Scientific Journal of Agricultural Sciences 3 (1): 66-78, 2021
Print (ISSN 2535-1796) / Online (ISSN 2535-180X) DOI: 10.21608/sjas.2021.59780.1066

Response of some durum wheat genotypes (*Triticum durum* Desf.) for potassium fertilization levels in newly reclaimed soil.

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Received on: 25-1-2021 **Accepted on: 1-3-2021**

ABSTRACT

The proper amount of fertilizer application is the main factor affecting thegrainyield and itscomponents of durum wheat**.** Hence, the field experiment was carried out in the tow growing seasons of 2017/2018 andits reported in 2018/2019, at Research Farmof Faculty of Agriculture, Sohag University,to study the effects of potassium fertilizer levels (zero, 25, 50 and 75 kgK_2O /fed.) on yield and its components of four durum wheat genotypes (BaniSuef 6,NGB 7214, NGB 5399 and NGB 4816). A randomized complete block design (RCBD) was used in split-plot with three replicates.The results showed that potassium fertilizer levels were significantly effectedon all studied characters except plant height in the firstand second seasons, and harvest indexin the firstseason only.As well as genotypes had significantly effect on the all studied traits; plant height (cm), spike length (cm),No. of Spikes /m^2, No. of grains/spike ,1000-grain weight (g), grain yield (ard./fed.), biological yield (ton/fed.), straw yield (ton/fed.) and harvest index(%) in both growing seasons. Increasing K up to 75 kgK_2O /fed.increased yield and its attributes of durum wheat in both growing seasons except plant height (cm) in the first and second seasons, and harvest index(%)in the firstseason only.BaniSuef 6 and NGB 7214 genotypes produced the highest values of grain yield compared to other genotypes in both seasons. Moreover, NGB 7214 accession produced the maximum values of spike length (cm), No. of Spikes /m^2, No.of grains/spike, 1000-grain weight (g), biological yield (ton/fed.) and straw yield (ton/fed.) in the first and second seasons, respectively, while NGB 7214, NGB 5399 and NGB 4816 accessions produced the tallest plants comparing with the Egyptian variety (BaniSuef 6). Interaction effect showed significant differences on all studied traits.In general, the highest grain yield (20.27 and 19.70ard./fed.) were obtained fromBaniSuef 6 genotype when fertilized with 75 kgK_2O /fed., andNGB 7214 genotype when fertilized with50 kg K_2O /fed.

KEYWORDS: Durum wheat genotypes, potassium fertilizer levels, and grain yield.

1. INTRODUCTION

For sustainable development, food security is one of most important issues facing the Egyptian government in all its various sectors (Asseng*et al*. 2018).Wheat crop isconsideredthe staple food and the first grain crop in Egypt. Wheat grains are used as human food and straw is used as animal feed. Durum wheat (*Triticum durum*), a tetraploid species, it is an important crop for human consumption, being used to make pasta, bulgur and couscous.The high quality of durum wheat productsit depends on the properties of the grains. Among the influencing factors on the quality of the grain are fertilization, genotype and possible interactions among these factors (Bouacha*et al*. 2014).Wheat cultivated area is1.26 million hectares with an average grain yield of 18.46 (ard. /fed)with a totalyield of approximately 8.1 million tons, but still there is a big gap about 50%, between production and consumption(Abdelmageed*et al*. 2019).So, theEgyptiangovernment is faced to increase wheat productionin two strategies. The first one is the vertical expansion in valley land through the application of modern technologies(modern irrigation system, high yielding varieties, drainage improvement). Mainly these lands are exhausted from nutrient elements deficiency, especially the potassium and phosphors, due to increasing the crop intensity rate in the past decades.The second strategy is horizontal expansion through cultivate wheat crops in newly reclaimed land (Afaf*et al*.2014),which suffers from low fertility and low water storage capacity, herein nutrientsadditionto the crop is considered one of the main factors, that affect yield and the quality(Hamouda*et al*.2015).Potassiumis one of the major nutrient elements which affects yield and quality of grain,it is involved in many physiological processes, and its effect on water relationships, photosynthesis, transport assimilation, and enzyme activation can have direct consequences for crops productivity by opening and organizing stomata close thus regulating moisture lossfrom the plant.Sufficient amounts of potassium result in stronger wheat straw and assist in grain filling(Agri-News, 2012).Potassium elementdeficiency leads to decrease in both the numberof leaves productionand the size of individual leaves. Potassium plays asorganizational roles in the plant. The nutrients are lost from the soil in a number of ways, including leaching, volatilization, and fixation with clay minerals. High amounts of nutrients are absorbedfrom the soil into the dry matter of the harvested crops.Tabatabaei*et al*. (2014)found that effect of different levels of potassium sulfate (Control, 80 kg/ha, 130 kg/ha and 160 kg/ha) was significant effecton number of spikes per m^2, number of grains per spike, number of spikelets per spike, protein content, biological yield, grain yield and straw yield.With regard to the application of modern technologies in agriculture, increased productivity can be achieved through selecting high-yielding wheat varieties and applying appropriate agricultural practices such as fertilization rates (Khaled and Hammad 2014).

The current investigation laid out to study the response of some durum wheat genotypes for potassium fertilization under newly reclaimed soil conditions.

2. MATERIALS AND METHODS

The current investigation was carried out in the winter seasons of 2017/2018 and 2018/2019, at Research Farm of Faculty of Agriculture, Sohag University. Four durum wheat genotypes included BaniSuef 6cultivar and three genotypes i.e.NGB 7214, NGB 5399 and NGB 4816 were imported at 2010 from Nordic Genetic Resource Center (Nord Gen) then, after adapted under Sohag conditions, were used to study their responded to four potassium fertilizer levels (zero, 25, 50 and 75 kg K_2O /fed.).

A randomized complete block design (RCBD)was usedin split-plot with three replications .The potassium fertilizer levels distributed randomly in the main plots; meanwhile durum wheat genotypes were laid out in the sub-plots. This experiment was included 48 experimental units, plots area was 10.5 m^2 (3.5 m length x 3.0 m width), consisting of 15 rows with 20 cm apart between them. Seeding rate was used as recommended (60 kg/fed.).Potassium fertilizer was added in potassium sulfateform(48% K_2O). Nitrogen fertilizer was added in the ammonium nitrate (33.5% N) at 100kg N/fed. Phosphorus was added before sowing in superphosphate form (15.5% P_2O_5). All other agriculture practices were carried out as recommended.The experiment soil was sandy-loam;some properties of soil surface are shown in Tables (1).

