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COMPARATIVE STUDIES ON SIX POMEGRANATE CULTIVARS UNDER BENI – SUEF GOVERNORATE CONDITIONS

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ABSTRACT

The present study was carried out for the comparison of six pomegranate cultivars namely: Manfalouty, Nab El-Gamal, Wardy, Araby, Badr and Tahrir grown at the experimental farm of the Hort. Res. Instit., station at Seds, Beni- Suef Governorate of middle Egypt region during the two growing seasons of 2007 and 2008.The present study included the different polymorphism variances as ; vegetative growth, flowering, yield, fruit quality and rooting ability of the six pomegranate cultivars. In this respect, Manfalouty and Tahrir cultivars were superior in most of vegetative growth characteristics. On the other hand, Badr cv. had the lowest values in most of these growth characteristics. The highest percentage of perfect flowers / tree was recorded for Araby and Tahrir cvs. and the lowest one was for Nab El-Gamal cultivar. Manfalouty and Wardy cvs. gave higher percentage of fruit set while Badr cultivar recorded the lowest values. Moreover, Nab El-Gamal and Manfalouty exhibited the highest yield (kg / tree), fruit weight, length, diameter & volume and juice volume while Badr cv. gave the least ones. The highest percentage of fruit grain was in Tahrir cultivar. As for fruit juice chemical characteristics (total acidity; total soluble sugars; vitamin (c); ascorbic acid; total anthocyanin and tannins), in general, the best cultivars were Manfalouty, Nab El-Gamal, Wardy and Tahrir. Cuttings of Badr and Tahrir cultivars gave the highest rooting percentage with tallest root while Nab El-Gamal had the highest number of roots in both experimental seasons. It is worthy to mention that, it can be recommended with Nab El-Gamal, Manfalouty, Wardy and Tahrir cultivars (the yield more than 30 kg/tree) to be planted in Beni-Suef Governorate representing the Middle Egypt region and are preferable than Badr and Araby pomegranate cultivars.

Keywords*:* Pomegranate – evaluation – cultivars – vegetative growth – flowering – yield – fruit quality – cuttings rooting ability**.**

INTRODUCTION

Pomegranate (*Punica granatum* L.) is one of the oldest known edible fruits. Its history dates to very ancient times. This fruit tree is one of the species mentioned in the Bible and the Koran and is often associated to fertility; originally from the Middle East and Asia., then it spreaded into Asia (Turkmenistan, Afghanistan, India, China, etc.), North Africa and Mediterranean Europe. The domestication process took place independently in various regions and not only in the Mediterranean region (Evreinoff, 1949).

Pomegranate is considered an excellent tree for growing in arid zones for its resistance to drought conditions. It is now widely cultivated in Mediterranean, in tropical and subtropical areas (Badizadigan, 1975, Ravi, 1999, Abdel –Naeem *et al.,* 2006 and Özgüven *et al.,* 2009). So it has been widely cultivated in Egypt long time ago .The total cultivated area of pomegranate reached 8080 feddans with total fruit production of 42934 metric tons, according to the statistics of the Ministry of Agriculture (2007).

This area is concentrated at Upper Egypt Governorates (Assuit and Souhag). The pomegranate is considered one of the most valuable fruits for its medicinal properties. Every part of the tree (leaves, flowers and roots) has featured in medicine for thousands of years. The majority of the pomegranate cultivars are grown for fresh consumption , though some are used in the processing industry and some have ornamental value (Feng YuZheng, *et al*., 1998).Therefore, there is an increased demand for fruits of pomegranate to meet the needs of both local and foreign markets to some European and Arabic countries (Boulos, 1960).The evaluation of pomegranate trees in different regions all over the world has been studied using products of fruits for processing (Pasad and Banker, 1999) or to determine the degree of polymorphism and similarities among genotypes (Khalil *et al* ., 1985; Mars and Marackchi, 1999 and Sarkhosh *et al.*, 2009) or may be used to develop an index for cultivars selection for pomegranate production and breeding programs in the future (Varasteh *et al*., 2009). In addition to the flowering and fruiting behavior (El- Kassas *et al*., 1998 and Feng YuZheng, *et al*., 1998) reported that fruit quality characteristics were assessed for the utilization of pomegranate cultivars resources. Evaluation fruit characteristics and chemical components of pomegranate cultivars were studied under different regions as Assiut Governorate (El- Sese, 1988b) and new reclaimed region , South Tahrir, (Abou- El-Khashab *et al*., 2005) . Moreover, it is necessary to evaluate the rooting ability of these pomegranate cultivars (Safia *et al*., 1998 and Dhillon and Sharma, 2002).

