Performance of Some Egyptian Rice Cultivars under Different Potassium Fertilization Rates

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ABSTRACT
Two field experiments were conducted at the Experimental Farm of the Rice Research and Training Center (RRTC), Sakha Research Station, Kafrelsheikh, Egypt, during two seasons of 2016 and 2017 to study the response of some rice cultivars to some potassium rates. The experimental design was a split- plot system with three replicates. The main plots were occupied by the eight rice cultivars "Sakha 101, Sakha102, Sakha105, Sakha106, Giza 177, Giza178, Giza179 and Giza 182". While, the sub-plots contain four Potassium rates (0, 50, 100and 150% from recommended of K=RDK). Panicle length (cm), number of filled grains/panicle, 1000- grains weight (g), biological, grain, and straw yields (t/ha.), hulling %, milling %, GT%, amylose, grain K content, grain protein content (%) were determined in both seasons. The obtained results revealed that all cultivars were affected significantly regard their respect to K fertilization due to their genetically differed. Moreover, the rice cultivars Giza 178, Sakha 101 and 102 had a significant response with increasing K- fertilizer rate up to 150 from the recommended dose (RDK) as compared with other cultivars under the study.

INTRODUCTION

Salt stress is one of the major abiotic stress factors that affect almost every aspect of Rice (*Oryza sativa* L.) is considered one of the most important food crops worldwide. It has grown in a wide range of climatic zones (Osman *et al*., 2013). In Egypt, the area devoted to rice cultivation is about 673000 ha and the average yield of rice reached about 9.3 t/ha, while, the cultivated area in the World reached about 160 million ha with an average 4.6 t/ha (FAO, 2016).

Potassium (K) is a macro- element known to be very dynamic and a major contributor to the organic structure and metabolic functions of the plant. Adequate K supply is also desirable for the efficient use of Fe, while higher application of K result in competition with Fe (Çelik *et al.,* 2010). Potassium is involved in a number of physiological processes like osmoregulation, cation–anion balance, protein synthesis and activation of enzymes. Scrutiny of the past and recent information on K status over four decades showed that there is a gradual decline in K status in soils from high to medium and medium to low. Potassium deficiency increases in poorly drained soils, partly because toxic substances produced in

highly reduced soils retard K uptake and partly because less soil K is released under these soils. Environmental stresses reduce the rice growth and severely affect the seedling biomass, photosynthesis, stomatal conductance, plant water relations and starch metabolism (Farooq *et al.,* 2009).

Rice plant significantly responded to increasing potassium level up to 75 or 171 kg K_2O/ha (Abd El- Rahman *et al*., 2004). Paddy yield and its components of rice averaged across six districts showed that the highest values for the number of grains/panicle, 1000-kernel weight, paddy yield and minimum percentage of sterile grains were observed in plants receiving split use of Potash. The whole of potash applied at transplanting and no application of potash ranked at second and third position respectively with respect to all characters. The increased grain yield of rice with split applying of K was attributed to the continuous supply of K during the crop growth period (Awan *at al*., 2007). Increase in K doses from 100 to 125% improved grain yield significantly. Agronomic efficiency of K was progressively increased with incremental doses of respective nutrients. Energy use efficiency of K is remarkably high, particularly with the first increment. Incremental doses of K over the recommended dose recorded significant improvement in uptake of respective nutrients. Grain quality and milling characters were significantly influenced by incremental doses of K taking consideration the economics, nutrient depletion and quality characters (Dakshina Murthy *et al.,* 2015).

The objective of this investigation was to evaluate the performance of some rice cultivars productivity under potassium fertilization rates.

MATERIALS AND METHODS

Two experiments were carried out at at the Research Farm of the Rice Research and Training Center (RRTC); Sakha, Kafr El-Sheikh, in cooperation with the Rice Training and Technology Center (RTTC), Alexandria, Egypt, during 2016 and 2017 seasons to investigate the response of some rice cultivars to different rates of potassium fertilizer.

The preceding crop was clover in both growing seasons. Soil samples of the experimental sites were taken at the depth of (0-30 cm). Some physical and chemical analysis of soil samples are presented in Table (1) and were determined according to the method described by Chapman and Pratt (1978).

