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## Assessment of Some Mango Species by Fruit Characters and Fingerprint

Malaka. A.Saleh, Nagwa.S. Zaied, Amira. A.Fouad, Mamdouh. M.Nagiub, Fekria, H.Khalil.

Pomology Dept., National Research Center, Dokki, Giza, Egypt.

**Abstract:** Six local mango accessions; Zebda, Zaghloul, Gemela, Ganofia, El-Madam and El-Kobbaneia were collected from private farm in Sharkia Governorate. Physical and chemical characteristics of fruits study besides of molecular characterization (as total proteins). The data showed that El-Kobbaneia fruit had the biggest fruit also El-Madam produced the smallest one. The lowest fiber percentage was clear in Ganofia fruit followed by Zebda fruit as compared with all mango fruits under study. The highest fruit Juice percentage was shown in El-Kobbaneia fruit, while Ganofia fruit had the lowest one. Also, the lowest titrable acidity was clear in Ganofia fruit, but the highest one was detected in Zebda fruit. Meanwhile, the highest total sugar was clear in Gemela fruit. However, El-Madam fruit had the lowest VC. The highest total number of variable bands (seven) was existed in Zebda species while the lowest number was presented in Ganofia species (2 bands). The percentage of polymorphism in all mango species ranged between 16.7% in both EL-Kobbaneia and Gemela species to 29.2 % in Zebda species.

**Key words:** Mango species, fruit characters, fingerprint

### INTRODUCTION

Many factors, especially environmental conditions influence the development of mango and therefore influence its quality. The same cultivation can attain different characteristics in different growing conditions. Even in the same region, the different environmental conditions at different years can affect maturity and quality of the fruit. Mango breeding has not a high priority, because it has been very difficult to achieve breeding objective in an expedition manner. The mango has a 7 years Juvenile period and time required to evaluate seedling trees can be up to 12 years (Arumuganathan and Earle, 1991). Mango hybrids have been obtained by controlled or open crosses. In the last one, it is important to identify the male parent because it is useful for the genetic cultivar history, thus it is important for planning further improvements. This work presents a parentage test used a mango other parameters (RAPD) (Random Amplified polymorphic DNA) markers to estimate the male parent to selected hybrids in an open cross plot by using five mango cultivars densely planted in a latin square design (Maria *et al.* 2006). The RAPD markers can be used as a diagnostic tool to identify plantlets in polyembry. Onic seeds but, at least duplicates and reproducible primers should be utilized to enhance the working efficiency (cordeiro *et al.* 2006). The present study aimed mainly to evaluate of some mango species and their fruits characters and fingerprint.

### MATERIALS AND METHODS

This study was carried out during 2005 to 2007 in an experimental orchard at Sharkia governorate. The trees were budded on seedling rootstock and were grown in a loamy clay soil. The trees were planted at five meters apart and were irrigated with Nile water using the traditional basin system and uniformly received other horticultural practices.

#### **Plant Material:**

Six local mango evaluations: Zebda, Zaghloul, Gemela, Ganofia, El-Madam and El-Kobbaneia trees were used in this work, at maturity stage according to El-Sheikh (2002).

A representative sample of 10 fruits was taken from each tree (replicate) during the (On) year trees and the following characters were determined

1. physical characteristics

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**Corresponding Author:** Malaka. A.Saleh, Pomology Dept., National Research Center, Dokki, Giza, Egypt.

Average fruit weight (g), fruit length (cm), fruit diameter (cm), fruit volume (cm), juice weight (g) and fiber percentage (%) were calculated

2. Chemical characteristics

- a Total soluble solids (TSS %) of fruit juice by using a hand refractometer (A.O.A.C 1990).
- b Titrable acidity of fruit juice was determined according to the (A.O.A.C 1990).
- c Total sugar of fruit juice was determined according to the (A.O.A.C 1990).
- d TSS/ acid ratio calculated by divided TSS by juice titrable acidity

2- Vitamin (was determined according to A .O. A .C 1990)

**Total proteins Electrophoretic analyses:**

SDS – polyacrylamide gel electrophoresis was performed according to laemmli (1990). Electrophoresis was carried out at 4°C until the bromophenol blue front passed completely through the gel. The gel was stained for 12 hr in 0.1 % coomassie brilliant blue and destained until the bands were clearly observed. Gel bands were scanned and analyzed using GEL Doc Bio–Rad system. Adendrogram was constructed on the basis of the similarity matrix data by unweighted pair group method with arithmetic average (VPGMA) cluster analysis using the software MEGA software.

