

Evaluation of Some Mango Species by Fruit Characters and Fingerprint

N.S. Zaied, S.A.A. Khafagy and M.A. Saleh

Department of Pomology, National Research center, Dokki, Cairo, Egypt.

Abstract: Eight local mango evaluations; Alphonso, Mabrouka, Hendi Meloky, Langra, Dabsha, El-Kobbaneia, Khad El Gamel and El-Madam were collected from private farm in Sharakia Governorate. Physical characteristics; [fruit weight, fruit length, fruit volume, fruit diameter, fiber percentage and juice weight] and chemical characters (TSS, titratable acidity, TSS/acid ratio, total sugar and V.C of fruits were study besides of molecular characterization (as total proteins). The data showed that the 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. Also, the highest TSS% was shown in langra fruit followed by Alphonso fruit and the lowest one was clear in Mabrouka. The highest titratable acidity was clear in Dabsha fruit, but the lowest one was detected in Langra, El-Madam and Alphonso fruits. However, the highest total sugar was clear in Hendi Meloky, but Dabsha, El-Madam and Mabrouka produced the smallest one. Further more, the Dabsha fruit had the lowest V.C and the lowest one was clear in Mabrouka fruit.

Key words:

INTRODUCTION

Mango is a tropical fruit tree which usually flowers in spring and produces attractive fruits in June or July. Mangos, like many other tropic fruit trees, do not flower consistently. The mango is produced in more than 80 countries. Egypt produces a significant amount of this fruit and there are indications for every significant increase in yield. The species consist of two ecogeographic races that can be distinguished on the basis of their seed type, i.e., monoembryonic /subtropical and polyembryonic / tropical^[7].

Actually mango (*Mangifera indica*, L.) is considered one of the largest Brazilian fruit business for the export market. Cultivar selection having high fruit quality is a fundamental step to obtain excellent results in this business. A mango breeding program based on intervarietal hybridization may produce new improved cultivars for mango growers. 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 among other parameters (RAPD) (Randor Amplified Polymorphic DNA) markers to estimate the male parent to the selected hybrids in an open cross plot by using five mango cultivars densely planted in a latin square design^[6].

The present study aimed mainly to evaluate of some mango species and their fruits characters and fingerprint.

MATERIALS AND METHODS

The present study was carried out during 2004 to 2006 in an experimental orchard at Sharakia Governorate. The trees were budded on seedling rootstock and were gravn in aloamy 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: Eight local mango evaluations; Alphonso, Mabrouka, Hendi Meloky, Langra, Dabsha, El-Kobbaneia, Khad El Gamel and El-Madam trees were used in this work, at maturity stage according to El-Sheikh^[3].

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

1- Physical Characteristics: Average fruit weight (g), fruit length (cm), fruit diameter (cm), fruit volume (cm), juice weight (g) and fiber percentage (%) were calculated.

2- Chemical Characteristics:

- Total Soluble Solids (TSS%) of fruit juice by using a hand refractometer^[1].
- Titrable acidity of fruit juice was determined according to the^[1].
- TSS/acid ratio calculated by divided TSS by juice titratable acidity.

- Vitamin C was determined according to^[1].

3- Total Proteins Electrophoretic Analyses: Sds-polyacrylamide gel electrophoresis was performed according to Laemmli^[5]. 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. A dendrogram was constructed on the basis of the similarity matrix data by unweighted pair group method with arithmetic average (UPGMA) 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 Cochran^[8]. The means were differentiated using Duncan^[2] multiple range test at 5% level.

RESULTS AND DISCUSSIONS

1- Fruit Characteristics:

1-a-Physical Characteristics: It is clear from table (1) that the fruit weight character values of Langra fruit was significantly higher values than that all others in both seasons, while, the fruits of Khade El-Gamel and El-Madam in both seasons had the lowest fruit weight. The Alphonso and Mabrouka fruits came in between in this respect.

In addition, fruit length character value of langra fruit was the highest in both seasons followed by Hendi Meloky fruit, while, the fruits of Alphonso and Khad El Gamel fruits in both seasons had the lowest fruit length. On the other hand, no fruit length was noticed in Dabsha, Mabrouka and El-Kobbaneia fruits in both seasons.

Further more, the highest fruit volume was shown by langra fruit followed by El Kobbaneia then Dabsha as compared with all other fruits in both seasons. Meanwhile, the lowest fruit volume was produced by Khade El Gamel and El Madam fruits in both seasons.

