

Studies on the Adaptability of Some Introduced Fig Cultivars to Riyadh Region, Saudi Arabia

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ABSTRACT. Studies were carried out on four fig (*Ficus carica* L.) cultivars introduced from Spain and planted at the Agricultural Experiment Station, College of Agriculture, King Saud University in 1979. Tree size, yield of fruit and the physical and chemical properties of fruits were determined during the growing seasons of 1989 and 1990.

Tree height and canopy diameter varied among the four fig cultivars (De Rey, Blanco Temperano, Napolitana and Melares). The average of total yield was De Rey 50.7, Napolitana 42.8, Blanco Temperano 40.7, and Melares 21.5 kg per tree. Physical size characteristics of the fruits differed among cultivars. Fruit moisture, TSS, acidity and vitamin C contents differed among cultivars. Total sugars ranged from 17.8 to 19.7% of fresh weight and were mostly reducing sugars.

The foregoing results show that the four fig cultivars are adapted to Riyadh region with De Rey (purple) and Blanco Temperano (yellow) being the most promising for cultivation.

Introduction

The fig (*Ficus carica*, L.) is one of the oldest and most nutritional tree fruits in the world. It ranked with grape, date and olive in importance in the early Mediterranean Civilization (Westwood 1978). While an estimate of an annual global fig production was given at 1.5×10^6 tons (FAO 1988), no information on fig production in Saudi Arabia was available. In Saudi Arabia, the fig tree has been cultivated from a long time in different regions, but its production is low (Saad *et al.* 1979). Further increase

in production could be attained if higher yielding and good fruit quality cultivars were available for planting.

A research program was started in 1979 to compare local and introduced cultivars at the Experimental Research Station of the College of Agriculture, King Saud University.

This study compared the tree and fruit characteristics of four fig cultivars introduced from Spain when grown under the environmental conditions of the Riyadh region of Saudi Arabia.

Material and Methods

This study was carried out at the College of Agriculture, King Saud University during the seasons of 1989 and 1990. The four fig cultivars introduced from Spain and compared were De Rey, Blanco Temperano, Napolitana and Melares. The trees were planted at the Experimental Research Station at Deirab in 1979. The soil was sandy loam and the trees were planted at 5×5 meters apart. The trees were provided to standard cultural practices used in the region. Five trees of similar vigor were selected at random from each cultivar. Each tree was used as one replicate. The vegetative growth of the trees including canopy diameter and tree height were measured. Fruits were harvested when their color changed from light green to yellow or purple according to the cultivar. Further, they should have tender flesh. Yield of each tree was determined in kg of ripe fruits per tree. To determine fruit properties, 25 ripe fruits were taken at random from each tree. Fruit samples were washed, dried and weighed. Fruit length, diameter and length/diameter ratio (L/D ratio) were determined. Moisture content was determined by drying 50 g of the fruits at 70°C until constant weight. Total soluble solids (TSS) were determined using the Abbe refractometer. Acidity (as citric acid) was determined by titration with standard NaOH solution (A.O.A.C. 1980). Vitamin C (Ascorbic acid) was determined by the use of 2, 6 dichlorophenol indophenol dye (Cox and Pearson 1962). Total sugars (reducing and non-reducing sugars) were determined according to the method described by Dubois *et al.* (1956).

The complete randomized design was used and the data obtained were statistically analyzed using the Analysis of Variance (ANOVA), and the differences between means were estimated according to the LSD method (Steel and Torrie 1980).

Results and Discussion

Vegetative Growth

The four fig cultivars varied in canopy diameter and height of the trees (Table 1). Canopy diameter varied among cultivars in both years and ranged from 2.7 to 3.6 m. The average canopy diameter of Blanco Temperano trees was significantly larger and Melares and Napolitana trees were significantly smaller than De Rey trees in both years. Tree height of De Rey trees was generally greater than all other cultivars and Melares trees were significantly shorter than all other cultivars.

TABLE 1. Vegetative growth and yield of the four fig cultivars of Spanish origin when grown in the Riyadh region.