Thus, this study was carried out to evaluate vegetative growth, flowering & fruiting characteristics and rooting ability of six pomegranate cultivars namely (Manfalouty, Nab- El-Gamal, Wardy, Araby, Badr and Tahrir) growing under the environmental conditions of Bani-Suef Governorate representing the Middle Egypt region.

MATERIALS AND METHODS

The present investigation was carried out during two successive seasons of 2007 and 2008 on 7- years- old of six pomegranate cultivars namely ; Manfalouty, Nab–El-Gamal, Wardy, Araby, Badr and Tahrir at the Horticulture Research Station orchard of Seds, Beni–Suef Governorate, to evaluate vegetative growth, flowering, fruiting and rooting ability of pomegranate cultivars under study. These trees were planted at 5x 5 meters apart in clay soil. In each season, 54 pomegranate single stem trees of six cultivars were selected with approximately the same vigor and received the same horticultural practices. The complete randomized design was followed with three replicates, each replicate was represented by three trees for each cultivar.

The following characters were studied:

Twenty shoots were labeled on each tree in different directions to study vegetative growth, flowering and fruiting.

I- Vegetative growth parameters:

Tree trunk circumference (cm), tree canopy circumference (m), tree height (m), shoot length & diameter (cm), number of internodes /shoot, number of leaves / shoot and leaf surface area were recorded.

II- Flowering characteristics:

The beginning of flowering date was recorded. The seasonal density of total number of both perfect and male flowers throughout flowering season was studied. From April to June of each season all opened perfect and male flowers were counted and labeled at weekly intervals, then, the percentage of perfect flowers was calculated relative to total number of each of perfect and male flowers / tree .The number of perfect flowers which succeeded to set fruits was also counted and labeled.

III– Date of fruit maturity, Yield and fruit quality characteristics:

1- Date of fruit maturity for the studied cultivars was recorded.

2- Total yield / tree was calculated as yield weight kg / tree, total fruit number / tree and fruit weight at harvest time. Fruits were picked at the last week of August for Wardy and Araby cultivars and at the 1st week of October for Manfaloty, Nab – El-Gamal, Badr and Tahrir cultivars in both seasons.

3- Fruit quality characteristics:

A sample of 10 fruits of each replicate tree was randomly selected for determining the following physical and chemical properties:

A-Fruit physical properties:

Fruit length & diameter (cm), fruit volume (cm^3), number of rooms / fruit, grain weight %, peel weight %, juice weight %, and juice volume (cm^3) and peel thickness (cm).

B-Fruit chemical properties:

- Total soluble solids % was estimated by using the hand refractometer.
- Total acidity using titration by NaOH at 0.1 N and phenolphthalein as an indicator then expressed it as gram citric acid / 100 ml juice as described in (A .O .A .C., 1985).
- Total soluble sugars: was determined according to the method described by Dubois *et al*., 1956. The amount of the estimated sugars in each sample was calculated in term of glucose.
- Vitamin (c) content mg. Ascorbic acid / 100 ml juice by (A .O .A .C., 1985).
- Total anthocyanin content in fruit juice as described by (Hsia *et al*., 1965).
- Tannins content was determined in fruit juice by the method described by (Winton and Winton., 1945).

V- Rooting ability:

An experiment was conducted during 2007 and 2008 seasons on terminal stem cuttings of the six pomegranate cultivars under studying to evaluate their rooting ability. All cuttings were prepared as being 20 – 25 cm. in length and 1- 1.5 cm in diameter after defoliation the leaves at December of every season. Cuttings were treated with Indole Butyric Acid (IBA) at 3000 ppm concentration and layered them until planting time in mid of February

every year. Each cutting was planted in plastic polyethylene black bag in a mixture of clay and sand (1:2).

Three months later, the rooting ability of the cuttings was recorded as rooting percentage, root length and number of roots / rooted cutting.

