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EFFECT OF SOWING METHODS AND SEEDING RATES ON YIELD AND ITS COMPONENTS OF SOME WHEAT CULTIVARS

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ABSTRACT

Two field experiments were conducted at Mallawi Agricultural Research station, Agricultural Research Center, Minia Governorate of 2009/2010 and 2010/2011 seasons. Each experiment aimed to find out the effect of three sowing methods i.e. drilling, broadcasting and on furrows, and three seeding rates i.e. 40, 60 and 80 kg/fed. on yield and its components of three wheat cultivars i.e. Sids-12, Shandaweel-1 and Sakha-94 (*Triticum aestivum* L.) in each season. Split-split plot design with three replications was employed. The results could be summarized as follows:-

Drilling sowing method surpassed the other methods in their effect on yield and its components. This method gave the highest values of No. of spikelets/spike, spike weight (g.), No. of kernels/spike, No. of spikes/m², 1000-grain weight, grain yield (ard./fed.) and straw yield (ton/fed.); increasing seeding rate to 60 kg/fed. significantly increased No. of spikelets/spike, No. of spikes/m², grain and straw yield/fed. and harvest index (%). While, spike length, number and weight of kernels/spike and 1000-grain weight significantly decreased as compared to 40 kg/fed.; three cultivars markedly varied in all estimated characters, Sids-12 and Shandaweel-1 significantly surpassed Sakha-94 in both seasons; the interaction effect between sowing methods and seeding rates had significant effect on spike weight, No. of kernels/spike, kernels weight/spike, No. of spikes/m², 1000-

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grain weight and grain yield ard. /fed. in both seasons. Similarly, spike length, straw yield ton/fed. and harvest index (%) in the first season only; the interaction effect between sowing methods and wheat cultivars had significant effect on spike length, spike weight, No. of kernels/spike, kernels weight/spike, No. of spikes/m², 1000-grain weight and grain yield/fed. in both seasons. On the other hand, straw yield/fed. and harvest index (%) had a significant effect in the first season only; the interaction between seeding rates and wheat cultivars significantly affected on spike weight, No. of kernels/spike, 1000-grain weight, grain yield/fed. straw yield/fed. and harvest index (%) in both seasons. While, the interaction had a significant effect on spike length and No. of spikelets/spike in first season and No. of spikes/m² in the second season and the interaction between sowing methods, seeding rates and wheat cultivars were significant on spike length, No. of kernels/spike, kernel weight/spike, No. of spikes/m², 1000-grain weight, grain and straw yield/fed. in both seasons. While, the spike weight and harvest index (%) were significantly affected in the first season.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is a member of family Poaceae which includes major cereal crops of the world such as maize, wheat, and rice. Among the food crops, wheat is one of the most abundant sources of energy and proteins than any other cereal crop for the world population. It is consumed in many different forms like bread, cakes, biscuits, bakery products and many other confectionery products. Its straw is used as animal feed and also in the manufacturing of papers. Wheat is the most important cereal crop in the world, as well as, in Egypt since it is stable food for human. The total consumption of wheat is about 13 million tons, while the total wheat production is about 8.27 million tons (produced from 3.00 million fed.) with average grain yield 18.20 ard./fed. (FAO, 2010/11) season, therefore, there is a gap between the national need and the local wheat production, which means that Egypt still imports about 4.73 million tons annually. So, it is necessary to conduct research on wheat to improve the productivity through breeding and agronomy studies. Sowing methods applied on the best regional cultivars with the suitable seed rates will help to improve wheat productivity.

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In Egypt, sowing wheat crop by broadcasting and drilling methods are common practices. Recently, sowing wheat grains by Afir in furrows consider new method. Eissa *et al.* (١٩٩٣) found that sowing Afir drill method gave the highest yield compared to Afir broadcast method in wheat fields. So, broadcasting method increased spike length, No. of grains/spike and grains weight/spike. The highest grains yield/fed. was obtained from seeded plant in rows at ١٥ cm. part.

Salem *et al.* (١٩٩٣) found that Afir drill method significantly increased wheat grain yield compared to Afir broadcast method. El-Far and Allam (١٩٩٥) stated that sowing by drilling method increased significantly the ١٠٠٠-grain weight and grain yield/fed. as compared to broadcast method. Mobarak (٢٠٠٨) found that Afir in furrows sowing method gave the highest values of spike length, spike weight, No. of grains/spike, grain weight/spike, No. of spike/m². and ١٠٠٠-grain weight as compared with Afir drill and Afir broadcast sowing methods. Whereas, Afir drill method gave the highest values of No. of spikelets/spike, grain and straw yields/fed.

