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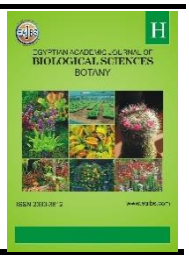

Effect of Planting Dates on the Productivity, Quality and Stemphylium Leaf Blight disease of Some Onion Cultivars Under Nubaria Conditions

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ABSTRACT

The present study was carried out at the Experimental Farm, Nubaria Research Station, Onion Research Department, Agricultural Research Center, Nubaria Region during the two winter seasons of 2018/2019 and 2019/2020 to study the effect of transplanting date on yield, quality and leaf diseases of the four onion cultivars. The two field experiments were laid out in a split-plot system in four replications in both seasons. The main plot was occupied by onion cultivars (Giza Red, Giza 6 Mohasen, Giza White and Giza 20), while the subplots were allocated by transplanting dates (1st November, 20th Novmber and 20th December) in both seasons.

The obtained results showed there was a significant difference among the four onion varieties, where Giza 6 Mohassan recorded the highest yield and quality characters and gave the lowest % bolter, double bulbs and number of days to maturity. Transplanting date 20th November or 20th December recorded the highest values of yield and quality characters and gave the lowest % bolter, double bulbs and number of days to maturity. The interaction between planting dates and onion cultivars was significant on all the studied characters, where planting Giza Red or Giza 6 Mohassan at 20th of November of December recorded the highest ones and gave the lowest % of a bolter, double bulbs and number of days to maturity in the two cropping seasons under the study conditions. The observation of stemphylium leaf blight showed that Giza red is the best variety to resist the disease compared with other varieties. In case of planting date, the best time for planting to reduce the disease is 20th November and 20th December.

INTRODUCTION

Onion (*Allium cepa* L) is one of the most important crops grown in Egypt. The area harvested was about 63.723 hectares (ha), while the national production was about 2304210 tons (FAO, 2018). In Egypt onion (*Allium cepa* L.) is one of the most important crops on account of its value for local consumption and exportation commodity. Since great attention

should be paid towards improving yield, keeping quality and maturation time (Kandil *et al*., 2013). It has been considered as a supply of micro food, minerals, salts, vitamins and as well as other nutrients. It has been noted that onions are subjected to many diseases due to attacks of insect pests that may cause a reduction in the yield and quality of crops (Lorbeer *et al.*, 2002).

In Egypt, Onion (*Allium cepa* L.) is the main important and oldest crop. The Egyptian Onion is famous all over the world because of its early appearance and superior quality. Onion is cultivated mainly for food, but also for traditional medicine. It's attacked by many diseases (leaf blight, purple blotch and Downey mildew) which vary according to region, season and variety. The disease can affect production and marketing, which reduce the quality and yield, and thereby increase the cost of the production and the export potential. Ismail *et al.* (2014) reported that leaf blight (*Stemphylium vesicarium*) is the most important disease in Nubaria region, which causes considerable losses in bulb crop. It can cause severe damage. Many attempts were carried out for controlling Stemphylium blight on onion by using varied chemicals (Aveling and Shyman, 1993). Consequently, it can use cultural practices such as cultivated-time for escaping from the serious infestation of leave blight in Nubaria area.

Transplanting dates of onion seedlings reflecting the effect of edaphic factors and all environmental conditions on large scale on growth, bulb yield and bulb quality, which differ widely from one region to another. Thus, optimum transplanting dates have a vital role in maximizing growth, bulb yield and its quality of onion (Bharti and Ram, 2014; Misra *et al*., 2014; Ali *et al*., 2016). Also, Rugi *et al*. (2018) reported that there was a significant effect of transplanting dates on fresh weight of shoot, dry weight of shoot, fresh weight of bulb, dry weight of the bulb, the average weight of the bulb, yield of a marketable bulb, and bolting. Among the varieties, V8 (Agrifound Dark Red) gave the highest fresh weight and dry weight of shoot, fresh weight and dry weight of the bulb, the average weight of the bulb, and yield of marketable. The lowest bolting was recorded in V4 (Bhima Raj).