Statistical analysis: The complete randomized design was followed in this study. The obtained data was subjected to analysis of variance (ANOVA) according to Snedecor and Cochran (1980). Differences between treatments were compared by LSD Test at 5%.

RESULTS AND DISCUSSION

I- Vegetative growth:

Results illustrated in Table (1) show that, circumference of tree trunk , tree height and canopy circumference of the studied pomegranate cultivars (Manfalouty , Nab El-Gamal ,Wardy , Araby , Tahrir and Badr) during 2007 and 2008 seasons . As for circumference of tree trunk , data revealed that Badr , Tahrir and Manfalouty had the highest values while Araby gave the lowest values in both seasons .Concerning the tree height of pomegranate cultivars which ranged from 3.34 and 3.55 for Manfalouty to 2.55 and 2.65 for Badr cultivar in 2007 and 2008 seasons , respectively. The differences between Manfalouty, Nab El- Gamal and Tahrir were not significant in both seasons while the other cultivars as Wardy, Araby and Badr gave significant difference with these cultivars. Regarding to canopy circumference, data in Table (1) indicated that, the canopy circumference of Nab El- Gamal in the first season had the highest values followed by Manfalouty while the lowest values obtained from Wardy cultivar. However, the highest circumference of pomegranate canopy cvs. was recorded for Manfalouty cv. and the lowest values was from Badr cultivar in the second season.

Shoot length, shoot diameter and number of internodes / shoot of pomegranate cultivars under study during 2007 and 2008 seasons are shown in Table (1). It is clear that, Manfalouty pomegranate cultivar had the highest values of shoot characteristics comparing with the others in 2007 and 2008 seasons. While the lowest values of shoot length was recorded for Badr cv., Araby cv. where gave the lowest values of shoot diameter and Wardy cultivar had the lowest number of internodes in the two study seasons .These results are in line partially with those reported by Khalil *et al*.,(1985) and Abou-El-khashab *et al*., (2005) on some pomegranate cultivars .

As for the number of leaves / shoot, Tahrir and Manfalouty cvs. exhibited the superior number of leaves / shoot in the first season and Manfalouty in the second one. On the contrary, Badr cv. had the lowest values in both seasons. These results are in agreement with Abou-El-khashab *et al*., (2005). Concerning the leaf area, Manfalouty pomegranate cultivar gave the highest records, while Badr gave the lowest ones in both seasons.

II- Flowering characteristics:

Data presented in Table (2) show flowering characteristics of some pomegranate cultivars under the conditions of Beni- Suef governorate during 2007 and 2008 seasons.

As for the date of flowering beginning of pomegranate cultivars under study as show in Table (2). Araby and Badr cultivars were earlier (1st week of April) during both seasons while the other cultivars were later (2nd week of April). El- Sese (1988b) found that Araby cultivar was earlier than Manfalouty and Nab El-Gamal under Assiut Governorate conditions.

Regarding to number of perfect flowers / tree, data in Table (2) show that Badr pomegranate cultivar produced the highest number of perfect flowers / tree (288.68 and 295.74) followed by Tahrir cultivar (236.74 and 258.20) in the first and second seasons , respectively. On the other hand, Araby cultivar produced the lowest number of perfect flowers / tree (171.64 and 195.47) in 2007 and 2008 seasons, respectively as compared with the other cultivars in the two experimental seasons.

As regard to number of male flowers / tree, data in Table (2) illustrated significant differences among pomegranate cultivars under study in both seasons. Nab El-Gamal pomegranate cultivar produced the highest number of male flowers/ tree (936.65 and 1063.60). Whereas, Badr cv. came in the second order in both seasons (820.46 and 789.85) in the first and second seasons, respectively .On the other hand , Araby cv. produced the lowest number of male flowers / tree (355.10 and 373.34) in 2007 and 2008 seasons, respectively .

Total number of flowers /tree: Significant differences were also observed between pomegranate cultivars in the total No. of flowers/ tree in both experimental seasons. Nab El-Gamal followed by Badr cv. gave the highest values, while Araby cultivar was the lowest in both seasons.

