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Effect of foliar nutrition grow vit on yield and yield components of two wheat cultivars

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ABSTRACT

Two field experiments were conducted at Kafr El-Amar Village, Kaluobia, Governorate, Egypt in 2015/2016 and 2016/2017 seasons, to study the effect of foliar fertilizer Grow Vit on yield and yield components of two wheat cultivars. The results could be summarized as follows: Misr-2 cultivar surpassed significantly Sids-12 cultivar in plant height (cm), number of tillers/ plant, number of spikes/ plant and grain yield ton/ feddan. At the same time the best values for weight of spikes (g)/plant, grain index (g), straw yield (g)/ plant and biological yield (g)/ plant were obtained from Sids-12 cultivar. Significant variation were recorded between the tested foliar treatments, the effective treatment for plant height (cm), grain index (g), grain yield (ton/fed.), straw yield (ton/fed.) and biological yield (ton/fed.) was 750g/ 300L, while the best treatment for number of tillers/ plant, number of spikes/ plant, weight of spikes (g)/ plant and biological yield (g)/ plant, was 937.5 g/ 300 L. At the same time the difference between 750 g / 300 L and 937.5 g /300 L fell to reach to significant level for biological yield (g)/ plant and grain, straw and biological yields (ton/fed.) in both seasons. The interaction between wheat cultivars x foliar spraying was significant in all characters under study except grain yield (g)/ plant and grain, straw and biological yields (ton/fed.). The best value for plant height was obtained by Misr-2 cultivar + 562.5 g/ 300 L, for number of tillers/ plant and number of spikes/ plant was obtained from Misr-2 cultivar + 937.5 g/ 300 L. It is worthy to mention that the best value for weight of spikes (g)/ plant and biological yield (g)/ plant was obtained by Sids-12 cultivar + 937.5 g/ 300 L Grow Vit fertilizer and 750 g/ 300 L water for grain index and562.5g/ 300L for straw yield (g)/ plant in both seasons.

Key words: Wheat, Cultivars, foliar nutrition, grow vit, yield, yield components.

Introduction

Wheat (*Triticum aestivum* L.) is one of the most important crops used in human food and animal feed in Egypt. Recently, a great attention of several investigations has been directed to increase the productivity of wheat to minimize the gap between the Egyptian production and consumption by increasing the cultivated area and wheat yield per unit area. The total biomass is a result of the integration of metabolic reaction in the plants. Any factor influenced the metabolic activity of the plant at any period of its growth can affect the yield. Metabolic processes in wheat plants are greatly governed by both internal i.e. genetic make up of the plant and external conditions (climatic and edaphically environmental factors). Increasing wheat production per unit area can be achieved by breeding and cultivating the promising wheat cultivars and applying the optimum cultural practices such as suitable fertilizer. Hassanein *et al*. (2001), El-Esh (2007); Zaki *et al*. (2012) and Zaki *et al*. (2015) reported that there were significant differences between cultivars.

As macro and micro-nutrients added to the soil, their availability will be affected by soil environmental factors. Foliar application techniques, as a particular way to supply macro and micro-nutrients could avoid these factors and results in rapid absorption. If applied properly, foliar spraying can be considered practical to supply nutritional plant requirements. Similar finding were found by Shalaby (2001); Ahmed and Ahmed (2005) and Gomaa *et al*. (2015). The primary objective of foliar application such as nitrogen into the plant tissue. Foliar application of fertilizer should be viewed as temporary as emergency solution only but still it showed excellent results in some crops. The foliar application method is usually preferred because very small amounts of fertilizers are applied per unit

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area. Yassen *et al*. (2010) revealed that spraying wheat plants with 1% urea increased yield. It is well known that the important role of phosphorus on growth and high yield with good quality. It plays a key role in metabolic processes. Potassium (K) is a essential macro-element required in large amounts for normal plant growth and development. This attributed of K in plant biochemical path pathway (Shalaby, 2001). Potassium increases the photosynthetic rates of crop leaves, co_2 assimilation and facilitates carbon movement (Basha, 2004).

Thus the aim of this investigation was to study the effect of foliar fertilizer grow vit on yield and yield components of two wheat cultivars.

Materials and Methods

Two field experiments were conducted at Kafr El-Amar Village, Kaluobia, Governorate, Egypt in private farm, during 2015/ 2016 and 2016/ 2017 seasons. The experiments were carried out to study the effect of foliar spraying with Grow Vit fertilizer on yield and its components of two wheat cultivars (*Triticum aestivum* L.).

The experimental design was split plot design with four replications. Wheat cultivars were allocated randomly in the main plots and foliar spraying treatments were allocated in the sup- plot. The size of each plot was 10.5m^2 (1/400 feddan) 3.5 m long and 3 m wide. Each experiment included 8 treatments which were the combination among two cultivars and four foliar spraying fertilizer treatments.

