A COMPARATIVE STUDY OF THE MORPHOLOGICAL CHARACTERISTICS OF THE LEAVES OF SOME SEEDLING DATE PALM MALES*

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ABSTRACT

Morphological characteristics of the leaves of about 100 selected males were studied. The characteristics were compared with those varieties that the female parent might be similar to males. This comparison was carried out to show how far such females are similar with their satellite males.

Morphological characteristics involved: leaf colour and length; spines number, length and width, pinnae number, length and width and apical angle.

Results showed that the above mentioned characteristics differed from one male to another, and there was similarity between the female cultivars and their satellite males in certain leaf morphological aspects.

Key words: Morphological characters, satellite males.

INTRODUCTION

This investigation is a part of an intensive research project aimed at evaluating date palm males used in pollination in the Central Region of Saudi Arabia. About 100 males were selected in this evaluation. Basis of selection was dealt with in a previous paper (Nasr et al., 1986).

Since these males are raised from seeds of the standard cultivars, then it is expected that the female cultivars and their «satellite» males might be similar in one or more of the morphological characteristics of the leaves (Al Bekr, 1972). The term «satellite» is suggested by Mason (1927) for males raised from seeds of any specific cultivar.

The present investigation was carried out to compare the morphological characteristics of the leaves of female cultivars and their «satellite» males.

MATERIALS AND METHODS

This investigation was carried out in 1984 at the College of Agriculture, King Saud University. The palm trees, used in this study, were chosen for vigour and for being disease-free. Four leaves a year old were collected from each of the selected males. Similar leaf samples were also collected

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from the female palms grown together with the selected males in the same orchard. The leaves were collected from the main directions of each tree.

The following growth characteristics as suggested by AlBaker (1972) were studied:
Leaf: Colour and length.
Spines: Number, length, width and length of spinney part.
Pinnae: Number, length, width and pattern of arrangement. Apical angle.

Length of the leaf was measured below the lowest spine to the end of the top most pinnae.

Length and width of pinnae were determined as an average of 10 pinnae taken from the middle portion of the rachis, 5 on each side. Length of the spinney part was measured and calculated as a percentage of total leaf length. Number of spines was counted as total on both sides. Length of spines was measured as average of 5 spines on each side. Apical angle was measured at 30 cm below tip of the rachis.

Data obtained were statistically analyzed according to methods described by Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Data of the present investigation revealed that leaves of the selected males varied in their morphological characteristics (Table 1 and Figures 1-6) as follows:

Leaves

Colour: It differed from dark green to light green.

Length: It ranged from 258 to 552 cm in the different males. The leaves could be divided into 3 groups according to their length.

a. **Short:** Less than 350 cm.
b. **Medium:** From 350-450 cm.
c. **Long:** More than 450 cm.

Length of spinney part

The length of the spinney part ranged between 10.54 to 33.58 percent from the total length of the leaf in the different males. According to the length of the spinney part, the males could be divided into 3 groups as follows:

a. **Short:** Less than 15 percent of total leaf length.
b. **Medium:** From 15 to 25 percent of total leaf length.
c. **Long:** More than 25 percent of total leaf length.

Spines

Colour:

The colour of the spines differed from green, greenish yellwo and green with yellow tip in the different males.

Number:

It differed from 9-48 spines per leaf. According to the number of spines, the males could be divided into 3 groups as follows:

a. **Low:** Less than 20 spines/leaf.
b. **Medium:** From 2-30 spines/leaf.
c. **High:** More than 30 spines/leaf.

Length:

The males could be divided into 3 groups according to spine length:

a. **Short:** Less than 8 cm.
b. **Medium:** From 8-12 cm.
c. **Long:** More than 12 cm.

Also, the length of the spine ranged from 3.10 to 17.69 cm in the different males.

Table 1. Mean of the different characters of date palm males.

