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Effect of Nitrogen and Potassium Fertilization on Seed Production of Onion (*Allium cepa* L.) Improved Giza 6 Cultivar

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Abstract: This study was carried out at the Experimental Farm, Faculty of Agriculture, Sohag University, Sohag, Egypt during two successive winter seasons 2010/2011 and 2011/2012 to investigate the effect of nitrogen and potassium fertilization on onion seed production Improved Giza 6 cultivar. Three nitrogen rates (50, 100 and 150 kg feddan^{-1}, one feddan= 0.42 ha) and three potassium rates (40, 80 and 120 kg feddan^{-1}) were used in this study. The new Duncan's multiple range tests showed that the nitrogen fertilizer doses had significant effect on all traits. Moreover, potassium fertilizer rates significantly affected on seed yield parameters, except umbel diameter. The maximum seed yield feddan^{-1} was obtained by the high nitrogen rates and the medium potassium rates. Seed yield plant^{-1} and feddan^{-1} were influenced by days to sprout, plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, days to flowering, flower stalks height and weight of seeds umbel^{-1}.

Key words: Nitrogen doses · Potassium rates · Onion · Seed production · Cultivar

INTRODUCTION

Onion (*Allium cepa* L.) is the most important vegetable crops in the world for the various economic, health and nutritional aspects. It belongs to family *Alliaceae*, monocotyledonous, cross-pollinated and cool season vegetable crops.It is widely used to increase the taste of many types of food and considered as a rich source of carbohydrates, proteins and vitamin C besides some minerals such as phosphorus and calcium [1] and protects stomach carcinoma [2]. These onion pharmacological effects may be due to both organosulfur compounds and flavonoids [3, 4].

In Egypt, it is considered one of the major sources of hard currency due to the early maturity and then the possibility of appearance in foreign markets early. In addition its higher quality compared to other onion due to high nutritional value and pungency. The total area cultivated with onions in Egypt in 2013 was 117 178 feddan with an average production of 12.71 tons feddan^{-1}. While, the total area cultivated with onions in Sohag in 2013 was 13533 feddan with an average production of 16.46 tons feddan^{-1}, it represents 11.55% of the total cultivated area in Egypt as mentioned by the yearly book of Economics and Statistics of the [5]. The amount of onion exports amounted to about 407.8 thousand tons valued at 170.4 million dollars and represents 7% of Egypt's total value of agricultural exports in 2010 [5].

Agricultural production and productivity are influence by several factors. Seed is one of the vital input factors which significantly help in enhancing the productivity of crops. The seed production of onion is very difficult phenomena as it is produced in two phases. In first phase, the bulb production is required, while under second phase the seed production takes place from the bulbs.

Improved Giza 6 onion cultivar is a high yielding and popular in Sohag Governorate. It is yellow skinned having flat bulbs. It has got excellent keeping quality, early exportation and dehydration process. It is consider the best cultivar on Upper Egypt according to Ministry of Agriculture, [5].

Lack of use optimum fertilizer dose may be a major constraint of maximum onion yield [6]. Nitrogen (N) increases the vegetative growth and produces good quality foliage and promotes carbohydrate synthesis. Potassium (K) is essential for photosynthesis activity of

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leaf, as it helps in translocation of food. Besides plants require large amount of potassium than the soil can supply [7]. Therefore, it is necessary to effective research and study the potentially of our local cultivars of bulb and seed production especially the information on the cultivar Improved Giza 6 because this cultivar appropriate for onion seed production in Upper Egypt generally and Sohag Province specially.

Since, the information on nitrogen and potassium fertilizers of the Improved Giza 6 cultivar is low in respect of seed production. Therefore, the present study was conducted to investigate the effects of nitrogen and potassium fertilizer on seed production of onion Improved Giza 6 cultivar under Sohag conditions.

MATERIALS AND METHODS

Location: The present study was conducted during two winter successive seasons of 2010/2011 and 2011/2012 at the experimental farm of Faculty of Agriculture, Sohag University, Sohag, Egypt under newly reclaimed sandy soil conditions. Physical and chemical properties of soil site are shown in Table 1.