Table 1. some properties of the experimentalsoil surface in 2017/2018 and 2018/2019 seasons.

Soil properties	2017/2018	2018/2019
Sand (%)	68.66	67.54
Silt (%)	21.70	21.50
Clay (%)	9.64	10.96
Soil texture	Sandy-loam	Sandy-loam
pH (1:2.5)	8.1	7.8
EC (ds/m) (1:2.5)	0.67	0.72
Organic matter(%)	1.73	1.81
Total N (%)	0.14	0.16
P2O5 (ppm)	18	17.4
K2O (ppm)	270	275
Available Fe (ppm)	2.86	3.00
Available Zn (ppm)	0.79	0.81
AvailableMn(ppm)	0.34	0.42
Available Cu (ppm)	0.58	0.60

2.1.Data recorded:

The following characters were recorded:-
Grain yield and its components (Plant height (cm), Spike length (cm), No. of grains/spike, No. of spikes/m^2, 1000-grain weight (g)and harvest index %)were recorded as recommended procedure. Biological and grain yields were recorded by weighing all above ground dry matter of each plot, then grain separating and weighing was done in kilograms and converted into ton and ard./fed., respectively.

3. RESULTS AND DISCUSSIONS

3.1. Effect of potassium levels(A):

Potassium is one of the major nutrients beside nitrogen and phosphorous (Fageria 2016). Potassium is necessary for various biochemical and physiological processes responsible for plant growth and development. Potassium is involved in protein synthesis, carbohydrate metabolism, and enzyme activation (Wang*et al*.2013).

Yield and yield component straits as influenced by level of K have been presented in Tables(2&3). All the studied characters were significantly influenced by different levels of K, with exception of plant height in both seasons and harvest indexin the first season did not affected significantly. Spike length was increased significantly by any of K fertilizer levels comparing with control treatment;

meanwhile it was not significantly affected by increasing K levels from 25 up to 75kg K_2O/fed. in both seasons. The highest values of spike length (9.84and 10.52 cm) were observed in plots fertilized with 75kg K_2O/fed.in both seasons. However, the lowest spikes length (8.78 and 9.34 cm) was observed in control treatment. No. of spikes/m^2 and grain yield (ard./fed.) were increased significantly with increasing K fertilizers from zero till 75 kg K_2O /fed.in both seasons. Whereas the highest numbers of spikes/m^2 (370.25 and 374.25) and maximum grain yield/fed were (16.94 and 17.96 ard./fed) in the first and second seasons, respectively. These finding confirmed by the highly significant correlation between No. of spikes/$m^2$and grain yield ($r = 0.90$ and 0.88) in the first and second seasons respectively (Table 4). Moreover, No. of grains/spike responded significantly to K fertilizer from zero (control) up to 25 and 50kg K_2O /fed.in the first and second seasons, respectively, also further increasing of K fertilizer after 25 kg K_2O /fed. did not affect 1000-grain weight in both seasons. While did not found any significant increasing of No. of grains/spike and 1000-grain at the highest K fertilizer levels in both seasons. Furthermore the highest significant means were69.75 at (25 kg K_2O /fed.) and 78.48 grains/spike at (50 kg K_2O /fed.) and (43.88 and 45.13 g) at 25 kg K_2O /fed.for No. of grains/spike and 1000-grain weight in the first and second seasons, respectively. No further significant increasing were found for both of biological and straw yields were found after 50 kg K_2O /fed.K levels in the first season, as well as the 25 kgK_2O /fed. level had none significantly difference on biological and straw yield comparing with control treatments but both of 50 and 75 kg K_2O /fed. K levels had significantly difference in the same way in the second seasons comparing with control and 25 kg levels. The result indicated that the cumulative effect of yield contributing characters, such as No .of spike/m^2, No.of grains/spike, and 1000-grain weight had positive contribution to higher grain yield obtained till 50kg K_2O /fed. This is confirmed by the highly significant positive correlation coefficients of grain yield (0.90, 0.86 and 0.82) and (0.88, 0.87 and 0.79) by No.of spikes/m^2, No. grains/spike and 1000-grain weight in the first and second season respectively (Table 4).In case of control, the growth and development of plants were hampered due to imbalance uptake of potassium element which resulted in poor performance of yield attributes and ultimately gave the lowest grain yield (Alam*et al*.2009).

Harvest index indicates the physiological ability to transform photosynthesis of the grain yield. Data regarding harvest index (Tables2&3) was insignificant influenced by different levels of K in the first season due to application of different potassium levels. The maximum harvest index (50.28%) was recorded from the plots fertilized with 25kg K_2O /fed. in the second season. Potassium fertilizer levels had significant effect on yield and its components of wheat might be due to the balanced accumulation of different nutrient elements in the grain resulting higher grain weight (El-Hamdi*et al*.2019). Potassium is an important essential element for plant growth and physiology, its impact on photosynthesis, water relations, enzyme activation and assimilate transport can have direct consequences on productivity of crop (Pettigrew, 2008).Potassiumis not only a component of plant structure but it also has a regulatory function in many biochemical processes related to protein synthesis, Carbohydrate metabolism, enzyme activation. Many physiological processes depend on such as stomatal regulation and photosynthesis (Hasanuzzaman et al. 2018).Hamouda et al. (2015) illustrate that the application of the potassium fertilization levels had an increased significant effect on the yield and its components of the wheat plant (number of spikes, straw, grain yield, biological yield, and 1000 grain weight) compared to the control. Potassium fertilization at a rate of 100% and 75% increase the most of the growth and yield components and the accumulation of nutrients in the wheat crop from 20-50% and 8-40%. However, using potassium at 50 and 25% increased growth components and yield by 4-20% compared to control (Kubar et al.2019). The same conclusion was reported by Arabi et al.(2002),Alam et al. (2009), Maurya et al.(2014), Hamouda et al. (2015) and El-Defan et al.(2016).

