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Morphological Characterization and Pollen Grain Fertility of Selected Olive Accessions

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THE NATIONAL objectives of the National Gene Bank and Genetic Resources (NGBGR) in Egypt include collection, conservation, characterization, and evaluation of agricultural genetic resources. The objective of the present study was to investigate the morphological characterization and pollen grain fertility of 8 Olive (*Olea europaea* L.) varieties. Olive varieties used in the present work were Coroniki, Coratina, Arbequin, Potelan, Verdal, Sevalano, Khouderi and Sourani.

Twenty-nine morphological characteristics of tree, leaf, inflorescence, fruit, and stone were used to distinguish varieties under the study. The morphological characterization showed wide range of differences among varieties. Characterization of tree vigor resulted in three degrees : weak, medium and strong. The morphological characterization of leaf shape showed seven elliptic-lanceolate varieties and one lanceolate. Fruit shape studies indicated that three varieties were ovoid, four were elongated and one was spherical. Shape of fruit apex (position A and B) demonstrated that five varieties were rounded and three were pointed. Color at full maturity fruit among varieties revealed that six were black and two were other. The stone shape (position A) L/W results indicated that four varieties were elliptic and four were elongated. The stone surface (position B) results indicated that two varieties were smooth and six were rogues. Other morphological studies are investigated and will be presented.

Studies of pollen grain fertility of Sevalano, Verdal and Coratina varieties demonstrated the highest pollen fertility. The rest of the variety showed intermediate values of pollen grain fertility percentage.

Keywords: National Gene Bank and Genetic Resources - Egypt - Olive varieties - Morphological description - Pollen grain fertility and sterility.

The olive is native to the Mediterranean region, tropical and central Asia and various parts of Africa. The olive has a history almost as long as that of Western civilization, its development being one of civilized man's first accomplishments. At a site in Spain, carbon-dating has shown olive seed found there to be eight

thousand years old. *Olea europaea* may have been cultivated independently in two places, Crete and Syria. Archeological evidence suggests that olives were being grown in Crete as long ago as 2,500 B.C. From Crete and Syria olives spread to Greece, Rome and other parts of the Mediterranean area (Wiesman *et al*., 1998).

Olive (*Olea europaea* L.) cultivation traditionally began and developed in the Mediterranean culture many centuries ago. Today 98.7 % of all olive plants are in the Mediterranean basin and in two countries in particular, Spain and Italy, which produce 60% of the world's Olive oil (C. O. I., 2000).

The olive growth habit is an evergreen tree growing to 50 ft. in height with a spread of about 30 ft. The tree can be kept to about 20 ft. with regular pruning. The graceful, billowing appearance of the olive tree can be rather attractive. In an all-green garden its grayish foliage serves as an interesting accent. The attractive, gnarled branching pattern is also quite distinctive. Olives are long-lived with a life expectancy of 500 years. The trees are also tenacious, easily sprouting back even when chopped to the ground (Bartolini *et al*., 1993).

The olive's feather-shaped leaves grow opposite one another. Their skin is rich in tannin, giving the mature leaf its gray-green appearance. The leaves are replaced every two or three years, leaf-fall usually occurring at the same time new growth appears in the spring. Flowers are small, fragrant, cream-colored olive flowers are largely hidden by the evergreen leaves and grow on a long stem arising from the leaf axils. The flowers are largely wind pollinated with most olive varieties being self-pollinating, although fruit set is usually improved by cross pollination with other varieties. There are self-incompatible varieties that do not set fruit without other varieties nearby, and there are varieties that are incompatible with certain others. Incompatibility can also occur for environmental reasons such as high temperatures (Rotondi *et al*., 2003).

The olive fruit is a green drupe, becoming generally blackish-purple when fully ripe. A few varieties are green when ripe and some turn a shade of copper brown. The cultivars vary considerably in size, shape, oil-content and flavor. The shapes range from almost round to oval or elongated with pointed ends (Rotondi *et al*., 2003).