Table1. Some soil properties of the experimental sites in 2016 and 2017 seasons

Soil properties	2016	2017
Mechanical analysis		
Sand %	18.90	19.50
Silt %	25.50	26.00
Clay %	55.60	54.50
Soil texture class	Clay	Clay
Chemical analysis		
Saturation percentage (SP)	73.06	71.60
ECe (Soil past at 25^0C)	2.02	2.30
pH (1:2.5)	8.17	8.03
$CaCO_3$ (Calci meter method) %	2.27	2.43
Soil ECE (c mol/kg)	30.50	29.80
Soil-O.M. (Walkly & Black) %	1.65	1.53
Available N (K-sulfate extract.) ppm	66.34	57.07
Available K (g/kg)	5.40	5.53

The experimental design was a split- plot design with three replicates. Each subplot size was 10.50 m^2 (3 m in length and 3.5 m in width). The main plots were occupied by the eight rice cultivars "Sakha 101, Sakha102, Sakha105, Sakha106 Giza 177, Giza178, Giza179 and Giza 182" provided from rice Research Section of Agriculture Research Center, Ministry of Agriculture in Egypt. The four applications of K- fertilizer "0, 50, 100 and 150% from the recommended dose of K" (RDK) were distributed at random in subplots in the two seasons.

Mineral nitrogen fertilizer at a rate of 168 kg N/ha was added at two equal doses. The first dose was added 15 days after transplanting, the second one was added 25 days later. In the two experiments, N- fertilizer was added on the form of urea (46.5 % N). Super phosphate fertilizer and Potassium sulphate fertilizer treatments at the rate of (0, 50%=30, 100%= 60 and 150% from RDK= 90 kg K$_2$O/ha) were applied during soil preparation. All the other agronomic practices were done as recommended.

Studied characters i.e., panicle length (cm), number of filled grains/panicle, 1000-grain weight (g), biological, grain, and straw yields (t/ha), hulling %, milling %, head rice (%), Amylose %, GT, grain protein and K content were recorded in both seasons.

Rice samples (150 g for each) were taken randomly; samples were cleaned and dehulled with an experimental Satake huller machine and polished in Satake miller and tested according to standard evaluation system of IRRI (1996).

Protein content was determined for brown rice, according to the standard Micro – Kjeldahl method. Then, the estimated nitrogen content was multiplied by a factor of 5.95 to obtain crude protein content. Amylose content was estimated by the simplified procedure reported by Juliano (1971), and Gelatinization temperature was recorded according to Little *et al*. (1958).

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 computer software package (CoStat, Ver. 6.311., 2005). The least significant differences (LSD at 0.05) was used to compare the treatment means.

RESULTS AND DISCUSSION

The results are shown in Table (2) revealed that there were significant differences among the eight rice cultivars in panicle length, the number of filled grains/panicle and 1000-grain weight, where the rice cultivar Sakha105 recorded the longest panicles (22.9 and 22.0 cm) followed by Giza 178, Giza177 and Sakha106.On the other hand, the rice cultivar Sakha 102 detected the shortest panicles were (21.1 and 21.0 cm), respectively in 2016 and 2017 seasons. Meanwhile, Giza 178 produced significantly the highest values of the number of filled grains/m^2 (175.2 and 186.8), and 1000- grain weight (25.5 and 27.9 g)). While, Sakha 102 cultivar recorded the lowest number of filled grains/panicle (124.0 and 130.8) in the first and second seasons, respectively. These results may be due to the genetic makeup of different cultivars.

The recorded results in Table (2) showed the significant effect of rates of K-fertilization, where 150% from RDK (90 Kg K$_2$O/ha) gave the highest mean values of panicle length (22.9 and 22.5 cm), number of filled grains/panicle (144.2 and 145.9 grains) with no significant between this treatment and 100 % from recommended dose (60 kg K$_2$O/ha) which gave the highest 1000- grain weigh (25.2 and 26.0 g) in 2016 and 2017 seasons, respectively. While, the lowest values of panicle length (20.0 and 19.9 cm), number of filled grains/panicle (123.1 and 135.0 grains) were recorded under the control treatment (0% RD) during both seasons, respectively. These results are in harmony with those obtained

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agreement with those obtained by Abd El- Rahman *et al*. (2004), Zayed *et al*. (2007), Farooq *et al.* (2009) and Dakshina Murthy *et al.* (2015)