Concerning perfect flowers percentage /tree, data indicated that Araby and Tahrir cultivars had higher percentage of perfect flowers / tree followed by Manfalouty cv. in the 1st season (32.65, 32.30 and 28.34), respectively. Meanwhile, in the 2nd one, Tahrir followed by Araby and Badr gave the highest percentage of perfect flowers (36.42, 34.37 and 27.30), respectively. On the contrary, the lowest values of perfect flowers percentage were recorded for Nab El-Gamal cultivar (19.55 and 17.96) in 2007 and 2008 seasons, respectively. These results are in partial agreement with Ibrahim *et al*., (1985); El- Sese (1988b) and El- Kassas *et al.,* (1998) who reported that the variation in male, perfect and total flowers / tree could be due to varietal differences and crop load during the previous season.

As for fruit set (%), data in Table (2) show that, significant differences were noticed among pomegranate cultivars under study during the two growing seasons. Wardy cv. showed the highest percentage of fruit set (34.30%) followed by Manfalouty and Araby cultivars (31.41 and 31.37 %), respectively, in the first season. Almost similar results were observed in the second season with Wardy cv. (32.43 %) followed by Manfalouty and Araby cultivars (29.94 and 27.96 %), respectively. On the other hand, Badr gave the lowest percentage of fruit set (26.77 and 25.05) in the first and second seasons, respectively as compared with the other cultivars.

1+2

III –Yield and fruit quality:

1- Number of fruits / tree:

Data in Table (3) show that, Wardy cultivar produced the highest number of fruits / tree (132.85 and 135.60) followed by Nab El-Gamal and Tahrir (129.93 and 132.41 & 119.20 and 129.57 in the first and second seasons, respectively. On the contrary, Badr pomegranate cultivar produced the lowest fruit number / tree (84.04 and 108.69) in both seasons, respectively.

2- Fruit weight:

As regard to average fruit weight of six pomegranate cultivars under studying, data indicated significant differences among these cultivars in both seasons. Manfalouty cv. produced the greatest weight of fruit (306.78 g) followed by Nab El-Gamal and Araby (299.0 and 273.37 g), respectively, in the first season. Whereas, Nab El-Gamal produced the highest fruit weight (316.83 g) followed by Manfalouty and Wardy cv. (307.73 and 272.18 g), respectively, in the second season. On the other hand, Badr cultivar produced the lowest fruit weight (227.67 and 218.20 g) in the first and second seasons, respectively. Similar results were found by El- Kassas *et al.,* (1998) and Abou-El-khashab *et al*., (2005). *3-Yield/ tree:* Significant differences were observed among pomegranate cultivars in the yield of tree during the two growing seasons Table (3).In the first season, the yield / tree varied from 19.18 to 38.85 kg .The highest yield of tree was produced by Nab El-Gamal (38.85) followed by Manfalouty, Wardy and Tahrir cultivars (33.28, 32.70 and 30.59 kg,), respectively. Similar results were observed in the second season in which the yield ranged from 23.73 to 42.04 kg and the highest yield was produced by Nab El-Gamal (42.04 kg) followed by Wardy, Manfalouty and Tahrir cvs. (36.95, 35.10 and 33.58 kg, respectively).Meanwhile, the lowest yield was obtained from Badr pomegranate cultivar (19.18 and 23.73 kg, in the first and second seasons, respectively). Araby cultivar gave the intermediate yield in both experimental seasons. Generally, data indicated differences and significant variations in the yield of pomegranate cultivars under study .These results are in line with some of investigators (**Ibrahim *et al***., 1985; El- Sese 1988b; El- Kassas *et al*., 1998 and Abou-El- khashab *et al*., 2005).

Table(3): Yield. Fruit number and fruit weight of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons.

Cultivars	Yield (kg/tree)		Fruit number / tree		Fruit weight (g)	
	2007	2008	2007	2008	2007	2008
Manfalouty	33.28	35.10	108.47	113.99	306.78	307.73
Nab-El-Gamal	38.85	42.04	129.93	132.41	299.00	316.83
Wardy	32.70	36.95	132.85	135.60	246.79	272.18
Araby	28.90	28.11	105.95	115.33	273.37	245.31
Badr	19.18	23.73	84.04	108.69	227.67	218.20
Tahrir	30.59	33.58	119.20	129.57	256.65	258.48
L. S. D. at 0.05	2.57	4.20	8.52	9.44	0.38	0.42

4- Date of fruit maturity:

Concerning date of maturity of pomegranate cultivars under studying, the data in Table (4) show that, Wardy was the earliest cultivar in this respect, (21 August and 17 August) in the first and second seasons, respectively, followed by fruits of Araby (27 and 20 August) in 2007 and 2008 seasons, respectively. However, the maturity of Manfalouty, Nab El-Gamal and Badr cvs. fruits were approximately at the last week of September and Tahrir cv. matured at the middle of September.

