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EVALUATION OF A NEW SELECTED APRICOT STRAIN UNDER THE CONDITIONS OF NUBARIA REGION. EGYPT

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ABSTRACT

This Investigation was conducted in two dependent experiments at the Nubaria Horticultural Research Station, Behaira Governorate Egypt to evaluate a new apricot strain from 2003 to 2009. The first experiment was to study the behavior of this strain and the second was to compare it with the well adapted Canino apricot cultivar. The trees were budded on apricot seedling and planted in a calcareous soil. The evaluation of the new apricot strain was based on the beginning date of growth and yield as well as physical and chemical characteristics of fruit. The beginning date of harvest was earlier than Canino by 10- 15 days in the two seasons. It was found to be significant over Canino in carrying yield (number fruits per tree 749.5 and 1353.0), flesh percentage (93.43 and 94.10%) and SSC percent (14.27 and 12.43%).

The fruit weight was greater for Canino cultivar than the new apricot strain (35.93 and 31.93 gm). Consequently yield in kilograms per tree (24.57 and 35.20kg). The fruit firmness was 7.3 and 9.0 (Ib/ $Inch^2$).

In both cultivars, the new strain and Canino, the majority of the fruits were born on one year old shoots, the lowest number of fruits on spur increased. In addition, productivity and fruit quality were better than the Canino one.

Key words: Apricot, cultivar, growth, fruit set, fruit quality.

INTRODUCTION

Apricot (*Prunus armenica* L.) is an important stone fruit of the temperate zone. It is a desirable early summer fruit in Egypt. It occupies an area of about 18061 Fadden. Most of this area is planted with Canino, Amal and local strains, which give yearly more than 106 thousand ton (Anonymous 2008). Many attempts had been carried out to introduce high quality cultivars from abroad as Royal, Tilton and Belenheim but they were not successful because of their high chilling requirements Guerriero and Scalabraelli,(1982). The majority of apricot orchards are concentrated in the Kaliobia , Fayoom and newly reclaimed desert areas. Horticulturists used to grow apricot as seedling trees which induced variations when sexual embryos produced trees. These trees differ greatly in growth habits, fruit quality, yield and date of maturity El-Banna and Gurguis (1993). Some other cultivars of low chilling requirements such as Canino and Amal are promising and proved to be adapted to Egyptian environment. Although, they showed great success especially in newly reclaimed desert, it is highly recommended for producing cultivars of good quality and suited to mild- winter areas to select apricot trees are considered superior and can be used as future mother trees.

Vigour, health and mortality were assessed in several apricot cultivars in two experiments conducted from 1988 to 2005at the fruit experimental station in Poland by Lieznar- Malazezuk and Sasna (2005). They found that cultivars grew more vigorously when grafted on Myrobalan seedling rootstock than on some seedling rootstock.

Fruit sets and fruit drops in Turkish apricot varieties grown under ecological conditions of van, Turkey were studied by Fikret Balta *et al,* 2007. It was determined from full bloom to harvest, in eight different dates for two years. They stated that Van city in eastern Turkey has suitable climatic conditions for apricot growing, but the yield in highly influenced by late spring frosts and undesired environmental conditions, unsatisfied technical and cultural applications.

Ruiz and Egea (2008) studied forty- three apricot cultivars and selections grown in a Mediterranean climate. A high variability has been found in the set of apricot genotypes evaluated with regard to the studied pomological traits related to fruit quality attributes. The high number of evaluated genotypes, coming from was different genetic

origins and with a large phenotypic variability could provide valuable information about the apricot species, regarding the parameters which influence apricot quality.

The objectives of the present study were to evaluate a superior strain of apricot which planted in Nubaria Horticultural Research station, based on growth and yield performance as well as physical and chemical characteristics of the fruits; another goal of study is to compare this strain with the well adapted Canino cultivar.

MATERIALS AND METHODS

Two dependent experiments on a new apricot strain were conducted at the Nubaria Horticultural Research station, El- Behira Governorate Egtpt. The first experiment was started in 2003, on one year old trees of this new apricot strain which was selected from a private farm in Khatataba, Monofiya, Egypt. This new apricot strain was grafted on apricot seedling rootstocks, and planted at 6X 4 m apart (170 trees/ Fadden) in a randomized block design with three replications of four trees per plot. The orchard is irrigated by drip irrigation system and trees were treated with normal agricultural practices. Twelve trees were selected nearly equal in growth (four trees for each replicate) in 2008 and 2009 seasons and the following records were taken:

Tree characteristics:

1- Flowering dates and full bloom
2- Total numbers of flowers at blooming stage were determined on 30 shoots randomly from each tree. Then after one month, number of fruits were counted and recorded to calculate fruit setting %.
3- Yield: harvest date, number and weight of apricot fruits were determined in each tree for yield attributes.
4- Vegetative growth:

   a- Trunk circumference for each tree was measured with a tape above graft union (10cm above the soil surface) at the end of each season.
   b- Tree dimensions: Canopy dimensions were measured at the end of October of each season.
   c- Length and diameter of ten one year old shoots were measured per tree at the end of each season

d- Leaf area were measured by area meters c D 2001 USA at the end of July in each season.