Experimental Details: Improved Giza 6 onion cultivar was used in this study. The source of this cultivar is Agricultural Research Center, Shandaweel Research Station, Onion Research section, Sohag, Egypt. Three nitrogen doses (N_1= 50, N_2= 100 and N_3= 150 kg feddan^{-1}) and three potassium rates (K_1= 40, K_2= 80 and K_3= 120 kg feddan^{-1}) were used in this study. The treatments were arranged in split-plot in randomized complete block (RCB) design with three replicates. The three nitrogen doses were arranged in the main plots,while three potassium rates were assigned in the sub-plots.

The bulbs between (4:6 cm) diameters were planted at 40 cm spacing. Nitrogen fertilizer was added in the form of ammonium nitrate (33.5 % N) in three equal doses after 30, 50, 80 days after planting (DAP). Potassium fertilizer was applied in the form of potassium sulphate (48-52 % K_2O) in two equal doses at 50 and 80 DAP.

Each experimental unit was 6.3 m^2 consisted of three ridges 70 cm apart and 3 m length. Bulbs were planted on 10 November in both seasons. Recommended cultural procedures other than the applied treatments were followed. The mature umbels were harvested in the morning with a small portion of flowering stalk between 15 and 25 April in both seasons, when 10-15 % of the fruits exposed black seeds.

Data Collection: Plant height (cm) and number of leaves plant^{-1} were recorded from 5 randomly sampled plants per plot at 90 DAP. Number of stalks plant^{-1} and flower stalks height (cm) were recorded from 5 randomly sampled plants per plot at 140 DAP. Days to flowering was measured by registering the number of days from planting until 50% of the plants having the first opened flower. Umbels diameter (cm) was measured using Vernier Caliper after 140 DAP. Weight of seeds umbel^{-1} (g) was recorded from 5 randomly selected plants after the completion of flowering. One thousand seeds were counted from each plot then weighed with electric balance in gram up to two decimal units. Seed yield plant^{-1} (g) was recorded after harvest from 5 randomly sampled plants per plot. Seed yield kg feddan^{-1} (one feddan 4200 m^2 i.e. 0.42 ha) was measured after harvest by converting the respective seed yield per plot. Weight of 1000 seeds (g) was recorded after harvest by an electric balance. For determining germination (%) percentage three dishes of 50 seeds were cultivated per treatment. The dishes were closed and placed in the germinator at the temperature 20°C. Germination percentage was calculated according to the following equation:

$$\text{Germination (\%)} = \frac{\text{Number of germinated seeds}}{\text{Number of cultivated seeds}} \times 100$$

Statistical Analysis: Data obtained during the two seasons of the study were statistically analyzed and treatments means were compared using the Duncan's multiple range tests [8].

Table 1: Soil characterization of the experimental site

Sampling depth	E.C. (1:5) dSm^{-1}	pH (H_2O) (1:2.5)	O.M %	$CaCO_3$ %	Clay %	Silt %	Sand %	Soil Texture	Total N (%)	$NaHCO_3$-P ppm	Available K ppm
0 - 25	0.21	7.35	2.51	11.27	29.70	23.12	47.18	SCL	0.199	8.3	374
25 - 45	0.15	7.73	0.09	52.15	3.19	6.00	90.81	S	0.053	19.5	178
45 - 65	0.19	7.90	0.40	55.49	2.90	7.18	89.92	S	0.004	19.9	144
65 - 80	0.20	7.85	0.31	22.50	2.60	7.22	90.18	S	0.004	6.5	102

SCL= Sandy Clay Loam, S= Sand, NaHCO3-P= NaHCO3-P extractable-P.