Previous studies showed differences of seeding rates on the yield and its components in wheat. Hassan (١٩٩٩) indicated that increasing seeding rate from ٥٠ to ٨٠ kg/fed., caused a significant increase in No. of spikes/m², spike length, straw and grain yields/fed. but reduced No. of grains/spike and ١٠٠٠-grain weight. Muhammad *et al.* (٢٠١١). The seeding rates ١٢٥ kg/ha. produced significantly the highest grains yield (٤.٣٠ t/ha.) followed by ١٥٠ kg/ha. seed rate (٣.٨٧ t/ha.).

With regard to the cultivar differences, grain and straw yield/fed. as well as, number and weight of spike of wheat cultivars according to the genotypes (El-Karamity ١٩٩٨). The differences between tested wheat cultivars were significant in No. and weight of grain spike (El-Hefnawy *et al.*, ١٩٩١), spike length (Shalaby *et al.*, ١٩٩٣). Muhammad *et al.* (٢٠١١) Wheat variety Shafaq-٢٠٠٦ was planted results showed that different fertilizer level and seeding rates affected significantly the various parameters under study especially, plant height, spike length, number of spikelets/spike, ١٠٠٠-grain weight, economical yield and harvest index. The objectives of this investigation were to

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study the response of wheat plant to different sowing methods namely: Afir drill, Afir broadcast and Afir in furrows method with different seeding rates on three wheat cultivars, as well as, their interaction on yield and its components under Middle Egypt conditions.

MATERIALS AND METHODS

Two field experiments were conducted at Mallawi Agricultural Research Station, Agricultural Research Center, Mallawi, El-Minia, Egypt, in 2009/10 and 2010/11 seasons. Each experiment aimed at finding out the effect of three sowing methods i.e. drilling, broadcasting and on furrows with 60 cm. apart ridges. Three seeding rates i.e. 40, 60 and 80 kg/fed. on three bread wheat cultivars i.e. Sids-12, Shandaweel-1 and Sakha-94. The preceding summer crop was maize (*Zea mays L.*) in both seasons. The sowing dates were on 3rd and 26th of November in the first and second season, and harvested were on 10th and 12th of May in the first and second season, respectively. Phosphorus fertilizer was applied as calcium super phosphate (10.0% P₂O₅) during soil preparation at the rate of 100 kg/fed., Nitrogen fertilizers were applied in the form of urea (46.0 % N). The other normal agricultural practices of wheat growing were done as recommended. The experiment included 81 plots (experimental unit); the plot area was 100 m². (30 m. length × 3.0 m. width).

The experimental design was split-split plot in three replicates. The sowing methods were allocated in the main plots, seeding rates were allocated in sub-plot and wheat cultivars were allocated in sub-sub plots.

Data recorded in both seasons:

At harvest time, ten spikes were chosen at random from each plot to study the following characters: Spike length (cm.), No. of spikelets/spike, spike weight (g.), No. of kernels/spike, kernel weight/spike (g.), No. of spikes/m²., 1000-grain weight (g.), grain yield (ard./fed), straw yield (ton/fed.) and harvest index (%).

All data were statistically analyzed according to technique of analysis of variance (ANOVA) for the split-split plot design as

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mentioned by Gomez and Gomez (1982) by means of "MSTAT-C" computer software package and least significant differences revised (L.S.D.) at 5% level of probability was calculated for compare between treatments means.

RESULT AND DISCUSSION

Effect of sowing methods:

Data in Table 1 revealed that, sowing Afir drill surpassed Afir broadcast method in their effects on yield and yield components. All the studied parameter was positively and significantly. This method significantly increased No. of spikelets/spike, spike weight (g.), No. of kernels/spike, No. of spikes/m², 1000-grain weight, grain yield (ard./fed.) and straw yield (ton/fed.). This may be attributed to greater inter plant competition at drill and broadcast method causing poor grain development and light grains at denser plant population. These results are in harmony with the finding of Salem *et al.* (1993), El-Far and Allam (1990) and Mobarak (2008). On the other hand no significantly effects were detected on spike length (cm.), kernel weight/spike (g.) and harvest index (%) due to sowing methods in the two seasons.

Table 1: Yield and yield components of wheat as influenced by sowing methods in two seasons (2009/2010 and 2010/2011).