The interaction between rice cultivars and application of K- fertilization rates had significant effect on these traits, where fertilizing Giza 178 by 150 % from RDK fertilizer recorded the highest values of biological yield (12.2 and 14.8 t/ha), and straw yield (8.2 and 10.2 t/ha) in both seasons, respectively. Meanwhile, Sakha101 with 100% K (RD) recorded the highest mean values of grain yield (4.4 and 5 t/ha) in 2016 and 2017seasons, respectively. On the other hand, Giza 182 with (0%=control) recorded the lowest biological yield (7.6 t/ha) in the first seasons, but in the second season Sakha106 with untreated gave the lowest biological yield (8.16 t/ha), while, Sakha 102 or Giza 178 with 0% RD from K gave the lowest straw yield (4.7 and 4.4 t) in the first season and the second season, respectively, while the lowest grain yield (2.5 and 3.0 t/ha) was recorded with Giza182 + no K application in both seasons.

Table 3. Yield attributes of eight rice cultivars as affected by K- fertilization rates and their interaction in both seasons

Yield Attributes	Treatments	Seasons															
		2016								2017							
	A) Rice varieties	B) K- fertilization rates				Average A	LSD at 0.05			B) K- fertilization rates				Average A	LSD at 0.05		
		0%	50%	100%	150%		A	B	A x B	0%	50%	100%	150%		A	B	A x B
Biological yield (t/ha)	Sakha 101	7.6	12.6	13.5	11.8	11.4				9.0	14.5	15.4	13.3	13.1			
	Sakha 102	7.6	9.12	9.0	12.0	9.4				10.1	11.6	10.8	14.4	11.7			
	Sakha105	10.2	8.2	9.8	9.4	9.4	1.7	0.88	2.5	12.0	9.8	11.6	11.9	11.3	1.21	0.73	2.1
	Sakha106	8.4	9.9	8.4	10.3	9.3				8.16	11.7	9.9	11.7	10.4			
	Giza 177	9.4	9.6	9.8	9.8	9.7				10.2	11.4	11.6	12.3	11.4			
	Giza 178	8.1	10.4	10.5	12.2	10.3				10.4	12.2	12.3	14.8	12.4			
	Giza 179	7.7	7.3	7.9	11.0	8.5				10.3	9.1	9.7	13.2	10.6			
	Giza182	7.4	13.4	10.9	10.9	10.7				9.5	12.4	12.9	12.8	11.9			
Average B		8.3	10.1	10.0	10.9					10.0	11.6	11.8	13.1				
Straw yield (t/ha)	Sakha 101	4.8	8.2	9.1	7.5	7.4				5.7	9.6	10.4	8.5	8.6			
	Sakha 102	4.7	5.7	5.6	8.0	6.0				6.7	7.7	6.8	9.9	7.8			
	Sakha105	6.7	5.1	6.6	5.8	6.1				7.9	6.1	7.8	7.7	7.4			
	Sakha106	5.3	6.4	5.1	6.1	5.7	1.67	0.76	2.15	7.1	5.8	6.0	8.8	6.9			
	Giza 177	6.4	6.0	5.7	7.0	6.3				6.6	7.3	6.9	8.9	7.4			
	Giza 178	4.0	6.8	6.5	8.2	6.4				5.7	8.1	7.8	10.2	8.0	1.0	0.61	1.7
	Giza 179	5.1	4.5	4.8	7.1	5.4				4.4	7.6	6.0	6.9	6.2			
	Giza182	4.9	10.2	7.3	7.2	7.4				6.5	8.5	8.8	8.5	8.1			
Average B		5.2	6.6	6.3	7.1					6.3	7.6	7.6	8.7				
Grain yield (t/ha)	Sakha 101	2.8	4.4	4.4	4.3	4.0				3.3	4.9	5.0	4.8	4.5			
	Sakha 102	2.9	3.42	3.4	4.0	3.4				3.4	3.9	4.0	4.5	4.0			
	Sakha105	3.5	3.1	3.2	3.6	3.4				4.1	3.7	3.8	4.2	4.0			
	Sakha106	3.1	3.5	3.3	4.2	3.5	0.39	0.37	1.05	3.8	4.1	3.9	4.8	4.1	0.39	0.36	1.048
	Giza 177	3.0	3.6	4.1	2.8	3.4				3.6	4.1	4.7	3.4	4.0			
	Giza 178	4.1	3.6	4.0	4.0	3.9				4.7	4.1	4.5	4.6	4.5			
	Giza 179	2.6	2.8	3.1	3.9	3.1				3.2	3.3	3.7	4.4	3.7			
	Giza182	2.5	3.2	3.6	3.7	3.3				3.0	3.9	4.1	4.3	3.8			
Average B		3.1	3.5	3.6	3.8					3.6	4.0	4.2	4.4				

Additionally, Table (4) showed the effect of cultivars K- application rates and the effect their interactions on hulling%, milling %and head rice % of eight rice cultivars during 2016 and 2017 seasons.