Also, the value of fruit diameter character of El-Kobbaneia fruit was significantly higher in both seasons as well as Langra fruit in the second season. While, the fruits of Hendi Meloky, Khade El Gamel and El-Madam in both seasons had the lowest fruit diameter. The Alphonso fruit came in between in this respect.

A glance at table (2) that the lowest fiber percentage was produced by Alphonso and El-Madam fruits followed by Khade El-Gamel fruit, then Mabrouka and El-Kobbaneia fruits as compared with all other accessions in both seasons.

However, the langra fruit contained the highest percentage of juice and Hendi Meloky fruit contained the lowest one in both seasons. The Dabsha fruit had percentage of juice significantly higher than that of El-Kobbaneia and Alphonso fruits of both seasons. No significant differences were detected between Alphonso and Mabrouka fruits at first.

These results are in agreement with those reported by Sawant *et al.*^[9] suggested that mango fruits should be handled carefully to avoid injury, they should be harvested at the proper maturity stage, they should be harvested with 2-3cm of stalk. In addition, 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.

1-b- Chemical Characteristics: It is clear from table (3) that Total Soluble Solids (TSS) percentage of langra fruit was the highest in comparing with other mango fruits in both seasons followed by Alphonso fruit in both seasons

Table 1: Fruit Characteristics of Some Mango Fruits during 2004 and 2006.

Characteristic	Fruit weight (g)		Fruit length (cm)		Fruit volume (cm)		Fruit diameter (cm)	
	2004	2006	2004	2006	2004	2006	2004	2006
Alphonso	289.67 ^C	295.67 ^D	9.73 ^E	10.13 ^E	335.33 ^D	338.00 ^D	7.83 ^C	8.07 ^C
Dabsha	420.33 ^B	426.67 ^C	11.73 ^C	12.43 ^C	452.67 ^C	448.67 ^C	8.13 ^B	8.47 ^B
Mabrouka	286.33 ^C	264.67 ^E	11.73 ^C	12.40 ^C	286.00 ^F	275.33 ^F	6.80 ^E	7.30 ^D
El-Kobbaneia	424.33 ^B	432.33 ^D	11.77 ^C	12.27 ^C	452.67 ^D	453.33 ^B	8.73 ^A	8.80 ^A
Hendi Meloky	250.33 ^D	256.67 ^F	12.67 ^B	13.33 ^B	254.33 ^G	257.00 ^G	6.67 ^E	7.03 ^E
Langra	717.67 ^A	718.00 ^A	18.00 ^A	18.60 ^A	696.00 ^A	703.00 ^A	8.37 ^B	8.93 ^A
Khade El-Gamel	253.00 ^D	229.67 ^G	8.50 ^F	9.13 ^F	325.00 ^E	325.67 ^E	7.10 ^D	7.03 ^E
El-Madam	255.00 ^D	255.67 ^F	11.33 ^D	11.27 ^D	255.67 ^G	256.00 ^G	6.90 ^{DE}	6.83 ^E

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

Table 2: Fruit Characteristics of Some Mango Fruits during 2004 and 2006

Characteristic Fruit	Fiber		Juice weight % in weight	
	Season			
	2004	2006	2004	2006
Alphonso	2.03 ^E	2.03 ^E	193.67 ^D	197.33 ^D
Dabsha	3.60 ^C	3.73 ^C	350.67 ^B	355.33 ^B
Mabrouka	2.30 ^D	2.43 ^D	192.67 ^D	186.67 ^E
El-Kobbaneia	2.37 ^D	2.40 ^D	295.00 ^C	300.00 ^C
Hendi Meloky	4.97 ^B	4.90 ^B	126.33 ^G	133.67 ^H
Langra	5.97 ^A	5.90 ^A	415.67 ^A	420.00 ^A
Khade El-Gamel	2.20 ^{DE}	2.30 ^D	155.00 ^F	155.33 ^G
El-Madam	2.20 ^{DE}	2.07 ^E	175.00 ^E	175.67 ^F

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

Table 3: Chemical Constituents of Some Mango Fruits during 2004 and 2006.

