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LEAF/BUNCH RATIO FOR OREABI DATE PALM CULTIVAR GROWN AT THE NORTH DELTA OF EGYPT

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ABSTRACT

Date palms of Oreabi cultivar grown at North Delta, near Gamasa, DK. Gov. responded to reducing the number of bunches per palm. A small number of bunches per palm made it possible to select stronger and better located ones on each palm. The nutrients available were used for better fruit-set, higher productivity with good quality fruits.

Pruning the date palms by increasing the number of leaves per bunch significantly increased fruit weight and total yield for the studied cultivar up to 9 or 11 leaves/bunch. Fruit quality was improved as fruit weight and flesh weight were increased while seed weight was reduced by maintaining the proper number of leaves per bunch. The soluble solids content of the fruit (SSC) was also increased.

Leaf/bunch ratio at 11 was the best for the studied cultivar. The problem of heavy fruit drop in Oreabi cultivar and alternate bearing were greatly eliminated by reducing the number of bunches/palm.

INTRODUCTION

Bearing capacity and quality of fruit on the Date-palm seems to be rather closely in proportion to green leaf surface . Too much fruit for the leaf area of the tree reduces size and quality of the fruit and leads to alternate bearing.

Leaf/bunch ratio for date-palms has been studied by many workers in different districts of Egypt and abroad. Proper balance between the number of leaves and bunches is important for regular productivity of higher quality fruits. Miremadi (1971) reported that the average number of leaf/bunch ranged from 3.8 in Dagelsorkh to 1o.2 in Kabkab. Abdalla *et al*.(1982) revealed that 8 leaves/bunch were the most suitable for both yield and good quality fruits of Hayani cultivar at Kalubiea district. Khalifa *et al*.(1984) and Abdel-Hamid (2000) found that 10 leaves/bunch was the most beneficial ratio for Zaghloul cultivar under Alexandria and Noubaria conditions. Similarly, El-Makhtoon *et al*. (1990) found that the ratio of 10 leaves/bunch improved yield and fruit quality of Samani cultivar under Kalubia environmental conditions. El-Salhy (2001) reported that yield/palm of Zaghloul was significantly reduced with increasing the leaf/bunch ratio.

Fruit growing on the North Delta area where the soil and water are saline is restricted to date palms and guava . Thus, the aim of this study was to examine the suitable number of leaves/bunch for better yield with higher fruit quality of Oreabi dates, the main soft Date cultivar grown under the environmental conditions of Kalabsho near Gamasa DK.Gov.

MATERIALS AND METHODS

This study was carried out during two successive seasons of 2005 and 2006 using 12 date palms of Oreabi cultivar. Age of the palms was (12

years) as they were planted at the experimental station, Kalabsho DK. Gov.. The soil of the orchard is sandy while irrigation water is saline The selected palms were uniform in size and vigor and received the usual cultural practices adopted for date palms under flood irrigation system. Analysis of the soil and irrigation water is shown in Tables 1,2. Pollen grains from the same males were used for pollination just after opening of the spathes in both seasons of study. The selected palms were divided at random into 4 groups of 1 palm replicated 3 times. The oldest pinnate (leaves) on the individual palm were removed and 50-55 leaves were maintained per each palm. Early and late or small inflorescences were removed to leave the adjusted number for each treatment. As such the applied treatments were 5,7,9 and 11 leaves/bunch **.** At harvesting during November of each season, yield/palm was determined for each palm. Four samples of 100 fruits per treatment were taken for the determination of fruit weight, flesh weight and seed weight. SSC percentage, acidity and tannins were also determined.

Table 1: Physical and chemical properties of the soil.

Properties seasons	Sand %	Silt %	Clay %	CaCo3	EC Ds m^{-1}	PH %	OM %	Available PPM		
								N	P	K
2004/2005	89.21	7.92	2.87	0.40	8.50	8.41	0.40	3.72	3.82	200.1
2005/2006	73.54	17.96	8.0	0.42	9.0	8.45	0.75	5.53	5.60	255.3

Table 2 : Chemical properties of the irrigation water.