Cultivars	1 Leaf length cm	2 Number of spines	3 Length of spines cm	4 Thickness of spines spines cm	5 Length of spines cm	6 Number of spines	7 Width of spines cm	8 Length of spines cm	9 Apical angle
Barhi	389	30.1	8.1	0.427	23.6	180.5	3.43	43.8	38.7
Serry	462	24.9	9.3	0.452	21.4	215.5	3.82	49.6	46.8
Nebut Seif	439	18.5	10.9	0.391	17.5	172.9	4.12	62.1	57.0
Dekheini	413	20.4	5.9	0.327	16.0	217.4	3.92	50.9	46.9
Sukkari	418	33.6	5.8	0.356	22.9	200.0	3.08	37.4	42.7
Shakret Al-Qassim	354	32.6	7.4	0.442	26.7	163.4	3.78	45.3	43.2
Sefri	384	23.8	8.4	0.322	21.8	192.4	3.61	46.9	69.4
Seleg	420	20.8	7.1	0.382	18.9	205.9	3.65	49.1	55.5
Khudari	381	20.4	8.3	0.329	16.2	197.0	3.25	52.1	38.3
Meneifi	365	24.1	7.6	0.429	18.3	210.5	3.48	50.7	59.1
Maktumi	414	31.8	8.1	0.349	21.9	199.0	3.77	60.0	73.2
Khewldi	383	15.5	7.4	0.417	17.8	193.6	4.05	50.1	71.5
L.S.D. 5%	---	9.0	N.S.	N.S.	5.3	N.S.	0.45	N.S.	N.S.
Mean	402	24.7	7.85	0.388	20.24	196.0	3.66	50.65	53.52
C.V.	15.4	33.0	31.5	25.2	26.2	15.4	11.1	21.3	48.1