Characteristic Fruit	TSS %		Titratable acidity		TSS/acid ratio		Total sugar		V.C m y / 100 m l juice	
	Season									
	2004	2006	2004	2006	2004	2006	2004	2006	2004	2006
Alphonso	10.40 ^B	11.2 ^B	10.64 ^D	1.51 ^F	6.34 ^B	7.42 ^B	18.59 ^D	18.59 ^D	22.24 ^C	17.76 ^C
Dabsha	9.00 ^D	9.30 ^D	1.99 ^A	1.89 ^A	4.52 ^E	4.92 ^F	13.65 ^E	13.71 ^E	27.04 ^A	26.24 ^A
Mabrouka	7.80 ^F	7.90 ^G	1.81 ^B	1.82 ^B	4.31 ^F	4.34 ^G	13.18 ^E	13.33 ^F	3.04 ^G	2.76 ^F
El-Kobbaneia	9.20 ^C	9.37 ^D	1.80 ^B	1.82 ^B	5.11 ^D	5.15 ^E	19.50 ^C	19.64 ^C	16.64 ^D	17.12 ^C
Hendi Meloky	10.40 ^B	10.60 ^C	1.81 ^B	1.81 ^B	5.75 ^C	5.86 ^C	25.63 ^A	25.07 ^A	14.40 ^E	14.80 ^D
Langra	13.40 ^A	13.63 ^A	1.52 ^E	1.55 ^E	8.82 ^A	8.79 ^A	20.56 ^B	20.72 ^B	7.04 ^F	5.44 ^E
Khade El-Gamel	8.80 ^E	8.80 ^F	1.73 ^C	1.78 ^C	5.09 ^D	4.94 ^F	18.44 ^D	18.55 ^D	22.30 ^C	17.78 ^C
El-Madam	9.00 ^D	9.13 ^E	1.51 ^E	1.82 ^D	5.96 ^C	5.64 ^D	13.50 ^E	13.82 ^E	25.09 ^B	25.31 ^B

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

and Hendi Meloky in the second season. While, the lowest TSS percentage was detected in Mabrouka fruit. No significant differences were found between Alphonso and Hendi Meloky as well as between Dabsha and El Madam in the first season and between Dabsha and El Kobbaneia in the second season.

However, the juice acidity percentage of Dabsha fruit was the highest in comparing with all mango fruits followed by Mabrouka, and El-Kobbaneia as well as Hendi Meloky in both seasons. While, the lowest juice acidity% was detected in Langra and El Madam in the first season and Alphonso in the second season. No significant difference was found between Mabrouka, El-Kobbaneia and Hendi Meloky fruits in both seasons.

Also, the TSS/acid ratio of Langra fruit was significantly higher followed by Alphonso fruit then Hendi Meloky in both seasons as well as El-Madam in the first season. On the other hand, Mabrouka fruit showed the significantly lowest TSS/acid ratio.

Meanwhile, the highest total sugar content was showed by Hendi Meloky fruit in both seasons while, the lowest total sugar content was shown by Dabsha and El-Madam as well as Mabrouka fruits in both seasons.

Furthermore, the highest citric acid content was shown by Dabsha fruit in both seasons. The fruit of Mabrouka contained the lowest citric acid, while the Alphonso and Khade El-Gamel fruits came in between in this respect in both seasons. The above results goes in line with the findings of Yahia^[10] 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 titra table acidity 2.64% (expressed as anhydrous citric acid).

3- SDS-PAGE Analysis of Total Proteins: SDS-PAGE profile patterns of total proteins extracted from eight mango cultivars were presented in Figure (1). SDS-PAGE

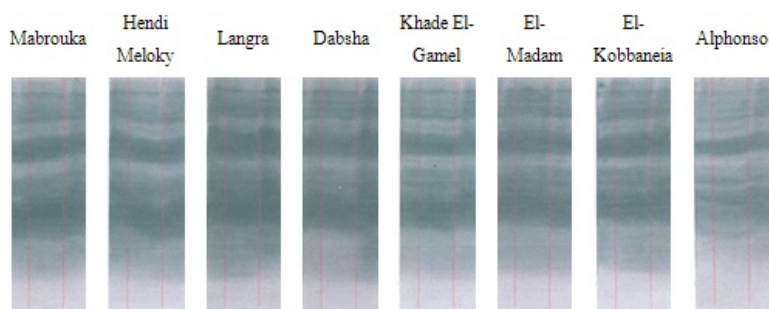


Fig. 1: Zymograms of total proteins banding patterns in eight cultivars in Mango.