3.2. Effect of genotypes (B):

The increasing yield was achieved through selection of wheat varieties are resistant to lodging, high response to mineral fertilizers, long spike, and medium or early maturing (Abdel mageed et al. 2019). Data in Tables (2&3) showed significant differences between durum varieties in all studied traits in both seasons. The imported genotypes (NGB 7214, NGB 5399 and NGB 4816) were increased significantly by 25.64, 26.25 and 24.32% and 23.61, 23.43 and 24.28 % in plant height comparing with the Egyptian variety (BaniSuef6) in the first and second seasons respectively.

Table 2. Means of studied traits under potassium(A)fertilization levels of durum wheat genotypes(B) in 2017/2018.

Potassium level	Varieties	Plant height (cm)	Spike length (cm)	No. of Spike /m^2	No. of grain/spike	1000-grain weight (g)	Grain yield (ardab/fed.)	Biological yield (ton/fed.)	Straw yield (ton/fed.)	Harvest index (%)
	V1	79.47	6.73	276.67	49.23	38.83	11.42	2.93	1.22	60.70
Zero (control)	**V2**	103.33	10.37	327.33	59.03	42.93	12.81	3.80	1.89	51.29
	V3	96.63	9.67	319.00	51.33	41.16	11.78	3.33	1.56	53.43
	V4	106.93	8.37	291.33	50.70	40.85	11.73	3.90	2.14	45.83
	Mean	**96.09**	**8.78**	**303.58**	**52.56**	**40.95**	**11.93**	**3.49**	**1.70**	**52.81**
	V1	78.73	8.23	316.33	68.03	42.27	12.86	3.32	1.40	58.68
25k$_2$o / fed.	**V2**	105.90	10.43	360.67	73.00	46.83	14.89	4.24	2.01	52.83
	V3	103.13	10.67	333.67	69.23	43.67	14.61	4.16	1.97	52.78
	V4	108.70	9.23	295.67	68.73	42.73	13.73	3.67	1.61	56.49
	Mean	**99.12**	**9.64**	**326.58**	**69.75**	**43.88**	**14.02**	**3.85**	**1.75**	**55.20**
	V1	82.73	9.30	367.00	73.30	45.03	15.74	4.81	2.45	49.31
50k$_2$o / fed.	**V2**	109.07	11.70	392.33	81.20	49.73	18.68	5.18	2.38	54.25
	V3	113.05	9.43	355.66	71.20	43.33	15.44	4.49	2.18	51.84
	V4	96.87	8.50	321.33	72.87	41.89	14.72	3.93	1.72	56.91
	Mean	**100.43**	**9.73**	**359.08**	**74.64**	**45.00**	**16.15**	**4.60**	**2.18**	**53.08**
	V1	92.93	9.77	408.00	79.73	50.87	19.55	5.11	2.18	57.39
	V2	101.17	11.63	394.00	78.40	49.80	18.39	4.87	2.11	56.69
75k$_2$o / fed.	**V3**	108.70	9.43	355.67	70.76	43.28	15.18	4.62	2.34	49.43
	V4	92.57	8.53	323.33	67.87	40.67	14.62	3.85	1.66	57.62
	Mean	**98.84**	**9.84**	**370.25**	**74.19**	**46.15**	**16.94**	**4.61**	**2.07**	**55.28**
Mean	**V1**	83.47	8.51	342.00	67.56	44.25	14.89	4.04	1.81	56.52
	V2	104.87	11.03	368.58	72.91	47.33	16.19	4.52	2.10	53.77
	V3	105.38	9.80	341.00	65.63	42.87	14.25	4.15	2.01	51.87
	V4	103.77	8.66	307.92	65.04	41.54	13.70	3.84	1.78	54.21
LSD 5%	**potassium levels (A)**	**-**	**0.59**	**12.50**	**3.04**	**3.00**	**0.45**	**0.36**	**0.31**	**-**
	genotypes (B)	**2.81**	**0.73**	**8.07**	**2.50**	**0.88**	**0.54**	**0.46**	**0.29**	**3.94**
	AxB	**5.62**	**1.47**	**16.15**	**5.00**	**1.76**	**1.08**	**0.91**	**0.77**	**9.87**

V1:BaniSuef 6 V2:NGB 7214 V3:NGB 5399 V4:NGB 4816 LSD :Least significant difference at 5%.

Table 3. Means of studied traits under potassium fertilization levels(A) of durum wheat genotypes(B) in in 2018/2019.

Potassium level	Varieties	Plant height (cm)	Spike length (cm)	No. of Spike /m^2	No. of grain/spike	1000-grain weight (g)	Grain yield (ardab/fed.)	Biological yield (ton/fed.)	Straw yield (ton/fed.)	Harvest index (%)
	V1	81.57	7.23	284.33	52.90	39.83	12.21	3.80	1.96	49.00
Zero	**V2**	103.30	10.93	334.00	63.03	44.03	13.59	4.67	2.63	43.91
(control)	**V3**	95.27	10.20	325.67	54.67	42.23	12.87	4.17	2.24	46.44
	V4	106.40	9.00	301.67	54.37	41.35	12.67	4.47	2.57	42.97
	Mean	**96.13**	**9.34**	**311.42**	**56.24**	**41.87**	**12.83**	**4.27**	**2.35**	**45.58**
	V1	81.90	8.83	328.33	70.37	43.07	13.94	3.94	1.85	53.90
25k_2o / fed.	**V2**	107.37	11.03	367.00	76.33	47.63	15.87	4.86	2.48	49.38
	V3	103.63	11.23	349.00	72.23	45.20	15.69	4.77	2.42	49.57
	V4	111.10	9.90	304.33	69.73	44.60	14.68	4.57	2.37	48.26
	Mean	**101.00**	**10.25**	**337.17**	**72.17**	**45.13**	**15.05**	**4.53**	**2.28**	**50.28**
	V1	84.33	9.83	369.00	77.63	45.73	16.72	5.65	3.15	44.49
50k_2o / fed.	**V2**	109.75	12.30	400.33	83.87	50.83	19.70	5.97	3.02	49.58
	V3	113.63	10.13	366.33	75.87	44.27	16.40	5.48	3.02	45.00
	V4	103.40	9.13	331.33	76.53	42.92	15.81	5.02	2.64	47.78
	Mean	**102.78**	**10.35**	**366.75**	**78.48**	**45.94**	**17.16**	**5.53**	**2.96**	**46.71**
	V1	94.63	10.50	416.33	83.07	51.47	20.27	6.05	3.01	50.25
	V2	102.87	12.27	397.00	82.37	50.37	19.44	5.75	2.84	50.79
75k_2o / fed.	**V3**	110.13	10.03	362.33	76.77	44.23	16.43	5.34	2.88	46.33
	V4	93.67	9.26	321.33	72.20	41.83	15.72	4.99	2.63	47.51
	Mean	**100.33**	**10.52**	**374.25**	**78.60**	**46.98**	**17.96**	**5.53**	**2.84**	**48.72**
Mean	**V1**	85.61	9.10	349.50	70.99	45.03	15.79	4.86	2.49	49.41
	V2	105.82	11.63	374.59	76.40	48.22	17.15	5.31	2.74	48.42
	V3	105.67	10.40	350.83	69.88	43.98	15.35	4.94	2.64	46.83
	V4	106.14	9.33	314.67	68.21	42.68	14.72	4.76	2.55	46.63
LSD 5%	**potassium levels (A)**	**-**	**0.58**	**12.18**	**2.36**	**2.84**	**0.48**	**0.38**	**0.31**	**3.54**
	genotypes (B)	**4.01**	**0.76**	**9.77**	**2.51**	**1.10**	**0.50**	**0.48**	**0.41**	**2.57**
	AxB	**8.01**	**1.54**	**19.54**	**3.52**	**2.19**	**1.00**	**0.95**	**0.83**	**7.15**