Sharma and Dogra (2017) revealed that there was a significant effect of varieties, transplanting dates and their interaction on bulb diameter, bulb weight and yield. The maximum bulb diameter and highest bulb weight among cultivars were noticed in cultivar Agrifound Dark Red. The yield of onion was significantly affected both by the variety and transplanting time. The highest average yield was observed in variety FDR. On the other hand, Sharma and Jarial (2017) revealed that there was a significant effect of both varieties and transplanting dates. The highest average yield was observed in cultivar AFDR. The highest bulb yield among transplanting dates was noted on the third transplanting date D3 (25^{th} July). Cultivar Agrifound Dark Red was the best-suited cultivar for kharif onion production in the lower Shivalik hills of Himachal. Moreover, Reddy and Gowdar (2005) determined the most appropriate sowing date of onion to minimize the incidence of purple blotch caused by *Alternaria porri*. The highest disease intensity was recorded in the early sown crop (June and July), followed by gradually declining disease intensity in later sown crop (August and September) in both the years. The highest bulb yield was obtained with 5 August (17.90 t/ha) and 15 August (19.80 t/ha) sowing in both seasons, respectively. *Alternaria, A. porri* and *Stemphylium vesicarium* were observed as the major pathogens. Sowing of crop on 1^{st} November resulted in significantly lower disease intensity (42.49 and 35.17% in the first and second year respectively) and recorded higher yield than sowing on either 14 October or 14 November (Efath *et al*., 2016).

The objectives of this investigation were:

1. To evaluate the performance of onion cultivars under different transplanting dates, and 2. To investigate what is the best planting date with onion cultivar which achieves the highest productivity, quality and less Stemphylium leaf blight disease infestation.

MATERIALS AND METHODS

Two field experiments were conducted out at the Experimental Farm, Nubaria Station, Onion Research Department, Agricultural Research Center, Nubaria Region during the two seasons of 2018/2019 and 2019/2020 to study the effect of sowing date on yield, quality and leaf diseases of some onion cultivars. Physical and chemical properties of experimental soil are presented in Table (1) which according to the method described by Page *et al.* (1982).

The two field experiments were laid out in a split-plot system in four replications in both seasons. The main plot was occupied by onion cultivars (Giza Red, Giza 6 Mohassan, Giza White and Giza 20), while the subplot was allocated by transplanting dates (1st November, 20th Novmber and 20 Decmber) in both seasons.

The average of climate data in Nubaria region, Alexandria at Latitude 31:12, longitude 29:57 and elevation 3.4 during 2018, 2019 and 2020 seasons are shown in Table (2).

Table 1. Soil Physical and chemical properties of experimental sites in 2018/2019 and 2019/2020 seasons

Character	Seasons	
	2018/2019	2019/2020
Soil texture (%)	Sandy loam	
Sand %	51.48	54.97
Silt %	32.10	33.63
Clay %	12.53	11.40
pH (1: 2.5 water suspension)	8.28	8.35
EC (dSm^{-1})	2.72	2.47
Cations (meq/L.)		
Ca^{++}	5.89	5.39
Mg^{++}	2.11	1.99
Na^{+}	13.68	12.79
K^{+}	1.82	1.51
Anions (meq/L.)		
HCO_3^{-}	3.27	2.77
Cl^{-}	16.36	15.32
$SO4^{--}$	3.67	3.21
O.M. (%)	0.35	0.32
$CaCO_3$ (%)	23.47	22.71
Available N(ppm)	35.22	37.81
Available P (ppm)	3.34	3.74
Available K (ppm)	98.63	107.20

Table 2. Average of climate data in Nubaria region, Alexandria at Latitude 31:12, longitude 29:57 and elevation 3.4 in 2018/2019 and 2019/2020 seasons.