There was a significant difference among the eight rice cultivars in all grain characters, where the rice cultivar Sakha 106 recorded the highest values of hulling, but Sakha 102 gave the highest values of milling and head rice in 2016 and 2017, respectively. On the other hand, the rice cultivar Giza182 gave the lowest hulling, milling and head rice percent ayes in both seasons. These results may be due to the genetic makeup of different cultivars.

Furthermore**,** Table (4) revealed that increasing K rate from 0 to 150% from RDK increased hulling, milling, and head rice %, where 150% from RDK (90 Kg K_2O/ha) gave the highest mean values of hulling milling and head rice % as compared with control (0 Kg K_2O/ha) which recorded the lowest values of those characters during the two seasons,

respectively. These results are in harmony with those obtained by Abd El- Rahman *et al*. (2004), Zayed *et al*. (2007), Farooq *et al*. (2009) and Dakshina Murthy *et al*. (2015).

The interaction between rice cultivars and K- fertilization rates had a significant effect on those traits, where fertilizing Sakha106 by 150 % from RDK recorded the highest value of hulling %, while Giza 182 + 100 % RD K gave the highest milling % and head rice in both seasons. Meanwhile, the lowest hulling %, milling % and head rice% were recorded with Giza 182 + control (0% RDK) in 2016 and 2017seasons (Table 4).

Table 4. Grain characters of eight rice cultivars as affected by K- fertilization rates and their interaction in both seasons

Grain characters	Treatments A) Rice varieties	Seasons 2016								2017							
		B) K- fertilization rates				Average A	LSD at 0.05			B) K- fertilization rates				Average A	LSD at 0.05		
		0%	50%	100%	150%		A	B	A x B	0%	50%	100%	150%		A	B	A x B
Hulling %	Sakha 101	79.6	79.8	80.4	80.6	80.1				80.4	80.5	81.1	81.4	80.9			
	Sakha 102	79.9	80.1	80.4	80.7	80.3				80.7	80.8	81.2	81.3	81.0			
	Sakha105	79.8	80.0	80.2	80.4	80.1				80.6	80.8	81.2	81.4	81.0			
	Sakha106	80.2	80.4	80.9	81.2	80.7	0.08	0.04	0.11	81.0	81.2	81.6	82.0	81.5	0.07	0.05	012
	Giza 177	79.9	79.9	80.0	80.2	80.0				80.6	80.7	80.7	81.0	80.8			
	Giza 178	78.9	79.4	79.7	79.9	79.5				79.6	80.2	80.5	80.4	80.2			
	Giza 179	78.9	79.3	79.5	79.6	79.3				79.7	80.0	80.2	80.4	80.1			
	Giza182	78.4	79.1	79.1	79.3	79.0				79.9	79.8	79.8	80.1	79.9			
Average B		79.5	79.8	80.0	80.2					80.3	80.5	80.8	81.0				
Milling %	Sakha 101	71.1	71.3	71.5	71.7	71.4				71.8	72.1	72.3	72.5	72.2			
	Sakha 102	70.6	70.9	71.3	71.4	71.1				71.4	71.7	72.0	72.2	71.8			
	Sakha105	70.6	70.8	71.1	71.3	71.0				71.3	71.5	71.8	72.0	71.7			
	Sakha106	70.4	70.8	71.1	71.3	70.9	0.05	0.03	0.10	71.2	71.6	71.9	72.1	71.7	0.06	0.04	0.11
	Giza 177	70.4	70.7	70.9	71.1	70.8				71.1	71.5	71.6	71.8	71.5			
	Giza 178	68.4	68.6	68.9	69.3	68.8				69.2	69.4	69.6	70.0	69.6			
	Giza 179	69.1	69.3	69.6	70.0	69.5				69.9	70.1	70.3	70.7	70.3			
	Giza182	68.6	68.9	69.3	69.7	69.1				69.3	69.6	70.1	70.5	69.9			
Average B		69.9	70.2	70.5	70.7					70.7	70.9	71.2	71.5				
Head Rice %	Sakha 101	65.2	65.5	65.9	66.1	65.7				65.6	65.9	66.3	66.4	66.1			
	Sakha 102	66.2	66.5	66.9	67.2	66.7				66.6	66.9	67.3	67.6	67.1			
	Sakha105	64.9	65.1	65.4	65.8	65.3				65.3	65.5	65.8	66.2	65.7			
	Sakha106	64.6	65.0	65.5	65.8	65.2	0.06	0.03	0.09	65.0	65.4	65.8	66.2	65.6	0.07	0.03	0.08
	Giza 177	60.5	61.3	61.8	62.2	61.5				60.8	61.7	62.2	62.6	61.8			
	Giza 178	59.8	60.0	60.5	61.0	60.3				60.1	60.4	60.8	61.3	60.7			
	Giza 179	62.2	62.6	63.0	63.4	62.8				62.6	63.0	63.3	63.8	63.2			
	Giza182	58.5	59.1	59.7	60.1	59.4				58.9	59.4	60.0	60.5	59.7			
Average B		62.7	63.1	63.6	64.0					63.1	63.5	63.9	64.3				