The principal characteristic of the olive fruit is the high oleic acid content, recognized internationally as one of the most healthy fatty acids. To evaluate the pollinating process micro and macro morphological analyses were carried out for 3 years on an experimental olive grave with two cultivars (Ascolana tenera and Giarrffa). The macro-morphological data shown relevant differences (tree crown volume and number of inflorescences) and similarities (the mean number of flowers per inflorescences) between the cultivars. Micro-morphological analyses determined the mean number of pollen grains per anther in Giarrffa used as the polliniser at the same time, for the stigmas this analysis

provided the potential pollen quantity captured by Ascolana tenera used as the pollinated plant (Orlandi *et al.*, 2003). The olive tree *Olea europaea* is one of the most ancient domestic, cultivated plants characteristic of Egypt. The area harvested (ha) in Egypt during 2005 year was 49,000 ha. The average productivity per hectare during the same year 310,000 kg/ ha (FAO, 2007). The genetic resources of olive in Egypt have not been characterized and evaluated systematically.

The objectives of the present investigation were to study the morphological characteristics of some olive varieties found in Egypt as well as their pollen grain viability.

Material and Methods

Morphological characterization

Eight olive varieties grown at the horticulture research institute, Agricultural Research Center (ARC), Ministry of Agricultural at Giza, Egypt, including Coroniki, Coratina, Arbequin, Potelan, Verdal, Sevalano, Khouderi and Sourani were the source of materials used in this study at 3 X 5 m and flood irrigated. The present study was carried out during 2005 to 2006.

Trees were cultivated with intervals of three meters between trees within the rows, and of five meters between rows. The morphological characteristics used to characterize and discriminate the 8 olive varieties were based on those previously prescribed for olive by the International Olive Oil Council (IOOC) and the International Union for Protection of New Varieties of Plant (UPOV) taking into consideration all the precautions reported. In this respect, 29 morphological characteristics were selected for the present investigation.

The study was performed using three trees for each variety; each tree was considered one replicate. Table 1 presents traits used for morphological characterization as well as their code. In this respect, tree vigor, growth habit and fruiting shoot (color) were characterized in the natural state and immediately after harvest.

Thirty mature and fully developed leaves per tree from one year brunch were collected and characterized for size, leaf shape, ratio of leaf length/width, color of upper side and color of lower side. Data were recorded for inflorescence number of flowers number per inflorescence and structure.

All observations on the fruit and its related parts were made at the optimum ripening stage. Fruit characteristics were observed on 10 variety typical fruits per each tree of the three replication trees. Data were documented for fruit size and weight, shape (position A) ratio between (L/W), color, shape of apex (position A and B), fruit mucro, shape of base (position A and B), nipple,

location of start of color change (at the start of the ripening period). Records also included color at full maturity (this is observed at the end of the ripening).

Fully developed stone were extracted from 10 fully ripped fruits taken from each tree of the three replications. In this respect, weight, size, shape (position A) L/W, and position of maximum transverse diameter (position B) were determined. The study comprised also stone surface (position B), and grooving. Records also included shape of cross-section.

TABLE 1. Code of morphological traits of tree, leaf, inflorescence, fruit and stone of 8 olive varieties.

Trait	Code	Trait	Code
Tree		Color	FrC
Vigor	V	Shape of apex (position A)	ShAp(A)
Growth habit	Gh	Shape of apex (position B)	ShAp(B)
Fruiting shoot (color)	FrC	Fruit mucro	FrMu
Leaf		Shape of base (position A)	ShB(A)
Size	LSi	Shape of base (position B)	ShB(B)
Shape	LSh	Nipple	Ni
Ratio length/width	RL/W	Location of start of color change (at the start of the ripening period)	LoCCh
Color of upper side	CUpS	Color at full maturity (this is observed at the end of the ripening	CFuM
Color of lower side	CLoS	Stone	
Inflorescence		Weight	StWt
Number of flowers/inflorescence	F/Inf	Size	StSi
Structure	St	Shape (position A) L/W	StSh(A)
Fruit		Position of maximum transverse diameter (position B)	StMxTD (B)
Size	FrSi	Surface (position B)	StSu(B)
Weight	FrWt	Grooving	StGv
shape (position A) Ratio between (L/W)	FrSh (A)	Shape of cross-section	StShC-S