Properties seasons	EC Ds m^{-1}	PH %	Soluble ions (meq L^{-1})							
			Cation				Anion			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$Co3^{-}$	$HCo3^{-}$	Cl^{-}	$So4^{--}$
2004/2005	4.10	7.90	1.90	1.90	1.31	1.61	-	7.47	3.38	0.87
2005/2006	4.30	7.72	5.13	1.14	1.02	1.78	-	2.09	6.11	0.88

The obtained data were statistically analyzed according to Gomez and Gomez, (1984) as a randomized complete block design. All statistical analysis was performed using the facility of computer and SAS software package (SAS, 2001)

RESULT AND DISCUSSION

Yield:

Data in table (3) revealed that the highest yield/palm for Oreabi cultivar was obtained from leaving 11 leaves/bunch in both seasons. Also the ratio of 7 leaves /bunch gave better yield / palm than leaving 5 or 7 leaves. It is also noticed that yield of this cultivar in the second year was more than that of the first one. Abdalla *et al*. (1982) mentioned that the palms differ considerably in yield from season to season irrespective of the treatments. This is obvious in the present study as the trees were still young and yields increase progressively. The increase in yield may also be attributed to the increase of metabolism and accumulation of more carbohydrates by more number of leaves/bunch. The obtained data are in agreement with Abdalla *et al*. (1982) working on Hayani cultivar as well as Khalifa *et al.* (1984) for Zaghloul cultivar , Basha & Sheban (1986) working on other date cultivars and El-Makhtoon *et al*. (1990) working on Samani cultivar.

Although Date palms can survive under different environmental conditions, environmental factors such as soil type and temperature generally

affected the yield of the palms (Atul Chandra 1990). It is clear that this cultivar proved to be adaptable to sandy soils and saline water of poor quality as shown from the analysis of irrigation water used in the area.. There growth and yield is acceptable under the condition of this area where other fruit species can not survive.

Table (3):Effect of leaf/bunch ratio on yield of Oreabi date palm cultivar .

Treatment	Bunch weight (kg)			Yield per palm (kg)		
	2005	2006	Mean	2005	2006	Mean
5 leaves/bunch	6.37	7.08	**6.73**	63.70	70.80	**67.25**
7 leaves/bunch	10.29	10.40	**10.35**	72.03	72.80	**72.42**
9 leaves/bunch	12.31	12.65	**12.48**	73.86	75.90	**74.88**
11 leaves/bunch	15.10	15.77	**15.45**	75.50	78.85	**77.18**
LSD	**0.52**	**0.46**	**------**	**1.74**	**2.18**	**-------**

Fruit and flesh weight:

It is clear from data in tables (4,5) that fruit and flesh weights of the studied cultivar was significantly increased as the leaf/bunch ratio increased. The highest fruit and flesh weight were obtained from treatment 11 leaves /bunch followed by 9 leaves/bunch in both seasons of the study. It is also observed that fruit weight was much better in the second year of the study. This could be explained by more accumulation of carbohydrates made by more number of leaf area.

The obtained results are in agreement with those reported by Khalifa *et al*. (1984) on Zaghloul cv at Alexandria region, Abdalla *et al.* (1982) on Hayani cv and El-Makhtoon *et al*. (1990) on Samani dates and Mahmoud *et al.* (2003).

Seed weight:

Data in table (6) show that seed weight varied significantly between the treatments in the studied cultivar. Seed weight was the highest at 11 and 9 leaves/bunch. The obtained data for this cultivar under this study are in agreement with the results obtained by Abdalla *et al.* (1982) and El-Makhtoon *et al.* (1990).

Table (4):Effect of leaf/bunch ratio on fruit weight of Oreabi date palm cultivar.

Treatment	Fruit weight (g)					
	Khalal		Mean	Rutab		Mean
	2005	2006		2005	2006	
5 leaves/bunch	11.10	11.93	**11.52**	8.43	11.27	**9.85**
7 leaves/bunch	11.95	12.59	**12.27**	9.39	11.95	**10.67**
9 leaves/bunch	12.90	14.99	**13.95**	10.71	13.31	**12.01**
11 leaves/bunch	14.00	15.51	**14.76**	11.50	13.97	**12.74**
LSD	0.14	**0.17**	-------	1.68	**1.50**	-------

Table (5): Effect of leaf/bunch ratio on flesh weight of Oreabi date palm cultivar.