Season	Date	Precipitation (mm month-1)	Relative Humidity at 2 Meters (%)	Maximum Temperature at 2 Meters (C)	Minimum Temperature at 2 Meters (C)	Wind Speed Range at 10 Meters (m/s)
2018	November	20.73	63.13	24.46	16.06	3.51
	December	33.43	67.21	19.38	12.60	4.71
2019	January	10.13	61.45	17.08	7.82	5.06
	February	21.84	63.49	18.72	8.68	4.53
	March	16.91	63.40	20.80	10.54	4.73
	April	4.26	56.36	24.58	12.83	4.60
	May	0.01	46.09	31.42	17.31	4.46
	Jun	0.00	56.97	32.84	21.51	4.50
	July	0.00	55.90	34.17	23.06	4.49
	August	0.00	58.10	34.31	23.09	4.14
	September	0.00	60.46	31.64	21.79	4.37
	October	25.34	62.52	29.89	20.20	4.12
	November	0.09	61.77	26.57	16.54	3.72
	December	28.68	67.73	20.30	12.54	5.16
2020	January	56.44	70.80	17.05	10.12	5.20
	February	30.24	70.90	18.57	10.18	4.40
	March	66.86	65.67	21.56	11.02	4.63
	April	62.01	63.56	23.86	12.98	4.10
	May	0.03	58.22	28.91	16.30	4.51

The experimental sub-plots size was 7 m^2, each consisting of four rows, 50 cm wide and 3.5 m^2 long. The varieties transplanting were planted on both sides of the row at 10 cm spacing.

Recommended doses of nitrogen, phosphorus and potassium fertilizers were added at the rate of 90 kg N, 45 kg P_2O_5 and 48 kg K_2O/ fed.

All other cultural practices for onion production in clay soil in Alexandria conditions were followed according to the recommendation of the Ministry of Agriculture and Land Reclamation.

The following data were recorded:

A. Bulbs Yield and Its Component:

At harvest days from planting, all Onion bulbs in each experimental sub-plot were pulled and the following data were recorded:

1. **Total Bulb Yield (t/fed.):** all harvested bulbs in each sub-plot were weighted in Kg then converted to t/fed.
2. **Marketable Bulb Yield (t/fed.):** yield of bulbs that were free from doubles, damaged bulbs and bolters for each sub-plot was recorded in both seasons and then converted to ton/fed.
3. **Average bulb weight (g):** was calculated by dividing the weight of single bulbs per sub-plot into both seasons by their number.

B. **Bulb Quality Parameters:**

1. **The Number Of Days To Maturity:** was expressed as a number of days from the transplanting date to the maturity stage. The maturity stage was determined based on the softening of bulb weight and 50% tops down of bulb leaves.
2. **Percentage of Single Bulbs:** was estimated by dividing the number of single bulbs by all number of bulbs per subplot x 100 for both seasons.
3. **Percentage of Double Bulbs:** calculated by dividing double bulbs by all number of bulbs per subplot x 100 for both seasons.
4. **Percentage of Bolters:** The number of bolters/total number of bulbs per subplot * 100 for both seasons.
5. **Total Soluble Solids (TSS):** was measured in the extracted juice, by squeezing a cross section of fleshy scales of the top above the largest bulb diameter by using a hand refract meter after 200 days from harvesting.

C. Stemphylium Leaf Blight Assessment:

Leaf blight disease was determined for each experimental plot as a percentage from the plant's area at the same time in both seasons.

Disease assessments were made on 15 plants from each experimental plot at 60 days from the first time of transplanting. Fifteen plants from each plot were randomly tagged for disease assessment on the 0 to 5 rating scale given by Sharma (1986).

Data were recorded on plant infection and percent leaf area diseased 15 days interval for 4 months starting from 1st of January and calculated in terms of percent disease index (PDI) was worked out by using the following formula.

$$\text{PDI \%} = \frac{\sum \text{of observed numerical rating}}{\text{Max. disease rating} * \text{Total number of observed plants}} * 100$$

- The details of 0-5 scale (Sharma, 1986) were as follows:-

0. No disease symptom
1. Symptoms cover up to 10 percent of the plant
2. Symptoms cover up to 20 percent of the plant

3. Symptoms cover up to 40 percent of the plant
4. Symptoms cover up to 75 percent of the plant
5. Symptoms cover more than 75 to 100 percent of the plant

All collected data were subjected to analysis of variance according to Gomez and Gomez (1984). All statistical analysis was performed using analysis of variance technique by means of CoStat (2005) computer software package.