V1= BaniSuef 6 V2=NGB 7214 V3= NGB 5399 V4= NGB 4816 LSD :Least significant difference at 5%.

Table 4. Correlation coefficient between studied traitsin 2017/2018 (abovediagonal) and 2018/2019 (below diagonal).

	PH	SL	NOS	NOG	TKW	BYD	GYD	ST	HI
PH		0.33*	0.12	0.09	0.19	0.32*	0.14	0.40**	-0.41**
SL	0.31*		0.62**	0.52**	0.62**	0.48**	0.55**	0.34*	-0.07
NOS	0.14	0.61**		0.79**	0.849**	0.789**	0.909**	0.55**	-0.08
NOG	0.15	0.51**	0.79**		0.72**	0.65**	0.86**	0.37**	0.12
TKW	0.24	0.61**	0.81**	0.69**		0.67**	0.82**	0.43**	0.29**
BYD	0.30*	0.45**	0.74**	0.69**	0.62**		0.85**	0.92**	-0.54**
GYD	0.17	0.57**	0.88**	0.88**	0.79**	0.87**		0.5786**	-0.04 N.S
ST	0.35*	0.31*	0.51**	0.45**	0.39**	0.93**	0.63**		-0.815**
HI	-0.32*	0.10	0.14	0.25	0.21	-0.40**	0.10	-0.69**	

PH: Plant height (cm), **SL**: Spike length (cm),**NOS:** No. of spikes/m^2**,NOG**: No. of grains/spike, **TKW**: 1000-grain weight (g)**, BYD:** Biological yield (ton/fed.), **GYD:** Grain yield (ardab/fed.), **ST** : Straw yield (ton/fed.),**HI**: harvest index %).

Meanwhile the genotypes (NGB 7214 and NGB 5399) were superior significantly in spike length comparing with both of BaniSuef 6 and NGB 4816 in both seasons. Since the highest value of spike length (11.03 and 11.63 cm) was exhibited by NGB7214 in the first and second season respectively. Regarding to No. of spikes/m^2, the genotypes NGB 7214 exhibited the highest number of spikes/m^2 (368.58 and 374.59) and increased significantly by 7.77 and 7.18 % from the Bani Suef 6. In contrast the genotype NGB 4816 was the lowest No. of spikes/m^2 (307.92 and 314.67) and decreased significantly by 9.46 and 9.96%from the BaniSuef 6in the first and second season respectively. The NGB 7214 was superior significantly in No. of grains/spike, 100-grain weight and grain yield/fed to the other genotypes, and exhibited the highest values (72.91 and 76.40 grains), (47.33 and 48.22 g) and (16.19 and 17.15 ardab/fed)in the first and second seasons respectively, meanwhile the genotype NGB 4816 was more decreased significantly than the others. Hence, the superiority of NGB7214genotype in grain yield/fed due to their ability to longest spikes, high spikes and grains numbers as well as high 1000-grain weight. Also these results explained by the significant positive correlations coefficients between grain yield ardab/fed. and both of spike length, No. of spikes/m^2, No. of grains/spike and 1000-grain weight (0.55, 0.90, 0.86 and 0.82) and (0.57, 0.88, 0.87 and 0.79) in the first and second seasons, respectively (Table 4).On the other hand, the genotype NGB 4816 was decreased significantly in the biological and straw yields/fed comparing with the other genotypes. The Egyptian variety (Bani Suef 6) was increased significantly in harvest index(56.52 and 49.41%) in the first and second seasons, respectively. Therefore this is due to the its lower grain yield. The highly differences among durum wheat genotypes could be due to the genetic make-up and their response to the environmental condition. Eman et al. (2011) showed that Beni Suef 6 variety surpasses of the other varietiesi.e Bani Suef 1, 3, 4, 5 and Sohag 3 in number of spikes/m^2, number of kernels/spike, higher 1000-kernel weight and grain yield. The differences among durum wheat varieties were reported by Arduini et al. (2006),Eman*et al*. (2011), Gul *et al*. (2012) Belay *et al*. (2013), Upadhyay et al.(2015), Amal*et al*. (2016),Abdel mageed et al. (2019), EL -Hamdi*et al*.(2019) and El-Rawy (2020)