Treatments	Spike length (cm.)	No. of spikelets/spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m ²	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton/fed)	Harvest index (%)
First season (2009/2010)										
Drilling	10.7	22.1	4.3	71.9	2.8	490.2	44.1	10.97	3.931	39.9
B.casting	10.0	21.2	4.0	60.0	2.8	400.0	43.4	10.09	3.600	39.3
Furrows	10.6	21.4	3.8	62.0	2.8	484.4	44.0	16.14	3.496	39.2
L.S.D.	NS	0.4	0.2	NS	NS	12.6	NS	NS	0.729	NS
Second season (2010/2011)										
Drilling	11.8	24.2	4.8	73.4	3.4	494.1	51.4	23.88	0.403	39.6
B.casting	11.7	23.3	4.4	64.7	3.4	406.7	48.3	22.00	0.280	39.7
Furrows	12.2	23.6	4.4	67.3	3.0	478.9	49.3	23.04	0.244	39.7

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L.S.D.	NS	٠.٢	NS	٢.٢	NS	١٥.٤	٠.٩	٠.١٦	٠.٢١٥	NS
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L.S.D. at ٠.٠٥ levels.

B.casting = Broadcasting

Effect of seeding rates:

Data presented in Table ٧ indicated that seeding rates had significant effects in both seasons seeding rate ٦٠ kg/fed. significantly increased No. of spikelets/spike, No. of spikes/m^٢, grain yield, straw yield/fed. and harvest index (%). And significantly decreased spike length, number and weight of kernels/spike and ١٠٠٠-grain weight as compared to ٤٠ kg/fed. The increases of grain yield favor of ٦٠ kg seed/fed, due to the effect of adequate seed rate on increasing photosynthesis activity and reducing competition between wheat plants which in turn increased yield and its components, i.e. higher number, weight, spikelets/spike and higher ١٠٠٠-grain weight than any seeding rates. These results go in line with those obtained by Khalil and El-Ganbeehy (٢٠٠٤), Njuguna *et al.* (٢٠١٠) and Muhammad *et al.* (٢٠١١).

Table ٧: Yield and yield components of wheat as influenced by seeding rates in two seasons (٢٠٠٩/٢٠١٠ and ٢٠١٠/٢٠١١).

Treatments	Spike length (cm.)	No. of spikelets/spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes/m ^٢	١٠٠٠-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed)	Harvest index (%)
First season (٢٠٠٩/٢٠١٠)										
٤٠ kg/fed.	١١.٣	٢١.٥	٤.٢	٦٤.١	٢.٨	٤٥٨.٥	٤٤.٥	١٤.٩٨	٣.٢٣٣	٣٧.٧
٦٠ kg/fed.	١٠.٥	٢٢.٨	٤.١	٦٤.٠	٢.٧	٤٩٠.٧	٤٣.٨	١٦.١٦	٣.٧٢٢	٤١.١
٨٠ kg/fed.	١٠.٠	٢٠.٣	٣.٧	٥٦.٠	٢.٧	٤٨٠.٤	٤٣.١	١٦.٠٦	٤.٠١٧	٣٩.٧
L.S.D.	٠.٢	٠.٦	٠.١	١.٦	NS	٢١.٨	٠.٩	NS	٠.٦٩٨	١.٠
Second season (٢٠١٠/٢٠١١)										
٤٠ kg/fed.	١٢.٢	٢٣.٩	٤.٧	٧٢.٤	٣.٦	٤٦٠.٤	٥١.١	٢١.٨٠	٥.٠٢٣	٣٩.٨
٦٠ kg/fed.	١١.٩	٢٣.٦	٤.٥	٦٧.٣	٣.٣	٤٩٦.٧	٤٩.١	٢٣.٥٩	٥.٣٦٥	٣٩.٥
٨٠ kg/fed.	١١.٧	٢٣.٧	٤.٣	٦٥.٦	٣.٣	٤٧٢.٦	٤٨.٥	٢٣.٥٢	٥.٣٧٠	٣٩.٧

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L.S.D.	NS	NS	۰.۲	۳.۰	NS	۱۵.۶	۰.۹	۰.۲۶	NS	NS
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L.S.D. at ۰.۰۵ levels

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Effect of wheat cultivars:

Data presented in Table 3 show that wheat cultivars significantly differed in No. of spikelets/spike, spike weight (g.), No. of spikes/m², grain yield (ard./fed.), straw yield (ton/fed.) and harvest index (%) in both seasons. While, spike length (cm.), No. of kernels/spike, kernels weight/spike (g.) and 1000-grain weight (g.) significantly differed in all studied cultivars in the second season only. Sids-12 cultivar surpassed Shandawel-1 and Sakha-94 cultivars in all studied characteristics spike length and straw yield (ton/fed.) in both seasons. Shandawel-1 cultivar recorded highest values in spike length and straw yield (ton/fed.) in both seasons. The cultivars differences in all studied characteristics may be attributed to genetical factors and environment condition which effected on yield attributes. These results are in harmony with those reported by El-Hefnawy *et al.*, (1991), El-Kalla *et al.*, (1994) and El-Karamity (1998).