RESULTS AND DISCUSSION

A. Bulbs Yield, Yield Component And Quality:

The results obtained in Table (3) showed the significant effect of planting dates on the four onion varieties and their interaction in all the studied characters during 2018/2019 and 2019/2020 seasons.

Results presented in Table (3) revealed that there was a significant difference among the four varieties in all the studied characters i.e., total bulb yield (t/fed), marketable bulb yield (t/fed), average bulb weight (g), number of days to maturity, percentage of single bulbs, percentage of double bulbs, percentage of bolters, and total soluble solids (TSS), whereas the onion variety Giza 6 Mohassan recorded the highest mean values of total yield, marketable yield, average bulb weight, percentage of single bulbs but gave the lowest values of the number of days to maturity followed by Giza Red variety which gave the highest values of the number of days to maturity and percentage of double bulbs, while the highest value of TSS was given with Giza White as compared with the other varieties in both seasons. These results are in harmony with those indicated by Fasika *et al*. (2008); Shah *et al.* (2012); Abou Azoom *et al.* (2014); Devi *et al.* (2014); Solanki *et al.* (2015) they reported that there was a significant difference among the studied varieties in growth, yield and quality characters that due to the genetic factors.

Regarding the effect of planting dates on onion characters, Table (3) showed that planting onion on the 20th of November recorded the highest mean values of total bulb yield (t/fed.), average bulb weight (g) in both seasons and marketable bulb yield (t/fed) in the second seasons, only. While, planting date at 20th of December gave the highest values of Percentage of single bulbs and TSS but gave the lowest number of days to maturity in both seasons as compared with the other date 1st November which gave the highest Percentage of double bulbs in the two seasons and Percentage of bolters in the first season, only. These differences may be due to the suitable conditions during the growth stages of the plant at a suitable date that enhances growth and increase vegetative growth. Such differences were found by Al Abdulsalam and Hamaiel (2004); Bhatt *et al.* (2007); Bardisi *et al.* (2013); Bharti and Ram (2014); Misra et al. (2014) and Ali *et al.* (2016).

Concern the interaction effect between onion varieties and planting dates, the results in Table (3) revealed that planting Giza Red or Giza 6 Mohassan on 20th November recorded the highest total yield (t/fed), and an average bulb weight (g) and gave the lowest % of bolters, while 20th December + Giza 6 Mohassan gave the highest marketable yield (t/fed). The lowest number of days to maturity was obtained with Giza White + 20th December in both seasons. On the other hand, planting Giza Red or Giza White on the 20th December gave the highest values of single bulbs and TSS (%), respectively as compared the other treatments in both seasons.

Table 3: Plant attributes of four onion varieties as affected by planting dates and their interaction in 2018/2019 and 2019/2020 seasons.