RESULTS AND DISCUSSION

Effect of Nitrogen Fertilization: Different doses of nitrogen fertilizer showed significant effect on growth and yield components (Tables 2, 3 and 4). The highest plant height (85.36 cm), number of leaves plant^{-1} (84.16), number of stalks plant^{-1} (7.62) and the maximum days to flowering (121.9) were produced by the highest nitrogen rate, which was significantly higher than the medium and small nitrogen doses (Table 2). Umbel diameter (7.79 cm), flower stalk height (93.19 cm), weight of seeds umbel^{-1} (3.28 g) and number of seed sumbel^{-1} (779.3) were obtained from the highest nitrogen rate, which was significantly higher than the medium and small nitrogen doses (Table 3). Similar trend was found in seed yield plant^{-1} (24.72 g), seed yield feddan^{-1} (371.6 kg), weight of 1000 seeds (4.19 g) and germination percentage (87.44 %) were obtained from the highest nitrogen rate, which were significantly different from two other doses of nitrogen (Table 4). The superiority of higher level of nitrogen may be due to the highest level of nitrogen was probably due to the availability of more nutrients, which helped, in maximum vegetative, flowering and seed yield growth of onion plants. These results are in harmony with those reported by Stuart and Griffin [9], Singh *et al*. [10], Nandpuri *et al*. [11], Malachowski [12], Levy *et al*. [13], Chakrabarti *et al*. [14], Ahmed and Abdalla [15], Nagaraju *et al*. [16], Cuocolo and Barbieri [17], Bokshi *et al*. [18], Bhardwaj *et al*. [19], Bhatia and Pandey [20], Mishra [21], Rahim *et al*. [22], Balraj *et al*. [23], Amjad *et al*. [24], Tiwari *et al*. [25], Morsy *et al*. [26] and Soleymani and Shahrajabian [27]. Whereas, the minimum effect of nitrogen fertilization on plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, days to flowering, flower stalk height, umbel diameter, weight of seeds umbel^{-1}, seed yield plant^{-1}, seed yield feddan^{-1}, weight of 1000 seeds and germination percentage (77.36 cm, 65.18, 7.16, 116.4, 7.43 cm, 84.49 cm, 2.49 g, 678.9, 18.0g, 270.8 kg, 3. 76, 75.59 %, respectively) were found from lower nitrogen doses.

Effect of Potassium Fertilization: No significant effect was found for potassium doses on umbel diameter (Table 3). While, using different potassium doses had significant affect on plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, days to flowering, flower stalk height, weight of seeds umbel^{-1}, number of seeds umbel^{-1}, seed yield plant^{-1}, seed yield feddan^{-1}, weight of 1000 seeds, germination percentage (Tables 2, 3 and 4). The significant variation in plant height (84.09 cm) was produced by applying maximum rate of potassium, while the lowest (78.27 cm) was produced by applying minimum rate of potassium, also the maximum number of leaves plant^{-1} (75.04) was recorded by applying maximum rate of potassium (K_3), while the lowest value (74.11) produced by applying minimum rate of potassium. The highest values for number of stalks plant^{-1}, flower stalk height, weight of seeds umbel^{-1}, number of seeds umbel^{-1}, seed yield plant^{-1}, seed yield feddan^{-1}, weight of 1000 seeds and germination percentage (7.56, 91.68 cm, 3.09 g, 757.0, 23.39 g, 350.9 kg, 4.10 g and 86.90 % respectively) were obtained from plants which received highest amount of potassium, which were significantly different from two other potassium doses (Tables 2, 3 and 4).

On the contrary the lowest amount of potassium (K_1) gave the maximum days to flowering (120.1), whereas the minimum (117.4) was obtained from plants received highest amount of potassium (K_3). The increase in growth and yield parameters with progressive increasing of potassium could be due to higher uptake of potassium at higher levels. Since potassium plays an important role in the translocation of photosynthesis, the added K might have translocated photosynthesis from root to leaves, which were further utilized in building up of new cells leading to better height and vigor. These results are in harmony with those reported by Malachowski [12], Levy *et al*. [13] and Singh and Dhankar [28].

On the other hand, the minimum potassium rate (K_1) significantly decreased all growth and yield parameters (plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, flower stalk height, umbel diameter, weight of seeds umbel^{-1}, weight of seeds umbel^{-1}, seed yield plant^{-1}, seed yield feddan^{-1}, weight of 1000 seeds and germination percentage). Except days to flowering, which were the opposite of that, as well as umbel diameter parameter not affected by using different doses of potassium.