**Statistical Data Analysis:**

The data obtained from the fruit characteristic experimental groups was arranged in a complete randomized block design and was analyzed according to Snedecor and Cochrun (1989). The means were differentiated using Duncan (1955) multiple rang test at 5% level.

**RESULT AND DISCUSSIONS**

**Fruit Characteristics:**

**a. Physical Characteristics:**

It is clear from tables (1 and 2) that the fruit weight character values of EL– Kobbaneia fruits was significantly higher values followed by Zaghoul fruits then Gemela fruits as compared with all others in both seasons; 424.33 g & 432.33 g of El-Kobbaneia, 400.33 g& 411.33 g of Zaghoul and 290.33 g & 297.67 g of Gemela. Meanwhile, the highest fruit length (12.83 and 13.03 Cm) was produced by Gemela fruits followed by Zaghoul fruits (11.90 and 14.45 Cm) as compared with all other accessions in both seasons. However, the highest fruit volume was shown by El-Kobbaneia followed by Zaghoul as compared with all other fruits in both seasons. Meanwhile, the lowest fruit volume was produced by Ganofia fruits in both seasons. In addition, the value of fruit diameter character of El-Kobbaneia fruit was significantly higher in both seasons. While, the fruit of Ganofia in both seasons had the lowest fruit diameter. Both Gemela and El-Madam fruits came in between in this respect. Furthermore, the lowest fiber percentage was produced by Ganofia fruit followed by Zebda and El-Kobbaneia then Zaghoul fruits as compared with all other accessions in both seasons. Also, the El-Kobbaneia fruit contained the highest percentage of juice and Ganofia fruit contained the lowest one on both seasons. These results are in agreement with those reported by Arnaud et al. (2003) conclusion that better control of the development of the mango fruit after harvest would make it possible to solve the most serious problems of quality. In addition, Zaied et al. (2007) found that Langra fruit had the biggest fruit followed by Dabsha and El-Kobbaneia, but El-Madam and Khade El-Gamel produced the smallest one. The lowest fiber percentage was clear in Alphonso fruit and the highest one was in Langra fruit. The highest fruit juice percentage was shown in Langra fruit, while the Hendi Meloky fruit had the lowest one.

**Table 1:** Fruit characteristics of some Mango fruits during 2005 season1

Characteristic -----	Fruit weight (g)	Fruit length (cm)	Fruit volume (cm)	Fruit diameter (cm)	Fiber	Juice weight % in weight
<b>Fruit</b>						
Zebda	271.67e	11.50c	296.33c	8.20b	2.20d	154.33e
Zaghoul	400.33b	11.90b	398.67b	8.27b	2.44c	265.00b
Gemela	290.33c	12.83a	298.00c	6.80c	4.78a	194.00c
Ganofia	96.77f	8.80d	85.33e	4.73d	2.01e	55.33f
El-Madam	284.67d	11.70ab	284.00d	6.87c	3.58b	185.33d
El-Kobbaneia	424.33	11.77bc	452.67a	8.73a	2.28d	295.00a

Means having the same letter (s) in each row are in significantly different at 5% level.

**Table 2:** Fruit characteristics of some Mango fruits during 2007 season2

Characteristic	Fruit weight (g)	Fruit length (cm)	Fruit volume (cm)	Fruit diameter (cm)	Fiber	Juice weight % in weight
Zebda	276.67d	12.00cd	306.33c	8.50b	2.20ed	155.67e
Zaghloul	411.33b	14.45b	403.00b	8.63b	2.59c	269.00b
Gemela	297.67c	13.03a	300.33d	7.00c	4.62a	198.33c
Ganofia	101.00f	9.07e	70.33f	4.93d	2.03e	61.33f
El-Madam	259.67e	11.77d	259.00e	7.17c	3.56b	179.00d
El-Kobbaneia	432.33a	12.27cb	453.33a	8.93a	2.34d	300.00a

Means having the same letter (s) in each row are insignificantly different at 5% level.