Cultivars	Canopy diameter (m)			Tree height (m)			Yield (kg/tree)		
	1989	1990	mean	1989	1990	mean	1989	1990	mean
De Rey	3.2	3.2	3.2	4.6	4.7	4.6	52.4	48.9	50.7
Blanco Temperano	3.6	3.7	3.6	3.6	4.5	4.0	43.9	37.5	40.7
Napolitana	2.9	3.0	3.0	4.0	4.3	4.2	40.8	44.9	42.8
Melares	2.7	2.7	2.7	3.3	3.4	3.3	20.9	22.1	21.5
LSD 5%	0.3	0.4	–	0.4	0.4	–	7.4	9.1	–
LSD 1%	0.5	0.5	–	0.6	0.6	–	10.3	12.8	–

Yield

The yield differed among cultivars in both years (Table 1). De Rey trees had the most kg/tree and Melares the least kg/tree. All cultivars produced only one crop per year, *i.e.*, the main crop. In Spain, these cultivars produced two crops or harvests per year (July and September). Generally, fruit ripening occurred between late July and mid August in each of the four cultivars under the environmental conditions of Riyadh region. Blanco Temperano fruits ripen earliest, followed by De Rey, Napolitana and Melares.

Fruit Properties

a) Physical properties

Fruit weight differed among cultivars and ranged between 29.22 to 35.8 g (average of the two seasons) (Table 2). Differences among the fig cultivars were statistically significant only in the second season. In this season, fruit weight of De Rey and Blanco Temperano cultivars was significantly larger than that in Napolitana and Melares cultivars.

Fruit length differed among cultivars and ranged from 3.4 to 4.5 cm (average of the two seasons) (Table 2). There were significant differences among cultivars in both seasons. Fruit length was longest in De Rey and shortest in Melares cultivar. Fruit diameter differed among cultivars and ranged between 2.7 to 4.8 cm (Table 2). The diameter of Blanco Temperano was larger and that of Melares smaller than the other two cultivars. The ratio between length and diameter (L/D ratio) indicates the shape of the fruits, the higher the value, the more elongated is the fruit. The L/D ratio ranged from 0.8 to 1.3. The values of less than 1 indicate an oblate shape such as Blanco Temperano (0.8); 1 indicates a round shape such as Napolitana (1.1); while more than 1 represents the oval shape such as Melares (1.2) and De Rey (1.3).

TABLE 2. Physical properties of the fruits of four fig cultivars of Spanish origin when grown in the Riyadh region.

Cultivars	Fruit weight (g)			Fruit length (cm)			Fruit diameter (cm)			L/D ratio		
	1989	1990	mean	1989	1990	mean	1989	1990	mean	1989	1990	mean
De Rey	33.1	38.6	35.8	4.4	4.7	4.5	3.6	3.7	3.6	1.2	1.3	1.3
Blanco Temperano	32.2	37.6	34.9	3.6	4.2	3.9	4.8	4.8	4.8	0.8	0.9	0.8
Napolitana	31.5	31.7	31.6	3.9	3.8	3.8	3.7	3.6	3.7	1.1	1.0	1.1
Melares	27.4	31.0	29.2	3.4	3.4	3.4	3.0	2.7	2.9	1.1	1.3	1.2
LSD5%	NS	3.1	-	0.2	0.2	-	0.2	0.2	-	0.1	0.1	-
LSD1%	NS	4.4	-	0.3	0.3	-	0.3	0.2	-	0.1	0.1	-

Fruit color differed among cultivars (Fig. 1). De Rey and Napolitana cultivars were purple, and Blanco Temperano and Melares, yellow.

b) Chemical properties

The data indicate that the fig fruits of all cultivars contained relatively high percentages of moisture (84.6 to 86.8%) at the mature stage (Table 3). Variations among cultivars, although significant, were inconsistent from year to year and not considered important. Our values of moisture content were generally higher than those reported by Watt and Merrill (1963) and Saad *et al.* (1979).

The average total soluble solids (TSS) ranged from 21.0 in Melares to 23.0 in Blanco Temperano, and intermediate in Napolitana and De Rey cultivars (Table 3). However, the ranking of cultivars was different in 1989 and 1990 seasons. Values of the TSS % obtained generally were in the upper range of those obtained by Saad *et al.* (1979) who stated that TSS ranged from 17.08 to 22.08% in some fig cultivars.

The average percentage of acidity ranged from 0.3 in Blanco Temperano to 0.4 in Napolitana (Table 3). Values of acidity obtained in the present study were higher than those obtained by Saad *et al.* (1979). They stated that acidity was very low (0.08 to 0.11%) in the fruits of some fig cultivars.

Vitamin C content ranged from 2.2 to 3.7 mg/100g in the fruits of De Rey and Blanco Temperano cultivars, respectively (Table 3). Values for vitamin C were significantly different among cultivars in both seasons. Watt and Merrill (1963) reported that vitamin C content of the fig fruits was 2 mg/100 g of the fresh fruits.