5- Fruit characteristics:

I- External:

Fruit weight, size and fruit dimensions (diameter, length and circumference in cm.), were determined. Also L /D ratio was estimated for ten fruits per tree.

II- Internal:

a- Flesh thickness and firmness of fruit were recorded.

b- Flesh percent: flesh percentage was calculated by such formula: Flesh weight X100 ÷ Fruit weight

c- Chemical characteristics:

SSC: Soluble Solids Content by hand refractometer.

Titratable Acidity: The titratable acidity percentage was determined according to AOAC1990.

SSC/ Acidity ratio was estimated and recorded.

The second experiment was started at 2008 and 2009 to compare the new apricot strain with Canino cultivar planted in the same area "Nubaria"; the trees were budded on apricot seedling and planted in a calcareous soil, trees having the same age and the same normal agricultural practices. Twelve trees as uniform as possible were selected, (four trees for each replicate). The following parameters were studied in both seasons (2008 and 2009).

1- The fruit set percentage was calculated and compared with the same percentage of new apricot strain.

2- At harvest time, number of fruits per tree and fruit yield were recorded and compared with the same values of new apricot strain.

3- The total number of fruits was recorded on ten shoots randomly from each tree. Then the percentages of fruits on spurs were calculated, in the two cultivars (the new strain and Canino cv.) under study.

4- All Fruit characteristics were recorded on 10 fruits per tree A.O.A.C (1990), and compared with the same data for the new apricot strain.

The obtained data during the study were statistically analyzed according to Snedecor and Cochran (1990) and L.S.D test at 0.05 level was used for evaluate the new strain and for comparison between it and Canino adapted cultivar.

RESULTS AND DISCUSSION

In the first experiment, dates of bud burst, flowering and fruit set as well as beginning of harvest of the new apricot strain are presented in Table (1). It is clear that the flowering period of the new strain ranged between 28 to 30 days in 2008 and 2009, respectively. Number of days from full bloom untill maturity was 62 and 61 days in the two seasons under the study. Fathi *et al*. (2008) found that Canino apricot trees need around 77 to 78 days for maturity. Also Khalil and El-Sheik, (2000) gave the same results for the maturity of Canino fruits (around 72 days).

Table(1): Date of bud burst, full bloom, fruit set and beginning of harvest for the new apricot strain in 2008 and 2009 seasons

season	Bud burst	Full bloom	Fruit set	Beginning of harvest
2008	Mar.8	Mar.22	Apr.5	May.23
2009	Mar.10	Mar.25	Apr.9	May.25

The present study clearly reveals that the new apricot strain had trunk circumference (27.27 and 31.20 cm), tree length (2.97 and 3.23m) and canopy diameter (2.72 and 2.88m) for the two seasons under study2008 and 2009. Table (2) shows the main branch circumference (4.27 and 5.03cm), and the number of shoots on these main branch (20.0 and 23.3).

Concerning length and diameter of one year old shoot, it was (62.13 and 73.40cm) and (0.71 and 0.84cm) respectively, while values of leaf area are (56.15 and 54.59cm). Liezenar-Malanczuk and Sosana, (2005) reported that the vegetative growth varied widely from apricot cultivar to another cultivar.

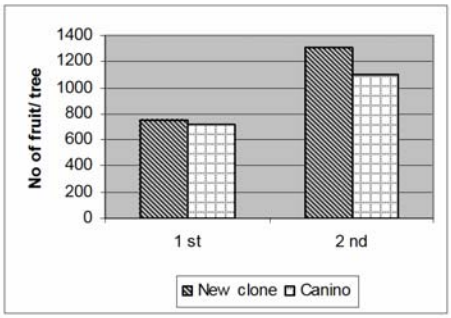
Table (2): Vegetative growth of the new apricot strain in 2008 and 2009 seasons

