 respectively[18,19]. The Picual variety with a high fruit weight introduced in Australia gave a pulp stone ratio of 8.34[20]. The table variety Ascolana Tenera with large fruit, gave in Yugoslavia the highest pulp stone ratio (12, 34)[21].

In Australia, the table varieties Manzanille, Ascolano and Gordal with a thick fruit and higher fruit weight have given pulp stone ratio in the respective order of 10.86; 11.52 and 12.4 [20]. The table foreign varieties Cucco, with a high fruit weight, have given a pulp stone ratio around 6.26.

The Moroccan Picholine local type, M1, M6, G10 and S2, suitable to table and oil use, with a high fruit weight have presented a pulp stone ratio higher than 6.

Fruit weight and pulp stone ratio are important agronomical characteristics, researched in olive table varieties (high P/S:7-10) or varieties used for oil production(low P/S:4-7) or to binary purposes varieties (suitable for both table and oil use) [12,13,14,15; 22, 23].

Therefore, these local and foreign varieties and Moroccan Picholine types can be considered primarily as table varieties or used in dual aptitude and their suitability for canning and trituration has been already now checked by farmers.

Moreover, it is noted that the studied 4 types of oleasters, with a small fruit size and low fruit weight (1.86 to 2.49 g) (BM2,BM3,BM4,BMR, BMM), has given pulp stone ratio not different to that of the dual aptitude variety Manzanille (4.4), which has given in its origin ecological areas a high pulp stone ratio (5.99-8.2)[18, 19] (Table n°1, Figure n°1and n°2). Fruit production of these types of oleasters is destined exclusively for oil production.

The study of fruits pomological criteria was the basis for the classification and identification of cultivars number of Andalusia in Spain[12,13] and Tunisia [14,15,24].

In dryness conditions of Tunisia, fruit weight and the pulp stone ratio, depending on the varieties (Koroneiki, Coratina, Arbequina, Chemlali Sfax, Chemlali Zarzis, Chemlali Boughrara) and soil characteristics (fertilization) [25] increased with the increasing of the ripeness index [24].

At the Italian oil variety Frantoio, umbrage of fruiting branches conducted from October to December affected negatively the growth of fruit and the pulp stone yield varied slightly. on the contrary, branches obscured during August and December, recorded a dramatic drop in pulp stone ratio. As for the defoliation of fruiting branches, it reduces the values of this parameter, despite the reduction observed in the dry weight of the endocarp [26]. In Italy at the local cultivar Canino, the competition between vegetative growth and fruiting set is very high in years of high production (year on),causing a reduction in both vegetative growth and fruit fresh weight, comparatively to others studied cultivars (Leccino, Maurino, Pendolino)[27].

4. CONCLUSION

The table foreign varieties (Picholine du Languedoc, Picual, Ascolana Tenera, and Gordal) and indigenous varieties (Bakhboukh Beldi, Bouchouk Laghlide), with a very high fruit fresh weight have presented a high pulp stone ratio (in the order of: 8.25; 7.26; 6.89; 6.42; 6.79, 6,07). The local type Moroccan Picholine, M1, M6, G10 and S2, suitable both to table and oil use, with a high fruit fresh weight have presented a pulp stone ratio higher than 6. The types of oleasters (BM2, BM3, BM4, BMR and BMM), with a small fruit size and low fresh fruit weight (1.86 to 2.49g), gave pulp stone ratio not different to that of the dual aptitude variety Manzanille (4.40). the determination of the pomological characteristics of fruit is an important step, which can be exploited not only in genetic improvement programs of the olive tree, but also for the selection and valorization of genotypes considered as new cultivars suitable for fruit canning ,oil production or for dual purposes (oil + table) [12,13,2,14,15,16,3.]

Table 1
Pulp-stone ratio of studied local and foreign varieties and local types of olive tree.