The experimental treatments can be described as follows:

A- Cultivars:
1- Misr-2
2- Sids-12

B- Grow Vit treatments (foliar spraying):
1- Control (without spraying)
2- 562.5 (g /300L water)/ feddan
3- 750.0 (g /300L water)/ feddan
4- 937.5 (g /300L water)/ feddan

Nitrogen fertilizer was added in three doses at a rate of 75 kgN/ feddan. Where,15kg N/ fed were added at sowing date,30kg N/fed added at first irrigation (25 days after sowing) and the third dose 30kg N/fed were applied 25 days after the first irrigation. N fertilizer added in the form of ammonium nitrate (33.5% N). Potassium fertilizer was applied before sowing at a rate of 50 kg/ fed., in the form of potassium sulphate (48% K_2O). Super phosphate fertilizer (15.5%P_2O_5) was applied before sowing at the rate of 100 kg/ fed. Sowing dates were November 20th and November 21th in both seasons, respectively, while, seeding rate was 70 kg/ fed. The normal agronomic practices of wheat were followed until harvest as recommended by Wheat Research Dep., Agric. Research Centre. Foliar spraying with Grow Vit were added twice during the growth period (when the flag leaf emerges and the beginning expulsion of spikes at 55 and 85 days after sowing). Chemical composition of Grow Vit are presented in Table (1).

Table 1: Chemical analysis of grow vit foliar fertilizer

Macro elements %			Natural stimulants%			Micro elements PPm		
Total N	P_2O_5	K_2O	Sucrose	Citric acid	Hexamine	Chelated Zn	Chelated Mn	Chelated Cu
15	13	16	1	1	0.001	50	100	50

At harvest, 10 plants at random were taken from each plot to determine plant height (cm), number of tillers/ plant, number of spikes/ plant, weight of spikes g/ plant, grain index (g), grain yield g/plant, straw yield g/ plant and biological yield g/ plant, also, one meter was taken from each plot to

determine grain yield (ton/fed), straw yield (ton/fed) and biological yield (ton/fed) was estimated from each plot.

Data obtained were exposed to the proper method of statistical analysis of variance differentiate among means of different treatment as described by Gomez and Gomez (1984). The treatments means were compared using the least significant differences (L.S.D.) test at 5% level of probability. Combined analysis was made from the two growing seasons hence the results of two seasons followed similar trend.

Results and Discussion

Effect of wheat cultivars:

Data in Table (2) revealed that the differences between the studied cultivars in yield and its components i.e. plant height (cm), number of tillers/ plant, number of spikes/ plant, weight of spikes g/plant, grain index (g), straw yield g/ plant, biological yield g/ plant and grain yield ton/ feddan in both seasons were significant. Misr-2 cultivar significantly surpassed Sids-12 cultivar in plant height (cm), number of tillers/ plant, number of spikes/ plant and grain yield ton/ feddan in both seasons. Where, Sids-12 cultivar overcome Misr-2 cultivar in weight of spikes g/plant, grain index (g), straw yield g/ plant and biological yield g/ plant in both seasons. The differences may be due to the genetic differences between the two cultivars. Also the differences in 1000 grain weight might be attributed to the variation in translocation rate of photosynthate from leaves to the strong organs i.e. the grain.

These results are in harmony with those reported by Abd El-Razik (2002), Saleh (2003), Abu-Grab *et al*. (2006), El-Esh (2007) and Zaki *et al*. (2012).

Table 2: Effect of cultivars and grow vit foliar fertilizer on yield and its components of wheat plants (Average of 2015/2016 and 2016/2017 seasons).

Characters Treatments	Plant height (cm)	No. of tillers/plant	No. of spikes/plant	Weight of spikes (g/ plant)	Grain index (g)	Grain yield (g/ plant)	Straw yield (g/ plant)	Biological yield (g/ plant)	Grain yield (ton /fed.)	Straw yield (ton /fed.)	Biological yield (ton /fed.)
Cultivars											
Misr-2	113.22	3.13	3.10	8.71	38.01	6.82	8.91	15.73	3.054	6.618	9.673
Seds-12	99.75	2.37	2.35	10.66	50.98	8.28	10.74	19.02	2.903	7.269	10.173
L.S.D. at 5%	8.96	0.22	0.28	1.32	2.03	n.s	1.80	2.34	0.135	n.s	n.s
Grow Vit foliar fertilizer											
Control	104.300	2.40	2.40	10.05	45.73	7.19	9.61	16.80	2.417	5.958	8.374
562.5 g/300L	106.67	2.60	2.53	8.48	43.88	6.85	8.70	15.55	2.598	7.063	9.661
750 g/300L	108.00	2.83	2.83	9.35	46.03	7.91	9.63	17.53	3.475	7.402	10.877
937.5 g/300L	106.97	3.17	3.13	10.85	42.35	8.27	11.35	19.62	3.426	7.353	10.778
L.S.D. at 5%	1.96	0.33	0.37	1.46	1.40	n.s	n.s	2.58	0.223	0.909	1.049