Interaction Effect of Nitrogen and Potassium Fertilization: The interaction between highest rates of nitrogen and potassium ($N_3 \times K_3$) gave the tallest plants (87.67 cm) which were significantly higher than the other interactions. On the contrary, the shortest plants (75.53 cm) were obtained from interaction between the lowest rates of nitrogen and potassium ($N_1 \times K_1$) (Table 2). These results are in harmony with those reported by Baloch *et al*., [29]. The highest number of leaves plant^{-1} (85.20) and number of stalks plant (7.67) were achieved by the highest rates of nitrogen and potassium ($N_3 \times K_3$), which were significantly higher than the other interactions, while the lowest values (65.33 and 7.00, respectively) was

recorded from interaction between (N_1×K_1) the minimum rates from nitrogen and potassium (Table 2). Similar results were reported by El-Bassiony [30], Ali *et al*. [31] and Al-Fraihat [32]. The maximum period for flowering (123.0) was recorded from interaction between the maximum rates of nitrogen (N_3) with minimum rate of potassium (K_1) which were significantly higher than the other interactions (Table 2). Similar trends were found by Ali, *et al*., [31]. The longest flower stalks (95.74 cm) was observed on plants which developed from (N_3×K_2), while (N_1×K_1) gave the shortest (82.36 cm) flower stalks (Table 3). The present results are in agreement with those obtained by Gasim and George, [33]. The maximum umbel diameter (7.87 cm) was obtained from plants which emerged from highest nitrogen rates with medium potassium rates (Table 3), while, the lowest values recorded from (N_1×K_1). Similar results were reported by Patil *et al*., [34]. The combination between the two studied factors indicated that the interactions significantly affected on yield components and the highest weight of seeds umbel^{-1}, number of seeds umbel^{-1} and weight of 1000 seeds (3.63 g, 839.3 and 4.34 g, respectively) were obtain from (N_3×K_2) the highest nitrogen rates with medium potassium rates (Tables 3 and 4) which were significantly higher than the other interactions. Similar results were reported by Mohanty, [37]. The highest seed yield plant^{-1} (27.39g) and germination percentage (89.56%) were achieved by the highest rates of nitrogen and potassium (N_3×K_3), which were significantly higher than the other interactions, while the lowest values (16.56g and 70.67%, respectively) recorded from interaction between the minimum rates from nitrogen and potassium (N_1×K_1) (Table 4). These results are in agreement with those obtained by Mishra, [21]. The heaviest weight of seed yield feddan^{-1} (412.5 kg) was obtained from interaction between (N_3×K_2), the highest nitrogen rates with the medium potassium rates (Table 4 and Figure 1).

Table 2: Effect of nitrogen, potassium fertilizers and their interaction on plant height, number of leaves plant^{-1}, number of stalks plant^{-1} and days to flowering of onion Improved Giza 6 cultivar in both growing seasons

		Plant height (cm)		Number of leaves plant^{-1}		Number of stalks plant^{-1}		Days to flowering	
Treatments		2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012
Nitrogen doses	N_1	77.36 C	78.49 C	65.71 C	65.18 C	7.16 B	7.28 B	116.4 C	116.8 C
	N_2	81.76 B	82.29 B	74.60 B	74.16 B	7.33 B	7.42 AB	118.9 B	119.4 B
	N_3	84.67 A	85.36 A	83.82 A	84.16 A	7.62 A	7.56 A	121.9 A	121.2 A
Potassium rates	K_1	78.27 C	80.85 C	74.49 A	74.11 B	7.20 B	7.29 B	120.1 A	120.0 A
	K_2	81.76 B	82.20 B	74.60 A	74.49 AB	7.40 AB	7.42 AB	119.7 A	119.4 B
	K_3	83.76 A	84.09 A	75.04 A	74.89 A	7.51 A	7.56 A	117.4 A	121.2 A
Nitrogen doses	N_1*K_1	75.53 e	77.40 f	65.33 e	65.13 d	7.00 c	7.13 c	117.7 c	118.0 d
*Potassium rates	N_1*K_2	76.33 e	77.53 e	65.87 e	65.00 d	7.06 bc	7.27 bc	117.0 c	117.0 d
	N_1*K_3	80.20 d	80.53 d	65.93 e	65.40 d	7.40 ab	7.46 ab	114.7 d	115.3 e
	N_2*K_1	79.60 d	80.67 d	75.93 d	74.00 c	7.07 b	7.26 bc	119.7 b	119.3 c
	N_2*K_2	81.93 c	82.13 c	73.87 d	74.13 c	7.40 ab	7.47 ab	119.3 b	119.7 c
	N_2*K_3	83.73 b	84.07 b	74.00 d	74.33 c	7.53 a	7.53 ab	117.7 c	119.3 c
	N_3*K_1	79.67 d	81.47 d	82.20 c	83.20 b	7.53 a	7.47 ab	122.7 a	122.7a
	N_3*K_2	87.00 a	86.93 a	84.07 b	84.33 a	7.73 a	7.53 ab	123.0 a	121.3 b
	N_3*K_3	87.33 a	87.67 a	85.20 a	84.93 a	7.60 a	7.67 a	120.0 b	119.7 c