Table 3: yield and yield components of wheat as influenced by wheat cultivars in two seasons (2009/2010 and 2010/2011).

Treatments	Spike length (cm.)	No. of spikelets /spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m ²	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed)	Harvest index (%)
First season (2009/2010)										
Sids-12	10.6	21.8	4.1	61.0	2.8	0.3	24.8	16.4	2.64	40.1
Shandawel-1	10.7	21.7	4.0	61.2	2.7	287.0	24.9	16.1	2.81	39.4
Sakha-94	10.0	21.1	3.9	61.2	2.7	249.6	24.7	14.6	2.01	38.9
L.S.D.	NS	0.0	0.1	NS	NS	3.6	NS	0.06	0.02	0.7
Second season (2010/2011)										
Sids-12	12.2	23.7	0.0	72.7	3.8	490.9	0.9	23.2	0.24	40.0
Shandawel-1	12.3	24.4	4.4	67.6	3.3	277.3	49.2	23.1	0.40	39.9

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Sakha-94	11.3	23.0	4.2	60.1	3.2	466.4	48.7	22.0	0.1	39.2
L.S.D.	0.4	0.4	0.2	1.8	0.2	12.0	0.9	0.2	0.2	0.7

L.S.D. at 0.05 levels

Effect of the interaction between sowing methods and seeding rates:

The results in Table 4 indicate that, the interaction between sowing Afir methods (drilling, broadcasting and on furrows) and different seeding rates (4, 6 and 8 kg/fed.) increased significantly in both seasons for spike weight, No. of kernels/spike, kernels weight/spike, No. of spikes/m², 1000-grain weight and grain yield ard./fed. in both seasons. On the other hand, that interaction had a significant effect on spike length (cm.), straw yield ton/fed. and harvest index (%) in the first season only. However, the highest values in these characters were obtained from sowing Afir drill method when 6 kg seed/fed. were used.

Table 4: Effect of the interaction between sowing methods and seeding rates on yield and yield components of wheat in two seasons (2009/2010 and 2010/2011).

Treatments		Spike length (cm.)	No. of spikelets /spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m ²	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed)	Harvest index (%)
Sowing Methods	Seeding rates										
First season (2009/2010)											
Drilling	4 kg/fed.	11.0	21.4	4.6	67.4	2.9	506.7	40.9	14.84	3.71	38.3
	6 kg/fed.	10.3	23.8	4.2	62.9	2.7	500.6	43.4	17.36	3.899	41.7
	8 kg/fed.	10.2	21.0	4.0	50.3	2.7	473.3	42.8	16.98	3.206	40.2
.casting	4 kg/fed.	10.8	21.4	4.0	62.7	2.6	506.7	42.9	13.08	2.908	37.8
	6 kg/fed.	11.0	22.1	4.1	62.7	2.8	437.8	42.3	10.20	3.804	41.1
	8 kg/fed.	9.0	20.0	3.4	54.8	2.9	400.6	40.0	10.17	3.103	40.1

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urrows	ε · kg/fed.	10.4	21.6	3.7	61.8	3.0	478.9	44.7	16.37	3.361	37.9
	6 · kg/fed.	11.2	22.6	4.1	66.4	2.7	528.9	43.6	16.19	3.462	41.4
	8 · kg/fed.	10.3	20.0	3.7	57.8	2.6	440.6	43.7	15.88	3.663	38.3
L.S.D.		0.4	NS	0.5	4.2	0.2	22.6	1.3	1.3	1.04	1.0
Second season (2010/2011)											
rilling	ε · kg/fed.	11.8	21.4	0.2	77.2	3.8	511.1	54.2	23.29	0.282	39.3
	6 · kg/fed.	11.7	23.8	4.4	74.7	3.3	503.3	50.9	20.08	0.400	40.3
	8 · kg/fed.	11.8	21.0	4.8	68.2	3.0	467.8	49.0	23.26	0.678	39.2
.casting	ε · kg/fed.	12.6	23.6	4.8	66.9	3.6	430.0	49.0	20.27	0.070	39.4
	6 · kg/fed.	11.4	23.2	4.3	64.6	3.2	462.2	48.0	23.36	0.381	39.8
	8 · kg/fed.	11.1	23.0	4.0	62.6	3.4	477.8	47.9	22.30	0.390	39.9
Furrows	ε · kg/fed.	12.7	24.3	4.4	70.8	3.0	447.8	49.3	21.83	4.099	39.9
	6 · kg/fed.	12.1	23.3	4.3	63.9	3.0	516.7	49.0	24.16	0.431	39.3
	8 · kg/fed.	11.9	23.2	4.4	62.1	3.6	472.2	49.0	23.13	0.041	40.0
L.S.D.		NS	NS	0.3	2.8	0.3	24.7	2.1	0.3	NS	NS