Attributes	Onion varieties (A)	Season 2018/2019				Season 2019/2020			
		Planting dates (B)			Average (A)	Planting dates			Average (A)
		1 November	20 November	20 December		1 November	20 November	20 December	
Total bulb yield (t/fed.)	Giza Red	13.58	17.86	13.28	14.91a	12.14	12.48	11.94	12.19a
	Giza 6 Mohassan	13.68	17.56	14.46	15.23a	13.72	14.78	12.50	13.67a
	Giza White	10.07	12.06	10.54	10.89b	11.79	12.87	11.16	11.94b
	Giza 20	12.02	15.50	10.97	12.83b	11.38	10.59	9.91	10.63b
Average (B)		12.34 b	15.75 a	12.31 b		12.26 a	12.68 a	11.38 b	
LSD at 0.05		**AB= 2.13**					**AB= 2.44**		
Marketable bulb yield (t/fed.)	Giza Red	9.39	9.28	10.38	9.68 a	9.41	10.01	8.80	9.41 b
	Giza 6 Mohassan	8.51	9.28	11.60	9.80 a	9.46	10.19	10.92	10.19 a
	Giza White	4.09	4.72	8.14	5.65 b	6.77	9.25	8.77	8.26 c
	Giza 20	5.56	8.78	7.13	7.16 b	6.98	8.01	6.08	7.02 c
Average (B)		6.89 c	8.02 b	9.31 a		8.15 b	9.37 a	8.39 b	
LSD at 0.05		**AB= 1.91**				**AB= 2.00**			
Average bulb weight (g)	Giza Red	84.75	112.00	83.00	93.25ab	104.50	111.25	97.75	104.50ab
	Giza 6 Mohassan	85.50	109.75	90.75	95.33a	111.25	118.25	110.25	113.25a
	Giza White	62.75	79.00	66.00	69.25c	75.25	102.75	94.25	90.75bc
	Giza 20	75.00	97.00	68.50	80.17bc	77.50	89.00	67.50	78.00c
Average (B)		77.00 b	99.44 a	77.06 b		92.13b	105.31a	92.44b	
LSD at 0.05		**AB= 13.28**				**AB=22.94**			
Number of days to maturity	Giza Red	188.50	162.75	148.50	166.58ab	195.25	176.25	145.50	172.33ab
	Giza 6 Mohassan	183.00	161.50	139.00	161.17 b	189.50	171.50	140.00	166.33b
	Giza White	184.00	164.75	136.50	161.75 b	193.75	167.50	138.50	166.58b
	Giza 20	185.75	169.00	150.75	168.50 a	197.25	182.50	153.75	177.83a
Average (B)		185.31a	164.50b	143.69c		193.94 a	174.69 b	144.44 c	
LSD at 0.05		**AB= 8.69**				**AB=5.90**			
Percentage of single bulbs	Giza Red	48.40	67.65	80.28	65.44a	52.90	47.90	57.78	52.86b
	Giza 6 Mohassan	51.70	68.28	77.95	65.98a	59.35	67.20	61.38	62.64a
	Giza White	33.45	46.15	77.10	52.23b	41.70	61.98	77.58	60.42a
	Giza 20	35.20	65.73	64.68	55.20b	36.70	40.83	35.53	37.69c
	Average (B)	42.19 c	61.95 b	75.00 a		47.66 b	54.48 a	58.07 a	
LSD at 0.05		**AB= 6.69**				**AB=11.94**			
Percentage of double bulbs	Giza Red	25.85	11.10	17.08	18.01b	34.83	38.88	29.13	34.28 b
	Giza 6 Mohassan	17.95	8.85	11.80	12.87c	31.88	26.10	14.78	24.25 c
	Giza White	11.78	7.05	8.23	9.02d	43.98	15.00	12.25	23.74 c
	Giza 20	22.18	17.28	24.30	21.25a	48.98	48.93	47.00	48.30 b
Average (B)		19.44a	11.07c	15.35b		39.92 a	32.23 b	25.79 c	
LSD at 0.05		**AB= 6.14**				**AB=10.90**			
Percentage of bolters	Giza Red	22.45	20.65	4.98	16.03 c	12.53	13.23	13.10	12.95a
	Giza 6 Mohassan	33.65	23.50	7.93	21.69 b	11.70	6.70	20.93	13.11a
	Giza White	54.78	46.80	14.68	38.75 a	14.33	23.03	10.18	15.85a
	Giza 20	42.63	17.00	11.03	23.55 b	14.33	10.25	17.48	14.02a
Average (A)		38.38 a	26.99 b	9.66 c		13.22a	13.30a	15.42a	
LSD at 0.05		**AB= 6.17**				**AB=15.56**			
Total soluble solids (TSS)	Giza Red	9.85	9.25	10.33	9.81a	8.83	9.38	9.63	9.28 b
	Giza 6 Mohassan	9.53	8.75	9.63	9.30b	8.33	8.28	9.08	8.56 c
	Giza White	9.98	9.20	10.48	9.89a	10.03	9.90	10.20	10.04 a
	Giza 20	9.83	9.28	9.50	9.54a	8.88	8.45	9.80	9.04 b
Average (B)		9.80 a	9.12 b	9.99 a		9.02 b	9.00 b	9.68 a	
LSD at 0.05		**AB=0.68**				**AB=0.83**			

Means in column (s)/row(s) followed by the same letter are not significant at the 0.05 level of probability.