Total sugars in the fruits ranged from 17.8 in Blanco Temperano to 19.7 in Melares. Melares and De Rey cultivars had significantly higher total sugars than that in both Blanco Temperano and Napolitana cultivars in both seasons of the present study (Table 4). Total sugars consisted mainly of reducing sugars in the four cul-

TABLE 3. Chemical properties of the fruits of four fig cultivars of Spanish origin when grown in the Riyadh region.

Cultivars	Moisture %			T.S.S. %			Acidity %			Vitamin C mg/10ml		
	1989	1990	mean	1989	1990	mean	1989	1990	mean	1989	1990	mean
De Rey	85.6	85.6	85.6	23.9	21.4	22.6	0.3	0.4	0.4	2.1	2.3	2.2
Blanco Temperano	86.9	86.1	86.5	23.5	22.6	23.0	0.3	0.3	0.3	3.7	3.7	3.7
Napolitana	86.9	86.7	86.8	20.4	22.2	21.3	0.4	0.5	0.4	2.2	2.6	2.4
Melares	85.5	83.8	84.6	20.4	21.7	21.0	0.4	0.4	0.4	2.7	2.6	2.6
LSD 5%	0.6	0.6	-	2.5	0.8	-	0.0	0.1	-	0.6	0.4	-
LSD 1%	0.8	0.8	-	3.5	1.1	-	0.1	0.1	-	0.8	0.5	-

TABLE 4. Sugars content of the fruit of four fig cultivars of Spanish origin when grown in the Riyadh region (% on fresh weight basis).

Cultivars	Reducing sugars %			Non-reducing sugars %			Total sugars %		
	1989	1990	mean	1989	1990	mean	1989	1990	mean
De Rey	15.2	15.4	15.3	4.0	3.9	3.9	19.2	19.3	19.3
Blanco Temperano	14.1	14.6	14.3	3.8	3.1	3.5	17.9	17.7	17.8
Napolitana	13.6	14.7	14.2	3.9	4.2	4.0	17.5	18.9	18.2
Melares	15.4	17.1	16.2	3.5	3.5	3.5	18.8	20.6	19.7
LSD 5%	1.1	1.2	-	NS	0.4	-	0.8	1.2	-
LSD 1%	1.5	1.7	-	NS	0.6	-	1.2	1.7	-

tivars. These findings were similar to those found by Hulme (1970) and Saad *et al.* (1979).

Petrova and Voronova (1986) and Levina (1986) evaluated many fig cultivars and stated that fig cultivars were grouped according to ripening dates, length of ripening period, yield and fruit quality into different groups.

It could be concluded from the foregoing results that the four fig cultivars are adapted to Riyadh region climatic conditions, but De Rey (purple) and Blanco Temperano (yellow) proved to be highly adapted than the other two cultivars.