Varieties and local types	fruit Fresh weight (g)	Pulp (exocarp) percentage (%)	Pulp-stone ratio
Bouchouk Laghlide	6.54	86.56	6.07
Bouchouk Rkike	4.22	84.67	5.93
Bakhboukh Beldi	6.25	86.39	6.79
Bouchouika	3.66	81.92	4.72
Type Oléastre BM2	1.86	78.06	3.59
Type Oléastre BM3	2.34	77.61	3.53
Type Oléastre BM K	2.18	72.87	2.78
Type Oléastre BM4	1.66	77.73	3.65
Type Oléastre BMR	2.495	76.61	3.47
Type Oléastre BM M	2.28	77.67	3.68
Type Pich. Maroc M1	4.92	85.95	6.15
Type Pich. Maroc M6	5.32	85.80	6.20
Type Pich. Maroc G9	4.95	84.88	5.71
Type Pich. Maroc G10	5.63	85.96	6.16
Type Pich. Maroc S1	4.97	84.22	5.48
Type Pich. Maroc S2	5.32	85.45	6.03
Dahbia	3.683	82.997	5.276
Picholine du Languedoc	4.85	88.59	8.25
Picual	6.48	87.58	7.26
Ascolana Tenera	8.502	87.02	7.025
Ascolana Dura	5.34	82.97	5.112
Gordal	12.84	86.05	6.501
Manzanille	3.97	81.21	4.40
Cucco	7.98	85.80	6.26

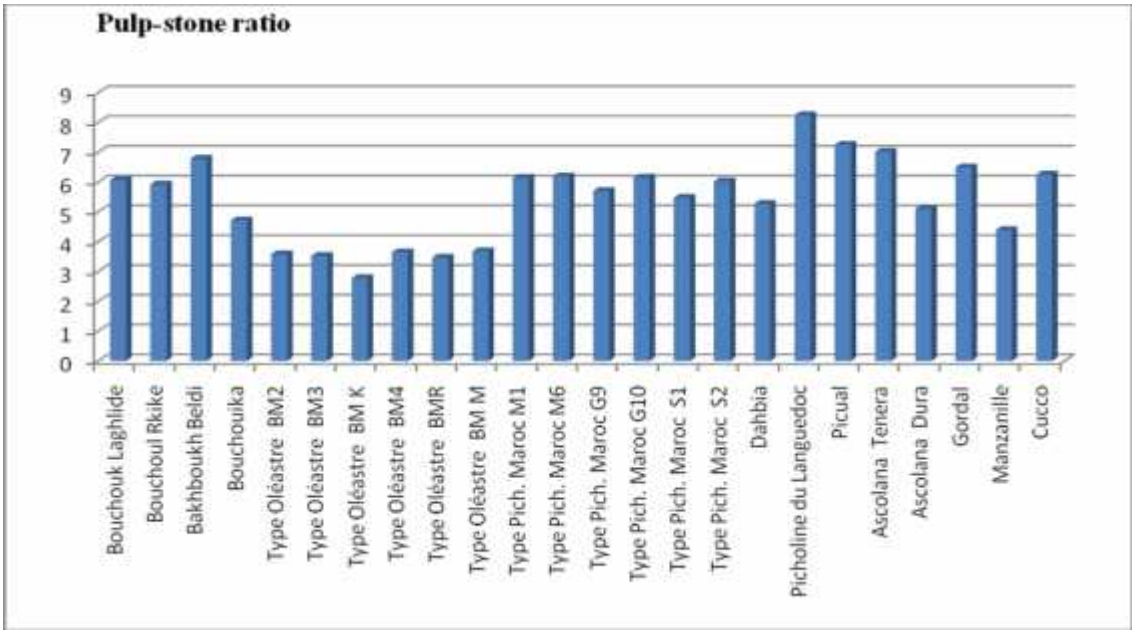

Figure 1
Pulp-stone ratio of studied local and foreign varieties and local types of olive tree.

