

## Evaluation of some Egyptian Onion Genotypes in Sohag Governorate

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### ABSTRACT

This investigation was carried out at Shandweel Agriculture Research Station during the two successive seasons of 2003/2004 and 2004/2005 to evaluate of six Egyptian onion genotypes namely, Giza 6 Mohassan, Shandweel-1, Dronka, Giza 20 original, Giza 20 pink flesh and Giza 20 white flesh in Sohag Governorate. The obtained results were as follows: The genotypes Giza 20 pink flesh, Giza 20 white flesh and Giza 20 original (blotched with red) were the tallest in plant height. Dronka (local strain) was the greatest of leaf area per plant and dry matter, while it produced the lowest portion of culls yield than the other genotypes. Shandweel-1 and Dronka were early in bulb development (expressed by bulbing ratio). Giza 20 white flesh produced the highest total, marketable yields and bulb weight, while its total weight loss was the lowest during 60, 120 and 180 days storage periods among the tested genotypes. Percentage of doubles was the lowest with Dronka. Giza 20 original was the highest in total soluble solids (T.S.S) among the tested genotypes. It could be concluded that Giza 20 white flesh showed the greatest potential for storage.

### INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important vegetable crops grown in the world. In Egypt, it is grown at a large scale for local consumption and for exportation to European and Arab countries. The Egyptian cultivars are well known for their high total soluble solids content, high pungency, and long shelf-storage period. Therefore, it is essential to evaluate the performance of the newly introduced cultivars compared with the local cultivated ones.

El-Shafie et al. (1971) compared the marketable yields of Behairy and Giza-6 Mohassan cultivars. They reported that the yields of Behairy cultivar were higher than those of Giza-6 Mohassan. Warid and El-Shafie (1976) investigated the performance of several onion cultivars. They reported that Giza-6 Mohassan and Behairy cultivars occupied the middle positions for the total and marketable yields tested characters. The two cultivars exhibited the lowest percentage of doubles. Belnarz and Kadams (1991), in Nigeria, evaluated exotic onion cultivars and 23 local cultivars. They showed that there were wide differences among the obtained yields (4.77 – 12.64 t/ha). Also, weight losses after storing the yields for 4.5 months varied from 27 to 79%. Bonalos (1991) indicated that the Granex 33 onion cultivar was superior in the plant height; number of leaves/plant and marketable yield characters when compared with the other nine

cultivars. Muniz et al. (1991), in Brazil, evaluated the productivity of nine cultivars. They reported that the promising cultivars produce yields among 26.7 and 38.2 t/ha. Patil and Kale (1991) assessed the storability of 12 cultivars. They reported that losses after 6 months varied from 29.25 to 94%. They indicated also that losses during the 1<sup>st</sup> month were due to physical weight loss and rotting, while losses in the last month were due to sprouting. Mohamed and Gamie (1999) evaluated the performance of three onion cultivars. Their results showed that Giza-20 cultivar was the best in the plant height, number of leaves/plant, bulb weight, total and marketable yields, and the percentage of remaining bulbs after 150 days of storage period, while, Shandaweel 1 cultivars was the best for the early bulb development. Pavloic et al. (2002), in Serbia and Montenegro, indicated that the values of mean bulb weight for 10 cultivars varied from 55.91 to 105.3g. Qudir and Boulton (2005), in Australia, examined the yield and maturity of five new released red onion cultivars. They reported that, red-shine cultivar produced the highest marketable yield of 34.57 t/ha, while the red-rock was the earliest in maturity.

The objective of this research is to evaluate the vegetable growth, yield and yield components, quality and storability characters of six onion genotypes under Sohag Governorate, Upper Egypt, conditions.

## **MATERIALS AND METHODS**

The present investigation was carried out in the experimental farm of Shandaweel Agric. Research Station, Sohag governorate, Egypt to evaluate the performance of six onion genotypes, i.e., Giza-6 Mohassan, Shandaweel 1, Dronka, Giza-20 original, Giza-20 pink flesh, and Giza-20 white flesh during the two winter seasons of 2003/2004 and 2004/2005.