5-Fruit physical properties:

Data concerning fruit physical characteristics as ; fruit length; diameter &volume; number of rooms / fruit ; grain; peel & juice weights; juice volume and peel thickness of six pomegranate cultivars under the conditions of Beni Suef Governorate are presented in Tables 4 and 5 during 2007 and 2008 seasons. It is clear that, Nab El-Gamal cv. gave the highest fruit length, diameter and fruit volume (Table 4) followed by Manfalouty cultivar. In contrast, the least fruit size was recorded for Badr pomegranate cultivar in the two experimental seasons.

As for the number of rooms/ fruit, data in (Table 4) shows significant differences among cultivars under studying. Araby cv. had the highest number of rooms/ fruit while Badr cultivar gave the lowest values in the first season.

No significant differences were recorded among pomegranate cultivars in the second season.

The percentage of fruit grain, fruit peel and fruit juice of six pomegranate cultivars are presented in Table (5). Significant differences were observed among the six pomegranate cultivars in the percentage of fruit grain, peel and juice during the first and second seasons. Tahrir cultivar produced the highest percentage of fruit grain while Manfalouty cv. gave the lowest percentage in both seasons. The percentage of fruit peel and fruit juice was higher for Manfalouty cultivar in the first and second seasons. Significant differences were also observed among the six pomegranate cultivars under studying in juice volume during the two growing seasons (Table 5). Juice volume ranged from 83.83 and 82.45 to 132.33 and 131.67 cm^3 in the first and second seasons, respectively. Nab El-Gamal cv. produced the highest juice volume followed by Manfalouty and Araby, however, the lowest volume of juice recorded for Badr cv. in both experimental seasons. As for peel thickness, the highest values in the first season were 0.771, 0.741 and 0.739 cm. for Nab El-Gamal, Manfalouty and Araby, respectively, whereas the lowest value was 0.508 for Badr cultivar. While, in the second season, the highest values were 0.559 and 0.482 for Wardy and Nab El-Gamal and the lowest value was 0.386 for Manfalouty cultivar. These results were related with reported by Ozguven *et al*., (1997); Ravi (1999) and Abou El-khashab *et al*., (2005).

4+5+6

6-Fruit chemical properties:

1- **Total soluble solids:**

Data presented in (Table 6) shows significant differences among the six pomegranate cultivars under studying during the two growing seasons. Manfalouty cv. gave the highest significant total soluble solids (15.80 and 15.73) in the first and second seasons, respectively, compared to the other cultivars. While the lowest total soluble solids obtained from fruits of Araby cultivar (14.63 and 15.00) in both seasons, respectively.

2- **Total acidity*:***

Data in (Table 6) revealed that, total acidity percentage in the fruit juice varied according to cultivars. It was significantly lower in fruits juice of Wardy cultivar (1.099 and 1.087 %) in 2007 and 2008 seasons, respectively. In contrast, the highest total acidity was recoded for fruits of Nab El-Gamal in the first season (1.297 %) and Manfalouty in the second one (1.358 %). El-Kassas (1983) reported that the total acidity and TSS in pomegranate juice are an efficient index to define fruit quality.

3-Total soluble sugars:

Data in (Table 6) showed significant differences among cultivars under study. The highest percentages of total sugars were 15.46 and 15.03 for fruits of Manfalouty cv. in the first and second seasons, respectively. While the lowest percentages of total sugars were 13.24 and 13.78 for fruits of Badr cultivar. These results were evaluated on the basis of Melgarejo *et al.*(1997).