Means followed by different letter are significantly different at 5% level of significance

Table 3: Effect of nitrogen, potassium fertilizers and their interaction on umbel diameter, flower stalk height, weight of seeds umbel^{-1}and number of seeds umbel^{-1} of onion Improved Giza 6 cultivar in both growing seasons

		Umbel diameter (cm)		Flower stalk height (cm)		Weight of seeds umbel^{-1}(g)		Number of seeds umbel^{-1}	
Treatments		2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012
Nitrogen doses	N_1	7.44 B	7.54 B	84.49 C	85.10 C	2.52 C	2.49 C	685.5 B	678.9 B
	N_2	7.43 B	7.48 B	90.33 B	91.13 B	2.79 B	2.84 B	699.2B	713.0 B
	N_3	7.69 A	7.79 A	92.50 A	93.19 A	3.23 A	3.28 A	767.2 A	779.3 A
Potassium rates	K_1	7.47 A	7.56 A	84.91 B	85.68 B	2.44 B	2.47 B	653.9 B	662.4 B
	K_2	7.54 A	7.63 A	91.29 A	92.05 A	3.03 A	3.05 A	750.9 A	757.0 A
	K_3	7.56 A	7.62 A	91.11 A	91.68 A	3.07 A	3.09 A	747.1 A	751.8 A
Nitrogen doses	N_1*K_1	7.33 d	7.50 c	82.36 e	82.98 e	2.35 d	2.39 c	678.1 cd	679.6 cd
*Potassium rates	N_1*K_2	7.43 bcd	7.53 bc	85.84 d	86.43 d	2.48 cd	2.43 c	671.5 cd	656.1 cd
	N_1*K_3	7.57 abcd	7.60 abc	85.27 d	85.88 d	2.70 c	2.66 c	706.9 bc	701.0 cd
	N_2*K_1	7.43 bcd	7.47 c	85.29d e	85.91 d	2.40 d	2.42 c	625.2 d	635.9 d
	N_2*K_2	7.47 abcd	7.50 c	92.82 b	93.99 b	3.05 b	3.10 b	762.4 ab	775.9 ab
	N_2*K_3	7.40 cd	7.47 c	92.88 b	93.49 b	2.97 b	3.04 b	710.0 bc	727.3 bc
	N_3*K_1	7.63 abc	7.70 abc	87.07 c	88.16 c	2.60 cd	2.63 c	658.5cd	671.7 cd
	N_3*K_2	7.73 a	7.87 a	95.23 a	95.74 a	3.56 a	3.63 a	818.9 a	839.0 a
	N_3*K_3	7.70 ab	7.80 ab	95.20 a	95.67 a	3.55 a	3.57 a	824.3 a	827.2 a

Means followed by different letter are significantly different at 5% level of significance

Table 4 Effect of nitrogen, potassium fertilizers and their interaction on seed yield plant^{-1}, seed yield feddan^{-1}, weight of 1000 seeds and germination percentage of onion Improved Giza 6 cultivar in both growing seasons