Season	Trunk circumference(cm)	Tree length (m)	Canopy diameter (m)	Main branch circumference (cm)	No. of shoots on main branch	Length of one year old shoot (cm)	Diameter of one year old shoot (cm)	Leaf area (cm^2)
2008	27.27	2.97	2.72	4.27	20.0	62.13	0.71	56.15
2009	31.20	3.23	2.88	5.03	23.3	73.40	0.84	54.59
L.S.D at 0.05	2.255	0.157	0.111	0.521	0.720	1.746	0.111	1.618

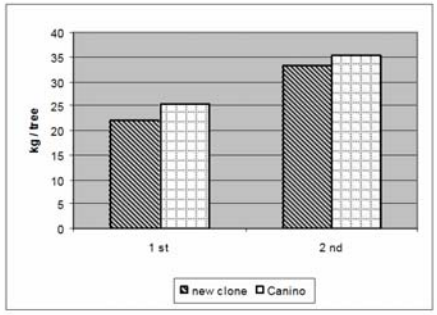
In the second experiment, Table 3 and Fig 1 summarize the comparison between the two cultivars (the new apricot strain and Canino cultivar) in the values of fruit set of new strain is slightly less than in Canino (ranged between 8.10 to 9.00% and between 10.43 to 10.20%) respectively. The number of fruits per tree for the new apricot strain was higher in the two seasons than the Canino cultivar (749.5- 1353.0) and (712.4- 1006.0) respectively. As regards to the yield in kilogram per tree, Canino gave 24.57 and 35.20 kg while the new apricot strain gave 22.20 and 33.20 kg in the two seasons respectively. Mclaren *et al* (1996) obtained fruit set between 0.4 and 46% in Sundrop apricot variety and between 1.0 and 54%in Moorpark apricot variety in New Zealand. Asthma (2000) reported that fruit set percentages of apricot flower buds range from 31.6 to 46.9% and fruit set percents age in bearing shoots are higher in the flowers located close to the tip than those close to the base. Alburqerque *et al* (2004) found that fruit set percentage ranged between 1.1 to 66.4% in some varieties in apricot, in Spain .Khalil and El-Sheik (2000) found that yield of Canino cultivar was higher than the yield of Amal cultivar in the two seasons under the study.

Table (3): Fruit set percentage, Number of fruits per tree and yield (kg / tree) of the new apricot strain and Canino cultivar in 2008 and 2009 seasons

Season	Fruit set %			No. of fruits/ tree			Yield / tree (kg)		
	New strain	Canino	Mean	New strain	Canino	Mean	New strain	Canino	Mean
2008	8.10	10.43	9.26	749.5	712.4	730.9	22.20	24.57	23.38
2009	9.00	10.20	9.60	1353.0	1006.0	1179.0	33.20	35.20	34.20
Mean	8.55	10.32		1051	859		27.70	29.88	
L.S.D at 0.05	Season		0.5544		93.93			1.49	
	CV.		0.5542		93.40			1.50	
	Season* CV		0.7840		132.1			2.107	



No. of fruits/ tree



Yield / tree (Kg)

Fig (1): yield per tree of two apricot cultivars (new apricot strain and Canino cv.) in 2008 and 2009 seasons.

Fruit weight, size, fruit length, diameter, L/D ratio, fruit firmness, flesh width and flesh percent of the new apricot strain and Canino cv. are shown in Table (4) and fig II in the second experiment. Significant differences in weight and size of fruits were observed between the values in the two seasons, (30.80 and 24.67 gm) in the new apricot strain and were (35.93 and 31.93 gm) in Canino cultivar, respectively. The highest values were in the first season and may be attributed to the lowest yield in such season.

It could be notice that there was a positive response of fruit dimensions in the two seasons under study. Apricot new strain fruits had length (3.30 and 3.23cm), while (3.06 and 3.33 cm) in Canino cultivar as well as diameter (3.54 and 3.69 cm) and (3.40 & 3.57 cm) in Canino cultivar, respectively Length/ Diameter ratio (0.932, 0.875, 0.902 and 0.934 for the two apricot cultivars under study, respectively. Little variations were observed in fruit firmness, flesh width and flesh percent, the flesh),

Table (4): Some Physical characteristics of fruits of the new apricot strain in 2008 and 2009 seasons.