4-Vitamin C :

According to (Table 6), it was clear that, vitamin C significantly differed in fruits juice of different cultivars in both seasons. Manfalouty and Nab El-Gamal produced the highest content of vitamin C in their fruits (23.40 and 23.20 mg ascorbic acid / 100 ml juice), respectively, in the first season. Moreover, Nab El-Gamal, Badr and Manfalouty gave the highest content of vitamin C (24.13, 23.80 and 23.73), respectively, in the second season .On the other hand, Badr cv. had the lowest content of vitamin C in the first season while in the second one Araby cv. gave the same result as compared to the other cultivars.

4- Total anthocyanin:

It is clear from Table 6 that the six pomegranate cultivar under studying in general significantly varied in respect of total anthocyanin content during the two growing seasons. In the first season, the values ranged from 0.395 to 0.662 %. Manfalouty cultivar produced the highest content of anthocyanin (0.662 %) followed by Nab El-Gamal cv. and Tahrir (0.581 and 0.511 %), respectively. Nearly similar results were found in the second season in which the total anthocynin content % varied from 0.405 to 0.638 % .The highest content of anthocynin was recroded by Manfalouty followed by Nab El-Gamal cv. and Tahrir .On the contrary the lowest content was obtained from the juice of Araby fruits in both seasons .

5- Tannins content:

In this respect, significant differences were recorded among the pomegranate cultivars under studying in both seasons. Manfalouty and Nab El-Gamal cvs. had the highest tannins content (3.23 and 3.10) in the first and

second seasons, respectively. However, the lowest tannins content in fruit juice was obtained from juice of Wardy cv. (2.57 and 2.73) in 2007 and 2008 seasons, respectively. These results were on the basis of the study of Ozguven *et al*., (1997) and Gil *et al*., (1997) on Mediterranean pomegranate cultivars. A significant variation among some pomegranate cultivars in respect of fruit physic-chemical properties were found under the conditions of Assiut Governorate, El- Kassas *et al*., (1998) and conditions of South Tahrir, Abou El-khashab *et al*. (2005).

Rooting ability:

Data presented in (Table 7) show that significant variation with respect of rooting percentage, root length and number of roots/ rooted cutting of six pomegranate cultivars , Manfalouty , Nab El-Gamal, Wardy , Araby , Badr and Tahrir under the environmental conditions of Beni- Suef Govrnorate during 2007 and 2008 seasons.

As for rooting percentage, Badr and Tahrir cultivars gave the highest percentage of rooting (88.83 & 89.07 and 87.53 &85.50) in the first & second seasons, respectively, followed by Nab El-Gamal and its averages were 78.48 and 78.60 in the first and second seasons, respectively .On the Other hand, the lowest rooting percentage was recorded for Manfalouty in the first season and recorded for Wardy in the second one.

Regard to the root length , the tallest roots were obtained from cuttings of Badr and Tahrir cultivars in both seasons while the shortest roots were recorded for the cuttings of Wardy in the first season and Manfalouty in the second one.

Table (7): Rooting percentage , root length and number of roots / rooted cutting of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons.

Cultivars	Rooting percentage %		Root length (cm)		Number of rooted roots/ cutting	
	2007	2008	2007	2008	2007	2008
Manfalouty	72.63	68.37	13.02	15.18	18.37	21.27
Nab-El-Gamal	78.48	78.60	18.70	20.92	20.67	22.85
Wardy	65.55	63.41	12.36	17.94	14.34	18.52
Araby	74.91	69.89	17.40	15.84	9.40	13.44
Badr	88.83	89.07	19.00	22.28	16.90	17.15

Tahrir	87.53	85.50	17.17	19.36	12.74	13.22
L. S. D. at 0.05	2.53	2.24	1.88	1.30	1.58	1.03

Number of roots / rooted cutting of pomegranate cultivars were varied clearly in both seasons according to the cultivars. Whereas, Nab El-Gamal cv. gave the highest number of roots / rooted cutting (20.67 and 22.85) followed by that formed on the cuttings of Manfalouty (18.37 and 21.27) while the lowest number of roots / rooted cutting were produced by the cuttings of Araby (9.40 and 13.44) in the first and second seasons, respectively .

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These results agree with those reported by (Purohit *et al*., 1985; Reddy and Reddy 1990 and Safia *et al*., 1998) who mentioned that the pomegranate cvs. succeeded to root and rooting potentiality was greatly varied from one cultivar to another .This may be attributed to the variance in the environmental conditions prevailing during both seasons which could be certainly reflected on characteristics, nutritional status and rooting potentiality of cuttings.