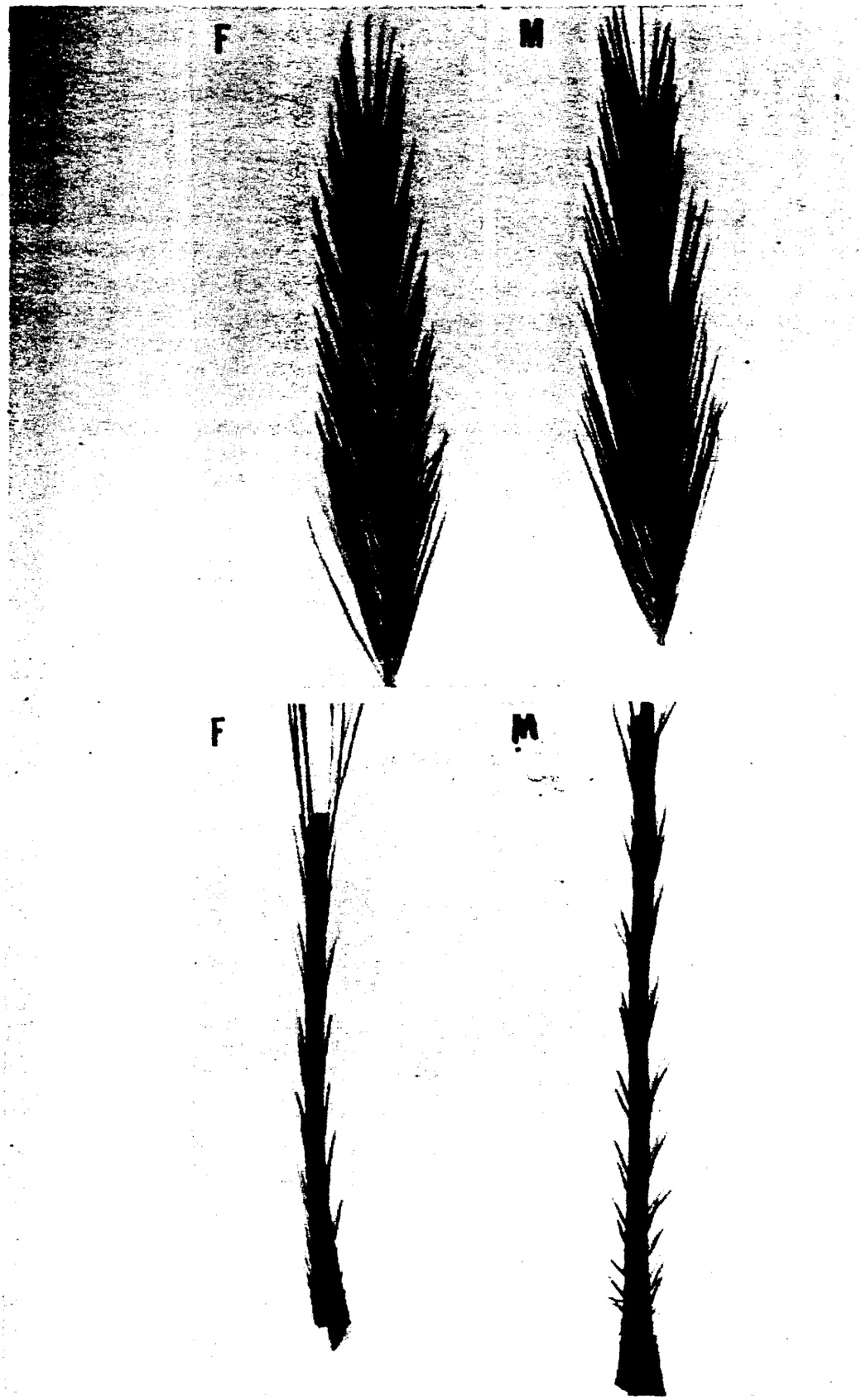

Figure 1. **Upper: Apical portion of the leaves of Barhi (F) cultivar and its satellite male (M).**

Lower: Spinney part of the leaves of Barhi (F) cultivar and its satellite male (M).

Table 2. Means of the male and females palm trees for the different characters averaged over 12 cultivars.

Sex	X_1 Leaf length cm	X_2 Number of spines	X_3 Length of spines cm	X_4 Thickness of spines spines cm	X_5 Length of spines cm	X_6 Number of spines	X_7 Width of spines cm	X_8 Length of spines cm	X_9 Apical angle
Male	396[a]	23.8[a]	8.36[a]	0.398[a]	20.9[a]	193.0[a]	3.76[a]	49.1[a]	53.7[a]
Females	407[a]	25.6[a]	7.36[a]	0.373[a]	19.6[a]	198.3[a]	3.57[a]	52.2[a]	53.4[a]

Width:

The width of the spines also differed from one male to another.

Pinnae

Number:

The total number of the pinnae per leaf ranged from 130 to 254.

Males could be divided into 3 groups according to the total number of pinnae:

a. **Low:** Less than 175 pinnae.
b. **Medium:** Between 175 to 200 pinnae.
c. **High:** More than 200 pinnae.

Length:

The length of pinnae differed from 23.94 to 68.61 cm in the various males. the males could be divided into 3 groups as follows:

a. **Short:** Less than 45 cm.
b. **Medium:** Ranged from 45-55 cm.
c. **Long:** More than 55 cm.

Width:

As with length of pinnae, males could be divided into 3 groups according to width:

a. Small: Less than 3 cm.
b. Medium: From 3 to 4 cm.
c. Big: More than 4 cm.

The width of the pinnae ranged from 2.12 to 5.07 cm in the different males.

Patterns of pinnae arrangement

Three patterns of pinnae arrangement were detected, namely, single, double and triple. Groups of 4 or 5 pinnae might be present. The occurrence of double pinnae groups is more frequent as compared with other groups. The percentage of the double pinnae groups ranged between 40.40 to 83.84 percent of the total number of pinnae groups in each leaf.