Pollen grain viability

Ten randomly selected whole flowers per each of the three trees of the studied varieties were collected at an appropriate stage. Flowers were immediately fixed in a 3 alcohol: 1 acetic acid solution for 24 hr. Then flowers were washed several times with distilled water followed by storage in 70 % ethanol. Squash preparations of pollen mother cells (PMC's) were made in aceto-carmen as described by Fayed *et al.* (1984). Twenty slides were prepared using the previously randomly selected 10 flowers for each variety.

The percentage of viable and aborted pollen grains was estimated by testing their satiability in the aceto-carmen staining. Round and dark stained pollen grains were considered viable and functional, while non-viable ones were the shriveled or the light stained pollen grains as described by Fayed (1990).

All data were arranged in a randomized complete block design and were statistically analyzed according to Snedecor and Cochran (1982). The Fishers protected least significant difference (LSD) at $P \leq 0.05$ was employed to separate the treatment means.

Results and Discussion

Morphological characterization

Table 2 presents the morphological traits of tree, leaf, inflorescence, fruit and stone of the 8 olive varieties under this study. The varieties Coratina, Arbequin, and Sourani demonstrated medium tree vigor (V), whereas the Coroniki, the Verdal and the Khouderi varieties had strong one. The rest of the varieties showed weak tree vigor. The degrees of tree growth habit (Gh) included drooping, spreading or erect growth habit. The tree growth habit of the varieties Coroniki, Coratina, Potelan, and Sourani was erect while Verdal and Khouderi varieties were spreading. The rest of the varieties showed drooping growth habit. The fruiting shoot (color) (FrC) was recorded in the natural state and immediately after harvest. All varieties showed grayish green color of fruiting shoot except for the Coratina and the Potelan varieties that showed light grey color (Table 2).

The characterization degrees of leaf size included very small, small, medium, large and very large. In this regard, all the varieties showed small leaf size (LSi) except for the variety Coroniki that demonstrated very small leaf size and variety Coratina demonstrated medium leaf size. The study of leaf shape (LSh) included elliptic, elliptic-lanceolate and lanceolate. None of the investigated varieties under the present study indicated elliptic leaf shape. All varieties exhibited elliptic-lanceolate LSh except for the Coratina variety that showed lanceolate leaf shapes. The ratio of leaf length/width (RL/W) included short & narrow, short & broad, long & narrow and long &broad. The varieties Coratina, Sevalano and Khouderi showed long & broad ratio of leaf length/width, whereas Potelan and Sourani demonstrated long & narrow. The Arbequin variety demonstrated short & broad RL/W, whereas Coroniki and Verdal varieties were short & narrows (Table 2). The categories under which leaf color of upper side (CUpS) of the different varieties was evaluated were green and dark green. The varieties Coroniki, Potelan, Verdal, Sevalano and Khouderi proved dark green CUpS, whereas Coratina, Arbequin and Sourani varieties confirmed green leaf color of upper side. The leaf color of lower side (CLoS) was evaluated for the different varieties (Table 2). The Coroniki, Coratina, Potelan, Verdal and Sevalano varieties demonstrated grey-green color of lower side, whereas those of the rest of the varieties were green-grey.