B-Stemphylium Leaf Blight Disease:

The results illustrated in Table (4) showed the significant effect of planting dates on the four onion varieties and their interaction in the percent disease index of stemphylium leaf blight at 8 recording times during 2018/2019 and 2019/2020 seasons.

Results presented in Table (4) revealed that there was no infection found in all planting dates on the 1st of January in all cultivars while the symptoms start to occur at the 2nd observation time after 15 days from the first time. Data showed a significant difference among the four varieties in percent disease index in both seasons i.e., Giza Red was found to be more resistant to leaf blight disease in both seasons while the lowest infection percent observed from last planting date 20th of December. From the 3rd recording time to last on starting from 1st of February till 15th of April the symptoms start to increase in all variety among all planting dates during both seasons with significance. We found that Giza red was more resistant and a lower index of symptoms was observed on it in most of the observing times. On the other hand, Giza White and Giza 6 mohassan found to be more susceptible to infection by Stemphylium leaf blight showing the highest percent disease index (PDI) in all-time of recording data.

Regarding the effect of planting dates on stemphylium leaf blight disease symptoms, Data in Table (4) showed that planting onion on the 20th of November and 20th of December recorded the lowest percent disease index (PDI) in both seasons in all observation times with the lowest appear of leaf blight symptoms. The highest disease index was recorded from the first planting date 1st of November in both seasons during all recording time.

The increase of leaf blight by the time especially for the first planting date may be due to the suitable conditions (temperature and relative humidity) as shown in Table (2) during growth stages of the plant which is suitable for the fungus to infect the plant and produce the symptoms. The optimum temperature for the development of infection on onion under controlled conditions is 10–25 °C (Suheri and Price 2000), (Jakhar *et al*., 1996a) and (Jakhar *et al*., 1996b)

Concern the interaction effect between onion varieties and planting dates, the results in Table (4) revealed that planting Giza Red on 20th December recorded the lowest disease incidence comparing with other treatments in both seasons. On the other hand, planting Giza White on the 1st November gave the highest percent of disease index in both seasons as compared to the other treatments in both seasons.

Table 4: Stemphylium Leaf blight disease index (PDI) of four onion varieties as affected by planting dates and their interaction in 2018/2019 and 2019/2020 seasons