### b. Chemical Characteristics:

It is clear from table (3) that the juice acidity percentage of Ganofia fruit (1.89 and 1.91) was the highest in comparing with other mango accessions and El-Madam (1.90) in the first season. While, the lowest juice acidity percentage was detected in Zebda fruit (1.73 and 1.71) in both seasons. However, all mango accessions were significantly different in the juice TSS percentage and this was clear in the two seasons of this study except in Zebda and Zaghloul in the second season as well as El-Madam and El-Kobbaneia which showed no significant difference between them. Meanwhile, no significant differences were found in TSS/acid ratio of Zebda and El-Kobbaneia in both seasons and Zaghloul and Ganofia in the second season. Furthermore, the highest total sugar content was showed by Gemela in both seasons as well as Zaghloul, Ganofia and El-Kobbaneia in the second season. While, the lowest total sugar content was shown by El-Madam fruits in both seasons. Also, the highest citric acid content was shown by El-Madam fruit in both seasons. The fruit of gamela contained the lowest citric acid .whil, the zebda and Ganofia fruits came in between in this respect in both seasons. These results are in agreement with those reported by Yahia (1998) recommending that harvest maturity in mango is reached in about 12 to 16 weeks after fruit set. For "Carabao" in the Philippines it is recommended that the soluble solid content should be 66.25 (Brix) and titratable acidity 2.64 % (expressed as anhydrous citric acid). Also, zaid et al (2007) found that the highest TSS% was shown in Langra fruit. The highest titratable acidity and the lowest V .C were clear in Dabsha fruit.

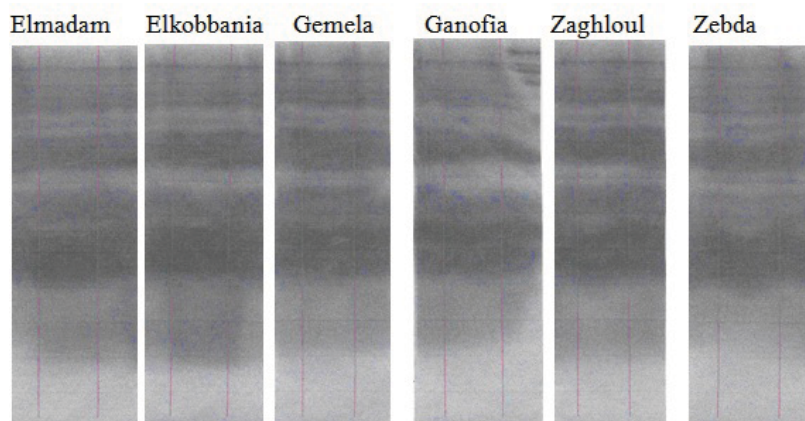
**Table 3:** Chemical constituents of some mango fruits during 2005 and 2007 seasons.

Characteristic accessions	Titratable acidity		TSS %		TSS/acid ratio		Total sugar %		V.C> mg/ 100 ml juice	
	2005	2007	2005	2007	2005	2007	2005	2007	2005	2007
Zebda	1.73c	1.71e	8.77f	8.83c	5.07d	5.16c	17.50c	16.69ab	22.20c	22.54c
Zaghloul	1.80b	1.82c	9.47c	9.70c	5.26c	5.33b	19.50b	19.54a	16.67e	16.78e
Gemela	1.81b	1.82c	10.30a	10.47a	5.69a	5.75a	25.67a	18.95a	14.60f	14.50f
Ganofia	1.89a	1.91a	10.00b	10.13b	5.29b	5.30b	18.60bc	18.66a	26.30b	26.34b
El-Madam	1.89a	1.87b	9.00 <sup>a</sup>	9.20d	4.76f	4.91d	13.65d	13.71b	27.25a	27.20a
El-Kobbaneia	1.80b	1.79d	9.17d	9.20d	5.09d	5.14c	19.60b	19.66a	16.81d	16.60e

Means having the same letter(s) in each row are insignificantly different at 5% level.