Table (5) show the effect of cultivars and the rate of K- application and their interactions effect on amylose %, G.T. %, K concentration and protein content during 2016 and 2017 seasons.

Table (5) revealed the significant response of rice cultivars to K- fertilization in grain composition characters, where the rice cultivar Sakha102 recorded the highest value of amylose % (19.0 and 17.2), GT (5.0 and 5.0) and protein content (7.5 and 8.7 %), while the highest values of grain K content % (0.45 and 0.45) were recorded with Giza 178 in both seasons, respectively. On the other side, the rice cultivar Giza178 recorded the lowest values of amylose (16.4 and 15.5), however, Giza 179 gave the lowest GT% and protein % while the lowest K concentrate in grain was obtained by Sakha101, 102, and Giza 182, respectively in both seasons. These results may be due to the genetic makeup of different cultivars.

Results in Table (5) revealed that increasing K rates up to 150% = 90 kg K_2O/ha increased the values of grain composition, where the highest values of amylose % (18.2 and 16.8), GT% (4.7 and 4.6), grain K content (0.44 and 0.45%) and grain protein content (7.2 and 8.2%) was obtained by application of 150% from RDK at the rate of 90 Kg K_2O/ha as

compared with 0 % of RDK in both seasons, respectively. These results were confirmed by Abd El- Rahman *et al.* (2004), Zayed *et al.* (2007), Farooq *et al.* (2009) and Dakshina Murthy *et al.* (2015).

The interaction between rice cultivars and K- fertilization rates had a significant effect on grain composition characters. Sakha 102 + 150 % from RDK recorded the highest value of amylose (20.1 and 18.0%), and protein % (8.4 and 9.6 %), while interaction between Giza182 and 50% and 150% recorded the highest GT% (5.7 and 5.7) but Giza178 with 100% RDK gave the highest grain K % (0.48 and 0.48) in both seasons, respectively. Meanwhile, Giza 178 with 150% and Giza177 with 50% RDK recorded the lowest amylose %, however, the lowest GT was recorded with Giza182 + control (0 RDK) and Giza177 gave the lowest K- content in the first and the second seasons, respectively. Concerning grain protein content, the lowest percentages were obtained from Giza 179 +100%RDK in the first season (6.2%), whereas in the second season Sakha 106 +0 K application gave the lowest grain protein content (6.6%) .

In general, it was remarkable that increasing K fertilization positively affected all studied characters because K deficiency decrease for example the number of reclines per panicle, because of this it was shown the rice yield suffered a great decline, where K was lacking at the Panicle formation stage.