### **Cultural practices:**

Onion seeds of the six genotypes were sown in mid-September of each growing season. Seedlings were transplanted in the experimental plots after sixty days from sowing (mid-November). The plot size was 2 X 3m (1/700 feddan). Each plot consisted of 10 rows spaced at 0.2m with 3m long. Seedlings within each row were spaced at 5-6cm. The experimental design used in this experiment was randomized complete blocks design (RCBD) in four replicates. The onion cultivars were randomly distributed in the blocks. All cultural practices concerning onion production were followed as recommended in the area. After ninety days from transplanting, ten guarded plants were selected randomly from each genotype for growth measurements. Onion bulbs were harvested at maturity, i.e., when 50% of

the leaves fall down. Onion plants were cured in the field for two weeks, roots and tops were cut and plant samples were collected for yield, yield components, quality, and storability characters. The measured data were as follows:

1- Vegetable growth characters:

- Plant height (cm). The longest blade + base/plant was measured.
- Leaf area/plant (cm<sup>2</sup>) was measured by the LI-COR apparatus (Mode LI-3020A/4).
- Bulbing ratio = (greatest diameter near the base/minimum rich diameter), according to Mann (1952).
- Dry weight of each bulb (g), was determined after drying the bulbs at 70 °C for 48 hours in electric oven.

2- Yield and yield characters:

- Total yield
- Marketable yield
- Exportable yield (free from cull bulbs)
- Culls yield (doubles + bolters + scallon + collar).

3- Quality characters:

- Average bulb weight (g)
- Percentage of doubles (splitting bulbs)
- Total soluble solids (TSS)

4- Storability characters:

Sound bulbs from each of the tested six genotypes were stored unpagged in the laboratory under room temperature for 180 days.

Measurements were taken at 60 days interval to determine:

Total weight loss (%) = physiological loss + rotting, sprouting and decay losses.

**Statistical analysis:**

The obtained data were statistically analyzed using the analysis of variance (ANOVA) method as outlined by Steel and Torrie (1980). LSD test at 0.05 level of significance was used to compare among the means of the treatments.

## **RESULTS AND DISSCUSION**

### **1. Vegetable growth characters:**

The comparison among averages of plant height, leaf area/plant, bulbing ratio, and dry weight of each bulb of the six onion genotypes for the two growing seasons is presented in Table 1. Results showed significant differences among the average values of plant height and leaf area/plant

growth characters in the two seasons. While, differences among the averages of bulbing ratio and dry weight/bulb characters were significant only in the 1<sup>st</sup> season. It is clear from the results that Giza-20 pink flesh and Giza-20 white flesh had the tallest plant height values of 78.34 and 78.33cm in the 1<sup>st</sup> season and 76.3 and 69.0cm in the 2<sup>nd</sup> season, respectively. The shortest genotypes were Dronka and Shandaweel 1. However, the largest average values of leaf area/plant (475.73 and 559.61cm<sup>2</sup>) were recorded for the Dronka genotype, while the smallest leaf area/plant values of 278.66 and 298.9cm<sup>2</sup> were recorded for Giza-6 Mohassan genotype in both growing seasons, respectively. Results indicated also that Dronka genotype had the highest bulbing ratio (0.44 and 0.72), while Shandaweel 1 and Giza-6 Mohassan genotypes had the lowest bulbing ratio in the two seasons. Results revealed also that Dronka genotype had the highest average dry weight/bulb (10.83 and 8.05g), while Giza-20 original had the lowest dry weight/bulb of 5.76 and 6.26g in the 1<sup>st</sup> and 2<sup>nd</sup> growing seasons, respectively. The obtained results were similar, more or less, to those reported by Bolanos (1991), Mohamed and Gamie (1999), McCallum et al. (2001) and Khandagale et al. (2005), who indicated that plant height and bulbing ratio were the highest in Giza-20, N-2-4-1 and some of New Zealand genotypes.

**Table (1): Vegetable growth characters for some of Egyptian onion genotypes after 90 days of transplanting during 2003/2004 and 2004/2005 seasons.**

Genotypes	Seasons							
	2003/2004				2004/2005			
	Characters				Characters			
	Plant height (cm)	Leaf area (cm <sup>2</sup> )	Bulbing ratio	Dry weight (g)	Plant height (cm)	Leaf area (cm <sup>2</sup> )	Bulbing ratio	Dry weight (g)
Giza Mohassan	67.00	278.66	0.39	6.63	64.30	298.90	0.60	7.58
Shandweel-1	66.33	401.56	0.29	8.09	61.00	455.94	0.61	7.47
Dronka	67.00	475.73	0.24	10.83	66.00	559.61	0.62	8.05
Giza 20 original	77.35	380.53	0.44	5.76	69.00	387.1	0.72	6.26
Giza 20 pink flesh	78.34	375.26	0.38	6.44	76.30	339.61	0.66	6.32
Giza 20 white flesh	78.33	325.43	0.36	8.03	69.00	319.70	0.63	6.53
L.S.D0.05	7.02	28.36	0.18	1.25	7.98	37.97	N.S	N.S

N.S.; not significant.