Attributes	Screening date	Onion varieties (A)	Season 2018/2019				Season 2019/2020			
			Planting dates (B)			Average (A)	Planting dates			Average (A)
			1 November	20 November	20 December		1 November	20 November	20 December	
Stemphylium Leaf blight	1/1	Giza Red	0	0	0		0	0	0	
		Giza 6 Mohassan	0	0	0	No infections	0	0	0	No infections
		Giza White	0	0	0		0	0	0	
		Giza 20	0	0	0		0	0	0	
	Average (B)		0	0	0	0	0	0	0	
	LSD at 0.05									
	15/1	Giza Red	1.34	0.00	0.00	0.45 b	3.33	1.67	0.00	1.67b
		Giza 6 Mohassan	2.33	0.67	0.00	1.00 a	2.00	2.33	0.00	1.44b
		Giza White	3.34	0.33	0.00	1.22 a	4.00	3.67	0.00	2.56a
		Giza 20	2.67	0.00	0.00	0.89 ab	3.00	2.33	0.00	1.78b
	Average (B)		2.42 a	0.25 b	0.00 b		3.08 a	2.50 b	0.00 c	
	LSD at 0.05		**AB= 0.89**				**AB= 0.76**			
	1/2	Giza Red	8.66	6.66	5.66	6.99a	4.33	3.33	2.66	3.44b
		Giza 6 Mohassan	10.0	9.00	7.66	8.89a	5.33	4.66	4.33	4.77a
		Giza White	9.33	9.58	8.00	8.97a	4.66	5.00	5.00	4.89a
		Giza 20	8.58	7.00	4.33	6.64a	6.00	4.67	3.00	4.56a
		Average (B)	9.14 a	8.06 a	6.41 b		5.08a	4.42ab	3.75b	
	LSD at 0.05		**AB= 13.28**				**AB=2.08**			
	15/2	Giza Red	14.33	10.67	7.33	10.78b	0.33	1.33	0.67	0.78b
		Giza 6 Mohassan	17.83	16.91	11.50	15.41ab	5.33	2.00	0.67	2.67a
		Giza White	16.83	16.00	13.67	15.50a	2.66	2.00	0.67	1.78ab
		Giza 20	18.50	11.33	9.58	13.14ab	2.00	1.66	1.00	1.55b
		Average (B)	16.87a	13.73b	10.52c		2.58a	1.75a	0.75b	
	LSD at 0.05		**AB= 3.39**				**AB= 2.95**			
	1/3	Giza Red	39.00	47.66	29.0	38.55c	46.66	46.67	34.66	42.66a
		Giza 6 Mohassan	52.33	59.33	41.00	50.89a	55.00	57.33	40.16	50.83a
		Giza White	56.67	54.16	35.33	48.72ab	51.00	54.66	36.00	47.22a
		Giza 20	44.83	55.33	31.16	43.77bc	42.33	53.66	32.00	42.66a
		Average (B)	48.21b	54.12a	34.12c		48.75a	53.08a	35.71b	
	LSD at 0.05		**AB= 8.78**				**AB= 8.94**			
	15/3	Giza Red	30.83	27.34	26.67	28.28a	14.67	13.33	15.33	14.44b
		Giza 6 Mohassan	27.66	21.00	30.66	26.44a	15.66	15.33	17.33	16.11a
		Giza White	29.66	37.66	27.83	31.72a	13.66	15.67	16.33	15.22ab
		Giza 20	35.66	22.75	29.33	29.25a	13.33	14.00	15.33	14.22b
		Average (B)	30.95a	27.19a	28.62a		14.33a	14.58a	16.08a	
	LSD at 0.05		**AB= 8.94**				**AB=3.77**			
	1/4	Giza Red	33.66	32.33	30.33	32.11a	12.66	11.33	10.00	11.33b
		Giza 6 Mohassan	36.66	31.91	41.00	36.52a	15.66	16.00	16.67	16.11a
		Giza White	43.33	35.00	35.67	38.00a	14.33	12.33	15.00	13.89a
		Giza 20	37.33	31.00	29.66	32.66a	15.00	18.33	12.67	15.33a
		Average (A)	37.75a	32.56a	34.17a		14.41a	14.50a	13.59b	
	LSD at 0.05		**AB= 12.77**				**AB=4.18**			
	15/4	Giza Red	65.00	55.67	40.25	53.64a	13.41	13.08	10.00	12.16b
		Giza 6 Mohassan	76.84	63.58	54.00	64.81a	16.16	16.50	14.67	15.78a
		Giza White	81.33	77.33	46.83	68.50a	17.42	14.33	14.08	15.28a
		Giza 20	76.33	74.00	44.67	65.00a	15.00	18.33	13.67	15.67a
		Average (B)	74.88a	67.65b	46.44c		15.50a	15.56a	13.11b	
	LSD at 0.05		**AB= 13.81**				**AB=3.22**			

Means in column (s)/row(s) followed by the same letter are not significant at the 0.05 level of probability.

CONCLUSION:

This study confirmed that onion varieties differed in all the studied characters i.e. growth, productivity, and bulbs quality whereas planting Giza 6 Mohassan, Giza Red and Giza White on 20th November or 20th December recorded the highest values of yield and quality characters that due to suitable varieties could be planting in these dates under study conditions at Nubaria, El-Beheira Governorate, Egypt and also due to their resistant to the incidence of stemphylium leaf blight disease.

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ARABIC SUMMARY

تأثير مواعيد الزراعة على الإنتاجية والجودة ومرض لفحة الاستيميفليم للأوراق لبعض أصناف البصل تحت ظروف النوبارية

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أجريت هذه الدراسة فى مزرعة محطة بحوث النوبارية – منطقة النوبارية – محافظة البحيرة خلال موسمي 2019/2018 و 2020/2019 و ذلك لدراسة تحديد أفضل موعد زراعة يعطى أعلى وأجود الصفات المحصولية تحت ظروف منطقة النوبارية. وقياس نسبة وشدة الإصابة بأمراض (البياض الزغبي ولفحة الأوراق واللطعة الأورجوانية) والوقوف على أقلها لكل موعد زراعة. وتحديد أنسب الأصناف لكل ميعاد يحقق أحسن محصول.