Effect of foliar spraying (Grow Vit):

Data in Table (2) showed that all yield characters under study i.e. plant height (cm), number of tillers/ plant, number of spikes/ plant, weight of spikes g/plant, grain index (g), biological yield g/ plant, grain yield ton/ feddan, straw yield ton/ feddan, and biological yield ton/ feddan in both seasons significantly by adding foliar spraying with Grow Vit. Also, from the same Table(2) there is no significant differences in grain and straw yields g/ plant, also there is no significant differences among 750g/300L and 937.5 g/300L in grain, straw and biological yields ton/ feddan which gave the highest mean values of these characters. It is clear from the data that the best treatment for number of tillers/ plant, number of spikes/ plant, weight of spikes g/plant and biological yield g/ plant was 937.5 g/300L. In general foliar spraying with Grow Vit increased significantly yield and its components of wheat cultivars. The increase in plant height (cm) by foliar spraying may be occurred due to the stimulation of cell division and internodes elongation resulted from nitrogen application. Similar finding have been reported by El-Ganbeehy *et al*. (2001), Abdel-Hamid (2005) and Tabl *et al*. (2005).

The increase in grain yield could be attributed to the significant increase in number of spikes/ plant, weight of spikes g/plant and grain index. These finding are in agreement with those obtained by Sawires (2000), Ottman *et al*. (2000); Hassanein (2001); Moussa (2001) and Abo-El-Ela (2006). In addition, the increase in grain yield and other studied traits could be due to the increase in dry weight of vegetative organs which might consider as a criterion for the photosynthetic efficiency of the plant (Abo-El-Ela,2001). The superiority of foliar spraying with 937.5g/300L may be due to the fast effect of NPK in chemical forms at the early stages of plant growth followed by the stimulate effect of foliar spraying fertilizer through flowering and grain production (Kabesh *et al.*, 2009).

Similar results were obtained by Singh and Singh (2003); Sharma (2004); Dhaliwal *et al*. (2007) and Sadur *et al*. (2008).

Effect of interaction between wheat cultivars and foliar spraying (Grow Vit):

The effect of the interaction between wheat cultivars x foliar spraying with Grow Vit fertilizer on yield and its components in both seasons were significant except grain yield g/ plant and grain, straw and biological yields ton/ feddan Table (3). Misr-2 cultivar with 562.5g/300L gave the highest value of plant height and with 937.5g/ 300L gave the highest value of number of tillers/ plant and number of spikes/ plant. On the other hand the best values for weight of spikes g/plant and biological yields g/ plant was Sids-12 cultivar with 937.5g/300L, while for grain index with 750g/ 300L and 562.5g/ 300L for straw yield g/ plant. At the same time the differences between Sids-12 cultivar +937.5g/ 300Land Sids-12 cultivar+ 562.5g/ 300L for straw yield g/ plant was not significant, Zaki *et al*. (2004) and Zaki *et al*. (2012).

Table 3: Effect of interaction between cultivars x grow vit foliar fertilizer on yield and its components of wheat plants (Average of 2015/2016 and 2016/2017seasons).

Treatments / Characters		Plant height (cm)	No. of tillers/ plant	No. of spikes/plant	Weight of spikes (g/ plant)	Grain index (g)	Grain yield (g/ plant)	Straw yield (g/ plant)	Biological yield (g/ plant)	Grain yield (ton /fed.)	Straw yield (ton /fed.)	Biological yield (ton /fed.)
Cultivars x Grow Vit foliar fertilizer												
Misr-2	Control	110.73	2.77	2.77	10.40	41.17	7.43	10.14	17.57	2.460	6.116	8.577
	562.5 g/300L	117.00	2.63	2.50	6.40	36.30	5.57	5.27	10.83	2.621	6.258	8.879
	750 g/300L	115.60	3.27	3.27	9.03	39.92	7.23	9.61	16.83	3.536	7.082	10.617
	937.5 g/300L	109.53	3.87	3.87	9.00	34.67	7.07	10.63	17.70	3.601	7.017	10.617
Seds-12	Control	97.87	2.03	2.03	9.70	50.30	6.95	9.08	16.03	2.373	5.799	8.171
	562.5 g/300L	96.33	2.57	2.57	10.57	51.47	8.13	12.14	20.27	2.575	7.868	10.443
	750 g/300L	100.40	2.40	2.40	9.67	52.13	8.58	9.65	18.23	3.414	7.722	11.136
	937.5 g/300L	104.40	2.47	2.40	12.70	50.03	9.46	12.08	21.53	3.251	7.689	10.939
L.S.D. at 5%		2.77	047	0.52	2.06	1.99	n.s	2.70	3.65	n.s	n.s	n.s

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