3.3. Interaction between potassium levels x genotypes (AxB):

Data in Tables (2&3) revealed that all studied traits affected significantly by potassium levels x genotypes interaction in both seasons. That is means the studied genotypes were responded in different ways to potassium fertilizer levels. The results showed that the tallest plants (113. 05 and 113.63 cm) were observed by the genotype NGB 5399 when fertilized at 50 kg k_2o/fed.in the first and second seasons, respectively. Moreover, the highest values of spike length (11.70 & 11.63 cm) and (12.30 & 12.37 cm) were obtained by the genotype NGB 7214 when fertilized at 50 and 75 kg k_2o / fed.in the first and second seasons, that is means that the spike length of this genotypes was responded to K fertilizers up to 50 kg k_2o/ fed. and no further increasing with the higher K levels. The highest values (408, 392.33 and 394 spikes), (79.73, 81.20 and 78.40 grains), (50.87, 49.73 and 49.80 g) and(19.55, 18.68 and 18.39 ardab/fed.) were found in the interaction treatments of (Bani Suef 6 + 75 kg k_2o/ fed.), (NGB 7214 + 50 kg k_2o/ fed.)and

(NGB 7214+ 75 kg k_2o/fed.) with insignificant differences amongeach other for No. of spikes/m^2, No. of grains/spike, 1000-grain weight and grain yield/fed in the first season, respectively. But the second season, the highest values (416.33, 400.33 and 397 spikes), (83.07, 83.87 and 82.37 grains), (51.47, 50.83 and 50.37 g) and (20.27, 19.70 and 19.44 ardab/fed.) were found in the same interaction treatments. These results are explained by the significant linear response of the Egyptian genotype Bani Suef 6 till the highest k fertilizer levels. Otherwise the genotype NGB 7214 was responded significantly up to 50 kg k_2o/fed. fertilizer level for the mentioned traits and no further significant response in the higher k levels, as well as for biological and straw yield. These finding may be due to the genetic ability of the imported genotype NGB 7214 in Kusage efficiently under these conditions.

The Figure1a&b represents the linear regressions of grain yield on the k fertilizer levels for the genotype BaniSuef 6 (V1) and genotype NGB 7214 (V2), whereas the regression coefficients (b) were (2.70 and 2.14) and determination coefficient (R2) were 0.98 and 0.88for V1 and V2 in both seasons. The b and R2 for No. of spikes/m^2were 44.47 and 23.12 and 0.99 and 0.90 in the first season and (43.67 and 22. 20) and (0.999 and 0.86) in the second season for the genotype V1 and V2 respectively(Figure2 a&b). The regression coefficients were higher in the No. of grains/spike and 1000-grain weight for BaniSuef 6 (V1) than the genotype NGB 7214 (V2), in contrast the determination coefficients were lower for V1 than the V2 in both seasons (Figure 3 and Figure 4).Bouacha et al.(2014) found that Landraces (Chili, Biskri, Mahmoudi and INRAT69)showed a better expression of protein content than high yielding cultivars(Karim,Razzak, Omrabiaa and Khiar) for all fertilizers combinations(nitrogen (N) and potassium (K).Overall means of protein content were calculated for landraces and high yielding cultivars and they were 18.32% and 15.81% ,respectively

4. CONCLUSION

In light of the results of the research work that lasted for two years, it can be concluded that significant differences among four durum wheat genotypes for all studied traits under potassium fertilization levels. Maximum grain yield of the Egyptian variety (BaniSuef 6) was achieved when fertilized at 75 kg k_2o/fed.,as well as the highest grain yield was obtained for the imported variety NGB 7214 was achieved when fertilized with 50 kg k_2o/fed. under the conditions of newly reclaimed soil.

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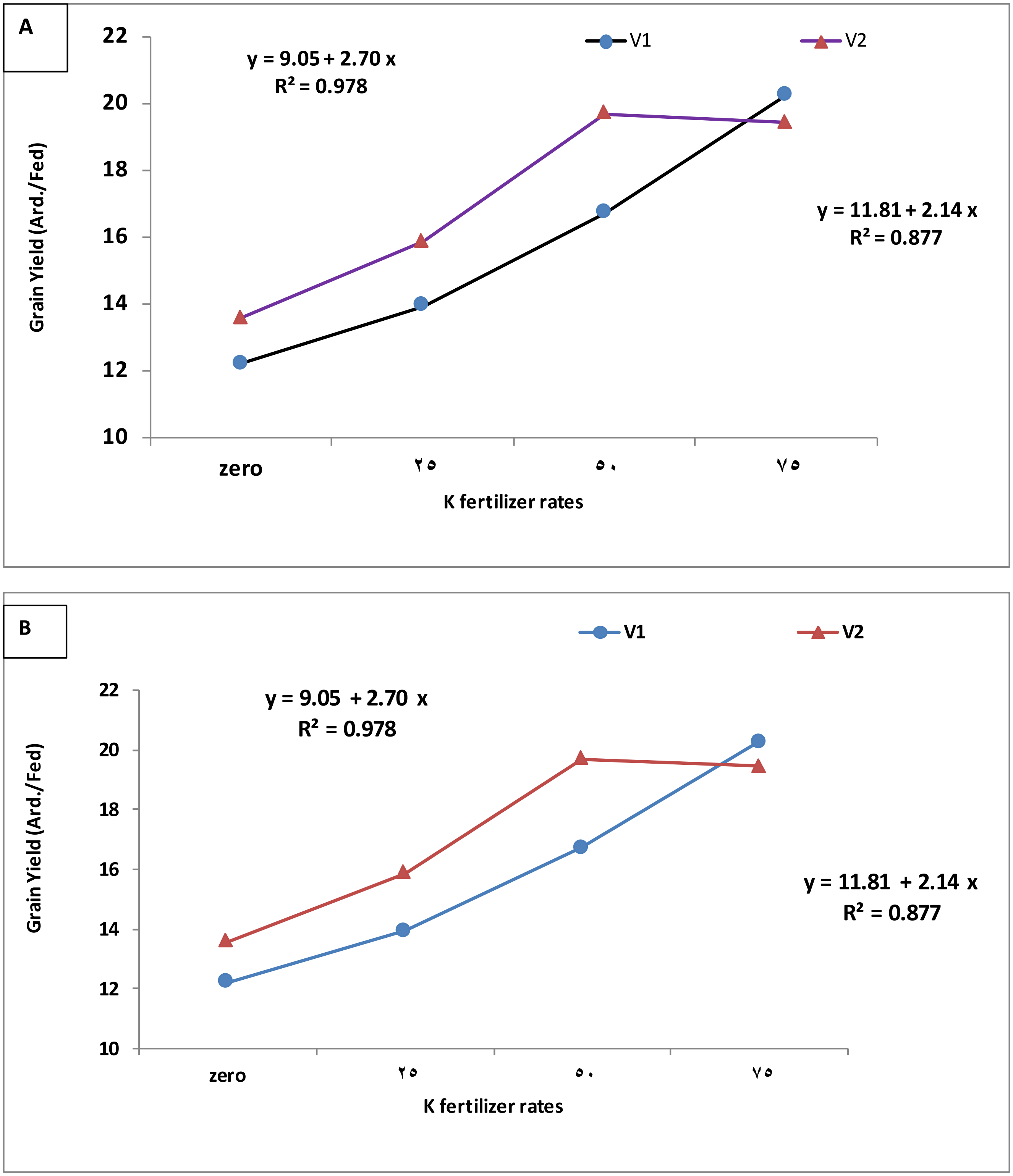