Pinnae arrangement at leaf end

It was observed that the leaves end either with a single or double pinnae, the former case being more dominant.

Apical Angle

Results showed that apical angle differed greatly among experimented males. According to these differences, the males could be divided into 3 groups, namely:

a. **Small:** Less than 30°.
b. **Medium:** From 30-50°.
c. **Big:** More than 50°.

Statistical analysis of the means of various characteristics showed that differences among males were significant with respect to number of spines, length of spinney part and width of pinnae. Other characteristics were not significant (Table 1).

Comparison between Female Cultivars and their «Satellite» Males

It was found, as a result of comparing the morphological features of the leaves in both males and females that female cultivars and their «satellite» males are similar in one or more of the leaves morphological characteristics (Table 2 and Figs. 1-6). For example, Figure 1 denotes that the apical portion of the leaf of the male is almost similar to that of Barhi cultivar. The spinney part of each male and the Barhi female is almost similar in their spine arrangement.

It is seen that the spines of the males are more dense as compared to the females. This could be explained in view of the fact that the males are raised from seeds and the dense character of the spines could be due to that the males are more juvenile than the females, since the latter are raised from offshoots.

Similar trends are noted in some other cultivars and their satellite males as indicated below:

Figure 2 for Serry: Figure 3 for Sefri, Figure 4 for Dekheini; Figure 5 for Shakret Al-Qas-

Figure 2. **Upper: Apical portion of the leaves of Serry (F) cultivar and its satellite male (M).**

Lower: Spinney part of the leaves of Serry (F) cultivar and its satellite male (M).

Figure 3. **Upper: Apical portion of the leaves of Sefri (F) cultivar and its satellite male (M).**

Lower: Spinney part of the leaves of Sefri (F) cultivar and its satellite male (M).

Figure 4. **Upper:Apical portion of the leaves of Dekheini (F) cultivar and its satellite male (M).**

Lower: Spinney part of the leaves of Dekheini (F) cultivar and its satellite male (M).