Treatment	Flesh weight (g)					
	Khalal		Mean	Rutab		Mean
	2005	2006		2005	2006	
5 leaves/bunch	10.25	10.29	**10.27**	7.62	9.80	**8.71**
7 leaves/bunch	10.86	10.86	**10.86**	8.48	10.38	**9.43**
9 leaves/bunch	11.81	13.61	**12.71**	9.19	11.69	**10.44**
11 leaves/bunch	12.71	13.92	**13.32**	10.31	12.38	**11.35**
LSD	**1.00**	**1.49**	-------	**1.72**	**1.48**	-------

Table (6): Effect of leaf/bunch ratio on seed weight of Oreabi date palm cultivar.

Treatment	Seed weight (g)					
	Khalal		Mean	Rutab		Mean
	2005	2006		2005	2006	
5 leaves/bunch	0.845	1.64	**1.24**	0.805	1.47	**1.14**
7 leaves/bunch	1.09	1.73	**1.41**	0.905	1.57	**1.24**
9 leaves/bunch	1.09	1.83	**1.46**	0.975	1.62	**1.30**
11 leaves/bunch	1.29	1.93	**1.61**	1.185	1.59	**1.39**
LSD	**0.22**	**0.09**	-------	**0.15**	**0.06**	------

Soluble solids content (SSC):

Significant differences were detected in SSC between the different levels of leave/bunch ratio in both seasons (Table 7). Oreabi dates gave the highest SSC with increasing the number of leaves/bunch up to 11 or 9 leaves. The obtained results also show that SSC of the studied cultivar are more in this area compared to what reported by the other workers under the clay soils conditions, Abdalla *et al.* (1982)and El-Makhtoon *et al*. (1990). Habib *et al*.(1984) also mentioned that Hayani dates followed different trends at Sinai Governorate.

Table (7): Effect of leaf/bunch ratio on SSC of Oreabi date palm cultivar

Treatment	S.S.C %					
	Khalal		Mean	Rutab		Mean
	2005	2006		2005	2006	
5 leaves/bunch	12.47	18.49	**15.48**	9.42	13.35	**11.39**
7 leaves/bunch	13.42	20.60	**17.01**	10.52	18.12	**14.32**
9 leaves/bunch	15.42	23.05	**19.24**	12.10	22.72	**17.41**
11 leaves/bunch	18.51	25.20	**21.86**	13.07	24.79	**18.93**
LSD	**2.86**	**3.77**	-------	**3.52**	**5.58**	-------

Acidity:

Significant differences were detected in acidity of the juice of Oreabi fruits at different leaf ratios (Table 8). Generally, acid content was lower as number of leaves increased. It is also seen that Oreabi dates showed lower acidity towards the peak at 11 and 9 leaves/bunch in the two seasons of study. Similar results were obtained by Abdalla *et al.* (1982) on Hayani dates, Khalifa *et al*.(1984) on Zaghloul dates and El-Makhtoon *et al.* (1990) on Samani dates.

Table (8): Effect of leaf/bunch ratio on acidity of Oreabi date palm cultivar.

Treatment	Acidity %					
	Khalal		Mean	Rutab		Mean
	2005	2006		2005	2006	
5 leaves/bunch	0.973	0.526	**0.749**	0.981	0.699	**0.84**
7 leaves/bunch	0.884	0.459	**0.672**	0.896	0.515	**0.706**
9 leaves/bunch	0.625	0.416	**0.521**	0.633	0.438	**0.536**
11 leaves/bunch	0.407	0.368	**0.388**	0.417	0.370	**0.394**
LSD	**0.15**	**0.11**	-------	0.27	**0.18**	-------

Tannins:

Data in table (9) show that tannins content in Oreabi dates was higher at Khalal stage than that at Rutab stage. The ratio of 11 leaves/bunch gave lower tannins content in the fruits of this cultivar. Mahmoud *et al*. (2003) reported that Zaghloul dates were of better quality and lower tannin content with the ratio of 8:1 leaf/bunch.

Table (9): Effect of leaf/bunch ratio on tannins content of Oreabi date palm cultivar .

Treatments	Tannins		
	2005	2006	Mean
5 leaves/bunch	0.245	0.209	**0.227**
7 leaves/bunch	0.178	0.159	**0.169**
9 leaves/bunch	0.135	0.129	**0.132**
11 leaves/bunch	0.111	0.105	**0.108**
LSD	**0.064**	**0.087**	-------

In conclusion, the retention of 9-11 leaves/bunch is suitable for Oreabi date palm cultivar, while the ratio of 5 gave less yield with lower quality fruits for this cultivar under the conditions of the lower Delta area of Egypt.