Figure 1. Linear response of grain yield (ard./fed.) for V1 and V2 in (A): 2017/2018 and (B): 2018/2019.

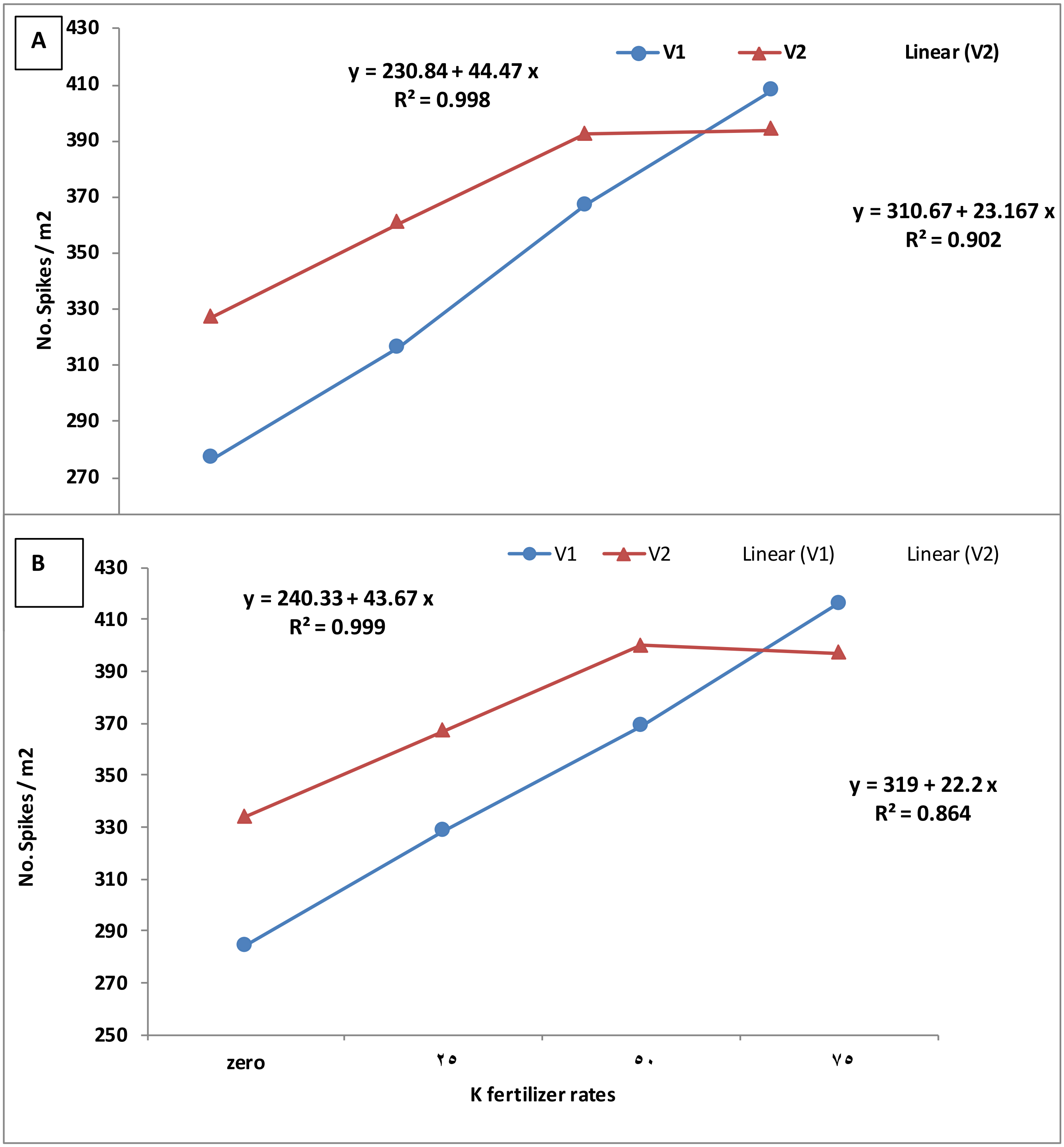


Figure 2. Linear response of spikes /m^2 for V1 and V2 in (A): 2017/2018 and (B): 2018/2019.