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دراسات مقارنة على ستة أصناف من الرمان تحت ظروف محافظة بنى سويف

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أجريت هذه الدراسة لمقارنة ستة أصناف من الرمان وهى المنفلوطي – ناب الجمل – وردى – عربي – بدر – تحرير والمنزرعة بالمزرعة البحثية لمحطة بحوث البساتين بسدس – بنى سويف والتي تمثل منطقة مصر الوسطي خلال عامي ٢٠٠٧ , ٢٠٠٨ .

وتضمنت هذه الدراسة مختلف القياسات : النمو الخضري و التزهير و المحصول و جودة الثمار كذلك قدرة عقل هذه الأصناف على تكوين الجذور.

وكانت النتائج كما يلي :

- تفوق صنفي الرمان المنفلوطي وتحرير في معظم صفات النمو الخضري المدروسة أما أقل القيم في النمو فكانت للصنف بدر.
- كانت أعلى نسبة للأزهار الخنثى / شجرة للصنفين عربي وتحرير وأقل نسبة كانت للصنف ناب الجمل .
- نسبة العقد للثمار كانت أعلى لصنفي منفلوطى ووردي وكانت أقل لصنف بدر
- أعطى صنفي الرمان ناب الجمل والمنفلوطي أعلى القيم للمحصول (كجم / شجرة) ووزن الثمرة و طول و سمك و حجم الثمرة و حجم العصير بينما كان الصنف بدر هو أقل الأصناف في هذه الصفات . كما أوضح الصنف تحرير أعلى نسبة للحب فى الثمار.
- كانت أعلى نسبة تجذ ير وأطول الجذور لصنفي الرمان بدر وتحرير أما أكبر عدد من الجذور/ عقلة فكان للصنف ناب الجمل خلال موسمي الدراسة .

وعلى ذلك يمكن التوصية تحت ظروف محافظة بنى سويف ومنطقة مصر الوسطي بزراعة أصناف الرمان : ناب الجمل و المنفلوطي و الوردي وتحرير حيث أن محصولهم أكبر من ٣٠ كجم / شجرة كأصناف مفضلة عن الصنفين عربي وبدر .

قام بتحكيم البحث

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Table(1):Vegetative grouth characteristics of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons .

Cultivars	Circumference of tree trunk (cm)		Tree height (m)		Canopy circumference (m)		Shoot length (cm)		Shoot diameter (cm)		Number of internodes / shoot		Number of leaves / shoot		Leaf area (cm)^2	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Manfalouty	25.89	29.09	3.34	3.55	8.03	9.30	35.19	32.80	0.419	0.400	16.23	16.42	45.42	52.91	9.64	10.58
Nab-El-Gamal	24.68	27.40	3.18	3.50	8.40	8.50	26.89	26.64	0.380	0.381	8.91	9.96	43.72	50.97	9.10	9.44
Wardy	24.32	26.57	2.94	3.33	7.32	8.16	24.37	25.91	0.345	0.353	8.45	8.56	43.00	41.37	8.16	7.84
Araby	20.65	23.56	2.68	2.69	7.56	8.64	22.06	23.43	0.320	0.321	9.77	10.33	42.66	45.75	6.58	7.32
Badr	29.96	31.44	2.55	2.65	6.58	7.72	21.00	22.61	0.426	0.395	14.11	13.46	31.40	39.11	5.63	5.10
Tahrir	28.71	29.51	3.26	3.52	7.43	8.58	30.57	30.45	0.387	0.395	14.71	15.28	46.41	47.50	7.94	8.74
L. S. D. at 0.05	1.70	1.35	0.58	0.84	0.38	0.42	2.35	2.40	0.016	0.007	1.16	1.19	4.47	5.98	0.61	0.45

Table(2): Flowering and fruit set of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons .

Cultivar	Time of beginning of flowers		Number of perfect flowers / tree		Number of male flowers / tree		Total flowers / tree		Perfect flowers percentage / tree		Fruit set %	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Manfalouty	Apr.14	Apr.15	208.22	224.51	429.59	626.08	737.81	850.59	28.34	26.41	31.41	29.94
Nab-El-Gamal	Apr.14	Apr.13	227.42	236.85	936.65	1063.6	1146.07	1320.43	19.55	17.96	26.80	25.71
Wardy	Apr.12	Apr.14	191.47	209.53	557.45	638.31	748.92	847.85	25.79	24.79	34.30	32.43
Araby	Apr.6	Apr.4	171.64	195.47	355.10	373.34	526.74	568.81	32.65	34.37	31.37	27.96
Badr	Apr.7	Apr.6	288.68	295.74	820.46	789.85	1109.17	1085.67	26.08	27.30	26.77	25.05
Tahrir	Apr.16	Apr.12	236.74	258.20	496.38	455.10	733.12	713.33	32.30	36.42	28.92	25.40
L. S. D. at 0.05			4.85	5.75	66.96	42.28	51.43	40.78	1.71	1.86	2.21	1.91

Table(4): Fruit physical characteristics of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons .

Cultivar	Time of fruit maturity		Fruit length (cm)		Fruit diameter (cm)		Fruit volume(cm^3)		Number of rooms/ fruit	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Manfalouty	Sept.30	Sept.28	7.35	7.31	8.38	8.00	304.34	273.33	6.33	6.05
Nab-El-Gamal	Sept.29	Sept.29	8.36	7.35	8.32	8.14	316.91	327.78	6.55	6.28
Wardy	Aug.21	Aug.17	6.58	6.84	8.00	8.05	273.46	248.89	6.61	6.00
Araby	Aug.27	Aug.20	6.83	6.76	7.24	7.62	254.13	252.22	8.00	5.89
Badr	Sept.28	Sept.25	6.49	6.52	7.29	7.11	222.90	222.25	6.11	5.33
Tahrir	Sept.17	Sept.15	7.13	6.69	7.78	7.82	255.00	244.41	6.61	5.89
L. S. D. at 0.05			0.45	0.28	0.36	0.41	13.11	22.79	0.45	N.S.

Table(5): Fruit physical characteristics of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons .

Cultivar	Fruit grain %		Fruit peel %		Fruit juice %		Juice volume(cm^3)		Peel thickness (cm)	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Manfalouty	52.64	54.78	47.36	45.22	46.92	40.93	116.72	111.39	0.741	0.386
Nab-El-Gamal	57.75	56.62	42.25	43.38	37.94	41.62	132.33	131.67	0.771	0.482
Wardy	54.49	57.23	45.52	42.78	40.46	43.73	95.77	102.67	0.591	0.559
Araby	61.29	57.17	38.71	42.74	34.10	43.44	111.20	111.00	0.739	0.420
Badr	63..91	55.30	36.08	44.70	42.21	41.01	83.83	82.45	0.508	0.419
Tahrir	64.74	57.44	35.26	42.56	36.74	42.64	102.93	90.78	0.620	0.406
L. S. D. at 0.05	2.32	1.26	2.31	2.01.	4.36	2.50.	8.95	9.45	0.055	0.036

Table(6): Fruit chemical characteristics of some pomegranate cultivars grown under the conditions of Beni – Suif Governorate during 2007 and 2008 seasons .

Cultivar	TSS %		Total acidity %		Total sugars %		Vitamin (c) mg ascorbic acid / 100 ml juice		Total anthocyanin Content %		Tannins content %	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Manfalouty	15.80	15.73	1.237	1.358	15.46	15.03	23.40	23.73	0.662	0.638	3.23	3.10
Nab-El-Gamal	15.13	15.40	1.297	1.302	14.04	14.01	23.20	24.13	0.581	0.587	2.93	3.00
Wardy	15.53	15.60	1.099	1.087	14.65	14.31	22.17	22.27	0.484	0.460	2.57	2.73
Araby	14.63	15.00	1.209	1.200	14.20	14.47	21.73	22.10	0.395	0.405	2.97	3.00
Badr	15.13	15.20	1.283	1.266	13.24	13.78	21.17	23.80	0.417	0.448	2.60	2.87
Tahrir	15.60	15.53	1.285	1.249	13.40	13.93	22.43	23.20	0.511	0.570	2.93	2.93
L. S. D. at 0.05	0.33	0.21	0.057	0.043	0.67	0.73	0.66	0.34	0.020	0.019	0.56	0.25