إقيمت تجارب حقلية في تصميم القطع المنشقة مرة واحدة حيث سيتم توزيع الأربع أصناف من البصل (جيزة أحمر و جيزة 6 محسن وجيزة أبيض وجيزة 20) و القطع الرئيسية كما ستوزع مواعيد الزراعة الثلاثة (أول نوفمبر و 20 نوفمبر و 20 ديسمبر) في القطع تحت الرئيسية (الشقية).

- **الصفات المدروسة: تم تقدير الصفات التالية عند الحصاد :**

1- الصفات الإنتاجية وتشمل:
   - محصول البصل الكلي/فدان.
   - محصول البصل الصالح للتسويق/فدان.
   - متوسط وزن البصلة.

2- صفات الجودة للابصال وتشمل
   - عدد الأيام حتى النضج.
   - نسبة البصل المفرد.
   - نسبة البصل المزدوج.
   - نسبة التزهير المبكر.
   - تقدير المواد الصلبة الذائبة الكلية.

3- دراسة وتحديد شدة الإصابة 8 مرات خلال موسم النمو الخضرى (من أول يناير وحتى النضج) بمعدل مرة كل 15 يوم للاصابة بمرض لفحة الاستيميفيليم لاوراق البصل

ولخصت أهم النتائج فيما يلي:

- اختلفت أصناف البصل الأربعة فيما بينها في المحصول والجودة مثل وزن البصلة (بالجم) ومحصول البصل الكلي (طن/فدان) ومحصول البصل الصالح للتسويق (طن/فدان) ومتوسط وزن البصلة ونسبة البصل المفرد ونسبة البصل المزدوج ونسبة التزهير المبكر (عدد الأيام حتى النضج) ونسبة النقضة ومجموع المواد الصلبة الكلية (%) خلال موسمي الزراعة حيث حقق صنف جيزة أحمر و جيزة 6 محسن أعلى قيم في صفات المحصول والجودة وأقل عدد أيام للنضج وأقل اصابة بالأمراض مقارنة بباقي الأصناف خلال موسمى الدراسة.
- أثر موعد الزراعة تأثيراً معنوياً على وزن البصلة (بالجم) ومحصول البصل الكلي (طن/فدان) ومحصول البصل الصالح للتسويق (طن/فدان) ومتوسط وزن البصلة ونسبة البصل المفرد ونسبة البصل المزدوج ونسبة التزهير المبكر (عدد الأيام حتى النضج) ونسبة النقضة ومجموع المواد الصلبة الكلية (%) خلال موسمي الزراعة حيث أوضحت النتائج أن موعد الزراعة في 20 نوفمبر أو 20 ديسمبر أعطت أعلى القيم للصفات المدروسة وحقق أقل عدد أيام حتى النضج وأقل إصابة بالأمراض خلال موسمي الزراعة.
- كان التداخل بين عاملي الدراسة بين أصناف البصل الأربعة ومواعيد الزراعة الثلاثة معنوياً في كل الصفات المدروسة حيث سجل موعد الزراعة 20 نوفمبر أو 20 ديسمبر لصنف جيزة 6 محسن وجيزة أحمر أعلى القيم في معظم الصفات كما سجل صنف جيزة أبيض مع الموعد 20 ديسمبر أقل عدد أيام حتى النضج وأقل نسبة البصل المزدوج وأقل إصابة بالأمراض مقارنة بباقي المعاملات خلال موسمي الدراسة.

التوصية:

توصى الدراسة بزراعة صنف جيزة أحمر أو جيزة 6 محسن في 20 نوفمبر و 20 ديسمبر حيث أن ذلك حقق أعلى محصول وجودة وقللت من الاصابة المرضية بلفحة الاوراق وأقل نسبة البصل المزدوج والنفضة خلال موسمي الدراسة وتحت ظروف منطقة النوبارية – محافظة البحيرة – مصر وظروف المناطق المماثلة لها.