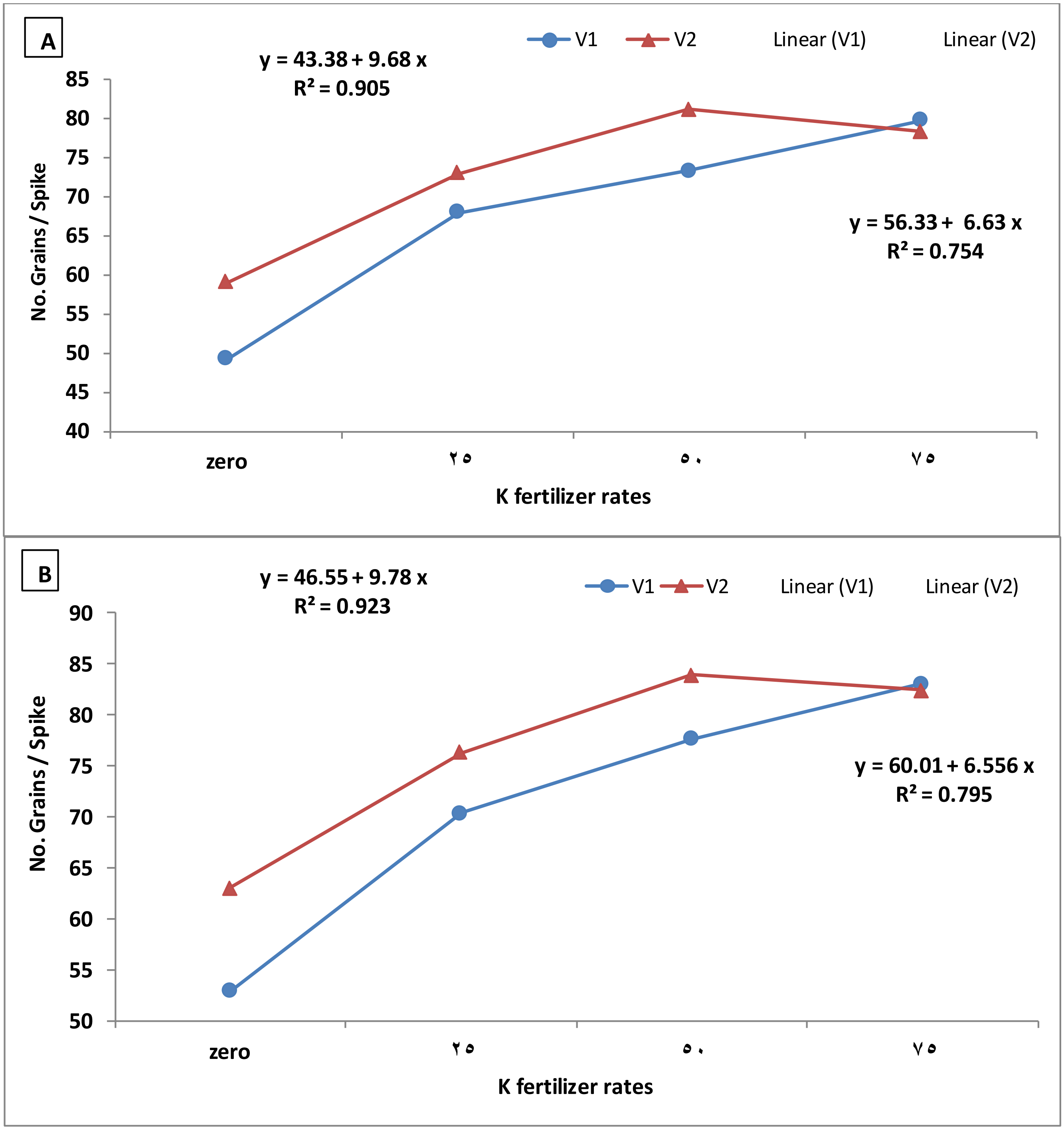
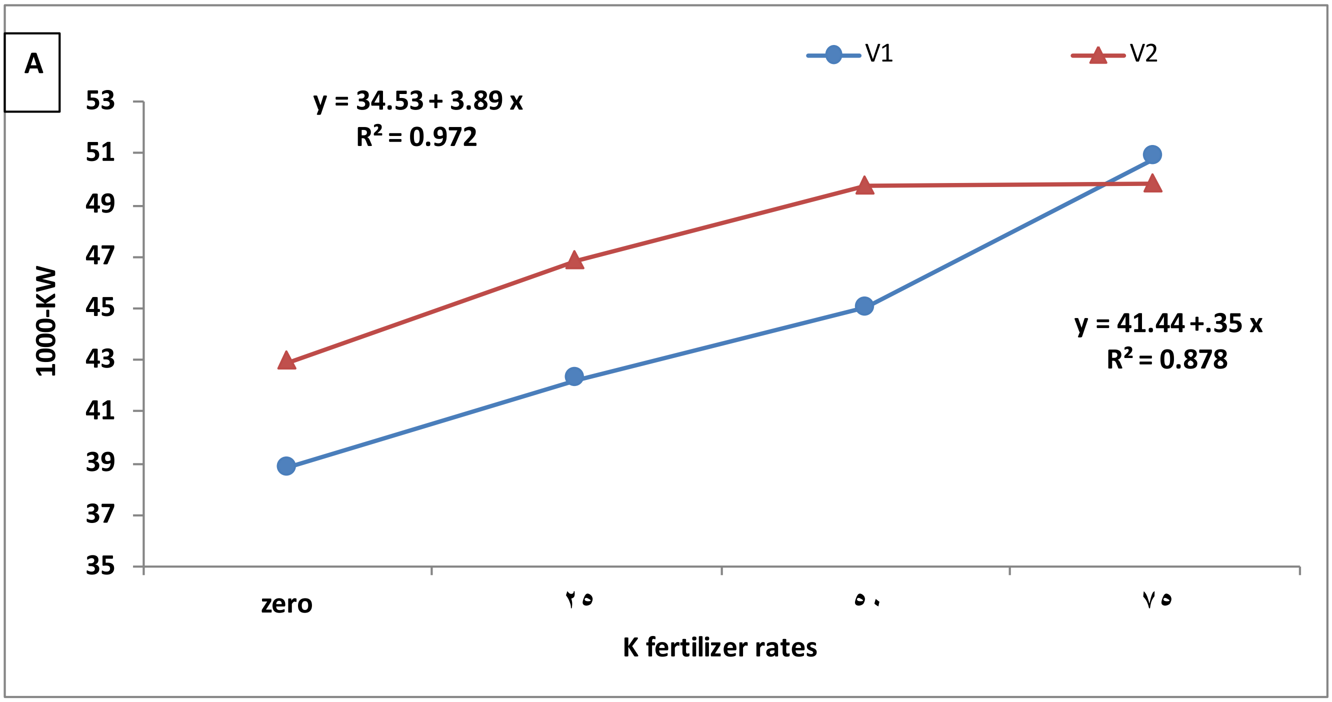


Figure 3. Linear response of No. of grains/spike for V1 and V2 in (A): 2017/2018 and (B): 2018/2019.