## 2. Yield and yield component characters:

Differences among averages of total bulb yield (t/fed), marketable yield (t/fed), export yield (t/fed) and culls yield (t/fed) for the tested genotypes in the two growing seasons are shown in Table 2. Results showed significant differences among averages of total bulb yield and marketable yield for the tested genotypes in the two seasons, while differences among export yield and culls yield were not significant. Giza-20 white flesh genotype had the highest average total bulb yield of 16.85 and 18.0 t/fed in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively, while Dronka genotype had the lowest average values of 12.45 and 14.33 t/fed in the same respective seasons. Results of the marketable yield indicated that the highest values were obtained from Giza-20 white flesh genotype and the lowest values were obtained from Shandaweel 1 genotype. Results indicated also that, the average export yield value of Giza-20 original was 41.6% more than that of Shandaweel 1 in the 1<sup>st</sup> season, while average export yield of Giza-20 white flesh was 37.7% more than that of Dronka genotype in the 2<sup>nd</sup> year. The lowest values of culls yield of 1.3 and 0.96 t/fed were obtained from Dronka genotype in 2003/2004 and 2004/2005 seasons, respectively. The obtained results were in line with those of El-Shafie et al. (1971) and Warid and El-Shafie (1976), who found that Behairy cultivar was the highest in total and marketable yields. Similar results, more or less, were reported by Bolanos (1989) with cv. Granex 33 followed by Granex 2000. Quadir and Boulton (2005) found that the cvs. "Red Shine and Red Back" produced the highest values of marketable yields of 35.86 and 35.63 t/ha, respectively.

**Table (2): Bulb yield and yield components (t/fed) for some Egyptian onion genotypes in 2003/2004 and 2004/2005 seasons..†**

Genotypes	Seasons							
	2003/2004				2004/2005			
	Characters (t/fed)				Characters (t/fed)			
Total yield	Marketable yield	Exported yield	Culls yield	Total yield	Marketable yield	Exported yield	Culls yield	
Giza 6 Mohassan	12.65	10.65	10.46	2.00	14.83	13.67	11.57	1.16
Shandweel-1	12.80	11.10	10.35	1.70	14.50	13.00	11.73	1.50
Dronka	12.45	11.15	10.75	1.30	14.33	13.37	11.13	0.96
Giza 20 original	16.84	15.00	14.66	1.84	16.53	15.47	13.07	1.06
Giza 20 pink flesh	16.00	13.65	11.70	2.35	15.83	14.13	12.93	1.70
Giza 20 white flesh	16.85	14.95	14.25	1.90	18.00	16.53	15.33	1.47
L.S.D0.05	1.72	2.08	N.S	N.S.	1.97	2.10	N.S	N.S

### 3. Quality characters:

Average bulb weight (g), percentage of doubles (%) and total soluble solids (TSS) values are presented in Table 3. Results indicated significant differences among average bulb weight and doubles values for the six tested genotypes in the two seasons, while significant differences in the TSS values occurred in the 1<sup>st</sup> season only. Results revealed that Giza-20 white flesh genotype had the heaviest bulb weight values of 82.17 and 84.95g in the 1<sup>st</sup> and 2<sup>nd</sup> seasons, respectively, while Shandaweel 1 genotype had the lightest values of 62.97 and 59.63g in the same respective seasons. Results revealed that Dronka genotype had the lowest doubles percentage of 0.33 and 0.56% in the two growing seasons as compared with the other genotypes. Average total soluble solid (TSS) values for Giza-20 original were the highest in the two seasons. The average values were 50.6% higher than that of Giza-6 Mohassan in the 1<sup>st</sup> season and were 16% more than that of Giza-20 original in the 2<sup>nd</sup> season. The obtained results were similar, more or less, to those of Warrid and El-Shafie (1976), Mohamed and Gamie (1999), McCallum et al. (2001), Pavlovic et al. (2002) and Quadir and Bolton (2005).