The Coratina, Potelan, Sevalano, Khouderi and Sourani varieties showed 18-25 (medium) flowers per inflorescence (F/Inf), whereas Arbequin and Verdal varieties exhibited low (<18 F/Inf). Coroniki variety demonstrated high (>25 F/Inf) (Table 2). The structure of inflorescence included short & compact, short & sparse, long & compact and long & sparse. The varieties Coratina, Potelan and Sevalano had long & compact structure of inflorescence while that of the Coroniki, Arbequin and Sourani varieties was long & sparse (Table 2). The structure of inflorescence of Verdal and Khouderi varieties was short & compact.

TABLE 2. Morphological traits of tree, leaf and inflorescence of 8 olive varieties.

Variety / Trait	Coroniki	Coratina	Arbequin	Potelan	Verdal	Sevalano	Khouderi	Sourani
Tree								
V	Strong	Medium	Medium	Medium	Strong	Weak	Strong	Medium
Gh	Erect	Erect	Drooping	Erect	Spreading	Drooping	Spreading	Erect
FrC	Grayish green	Light grey	Grayish green	Light grey	Grayish green	Grayish green	Grayish green	Grayish green
Leaf								
LSi	Very small	Medium	Small	Small	Small	Small	Small	Small
LSh	Elliptic-lanceolate	Lanceolate	Elliptic-lanceolate	Elliptic-lanceolate	Elliptic-lanceolate	Elliptic-lanceolate	Elliptic-lanceolate	Elliptic-lanceolate
RL/W	Short & Narrow	Long & Broad	Short & Broad	Long & Narrow	Short & Narrow	Long & Broad	Long & Broad	Long & Narrow
CUpS	Dark green	Green	Green	Dark green	Dark green	Dark green	Dark green	Green
CLoS	Grey-green	Grey-green	Green-grey	Grey-green	Grey-green	Grey-green	Green-grey	Green-grey
Inflorescence								
F/Inf	High (>25)	Medium (18-25)	Low (<18)	Medium (18-25)	Low (<18)	Medium (18-25)	Medium (18-25)	Medium (18-25)
St	Long & sparse	Long & compact	Long & sparse	Long & compact	Short & compact	Long & compact	Short & compact	Long & sparse

Characteristics were described for olive by the International Olive Oil Council (IOOC) and the International Union for Protection of New Varieties of Plant (UPOV) (1985)

V: Vigor, Gh: Growth habit, FrC: Fruiting shoot (color), LSi: Leaf Size, LSh: Leaf shape, RL/W: Ratio length/width, CUpS: Color of upper side, CLoS: Color of lower side, F/Inf: Number of flowers/inflorescence, St: Structure.

The fruit size (FrSi) included very small, small, medium, large or very large fruit size. None of the varieties under the study demonstrated very large fruit size. The fruit size of the varieties Coratina, Verdal, Khouderi and Sourani was medium while the Coroniki and Arbequin varieties were very small. The fruit size of Khouderi variety was small while Potelan variety was large. The fruit weight (FrWt) included low (<2g), medium (2-4g), high (4-6g) or very high (>6g) fruit weight. The fruit weight of the varieties Arbequin, Verdal and Khouderi was medium while the Coroniki and Sevalano varieties were low. The fruit weight of Coratina and Sourani varieties were high while Potelan variety was very high (Table 3). Table (3) illustrates the morphological traits of fruit and stone of 8 olive varieties under the study. The varieties Coroniki, Coratina, Potelan and Sevalano revealed elongated (>1.45 cm) fruit shape (position A) ratio between (L/W), whilst the rest of the varieties exhibited ovoid (1.25-1.45 cm) except Arbequin exhibited spherical (<1.25 cm). The fruit color (FrC) included 2 colors dark vilot or black. In this regard, all the varieties under the study showed black fruit color (FrC) except Coroniki showed dark violet. Regarding shape of fruit apex (position A) (ShApA), the varieties Arbequin, Potelan, Verdal, Khouderi and Sourani showed rounded shape of fruit apex (position A), whereas Coroniki, Coratina and Sevalano demonstrated pointed ShApA (Table 3). The shape of fruit apex (position B) (ShApB) of the varieties Arbequin, Potelan, Verdal, Khouderi and Sourani was rounded while the rest of the varieties exhibited pointed ShApB. Regarding fruit mucro (FrMu), the varieties Coratina, Arbequin, Potelan, Verdal, and Khouderi showed absent fruit mucro (Table 3). The remaining of the varieties displayed present fruit mucro. The varieties Coroniki, Coratina, Verdal, Sevalano and Khouderi proved rounded fruit shape of base (position A) (ShBA). The rest of the varieties had truncate ShBA.