season	Fruit weight (gm)			Fruit size (cm^3)			Fruit length (cm)			Fruit diameter (cm)		
	New strain	Canino cv.	Mean	New strain	Canino cv.	Mean	New strain	Canino cv.	Mean	New strain	Canino cv.	Mean
2008	30.8	35.93	33.37	28.57	22.60	25.58	3.30	3.06	3.18	3.54	3.40	3.47
2009	24.67	31.93	28.30	33.97	29.77	31.87	3.23	3.33	3.28	3.69	3.57	3.63
Mean	27.73	33.93		31.27	26.18		3.26	3.20		3.61	3.49	
L.S.D at 0.05	Season	0 .556		0.5859			0.1787			0.0773		
	CV.	0.5562		0.5859			0.1787			0.0773		
	Season* CV.	0.7866		0.8286			0.2527			0.1094		
season	Fruit width (cm)			Flesh %			Fruit firmness ($Ib/ Inch^2$)			L/D ratio		
	New strain	Canino cv.	Mean	New strain	Canino cv.	Mean	New strain	Canino cv.	Mean	New strain	Canino cv.	Mean
2008	1.20	1.10	1.15	93.43	90.73	92.08	4.03	7.27	5.65	0.93	0.90	0.92
2009	1.40	1.26	1.33	94.10	91.20	92.65	5.60	8.97	7.28	0.88	0.93	0.91
Mean	1.30	1.18		93.77	90.97		4.82	8.12		0.91	0.92	
L.S.D at 0.05	Season	0.0893		0.6978			0.5843			0.0447		
	CV.	0.0893		0.6978			0.5842			0.0447		
	Season* CV.	0.1264		0.9869			0.8262			0.0632		

percentage ranges from 93.43 to 94.10% for the new apricot strain while (90.73 and 91.20) in Canino cultivar in the two seasons .Fig II shows the comparison between the new apricot strain and Canino cultivar for the values of fruit weight, firmness, flesh percentage and SSC percent. The present data refers to better fruit weight for Canino and ranged between 31.93 to 35.93 gm in the two seasons. Fruit firmness values were lower for the new strain (4.03 and 5.60) for Canino (7.27 and 8.97) during the two seasons 2008 and 2009 respectively. Concerning the flesh percent, it significantly

increased for the new strain (93.43 and 94.10%), while they were (90.73 and 91.20%) for Canino in the two seasons respectively. The same results for the values of SSC% where the new strain gave 14.27 and 12.43% and Canino gave 11.90 and 10.60%

Concerning some chemical characteristics of fruits of the new apricot strain data in table (5) indicated that SSC%, Acidity and SSC/ Acidity ratio were significantly differ. Acidity% and SSC / acidity were higher in the first season (0.83 and 0.65% and 17.10 and 17.98) for the new strain, while they were (0.66 and 0.68% and 19.08 and 15.63) for Canino in the two seasons respectively.

Table (5): Some chemical characteristics of fruits of the new apricot strain and Canino cultivar in 2008 and 2009 seasons

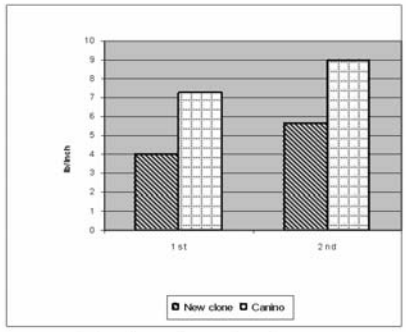
Season	SSC %		Mean	Titralable Acidity %		Mean	SSC / Acidity ratio		Mean
	New strain	Canino cv.		New strain	Canino cv.		New strain	Canino cv.	
2008	14.27	11.90	13.08	0.83	0.66	0.75	17.10	19.08	18.09
2009	12.43	10.60	10.60	0.65	0.68	0.66	17.98	15.63	16.80
Mean	13.35	11.25		0.74	0.67		17.54	17.35	
L.S.D at 0.05	**Season** 0 .3431			0.0446			1.064		
	CV. 0.3432			0.0446			1.064		
	Season*CV. 0.4853			0.0632			1.504		

SSC / Acidity ratio significantly increased in the second season (17.50 and 20.43 respectively). So this ratio is considered as an indicator for high fruit quality. El-Banna and Guirguis (1993) selected fourteen apricot seedling trees which considered superior of its fruit qualities and can be used as future mother trees for apricot propagation. Khalil and El-Sheik (2000) stated that SSC and Acidity percentage were very close for the two apricot cultivars (Amal and Canino). Also, they mentioned that the flesh percentage ranged "between" 92% to 95% for the same cultivar.