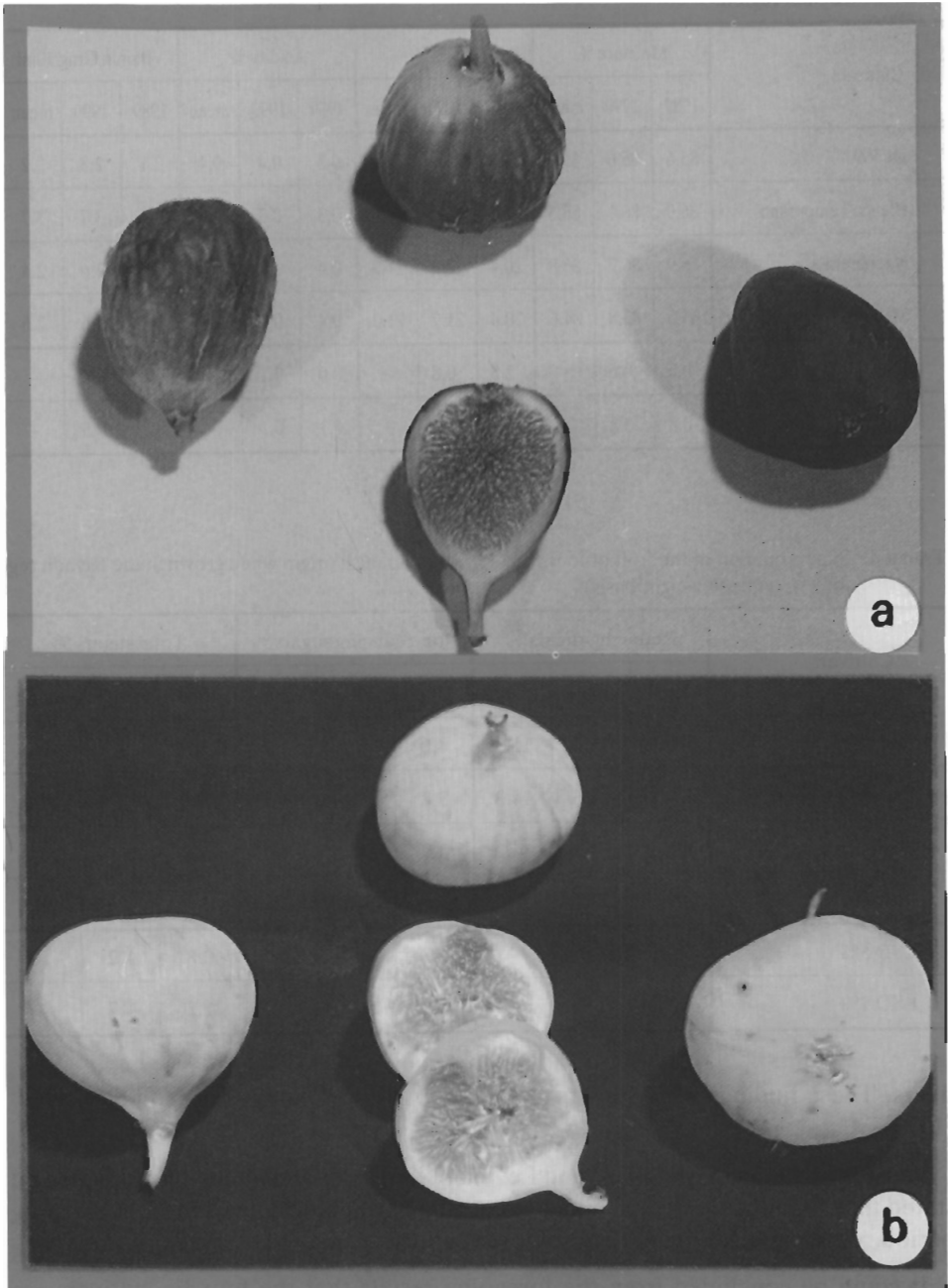


FIG. 1. (a) Fruits of De Rey fig cultivar.
(b) Fruits of Blanco Temperano cultivar.

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دراسات عن مدى تأقلم بعض أصناف التين المستوردة لمنطقة الرياض بالمملكة العربية السعودية

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المستخلص . أجريت هذه الدراسات على أربعة أصناف من التين المستوردة من أسبانيا
 والمزرعة بمحطة الأبحاث والتجارب الزراعية التابعة لكلية الزراعة ، جامعة الملك سعود
 منذ عام ١٩٧٩م . وقد تمت دراسة النمو الخضري ، المحصول والصفات الطبيعية
 والكيميائية للثمار خلال موسم ١٩٨٩ و ١٩٩٠م .

وقد أوضحت النتائج أن النمو الخضري للأشجار في الأصناف الأربعة (ديري ، بلانكو
 تمبرينو ، نابوليتانا و ميلارس) كان جيداً . وقد بلغ متوسط المحصول الكلي للشجرة
 الواحدة من الثمار (كجم) ٦٧, ٥٠ ، للصف دييري ، ٨٣, ٤٢ ، للصف نابوليتانا ،
 ٦٩, ٤٠ ، للصف بلانكو تمبرينو و ٥١, ٢١ ، للصف ميلارس . وقد اختلفت الصفات
 الطبيعية للثمار من صنف لآخر . كما أوضحت النتائج الخاصة بالصفات الكيميائية للثمار
 أن محتويات الثمار من الرطوبة ، المواد الصلبة الذائبة الكلية ، الحموضة وفيتامين ج قد
 اختلفت من صنف لآخر - وبالإضافة إلى ذلك فإن النسبة المئوية للسكريات الكلية قد
 تراوحت من ٨٠, ١٧ إلى ٧٠, ١٩% ، وكان أغلبها سكريات مخزلة في الأصناف الأربعة .
 ومن النتائج الخاصة بهذه الدراسة يمكن الاستنتاج بأن الأصناف الأربعة متأقلمة
 للظروف الجوية لمنطقة الرياض ولكن أفضلهم صنف دييري (بنفسجي اللون) وبلانكو
 تمبرينو (أصفر اللون) .