All the varieties under the study showed either rounded or truncate fruit shape of base (position B) (ShBB). None of the varieties proved depressed ShBB. While the varieties Coratina, Arbequin, Potelan, Verdal, Sevalano and Sourani showed truncate fruit shape of base (position B), the rest of the varieties exhibited rounded fruit shape of base (position B). The characterization degrees of fruit nipple (Ni) included absent, tenuous and obvious. In this regard, the varieties Coratina, Arbequin, Potelan and Verdal showed absent fruit nipple. The varieties Sevalano and Khouderi demonstrated tenuous fruit nipple. The rest of the varieties had obvios Ni (Table 3). The varieties Coratina, Arbequin, Potelan, Khouderi and Sourani showed the location of start of color change (at the start of the ripening period) (LoSCCh) from the apex. Only the Sevalano variety showed LoSCCh from the base. The rest of the varieties showed uniformly across the whole epidermis (Table 3). The studied olive varieties had black or other color at full maturity (at the end of the ripening) (CFuM). The varieties Coratina, Arbequin, Verdal, Sevalano, Khouderi and Sourani revealed black color at full maturity, whilst the rest of the varieties exhibited other.

TABLE 3. Morphological traits of fruit and stone of 8 olive varieties.

Variety / Trait	Coroniki	Coratina	Arbequin	Potelan	Verdal	Sevalano	Khouderi	Sourani
fruit								
FrSi	Very small	Medium	Very small	Large	Medium	Small	Medium	Medium
FrWt	Low (<2g)	High (4-6g)	Medium (2-4g)	Very high (>6g)	Medium (2-4g)	Low (<2g)	Medium (2-4g)	High (4-6g)
FrSh(A)	Elongated (>1.45cm)	Elongated (>1.45cm)	Spherical (<1.25 cm)	Elongated (>1.45cm)	Ovoid (1.25-1.45cm)	Elongated (>1.45cm)	Ovoid (1.25-1.45cm)	Ovoid (1.25-1.45cm)
FrC	Dark violet	Black	Black	Black	Black	Black	Black	Black
ShAp(A)	Pointed	Pointed	Rounded	Rounded	Rounded	Pointed	Rounded	Rounded
ShAp(B)	Pointed	Pointed	Rounded	Rounded	Rounded	Pointed	Rounded	Rounded
FrMu	Present	Absent	Absent	Absent	Absent	Present	Absent	Present
ShB(A)	Rounded	Rounded	Truncate	Truncate	Rounded	Rounded	Rounded	Truncate
ShB(B)	Rounded	Truncate	Truncate	Truncate	Truncate	Truncate	Rounded	Truncate
Ni	Obvious	Absent	Absent	Absent	Absent	Tenuous	Tenuous	Obvious
LoCCh	Uniformly across the whole epidermis	From the apex	From the apex	From the apex	Uniformly across the whole epidermis	From the base	From the apex	From the apex
CFuM	Other	Black	Black	Other	Black	Black	Black	Black
Stone								
StWt	Low (<0.3g)	Very high (>0.7g)	Medium (0.3-0.45g)	Very high (>0.7g)	High (0.45-0.7g)	High (0.45-0.7g)	High (0.45-0.7g)	Very high (>0.7g)
StSi	Small	Large	Small	Medium	Medium	Medium	Medium	Medium
StSh(A)	Elongated (>2.2)	Elongated (>2.2)	Elliptic (1.8-2.2)	Elongated (>2.2)	Elliptic (1.8-2.2)	Elongated (>2.2)	Elliptic (1.8-2.2)	Elliptic (1.8-2.2)
StMxTD(B)	Central	Central	Central	Towards apex	Towards apex	Central	Towards apex	Towards apex
StSu(B)	Smooth	Rogues	Rogues	Rogues	Rogues	Rogues	Smooth	Rogues
StGv	Absent	Medium	Weak	Medium	Weak	Weak	Absent	Medium
StShC-S	Elliptic	Elliptic	Circular	Circular	Circular	Circular	Circular	Elliptic