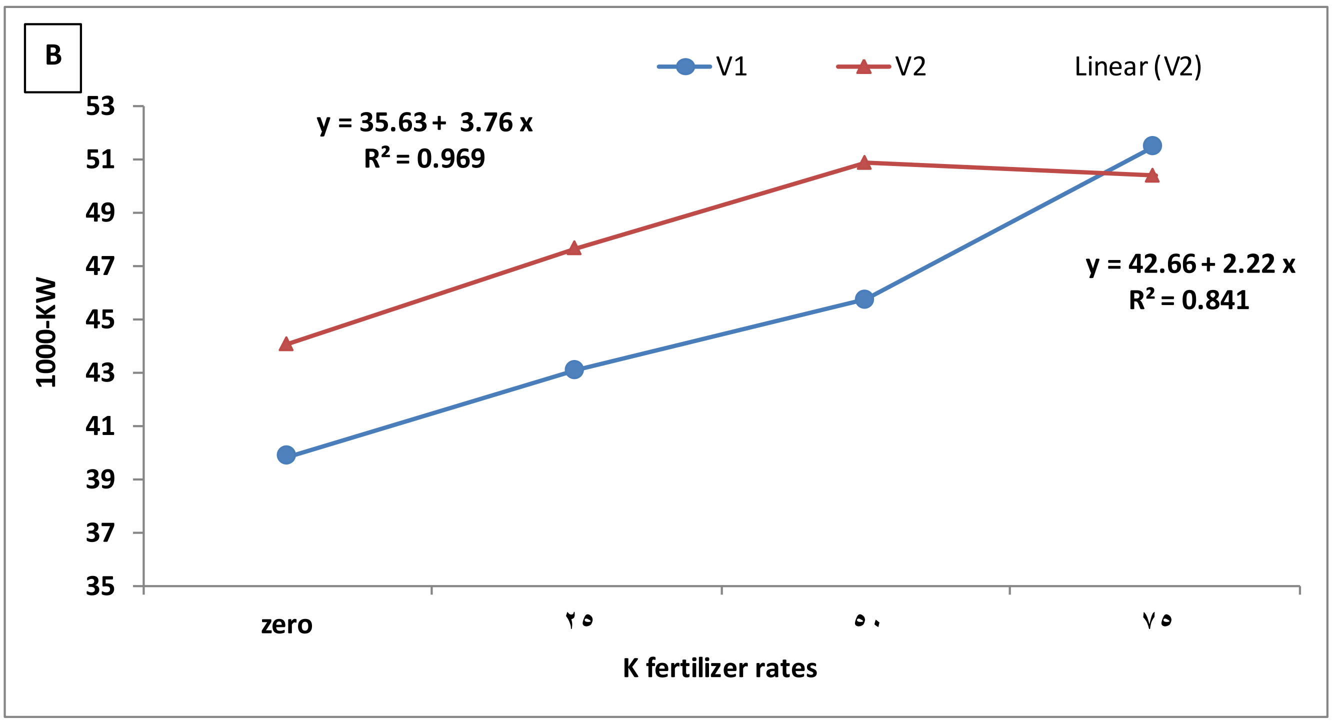


Figure 4. Linear response of 1000-grain weight (g) for V1 and V2 in (A): 2017/2018 and (B): 2018/2019.

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الملخص العربى

استجابة بعض التراكيب الوراثية لقمح الديورم لمستويات التسميد البوتاسى في الاراضى حديثةالاستصلاح.

أقيمت التجربة الحقلية بمزرعة كلية الزراعة جامعة سوهاج فى موسمين ٢٠١٨/٢٠١٧ و٢٠١٩/٢٠١٨لدراسة تأثير أربعةمستويات من سماد البوتاسيوم هىصفر ، ٢٥ ، ٥٠ ، ٧٥ كجم / فدان على المحصول ومكوناته لأربعة تراكيب وراثيةمن قمح الديورمهى BaniSuef 6, NGB 7214 , NGB 5399, NGB 4816، استخدم تصميم القطاعات كاملة العشوائية فى شكل القطع المنشقة مرة واحده فى ثلاث مكررات.

كانت أهم النتائج كما يلى:

- وجود فروق معنوية بين مستويات السماد البوتاسي لجميع الصفات المدروسة ما عدا ارتفاع النبات في كلاالموسمين ودليل الحصاد في الموسم الأول فقط .
- وجود فروق معنوية بين التراكيب الوراثية لجميع الصفات المدروسة. ارتفاع النبات (سم) ، طول السنبلة (سم) ، عدد السنابل / م^{٢} ، عدد حبوب / السنبلة ، وزن ١٠٠٠ حبة (جم) ، محصول الحبوب (اردب / فدان) ، المحصول البيولوجي (طن / فدان) .) ومحصول القش (طن / فدان) ودليل الحصاد (٪) في كلا الموسمين.
- زيادة التسميد البوتاسى حتى ٧٥ كجم / فدان أدى الى زيادة معنوية فىالمحصول ومكوناته في موسمي النموما عداارتفاع النبات (سم) في كلاالموسمين ودليل الحصاد (٪) في الموسم الأول فقط.
- اعطى صنف بني سويف ٦ والتركيب الوراثى NGB 7214 أعلى قيم لمحصول الحبوب مقارنة بالتراكيب الأخرى في كلا الموسمين. علاوة على ذلك ، اعطى االتركيب الوراثىNGB 7214اعلى قيم لطول السنبلة (سم) وعدد السنابل / م^{٢} وعدد الحبوب / السنبلة ووزن ١٠٠٠ حبة (جم) والمحصول البيولوجي (طن / فدان) ومحصول القش (طن / فدان) في الموسمين على التوالي . بينما تم الحصول على اطول النباتات من التراكيبNGB 7214 و NGB 5399 و NGB 4816 مقارنة بالصنف المصري بني سويف ٦.
- أظهر تأثير التفاعل فروق معنوية في جميع الصفات المدروسة. وبشكل عام ، تم الحصول على أعلى محصول حبوب بمقدار٢٠.٢٧ و ١٩.٧٠ أردب / فدان عند زراعةالصنف بني سويف ٦ واضافة ٧٥ كجم بوتاسيوم / فدان ، و زراعة التركيبالوراثىNGB 7214واضافة ٥٠ كجم بوتاسيوم/ فدان. على التوالي.