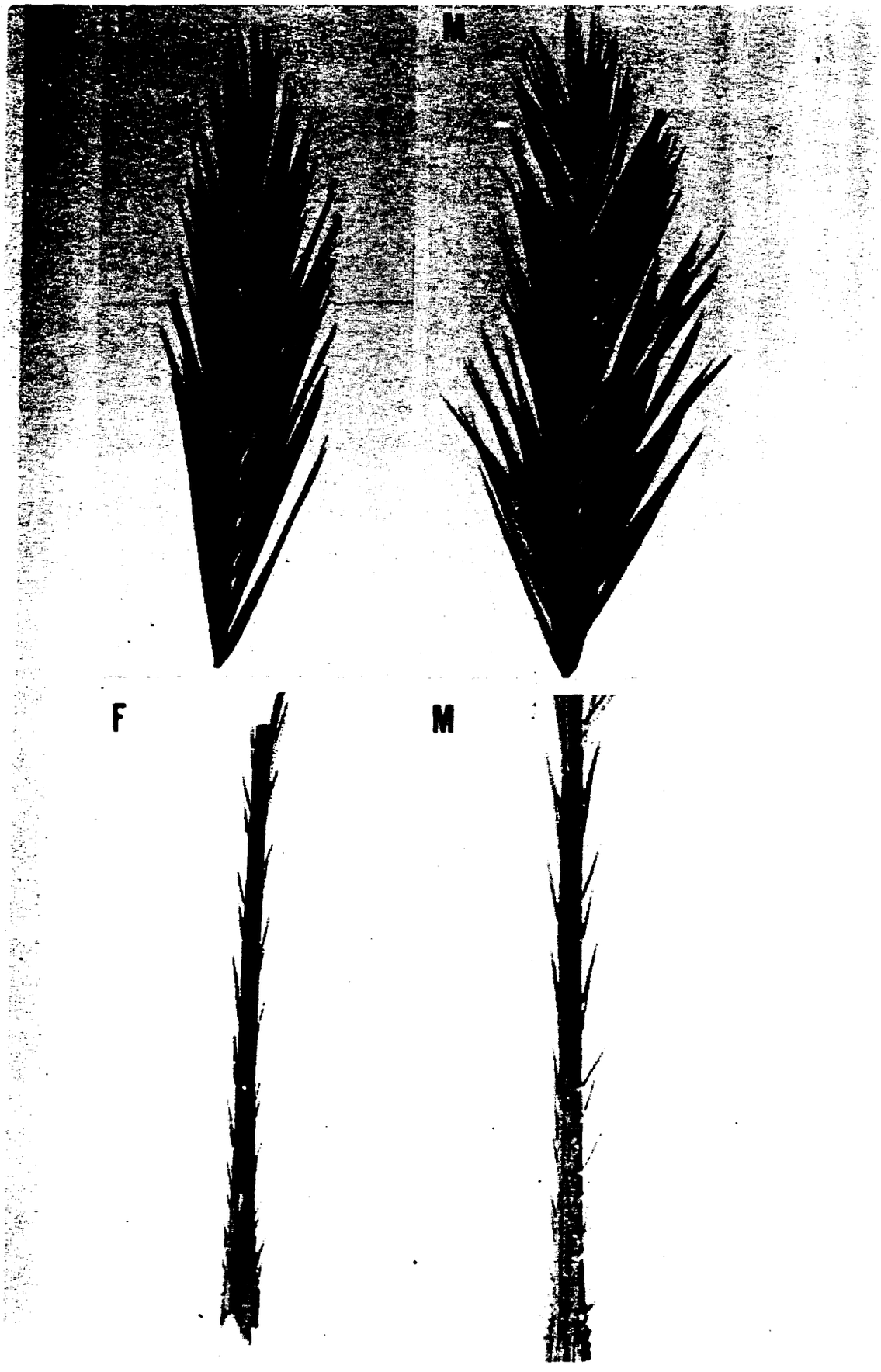

Figure 5. **Upper: Apical portion of the leaves of Shakrat Al-Qassim (F) cultivar and its satellite male (M).**

Lower: Spinney part of the leaves of Shakrat Al-Qassim (F) cultivar and its satellite male (M).

Figure 6. Spinney part of the leaves of female cultivars and their satellite males.

Upper: Left: Khudari Right: Seleg
Lower: Left: Sukkari Right: Maktumi

sim and Figure 6 for Khudari (upper left), Seleg (upper right), Sukkari (lower left), and Maktumi (lower right).

The observation that there is similarity between a certain female cultivar and some of the evaluated males in one or more characters assumes that this female cultivar is the female parent of such males. Accordingly such males are nominated as the female parent. Along with this criteria, evaluated males are grouped into 16 males as shown previously in the text.

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دراسة مقارنة للصفات المورفولوجية لأوراق بعض ذكور نخيل البلح البذرية

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الخلاصـــة

درست الصفات المورفولوجية للأوراق في ذكور النخيل المنتخبة و البالغ عددها حوالى مائة ذكر. وقورنت هذه الصفات بصفات الأوراق في الأصناف المؤنثة القريبة الشبه بهذه الذكور وذلك لدراسة مدى التشابه بين هذه الأصناف المؤنثة والذكور المنتخبة المرادفة لهذه الأصناف.

واشتملت الصفات المورفولوجية: لون وطول الورقة، عدد وطول وعرض الأشواك، عدد وطول وعرض الخوص، والزاوية القمية.

وتوضح النتائج المتحصل عليها أن الصفات السابقة الذكر تختلف من ذكر إلى آخر. كما توضح النتائج أيضا أن هناك تشابها بين الأصناف المؤنثة والذكور المرادفة لها في بعض الصفات المورفولوجية.

الكلمات الدليلية : الصفات المورفولوجية، الذكور المرادفة.