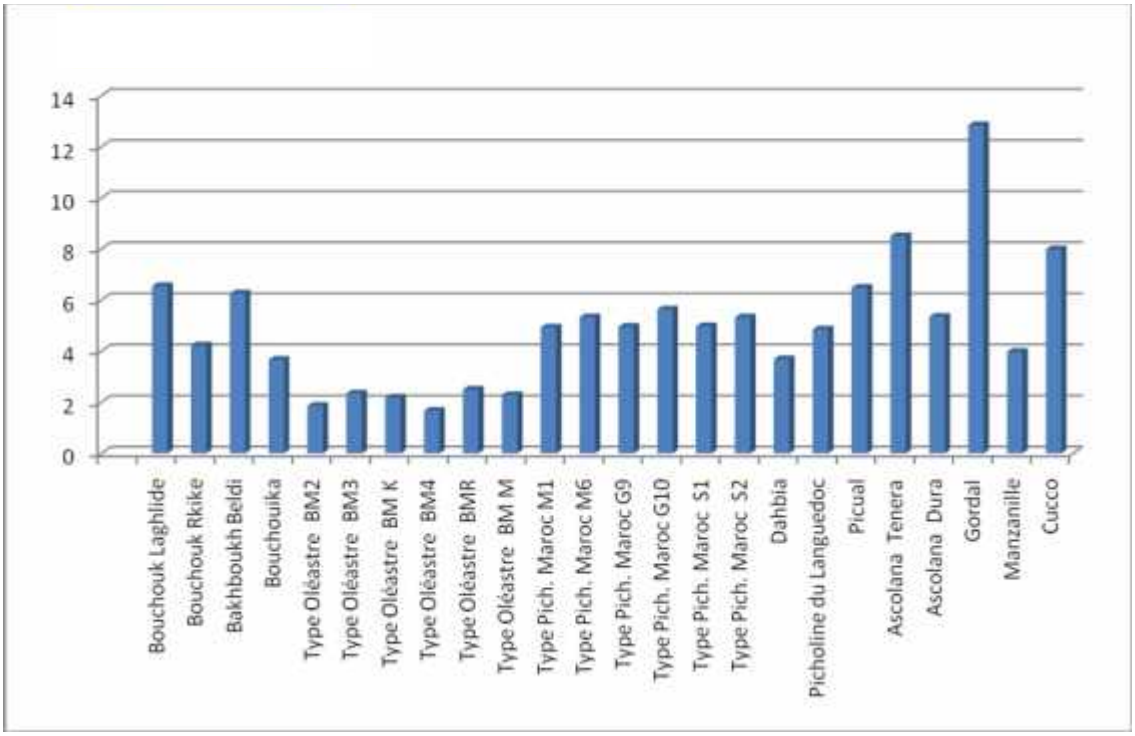

Figure 2
Fruit Fresh weight of studied local and foreign varieties and local types of olive tree.