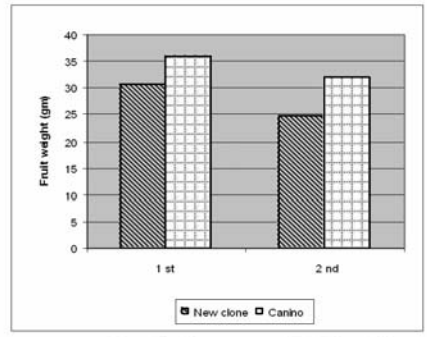
The fruiting behavior of the two apricot cultivars is presented in Table (6). The number of fruits on shoot was (65.12 and 60.47) in the new apricot strain and were (71.35 and 65.43) in Canino cultivar. The percentage of fruits on spur were (34.86 and 55.18%) in the new apricot strain and (28.65% and 71.35%) in Canino cultivar. These results were in agreement with Khalil and El-Sheik (2000) who postulated that the majority of the fruits were on spurs.

Table (6): Number of fruits on main shoot and the percentage of fruits on spur for the new apricot strain and Canino cultivar in 2008 and 2009 seasons

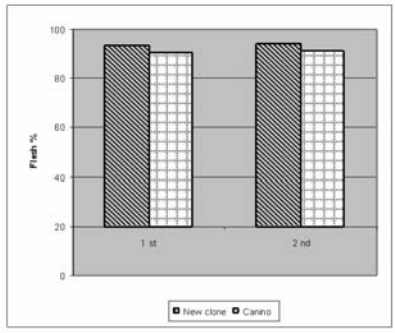
Season	No. of fruits/ main shoot		Mean	Percentage of fruits on spur		Mean
	New strain	Canino cv.		New strain	Canino cv.	
2008	65.12	71.35	68.23	34.86	28.65	31.75
2009	60.47	65.43	62.95	55.18	71.35	63.26
Mean	62.79	68.39		45.02	50.0	
L.S.D at 0.05	**Season** 2.37 **CV.** 2.38 **Season*CV.** 3.36			14.89 14.89 21.05		



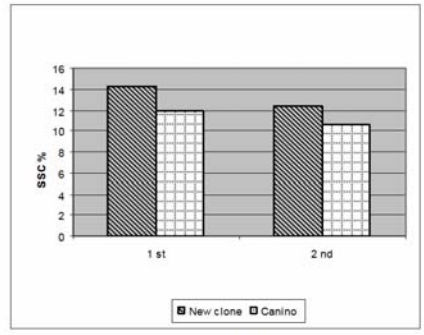
Fruit weight (gm)



Fruit firmness (Ib/ Inch^2)



Flesh percent %



SSC %

Fig II: Fruit weight, fruit firmness, flesh percent and SSC of two apricot cultivars (New apricot strain and Canino) in 2008 and 2009 seasons

Fig III: Tree and fruits of the new apricot strain in 2009 season

Conclusion

The evaluation based on vegetative growth and yield performance as well as physical and chemical properties of fruit of new apricot strain reveals significant superiority Canino cultivar in having earlier harvest date, yield as in number fruits per tree, SSC percentage and the flesh percent. The fruits of the new apricot cultivar have attractive color but smaller in size than Canino fruits. The evaluation of this new strain will give good chance for breeders and fruit growers to produce new cultivar.

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تقييم لسلالة مشمش جديدة منتخبة تحت ظروف منطقة النوبارية بمصر

بهان محمود خليل – وصفي ماهر عبد المسيح- سلوى الحبشي عبد الفتاح- رمضان أبوسريع سيد

معهد بحوث البساتين- مركز البحوث الزراعية – الجيزة.

أجريت هذه الدراسة على أشجار مشمش منزرعة في محطة البحوث الزراعية بمنطقة النوبارية محافظة البحيرة في عام 2003 ومطعومة على أصول مشمش بذرية وذلك لدراسة سلوك سلالة جديدة منتخبة من منطقة الخطاطبة محافظة المنوفية ومقارنتها بصنف المشمش "كانينو" المنزرع في نفس منطقة النوبارية ونفس طبيعة التربة وكان ملخص النتائج المتحصل عليها كالآتي:

1- تبكير السلالة الجديدة في بداية ميعاد الجمع بحوالي 10- 15 يوم عن صنف الكانينو.

2- تفوقت السلالة في عدد الثمار بالنسبة للشجرة الواحدة عن صنف الكانينو بينما كان المحصول أقل وزناً.

3- تفوقت السلالة الجديدة في نسبة اللحم للثمار مقارنة بصنف الكانينو.

4- كما تفوقت السلالة الجديدة في نسبة المواد الصلبة الذائبة الكلية عنها في ثمار صنف الكانينو بينما كانت متقاربة جداً في قيم الحموضة.

5- كانت صلابة الثمار أقل في السلالة الجديدة .