Characteristics were described for olive by the International Olive Oil Council (IOOC) and the International Union for Protection of New Varieties of Plant (UPOV) (1985)

FrSi: Fruit size, **FrWt**: Fruit weight, **FrSh(A)**: Fruit shape (position A) Ratio between (L/W), **FrC**: Fruit Color, **ShAp(A)**: Shape of apex (position A), **ShAp(B)**: Shape of apex (position B), **FrMu**: Fruit mucro, **ShB(A)**: Shape of base (position A), **ShB(B)**: Shape of base (position B), Ni: Nipple, **LoCCh**: Location of start of color change (at the start of the ripening period), **CFuM**: Color at full maturity (this is observed at the end of the ripening, **StWt**: Stone weight, **StSi**: Stone size, **StSh(A)**: stone shape (position A) L/W, **StMxTD(B)**: Position of maximum transverse diameter (position B), **StSu(B)**: Surface (position B), **StGv**: Grooving, **StShC-S**: Shape of cross-section

Table 3 illustrates the morphological traits of stone of 8 olive varieties under the study. The stone weight (StWt) included low (<0.3g), medium (0.3-0.45g), high (0.45-0.7g) or very high (>0.7g) stone weight. The stone weight of the varieties Verdal, Sevalano and Khouderi was high while the Coratina, Potelan and Sourani varieties were very high. The stone weight of Coroniki variety was low while Arbequin variety was medium. The characterization degrees of stone size included small, medium and large. In this regard, the varieties Potelan, Verdal, Sevalano, Khouderi and Sourani showed medium stone size (StSi). The stone size of Coratina variety was large while the rest of the varieties exhibited small. All the varieties under the study showed either elliptic (1.8-2.2) or elongated (>2.2) stone shape (position A) L/W (StShA). None of the varieties proved spherical (<1.4) or ovoid (1.4-1.8) stone shape (position A) L/W. While the varieties Coroniki, Coratina, Potelan and Sevalano showed elongated stone shape (position A) L/W, the rest of the varieties exhibited elliptic stone shape.

The Coroniki, Coratina, Arbequin and Sevalano varieties showed central of stone position of maximum transverse diameter (position B) (StMxTDB), whereas the Potelan, Verdal, Khouderi and Sourani had towards apex. No variety showed towards base of stone position of maximum transverse diameter (position B). Among the studied varieties, Coratina, Arbequin, Potelan, Verdal, Sevalano and Sourani demonstrated rogues stone surface (position B) (StSB). The residues of the varieties had smooth stone surface (position B). No variety showed scabrous stone surface (position B).

The stone grooving (StGv) included absent or very weak, weak, medium, strong and very strong. The varieties Arbequin, Verdal, Sevalano had weak stone grooving while that of the Coratina, Verdal and Sourani varieties was medium (Table 3). The rest of the varieties exhibited absent or very weak stone grooving. No variety showed strong or very strong StGv.

Regarding stone shape of cross-section (StShC-S), the varieties Arbequin, Potelan, Verdal, Sevalano and Khouderi showed circular stone shape of cross-section, whereas the remaining of the varieties displayed elliptic StShC-S (Table 3).