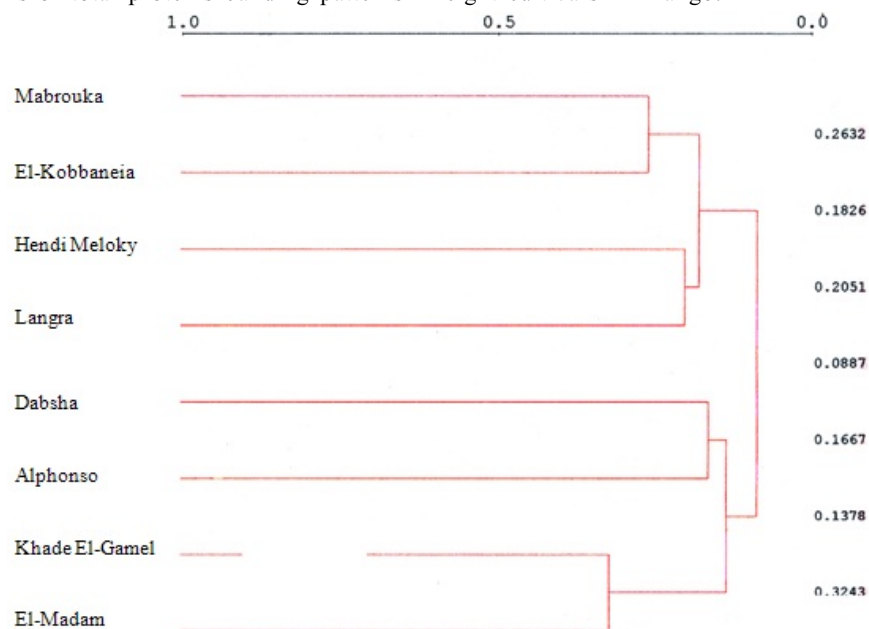


Fig. 2: Dendrogram demonstrating the relationships among eight cultivars of mango based on total proteins.

Table 4: SDS-PAGE analysis of total proteins among eight mango cultivars

Total protein of mango cultivars									
Band No.	RF	Mabrouka	Hendi Meloky	Langra	Dabsha	Khade El-Gamel	El-Madam	El-Kobbaneia	Alphonso
1	0.048	+	+	+	+	+	+	+	+
2	0.074	+	+	+	+	+	+	+	+
3	0.100	+	+	+	+	+	+	+	+
4	0.132	+	+	+	+	+	+	+	+
5	0.163	+	+	+	+	+	+	+	+
6	0.185							+	
7	0.208	+		+		+	+	+	
8	0.229		+		+	+			+
9	0.255	+		+	+	+	+	+	
10	0.286	+	+		+	+	+	+	
11	0.317	+	+	+		+	+		+

Table 4: Continue

12	0.360					+	+	+
13	0.419		+	+	+	+	+	+
14	0.453	+		+	+		+	+
15	0.469	+	+	+	+	+		+
16	0.517	+	+	+			+	+
17	0.550	+	+	+	+	+		+
18	0.585	+	+	+	+	+	+	+
19	0.636	+	+	+	+	+		+
20	0.685			+			+	+
21	0.741	+	+	+	+	+		+
22	0.802				+		+	+
		16	14	17	16	17	16	16
								15

analysis revealed 22 bands with different RF. The mango cultivars were ordered in ascending range from 14 bands in Hendi Meloky cv. to 17 bands in langra and Khade El-Gamel cvs. Among the cultivars that characterized by 16 bands (Mabrouka, Dabsha, El-Madam and El-Kobbaneia) were similar in their four displayed bands. The Alphonso cultivar characterized by 15 bands.

SDS-PAGE analysis of total proteins revealed a total of 22 protein bands. Whereas, five bands were commonly detected in all mango cultivars with different RF (Table 4). The other variable bands were used to characterize the eight mango cultivars individually. On the other hand, the dendrograms resulting from the UPGMA cluster analysis indicated that the eight mango cultivars could be divided into two clusters from the same node. The first cluster contains Dabsha, Khade El-Gamel, El-Madam and Alphonso cultivars, while the second cluster contains Mabrouka, Hendi Meloky, Langra and El-Kobbaneia cultivars and divided into two subclusters each. as showed in figure (2). These results were agreed with who found that analyses of data using cluster analysis showed two major clusters of mango cultivars.

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