		Seed yield plant^{-1} (g)		Seed yield feddan^{-1} (kg)		Weight of 1000 seeds (g)		Germination percentage	
Treatments		2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012	2010/2011	2011/2012
Nitrogen doses	N_1	18.00 C	18.20 C	270.8 C	273.0 C	3.67C	3.67 C	75.93 C	75.59 C
	N_2	20.49 B	21.10 B	307.3B	317.0 B	3.97 B	3.98 B	83.78 B	84.71 B
	N_3	24.64 A	24.72 A	369.6 A	371.6 A	4.19 A	4.18 A	86.78 A	87.44 A
Potassium rates	K_1	17.58 B	17.99 B	263.7 B	269.9 B	3.73 C	3.72 C	77.22 C	77.59 C
	K_2	22.53 A	22.73 A	337.9 A	341.2 A	4.01 B	4.01 B	82.56 B	83.22 B
	K_3	23.07 A	23.39 A	346.1 A	350.7 A	4.09 A	4.10 A	86.70 A	86.90 A
Nitrogen doses	N_1*K_1	16.56 e	17.05 d	250.6 e	255.8 d	3.52 i	3.51 g	71.56 h	70.67 h
*Potassium rates	N_1*K_2	17.52de	17.67 d	262.9 de	265.0 d	3.69 h	3.70 f	75.11 g	75.44 g
	N_1*K_3	19.94 c	19.88 c	299.0 c	298.2 c	3.81 f	3.80 e	81.11 e	80.67 e
	N_2*K_1	16.59 e	17.34 d	248.8 e	260.2 d	3.75 g	3.75 ef	77.00 f	78.00 f
	N_2*K_2	22.56 b	23.16 b	338.4 b	347.4b c	3.97 d	4.00 c	84.89 c	86.00 c
	N_2*K_3	22.31 b	22.90 b	334.6 b	343.4 b	4.17 c	4.18 b	89.44 a	90.20 a
	N_3*K_1	19.45c	19.58 c	291.7 cd	293.6 c	3.92 e	3.91 d	83.11 d	84.11 d
	N_3*K_2	27.50 a	27.35 a	412.5 a	410.9 a	4.34 a	4.33 a	87.67 b	88.22 b
	N_3*K_3	26.97 a	27.39 a	404.6 a	410.2 a	4.32 b	4.32 a	89.56 a	90.00 a

*Feddan is 4200 m^2, approximately 0.42 hectare.

Means followed by different letter are significantly different at 5% level of significance.

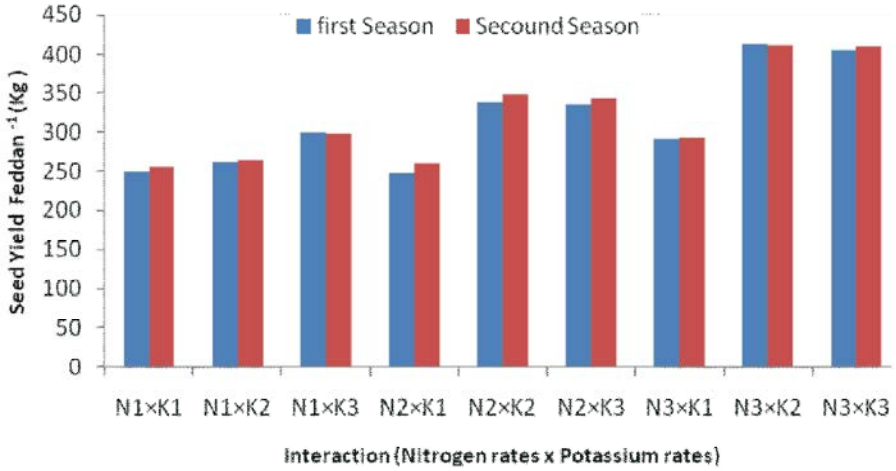

Fig. 1: Interaction effect of nitrogen and potassium rates on seed yield feddan^{-1} (kg) of onion Improved Giza 6 cultivar in both growing seasons

Correlation Between Traits: Relationships between 10 characters related to seed production of onion Improved Giza 6 cultivar are presented in Table 5. Seed yield plant^{-1} and feddan^{-1} were influenced by plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, umbels diameter, flower stalks height, weight of seeds umbel^{-1}, number of seed umbel^{-1} and weight of 1000 seeds.