Pollen grain viability

The percentage of pollen grain fertility and sterility of the 8 olive varieties are presented in Table 4. Figure 1 demonstrates the external appearance of olive fertile and sterile pollen grains. Number of pollen grains examined ranged from 1248-1579 for all the studied varieties.

As Table 4 showed, the varieties exhibited varied frequencies of pollen sterility. The highest pollen abortion was found in the variety Coronaiki (5.13), followed by Khouderi (4.11), and Arbequin (3.93), respectively. The variety Sevalano, Verdal and Coratina displayed the highest pollen fertility. Moreover, the data showed that mean percentage of pollen grain fertility was higher than 94%.

TABLE 4. Frequencies of pollen sterility and fertility in olive varieties.

Variety	No. of pollen grains examined	No. of viable pollen grains	Mean % of pollen sterility	Mean % of pollen fertility
Coroniki	1326	1258	5.13 A	94.87 E
Coratina	1391	1368	1.65 G	98.35 AB
Arbequin	1248	1199	3.93 C	96.07 D
Potelan	1579	1548	1.90 E	98.10 BC
Verdal	1202	1184	1.50 F	98.50 AB
Sevalano	1259	1251	0.63 H	99.36 A
Khouderi	1264	1212	4.11 B	95.89 DE
Sourani	1422	1382	2.81 D	97.19 C

Means fallowed by the same letter within the same column are not significantly different ($P<0.05$: LSD test).

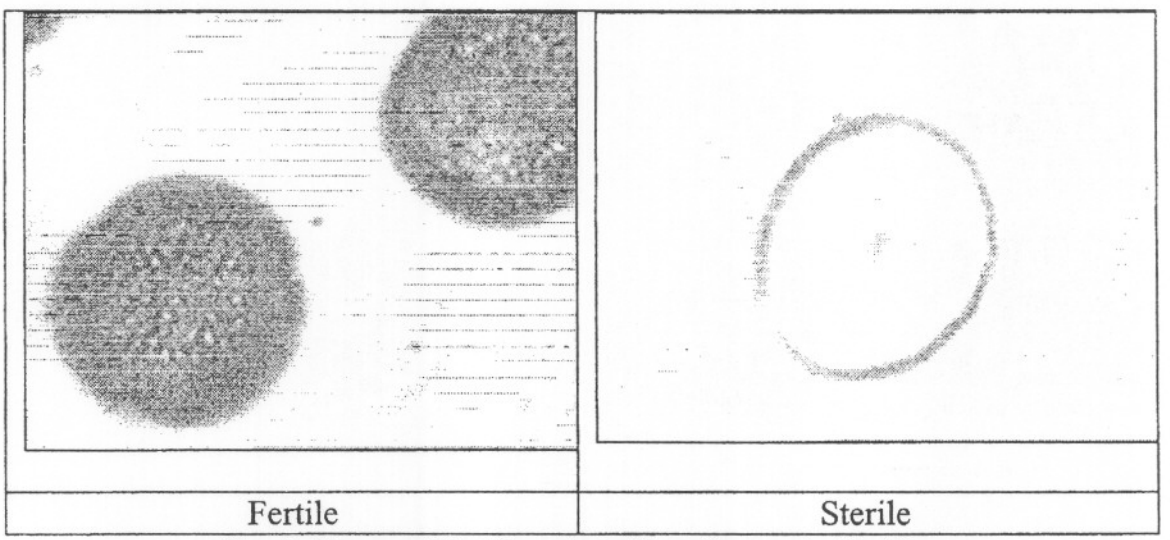

Fig. 1. Shape of fertile and sterile pollen grain in olive.

References

Bartolini G., Messeri, C. and Prevost, G. (1993). Olive tree germplasm: descriptor list of cultivated varieties in the world, *Acta Hort.* **356**, 116.