5. REFERENCES

1. Kartas A, Touati J, Chliyeh M, Ouazzani Touhami A, Gaboun F, Benkirane R, Douira A. Performances and potentialities of introduced varieties and local types of olive trees (*Olea europaea* L.) grown in the Ouazzane areas (North of Morocco). International Journal of Recent Scientific Research, 2015; 6 (2): 2571-2586.
2. Pandolfi S, Tombezi A, Pilli M, Preziosi P. Fruit characteristics of olive cultivars of different origin grown in Umbria. Acta Horticulturae, 1994; 356: 362-366.
3. Esmaeili A, Norie M, Gholam RT. Flower and fruit characteristics of natural olive stands in ilam province. International journal of agriculture and crop sciences, 2012; 4(22): 1637-1640.
4. Ouazzani N, Adil B. AOP Meknes project: a qualitative and historical notoriety for the promotion of regional and national olive oil. 6th Edition of the Mediterranean Days of the olive tree. The 27, 28 and March 1 ENA Meknes (Morocco), 2013.
5. Ouazzani NAOP, olive oil Meknes: A project to promote olive oil quality in Morocco. 7th Edition of the Mediterranean Days of the olive tree. From 21 to 23 October in Meknes (Morocco), 2014.
6. D'Amore R, Iannota N, Perri L**.** Contribution to the study of the main cultivars of the olive tree present in calabia. Annals Ist. Sper, 1978; 1-113.
7. Poli M. Bibliographic study of alternate bearing in olive (*Olea europaea* L). Olivae, Fruits, 2013; 34(11) :687 – 695.
8. Lavée S. Biology and physiology of the olive tree. World Encyclopedia of the olive tree, 1997; 61-110.
9. Cavusoglu A, Oktar A. The effects of agronomic factors and storage conditions prior to milling on the quality of the olive oil, Olivae,1994; 52: 18-24.
10. Cimato A. Agronomic and Technological Factors Affecting Tunisian Olive Oil Quality Olivae, 1990; 31: 20-31.
11. Fourati H, Khlif M, Cossentini M. Comparative study of phonological and physicochemical characteristics of thirty olive cultivars. Olivae, 2003; 96: 35-37.
12. Rallo L, Barranco D. Autochtonous olive cultivars in Andalucia. Acta Horticulturae, 1983; 140: 169-170.
13. Barranco D, Rallo L. The olive varieties grown in Andalucia. Ministerio of Agriculture. Fisheries and Food. Junta de Andalucia, 1984.
14. Msallem M, Mehri H, Radhouane L. Inventory olive collections in Tunisia. Plant Genet.Resour.Newlett, 2000; 122: 36-40.
15. Hannachi H, Msallem M, BenElhaj S, ElGazzah M. Influence of geographical location on the agronomical and technological potentialities of the olive tree *(Olea europaea* L.) in Tunisia. CR Biologies, 2007; 330(2): 135-142.
16. Zarrouk W, Baccouri B, Taamali W, Trigui A, Daoud D, Zarrouk M. Oil fatty acid composition of eighteen Mediterranean olive varieties cultivated under the arid conditions of Boughrara (Southern Tunisia). Grasas y Aceites, 2009; 60(5): 498-506.
17. COI. Methodology for primary characterization of olive varieties. Projet RESGEN-CT (67/97), Union Européenne/COI. 1997.
18. Tous J., Romero A. Cultivar and local effects on olive oil quality in Catalonia, Spain. Acta Horticulturae, 1991; 356: 323-326.
19. Tous J., Romero A. Performance of five olive cultivars in Tarragona. Agricultura, Revista Agropecuria, 1994; 60(117): 909-913.
20. Sweeney S. Plant research Waite, research precinet, rural industries research and development; Hartley grove urbrec 5064, Australie, 2004.
21. Miranovic K. Investigation of quality in some introduced table olive varieties in the basin of lake Skadar. Jugoslovensko vocartsvo, 1986; 20(1/2):701-708.
22. Abaza L, Msallem M, Daoud D, Zarrouk M. Caractérisation des huiles de sept variétés d'olivier tunisiennes.OCL, 2002; 9: 174-179.
23. Boskou D. Characteristics of the olive tree and olive fruit. Aristotle University (Greece). 2006; 13-19.
24. Dabbou S, Rijiba I, Nakbi A, Gazzah N, Issaoui M, Hammami M. Compositionnal quality of virgin olive oil from cultivars introduced in Tunisian arid zones in comparison to chemlali cultivars. Scientia Horticulturae, 2010; 124: 122-127.
25. Tanilgan K, Ozcan M, Unver A. Physical and chemical characteristics of olive (*Olea europaea* L) varieties and their oils. Grasas y Aceites, 2007; 58(2): 142-147.
26. Proietti P, Tombesi A, Boco M. Influence of leaf shading and defoliation on oil synthesis and growth of olive fruits. Acta Horticulturae, 1994; 356: 272-277.
26. Bignami S, Natali C, Menna G, Perruzzi C. Growth and phenology of some olive cultivars in central Italy. Acta Horticulturae, 1994; 356: 106-109.