### c- Sds-page Analysis of Total Proteins:

SDS-PAGE profile patterns of total proteins extracted from six mango species were presented in Fig (1). SDS-PAGE analysis species revealed 24 bands with different RE. The six mango species were ordered in ascending range from 16 bands in ganofia species to 21 bands in Zebda species. EL-Madam species characterized by 20 bands ; EL-Kobbaneia and gemela species were characterized by 18 bands and Zaghloul species characterized by 19 bands. Also, SDS-PAGE analysis of total proteins were presented in table (4) and revealed a total of nubands with different RF 14 out of them were commonly detected in all mango species. Table (4) revealed the variable bands and the total variable bands are 10, the highest total number of the variable bands (seven) was existed in Zebda species , while the lowest number was presented in Ganofia species (2 bands ) . the residwal species were intermediate between them (six bands in El- Madam species, four bands in both EL-Kobbaneia and gemela species and five bands in Zaghloul . Also, table(4) revealed the percentage of polymorphism in all mango species ranged between 16.7% in both EL-Kobbaneia and gemela species to 29.2 % in Zebda species. These results are in agreement with those reported by Maria et al 2006 found that a parentage test used a mango other parameters (RAPD) (Random Amplified Polymorphic DNA) markers to estimate the male parent to selected hybrids in an open cross plot by using five mango cultivars densely planted in elation square design.



**Fig. 1:** Zymograms of total proteins banding patterns in six mango species.

**Table 4:** SDS-PAGE analysis of total proteins a mango six mango species

Total protein of mango species							
Bands	RF	Zebda	EL-Madam	EL Kobbancia	Zaghoul	Gemela	Genofia
1	15	+					
2	27		+	+	+	+	+
3	45	+	+	+	+	+	+
4	63	+	+	+	+	+	+
5	73	+	+	+	+		
6	92	+	+	+	+	+	+
7	104	+	+	+	+	+	+
8	132	+	+	+	+	+	+
9	157	+	+	+	+	+	+
10	204	+	+	+	+	+	+
11	219	+					
12	252	+	+	+	+	+	
13	288	+	+	+	+	+	+
14	317	+					
15	353	+	+	+	+	+	+
16	403	+	+		+	+	
17	438	+	+	+	+	+	+
18	486	+	+	+	+	+	+
19	540	+	+	+	+		+
20	571		+			+	+
21	607	+	+	+	+	+	+
22	699		+				
23	737	+	+	+	+	+	+
24	821			+			
Total 24	21	20	18	19	18	16	
Total polymorphic bands = 1		7	6	4	5	4	2
% of polymorphism		29.2	25	16.7	20.8	16.7	8.3

## REFERENCES

- A.O.A.C., 1990. Official Methods of Analysis. The Association of official Analytical chemists. Arlington. West Virginia, USA, 15<sup>th</sup> Edn. Washington D.C.
- Arnaud, C., H. Vannire and T. Goguy, 2003. Determinants of quality for mango produced in the Brazilian Nordeste. *fruits* Paris, 58: 191–204.
- Arumuganathan, K. and E.D. Earle, 1991. Nuclear DNA content of some important plant species. *Plant Mol. Biol. Rep.*, 9: 208- 218.
- Cordeiro, M.R., A.C. Queiroz, V.H.V. Ramos, F.G. Faleiro and L.M.S. Fraga, 2006. Identification of plantlet genetic origin in polyembryonic Mango (*Mangifera indica*) CV. Rosinha seed using RAPD Markers. *Rev. Bras. Frutic. Jaboticabal. Sp.*, 28(3): 454- 457.
- Duncan, B.D., 1955. Multiple Range and Multiple Fe. Tests. *Biometrics*, 11: 1- 42.

El- Shiekh, A.F., 2002. Effect of preharvest bagging during development of mango fruits on postharvest color and quality during cold storage. *Zagazig. J. Agric. Res.*, 29: 745- 766.

Laemmli, V.K., 1970. Cleavage of structural protein during the assembly of the head of bacteriophage  $\phi_4$ . *Nature*, 227: 980- 985.

Maria, C.R., A.C. Pinto, V.H. Ramos, F.G. Faleiro and L.M. Fraga, 2006. RAPD Markers utilization and other parameters in the determination of Mango hybrids genitors *Rev. Bras. Frutic. Jaboticabal. Sp.*, 28(2): 164- 167.

Sendecor, G.W. and W.G. Cochran, 1989. *Statistical Methods* 8<sup>th</sup> Ed. The Iowa state Univ. Press. Ames. USA.

Yahia, E.M., 1998. Modified and controlled atmospheres for tropical fruits *Horticultural Reviews*. 22: 123- 183.

Zaied, N.S., S.A.A. Khafagy and M.A. Saleh, 2007. Evaluation of some Mango species by fruit characters and fingerprint. *Res. J. Agric and Biol. Sci*, 3(4): 316- 320.