C. O. I. (2000) World Olive encycolopaedia. Madrid, Olive. Oil Council. Available at: http://www.international oliveoil.org

FAO (Rome, Italy). FAOSTAT. (2007) Available at: <http://faostat.fao.org/site/336/Desktop Default.aspx?PageID=336>

Fayed, A. H. (1990) Extended cytological damage in field beans (*Vicia faba* L.) caused by extracts of malformed mango organs. *Egypt. J. Appl. Sc.* **6**, 236.

Fayed, A. H., Mandour, A. S. and Ismaile, M. A. (1984) Variation in chiasma frequency in various types of *Vici faba* L. *Indian. J. Genet.* **44**, 460.

Orlandi, F., Ferranti, F. Romano, B. and Fornaciari, M. (2003) Olive pollination flowers and pollen of two cultivars of *Olea europaea*. *New Zealand Journal of Crop and Horticultural Science*. **31**,159.

Rotondi A., Magli, M., Ricciolini, C. and Baldolini, L. (2003). Morphological and molecular analysis for the characterization of a group of Italian olive cultivars, *Euphytica* **132** (2), 129.

Snedecor, G.W. and Cochran, W. G. (1982) *"Statistical Methods"*, 6th ed. the Iowa State Univ. Press, Ames, Iowa, USA. pp. 325- 330.

Wiesman, Z., Avidan, L., Lavee, S. and Quebedeaux, B. (1998) Molecular characterization of common olive varieties in Israel and the West Bank using randomly amplified polymorphic DNA (RAPD) markers, *J. Am. Soc. Hort. Sci.* **5**, 837.

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التوصيف الظاهرى وخصوبة حبوب اللقاح لبعض أصناف الزيتون

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البنك القومى للجينات والموارد الوراثية، وزارة الزراعة وإستصلاح الأراضى- القاهرة - مصر .

تتضمن المهام القومية للبنك القومى للجينات والموارد الوراثية بجمهورية مصر العربية عمليات جمع وحفظ وتوصيف وتقييم الموارد الوراثية الزراعية. وتهدف الدراسة الحالية إلى التوصيف الظاهرى وإختبار حيوية حبوب اللقاح لعدد ٨ أصناف من الزيتون (*Olea europaea* L).

وكانت الأصناف تحت الدراسة هى كوروناكى، كوراتينا، اربكوين، بوتيلان، فيردال، سيفلانو، خضيرى، سورانى. وقد تم دراسة عدد ٢٩ صفة مورفولوجية على الشجرة، الورقة، النورة، الثمرة، النواة. وقد أظهرت دراسة الصفات الظاهرية تباين واضح بين الأصناف تحت الدراسة. وقد أوضحت دراسة قوة نمو الشجرة على وجود ٣ درجات لقوة نمو الشجرة وهى ضعيف، متوسط، قوى. وقد أوضحت نتائج دراسة شكل الورقة (Leaf shape) وجود صنف واحد يتميز بالشكل lanceolate ، وجود سبعة أصناف تتميز بالشكل elliptic-lanceolate. أظهرت دراسة شكل الثمرة وجود ٣ أصناف تتميز ثمارها بالشكل ovoid، أربعة أصناف تتميز بالشكل elongated وصنف واحد يتميز بالشكل spherical. وقد إختلفت الأصناف أيضاً فى شكل قمة الثمرة حيث تميزت خمسة أصناف بصفة القمة المستديرة rounded، وثلاثة بالصفة pointed . أوضحت دراسة شكل نواة الثمرة وجود ٤ أصناف تتميز بالشكل elliptic ، أربعة أصناف تتميز بالشكل elongated . أوضحت دراسة سطح نواة الثمرة وجود صنفين يتميزا بسطح smooth، وستة أصناف ذات سطح rougues.

كما أوضحت دراسة خصوبة حبوب اللقاح تميز الأصناف سيفلانو، فيردال، كوراتينا بدرجة خصوبة عالية. بينما أظهرت بقية الأصناف تحت الدراسة درجات متوسطة فى خصوبة حبوب اللقاح.