**Table (3): Quality characters of bulb for some of Egyptian onion genotypes in 2003/2004 and 2004/2005 seasons.**

Genotypes	Seasons					
	2003/2004			2004/2005		
	Characters			Characters		
	Average Bulb weight (g)	Doubles (%)	T.S.S (%)	Average Bulb weight (g)	Doubles (%)	T.S.S (%)
Giza Mohassan	6 70.85	3.21	9.94	71.27	4.00	10.00
Shandweel-1	62.97	1.08	10.46	69.63	1.66	10.20
Dronka	68.52	0.33	10.55	69.67	0.56	10.20
Giza 20 original	76.50	2.49	14.97	76.17	1.33	11.60
Giza 20 pink flesh	80.60	1.53	10.56	76.28	1.13	10.70
Giza 20 white flesh	82.17	0.44	13.60	84.95	0.83	10.60
L.S.D0.05	9.19	1.22	2.30	6.06	1.54	N.S

#### 4. Storability characters:

Average weight loss after 60, 120 and 180 days from harvesting for the tested six genotypes during the two growing seasons are presented in Table 4. Results indicated that, percentages of total weight losses were significant during 60, 120 and 180 days storage in both seasons. It was clear that Giza 20 white flesh genotype was the lowest in losses percentage during 60, 120 and 180 days storage periods. On the other hand, Shandweel-1 was the highest in losses during the three storage periods in both seasons. During the 60 days storage period most of the losses were due to physiological weight loss, while in 180 days they were due to sprouting. These results are in agreement with Patil and Kale (1991) and McCallum *et al.* (2001).

**Table (4): Percentage of total weight losses of some of Egyptian onion genotypes at 3 storage periods in 2003/2004 and 2004/2005 seasons.**

Genotypes	Seasons					
	2003/2004			2004/2005		
	Weight loss (%)			Weight loss (%)		
	60 days	120 days	180 days	60 days	120 days	180 days
Giza 6 Mohassan	16.32	23.56	28.55	14.47	21.43	28.35
Shandweel-1	21.75	26.88	35.07	18.28	25.82	32.73
Dronka	16.63	20.77	27.52	13.93	20.41	25.47
Giza 20 original	17.15	22.59	29.44	16.26	18.80	26.99
Giza 20 pink flesh	16.68	20.39	27.72	12.68	18.10	24.93
Giza 20 white flesh	13.73	18.05	26.08	11.42	17.97	24.60
L.S.D0.05	1.89	2.03	1.82	2.54	3.50	3.01

#### CONCLUSION

From the above-mentioned results it could be concluded that Giza 20 white flesh was the best genotype in total and marketable yields and quality characters, especially storability.

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## الملخص العربي

### تقييم بعض التراكيب الوراثية للبطيخ المصري في محافظة سوهاج

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قسم بحوث البطيخ - معهد بحوث المحاصيل الحقلية - مركز البحوث الزراعية - مصر

- أجرى هذا البحث في محطة البحوث الزراعية بجزيرة شندويل - محافظة سوهاج لمدة سنتين (٢٠٠٣/٢٠٠٤ ، ٢٠٠٤/٢٠٠٥) لتقييم ستة تراكيب وراثية هي جيزة ٦ محسن ، شندويل-١ ، درنكة ، جيزة ٢٠ أحمر اللحم ، جيزة ٢٠ أبيض اللحم. وكانت النتائج كما يلي:
- أعطت التراكيب الوراثية لجيزة ٢٠ أطول النباتات حيث كان جيزة ٢٠ الأحمر والأبيض أطول التراكيب خلال السنتين.
  - درنكة كان أعلى التراكيب في مساحة الأوراق لكل نبات وأكثرها في المادة الجافة بعد ٩٠ يوم من الزراعة ، كما أنها أعطت أقل بطيخ نقضه من كل التراكيب تحت الدراسة وأقلها في النسبة المئوية للأبصال المزدوجة.
  - شندويل-١ ودرنكة أول التراكيب الوراثية في تكوين أبصال بعد ٩٠ يوم من الشتل.
  - كان جيزة ٢٠ أبيض اللحم الأعلى في المحصول الكلي والمحصول التسويقي ، كما أعطى أعلى وزن للبطيخ خلال موسم الزراعة.
  - جيزة ٢٠ أعطى أعلى نسبة مواد صلبة ذائبة كلية ، بينما كان أقل فقد أثناء التخزين بعد ١٨٠ يوم وجد في جيزة ٢٠ أبيض اللحم أي أنه أكثرهم تحملاً للتخزين.