Table 5. Grain composition of eight rice cultivars as affected by K- fertilization rates and their interaction in both seasons

Grain composition characters	Treatments A) Rice varieties	2016 B) K- fertilization rates				2016 Average A	2016 LSD at 0.05			2017 B) K- fertilization rates				2017 Average A	2017 LSD at 0.05		
		0 %	50%	100%	150%		A	B	AxB	0	50%	100%	150%		A	B	AxB
Amylose %	Sakha 101	18.7	16.3	17.5	19.17	17.9				18.0	15.2	17.8	16.2	16.8			
	Sakha 102	18.3	19.1	18.3	20.1	19.0				14.7	19.0	17.2	18.0	17.2			
	Sakha105	17.5	16.6	17.2	18.4	17.4				16.1	15.5	17.2	16.3	16.3			
	Sakha106	18.1	18.7	18.8	17.8	18.4	0.80	0.52	1.5	17.4	17.8	10.1	17.0	15.6	0.78	0.54	1.5
	Giza 177	16.3	15.8	18.4	18.8	17.3				15.1	14.4	17.6	17.1	16.1			
	Giza 178	16.3	16.8	16.7	15.6	16.4				15.9	15.6	14.7	15.8	15.5			
	Giza 179	16.6	18.2	17.6	17.6	17.5				14.9	16.9	17.3	16.2	16.3			
	Giza182	15.9	19.6	19.3	18.4	18.3				16.9	17.4	16.8	17.4	17.1			
	Average B	17.2	17.6	18.0	18.2					16.1	16.5	16.1	16.8				
Gelatinization temperature (GT%)	Sakha 101	4.3	5.0	4.7	4.0	4.5				4.3	5.7	5.0	4.3	4.8			
	Sakha 102	3.7	4.7	5.7	5.7	5.0				4.7	5.7	5.0	4.7	5.0			
	Sakha105	4.0	4.7	4.7	5.0	4.6				4.0	4.3	5.0	4.3	4.4			
	Sakha106	4.0	4.0	4.3	5.3	4.4	0.81	0.43	1.2	3.7	4.7	4.7	5.0	4.5	0.48	0.44	1.3
	Giza 177	4.3	4.3	4.3	5.0	4.5				4.0	4.7	4.3	5.0	4.5			
	Giza 178	6.0	4.7	4.3	4.0	4.8				4.3	4.7	3.0	3.7	3.9			
	Giza 179	3.7	5.0	3.0	4.0	3.9				4.0	4.7	3.0	4.0	3.9			
	Giza182	3.7	5.7	4.7	4.7	4.7				3.3	5.0	4.3	5.7	4.6			
	Average B	4.2	4.8	4.5	4.7					4.0	4.9	4.3	4.6				
Grain K concentration (%)	Sakha 101	0.38	0.41	0.40	0.43	0.41				0.39	0.42	0.41	0.44	0.42			
	Sakha 102	0.35	0.45	0.37	0.47	0.41				0.36	0.46	0.38	0.48	0.42			
	Sakha105	0.39	0.43	0.44	0.42	0.42				0.40	0.44	0.45	0.43	0.43			
	Sakha106	0.38	0.44	0.46	0.46	0.44	0.030	0.022	0.06	0.38	0.47	0.49	0.48	0.46	0.03	0.02	0.06
	Giza 177	0.33	0.44	0.43	0.42	0.41				0.35	0.45	0.44	0.43	0.42			
	Giza 178	0.38	0.46	0.48	0.47	0.45				0.41	0.45	0.47	0.47	0.45			
	Giza 179	0.37	0.43	0.47	0.45	0.43				0.38	0.44	0.48	0.46	0.44			
	Giza182	0.36	0.44	0.43	0.41	0.41				0.37	0.45	0.44	0.42	0.42			
	Average B	0.37	0.44	0.44	0.44					0.38	0.45	0.45	0.45				
Grain protein content (%)	Sakha 101	6.8	7.8	7.6	7.6	7.5				7.9	9.0	8.8	7.2	8.2			
	Sakha 102	7.0	7.2	7.2	8.4	7.5				8.2	8.4	8.4	9.6	8.7			
	Sakha105	7.3	7.6	7.1	8.1	7.5				8.1	8.2	8.3	9.3	8.5			
	Sakha106	6.8	6.8	7.1	6.7	6.9	0.44	0.36	1.02	6.6	8.0	8.2	8.4	7.8	0.36	0.39	1.09
	Giza 177	6.9	6.8	7.1	6.7	6.9				6.7	7.9	8.3	7.4	7.6			
	Giza 178	6.6	6.9	6.6	6.8	6.7				7.1	8.1	7.8	8.0	7.8			
	Giza 179	7.1	6.8	6.2	6.6	6.7				6.8	8.0	7.4	7.8	7.5			
	Giza182	7.0	6.6	6.7	6.9	6.8				8.1	7.7	7.9	7.8	7.9			
	Average B	6.9	7.1	7.0	7.2					7.4	8.2	8.1	8.2				

