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Effect of Set Size on the Yield of Onion Under Libyan Conditions

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ABSTRACT

The present study was conducted in a randomized complete block design with four replicates in 1976–1977, and 1977–1978 seasons in Tripoli. Three sizes of sets: small, medium and large of Giza Synthetic cultivar were used. Data were statistically analysed. The results showed that small sets significantly produced greater weight of marketable yield and higher percentage of single bulbs than those resulted from either medium or large sets. Medium sets were superior to large ones. Large sets significantly produced higher percentage of bolters and greater number of sprouts than those produced by either medium or small sets. With respect to percentages of doubles and stand, there were no significant difference between the three set sizes. Medium and large sets decreased weight of marketable yield and percentage of single bulbs through the production of higher percentage of bolters. Under Libyan conditions, the use of small sets of Giza Synthetic reduced the percentage of bolters significantly.

INTRODUCTION

Size of sets and temperature under which the sets had been kept prior to planting were important with respect to percentage of onion plants that develop seed-stalks, as described by Boswell (3) and Thompson and Smith (5). According to Jones and Mann (4) bulbs from sets matured about three to four weeks earlier than those from direct seeded crop planted at the same time. Because of earliness, bulb production from sets escape infection with white rot disease in Egypt as reported by Ahmed and Ahmed (1) and Ahmed and El-Gammal (2). Recently, Vasic (6) found that the suitable size of sets that gave the best yield and marketable quality of onion differed according to the cultivar used, being 17.5–20 mm for Holland Yellow and 6–12.5 for Makoi. Intermediate sizes between these extremes were reported for other cultivars.

Bulb production from sets is not well known in the Libyan Jamahiriya. It is used mainly for producing early green onions during winter months. The objective of the present study was to investigate the effect of three sizes of onion sets of Giza Synthetic cultivar on yield and quality of onion under Libyan conditions and to determine the proper size that gives the highest yield of bulbs.

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MATERIALS AND METHODS

A randomized complete block design with four replicates was conducted at the University Research Farm in Tripoli, over two successive seasons 1976–1977 and 1977–1978. Three different sizes of sets of Giza Synthetic cultivar were planted: (1) small, less than 15 mm in diameter (2) medium, from 15 to less than 25 mm, and (3) large, from 25 to less than 35 mm. Planting distance was 30 cm between rows and 10 cm between plants. Fertilization and irrigation were applied as commonly practiced. Time of planting seeds in the previous season to produce sets was in November and December for both 1976–77 and 1977–78 seasons. The following table shows plot size, dates of planting and harvest:

	1976–1977	1977–1978
Plot size	$0.6 \times 4.0 = 2.4$ m^2	$0.9 \times 3.0 = 2.7$ m^2
Planting date	10/10/76	4/10/1977
Harvesting date	21/4/77	22/4/1978

Late in the growing season, the number of sprouts per plant was counted and subsequently the average number of sprouts for each set size was determined. At harvest the percentages of singles, bolters, doubles (among non bolters), and stand were determined and statistically analysed after angle transformation. In addition, the weight of single bulbs or marketable yield and number of sprouts were statistically analysed.

RESULTS AND DISCUSSIONS

The percentages of single bulbs (marketable), bolters, and doubles that resulted from planting small, medium and large sets during 1976–1977 and 1977–1978 are shown in Table 1. During both seasons, small sets produced the highest percentage of single bulbs, i.e. small sets were superior to medium and large sets while medium sets were superior to large ones. In 1976–1977 season, the percentages of single bulbs given by small, medium, and large sets were 86.8, 41.7 and 3.8%, respectively. They were 38.2, 9.6, and 4.2% in the 1977–1978 season, respectively. The statistical analysis of the percentages of bolters (plants that developed seedstalks) showed that the percentage of seedstalks was significantly higher in large sets treatment than in medium sets. The latter was significantly higher than that resulted from small sets. The percentages of bolters resulting from planting small, medium, and large sets in 1976–1977 season were 9.2, 55.2 and 90% respectively; while they were 61.8, 90.3, and 95.2% in the 1977–1978 season. It is meant by the percentage of doubles presented in Table 1, the proportion of bulbs that show external doubling within non-bolters as compared to the total number of bulbs produced. Therefore, doubles within bolters were not included. Percentages of doubles resulting from small, medium, and large sets in both seasons were not significantly different.

Apparently the size of sets has no effect on the percentage of doubles within non-bolters under the conditions of the experiment.

In the combined analysis, the interaction between set size and year had significantly affected the percentages of singles and bolters. The highest percent singles and the lowest percent bolters were produced by small sets in both seasons. Large sets may be used to produce a seed crop because they gave maximum number of bolters.

Table 2 summarizes the percentage of stand, average number of sprouts, and average

Table 1 Means and Angle transformed means of the percentages of singles, bolters, and doubles that resulting from planting small, medium, and large sets of onion during 1976–1977 and 1977–1978, in Tripoli.

	1976–1977						1977–1978					
	Singles		Bolters		Doubles		Singles		Bolters		Doubles	
Treatment	T. mean	%	T. mean	%	T. mean	%	T. mean	%	T. mean	%	T. mean	%
Small sets	68.67	86.8	17.64	9.2	10.73	3.2	38.15	38.2	51.81	61.8	0.00	0.00
Medium sets	40.26	41.7	47.99	55.2	9.04	2.5	18.06	9.6	71.82	90.3	0.00	0.00
Large sets	11.22	3.8	71.57	90.0	11.44	3.9	11.92	4.2	77.33	95.2	2.18	0.14
F	47.53**	—	37.03**	—	0.43	—	68.25**	—	86.80**	—	1.00	—
L.S.D. .05	14.41	—	15.56	—	n.s.	—	5.75	—	4.99	—	n.s.	—

L.S.D. .05 set size × year = 13.82 for transformed means of singles.
L.S.D. .05 set size × year = 13.03 for transformed means of bolters.
n.s. = not significant.
** = highly significant (at 1% level).

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تأثير حجم البصيلات على محصول البصل تحت الظروف الليبية

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المستخلص

أجرى هذا البحث في مزرعة كلية الزراعة جامعة الفاتح بطرابلس خلال الموسمين الزراعيين ٧٦–١٩٧٧ م و٧٧–١٩٧٨ م . واستخدمت فيه ثلاثة أحجام من بصيلات الصنف جيزة التركي : صغير ، متوسط ، وكبير وأوضحت النتائج ما يأتي :

١ — أدى استخدام البصيلات الصغيرة الحجم إلى زيادة مؤكدة في المحصول الصالح للتسويق ونسبة الأبصال المفرد أكثر منه في حالة استخدام البصيلات المتوسطة . وأعطت البصيلات المتوسطة زيادة مؤكدة عن البصيلات الكبيرة بالنسبة لنفس الصفتين .

٢ — نتج عن زراعة البصيلات الكبيرة زيادة مؤكدة في نسبة الخنبوط وعدد النموات الخضرية عنه في حالة البصيلات المتوسطة والصغيرة .

٣ — لم يكن هناك فروق معنوية بين الأحجام الثلاثة بالنسبة لنسبة الأبصال المزدوجة وعدد النباتات المتبقية في نهاية التجربة .

٤ — وعليه يتضح أن البصيلات المتوسطة والكبيرة تؤدى إلى خفض المحصول الصالح للتسويق ونسبة الابصال المفرد من خلال زيادة نسبة الأبصال الخنبوط . . وتحت الظروف الليبية أمكن باستخدام بصيلات صغيرة الحجم للصنف جيزة التركي خفض نسبة الأبصال الخنبوط بصفة مؤكدة .