REFERENCES

Abdalla, K.M., M.A. Meligi and S.Y. Risk (1982). Influence of crop load and leaf/bunch ratio on yield and fruit quality of Hayany dates. First Symposium on date palms. Saudi Arabia 222-232.

Abdel-Hamid, N. (2000). Effect of time, rate and patterns of thinning, leaf/bunch ratio and male type on "Zaghloul" date yield and quality. Arab Universities Journal of Agricultural Sciences, 8 (1): 305-317.

Atul Chandra; R. Swaminathan; R.Chaudary; N.L. Monohar and O.P. Pareek (1990). Performance of date palm cultivars in the Thor desert. Indian Journal of Horticulture. 47(1): 28-33.

Basha, M.A. and M.A. Sheban (1986). The effect of different leaf/bunch ratios on yield and fruit quality of Nebut Saif and Euzeizi date palm cultivars. Arab Gulf Journal of Scientific Research, 4(1): 341-347.

El-Makhtoon, F.M.; A.M. Abdel-Kader and M.B. Bastawaros (1990). Effect of leaf/bunch ratio on yield and fruit quality of Khadrawi and Samani dates (*Phoenix dactylifera* L.) J. Agric. Sci. Mansoura Univ., 15(5): 696-702.

El-Salhy, A. M. (2001). The relation between leaf/bunch ratio and Zaghloul date productivity. Egyptian Journal of Horticulture, 28 (2): 149-158.
Gomez, K. A. and A. A. Gomez (1984). Statistical procedures for Agricultural research. 2nd Ed. John Wally & Sons, Inc., New York. USA.
Habib, S.S.; Nawal Gamil; G.M. Nour and A.A. Hussein (1984). Evaluation of some date palm varieties grown in Northern Sini Governorate. Agric. Res. Review. 62(3) : 272-288.
Khalifa, A.S.; M.R. Tadros; G.A. Said; H.El-Morsy and M.B. Bastawaros (1984). Effect of leaf/bunch ratio on yield and fruit quality of Zaghloul dates. Agric. Res. Review. 62(3): 249-254.
Mahmoud, H. M.; T. K. El-Mahdy and M. A. Fouad (2003). Effect of expanded leaf/bunch ratio on yield and fruit quality of Zaghloul dates under Aswan conditions. Assiut Journal of Agricultural Sciences, 34(2): 123-137.
Miremadi, A. (1971). Principles of date pruning in relation to fruit thinning Report of Date Growers' Institute, 48: 9-11.
SAS Institute 2001. SAS for Windows, SAS user's guide: Statistics. Version 8.0 e. SAS Inst., Inc., Cary, North Carolina.

نسبة عدد الأوراق إلى السباطات فى صنف البلح العرابى فى منطقة شمال الدلتا – مصر

عبدالعال حجازى ، الرفاعي الدنجاوى و مروه حسن حمامه
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أجريت هذه الدراسة على صنف البلح العرابى المنزرعة بمزرعة كلية الزراعة - جامعة المنصورة فى منطقة شمال الدلتا بالقرب من مصيف جمصة و كان الغرض من البحث هو معرفة أفضل عدد من الأوراق التى يمكن تركها لكل سباطة على النخلة.

و قد أظهرت الدراسة أن تقليل عدد السباطات على النخلة بما يحقق وجود نسبة أكبر من الأوراق/سباطة هو الأفضل و بذلك فإن تقليل عدد السباطات على النخلة جعل من الممكن اختيار أفضل الأغاريض و أقواها و الموزعة جيدا على رأس النخلة و بذلك فإن العناصر الغذائية المتاحة للنخلة يمكن أن تستخدم لغرض العقد الجيد و الإنتاجية العالية مع جودة الثمار.

و كانت من نتائج الدراسة أنه بترك عدد أكبر من الأوراق/سباطة أعطى زيادة معنوية فى وزن الثمار و المحصول الكلى عند ترك ٩ أو ١١ ورقة/سباطة .و قد أدت هذه النسبة أيضا إلى تحسين خصائص الثمار من حيث زيادة وزن الثمرة و اللحم بينما كان هناك نقص فى وزن البذور.

كما أن محتوى الثمار من المواد الصلبة الذائبة كان الأفضل مع هذه النسبة من الأوراق إلى السباطات. و على ذلك فإن معدل ١١ ورقة/سباطة كان هو الأفضل لهذا الصنف مما قد يؤدى إلى تقليل تساقط الثمار أو تبادل الحمل.