Conclusion:

Finally, it could be concluded that all tested cultivars were highly significantly differed decreasing that these differences were due to the difference in their genetic background. The eight rice varieties had a different response to increasing K- fertilization up to 150% from recommended dose (RDK) at the rate of 90 kg K_2O/ha in all characters of yield and grain characters under this study, where Giza 178, Sakha 102 and Sakha 101with 150 % RDK during the two seasons

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ARABIC SUMMARY

تأثير مستويات مختلفة من التسميد البوتاسي على بعض أصناف الأرز المصرية

سماح محمد عامر[1] و داليا محمد طبل[2]
1-مركز البحوث و التدريب فى الأرز ـ سخا ـ كفر الشيخ
2-مركز تدريب و تكنولوجيا الأرز -الإسكندرية – مصر

أقيمت تجربتان حقليتان لمحصول الأرز خلال الموسمين الزراعيين 2016 و 2017 ،وذلك فى المزرعه البحثية بمركز البحوث و التدريب فى الأرز (RRTC) بسخا ـ كفرالشيخ بالأشتراك مع مركز تدريب و تكنولوجيا الأرز (RTTC) الأسكندرية ـ مصر. لدراسة استجابة ثمانية أصناف الأرز المصرية تحت مستويات مختلفة للتسميد بالبوتاسيوم. واستخدم التصميم الإحصائى التجريبي هو القطع المنشقه فى ثلاثه مكررات. ووزعت الأصناف عشوائياً في القطع الرئيسية (سخا 101 ، سخا 102 ، سخا 105 ، سخا 106 ، جيزة 177 ، جيزة 178 ، جيزة 179 ، جيزة 182) ، ووزعت معاملات التسميد البوتاسي الأربعة عشوائياً في القطع المنشقة (بدون أضافة ، 50 ، 100 ، 150% من الجرعة الموصى بها من البوتاسيوم). سجلت الصفات التالية (طول السنبلة (سم) ، عدد الحبوب الممتلاءة/للداليا ، وزن 1000 حبة ، المحصول البيولوجي ، محصول القش ، ومحصول الحبوب ، التقشير والتبيض ، GT% ، نسبة الأميلوز ، محتوى الحبوب من البوتاسيوم والبروتين).

ولخصت النتائج فيما يلي:
- أختلفت جميع أصناف الأرز المصرية اختلافاً معنوياً في استجابتها لمستويات البوتاسيوم المختلفة في كل الصفات المدروسة السابق ذكرها وذلك لاختلاف التراكيب الوراثية الخاصة بها, حيث تفوق صنف جيزة 178 ، وسخا101 ، سخا 102 عن باقي أصناف الأرز في معظم الصفات المحصولية والتكنولوجية خلال موسمئ الدراسة.
- أثر إضافة مستويات مختلفة من البوتاسيوم تأثيراً معنوياً في معظم الصفات تحت الدراسة خلال موسمي الدراسة حيث حقق الزيادة فى معدل التسميد البوتاسي حتى 150% من الجرعة الموصى بها (90 كجم بو₂أ/هكتار) لزيادة في صفات المحصول والصفات التكنولوجية ومتبوعاً بمعدل 100% (الجرعة الموصى بها = 60 بو₂أ/هكتار) دون اختلاف معنوياً مع المعاملة 150% من الجرعة الموصى بها في معظم الصفات المدروسة خلال موسمي الدراسة.
- سجل التداخل بين أصناف الأرز ومعدلات التسميد البوتاسي تأثير معنوياً على صفات المحصول والصفات التكنولوجية حيث أن أصناف الأرز صنف جيزة 178 ، وسخا101 ، سخا 102 تحت مستوى 150% ، 100% (الجرعة الموصى بها) حقق أعلى قيم للصفات المدروسة مقارنة بالأصناف الأخري التى قد تحتاج لزيادة في مستويات البوتاسيوم خلال موسمي الزراعة وتوصى الدراسة باستخدام الأصناف التي تحقق أعلى محصول ومكوناته تحت مستويات أقل من البوتاسيوم تحت ظروف منطقة الدراسة.