Correlation between each of these two traits with, plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, umbels diameter, flower stalks height, weight of seeds umbel^{-1}, number of seeds umbel^{-1} and weight of 1000 seeds were (0.952 and 0.950; 0.939 and 0.939), 0.721 and 0.718; 0.742 and 0.743), (0.905 and 0.904;0.888 and 0.887), 0.777 and 0.775; 0.715 and 7.15), (0.941 and 0.959; 0.950 and 0.950), (0.997 and 0.997; 0.998 and 0.999), (0.951 and 0.953; 0.971 and 0.971), (0.955 and 0.954; 0.961 and 0.961), in the first and second seasons, respectively and highly significant ($P< 0.01$).These results are in agreement with those obtained by Rahman and Das [35], Bolandnazar [36], Mohanty [37], Aklilu *et al*. [38], Sultana *et al*. [39], Trivedi and Dhumal [40], Obiadalla [41] and El-Damarany *et al*. [42], who found that one or more from these correlations between onion traits.

Table 5: Phenotypic correlation coefficients among 12 traits of Improved Giza 6 onion cultivars sown during 2010/2011 and 2011/2012 seasonsin upper and lower triangle respectively.

	PH	NLP	NSP	UD	FSH	WSU	NSU	W1000S	SYP	SYF
PH	1	0.791**	0.898**	0.735**	0.937**	0.951**	0.839**	0.981**	0.952**	0.950**
NLP	0.858**	1	0.765**	0.777**	0.720**	0.706**	0.544*	0.806**	0.721**	0.718**
NSP	0.897**	0.726**	1	0.824**	0.844**	0.874**	0.765**	0.930**	0.905**	0.904**
UD	0.700**	0.746**	0.629*	1	0.609*	0.754**	0.688**	0.741**	0.777**	0.775**
FSH	0.899**	0.737**	0.863**	0.538*	1	0.947**	0.858**	0.959**	0.941**	0.959**
WSU	0.935**	0.743**	0.863**	0.714**	0.949**	1	0.960**	0.947**	0.997**	0.997**
NSU	0.853**	0.640*	0.784**	0.714**	0.893**	0.976**	1	0.824**	0.951**	0.953**
W1000S	0.966**	0.803**	0.927**	0.652**	0.963**	0.955**	0.870**	1	0.955**	0.954**
SYP	0.939**	0.742**	0.888**	0.715**	0.950**	0.998**	0.971**	0.961**	1	0.999**
SYF	0.939**	0.743**	0.887**	0.715**	0.950**	0.999**	0.971**	0.961**	0.999**	1

PH: Plant Height, NLP: Number of leaves plant^{-1}, NSP: Number of stalks plant^{-1}, UD: Umbels diameter (cm), FSH: Flower stalks height (cm), WSU: Weight of seeds umbel^{-1} (g), NSU: Number of seed umbel^{-1}, W1000S: Weight of 1000 Seed, SYP: Seed yield plant^{-1} (g) and SYF: Seed yield feddan^{-1} (kg). *: significant correlation at 5%, **: significant correlation at 1% and Ns: Non-significant

CONCLUSION

From the data presented in this study it can be concluded that the combination between maximum nitrogen doses (150 kg feddan)and medium potassium doses (80 kg feddan) resulted in the highest seed yield feddan^{-1} from Improved Giza 6 onion cultivar under such conditions. Seed yield plant^{-1} and feddan^{-1} were significantly correlated with plant height, number of leaves plant^{-1}, number of stalks plant^{-1}, umbels diameter, flower stalks height, weight of seeds umbel^{-1}, number of seed umbel^{-1} and weight of 1000 seeds.

Further investigation is, therefore, suggested for different agro-ecological climates of SohagProvince, Egypt in order to confirm the present findings.

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