Effect of the interaction between sowing methods and wheat cultivars:

Data recorded in Table 6 represent the effect of interaction between sowing methods and wheat cultivars. Sowing Sids-12 cultivar in Afir drill method produced the highest values of spike weight (g.), kernels weight/spike (g.), straw yield ton/fed. and harvest index (%) in both seasons. And No. of spikes/m² in first season and 1000-grain weight (g.) in the second season.

Table 6: Effect of the interaction between sowing methods and wheat cultivars on yield and yield components of wheat in two seasons (2009/2010 and 2010/2011).

Treatments		Spike length (cm.)	No. of spikelets /spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m ²	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed.)	Harvest index (%)
Sowing methods	Wheat cultivars										

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First season (2009/2010)											
Drilling	Sids-12	10.6	22.7	4.4	71.2	3.2	0.7	44.0	17.0	4.18	40.6
	Shandawel-1	10.8	21.4	4.2	74.7	2.0	0.2	40.0	17.0	4.02	40.0
	Sakha-94	10.6	22.1	4.2	69.9	2.6	470	43.3	10.8	3.07	39.1
B.casting	Sids-12	10.7	21.2	3.9	70.7	2.9	494	44.9	10.0	3.41	40.1
	Shandawel-1	10.4	20.7	4.1	70.3	3.0	400	43.2	17.1	3.89	39.3
	Sakha-94	10.2	21.7	3.9	69.1	2.0	400	42.1	13.7	3.70	38.3
Furrows	Sids-12	11.0	21.4	3.7	71.7	2.8	0.7	44.0	17.7	3.79	38.0
	Shandawel-1	10.7	21.2	4.0	74.6	2.7	0.3	40.4	17.1	3.02	39.9
	Sakha-94	10.3	21.4	3.7	69.7	2.8	443	42.7	14.4	3.27	39.0
L.S.D.		0.4	NS	0.1	2.1	0.2	18.1	0.8	0.97	0.04	1.1
Second season (2010/2011)											
Drilling	Sids-12	12.3	24.4	0.0	70.7	4.0	483	02.9	23.9	0.47	39.7
	Shandawel-1	11.7	24.8	4.9	79.3	3.1	021	02.0	24.1	0.02	39.4
	Sakha-94	11.3	23.3	4.1	70.1	3.1	477	48.7	23.0	0.37	39.7
B.casting	Sids-12	11.8	23.1	4.8	79.8	3.0	403	00.0	22.1	0.33	39.8
	Shandawel-1	12.0	23.9	4.3	73.1	3.0	482	47.7	22.0	0.49	39.1
	Sakha-94	11.3	22.8	4.1	71.1	3.7	434	47.7	21.8	0.01	40.1
Furrows	Sids-12	12.0	23.7	4.7	72.7	3.9	481	49.7	23.3	4.93	40.2
	Shandawel-1	13.0	24.7	4.2	77.0	3.7	484	48.0	23.7	0.19	39
	Sakha-94	11.2	22.8	4.3	72.2	3.0	471	49.7	21.9	4.94	39.9
L.S.D.		0.7	NS	0.4	3.1	0.3	20.9	1.7	0.30	NS	NS

L.S.D. at 0.05 levels.

B.casting = Broadcasting

On the other hand, sowing Shandawel-1 cultivar in Afir drill method recorded the highest values of No. of kernels/spike in both seasons, No. of spikes/m² and grain yield ard/fed. in the second season. Whereas, sowing Shandawel-1 cultivar in Afir in furrows method gave the highest values of 1000-grain weight (g.) and grain

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yield ard/fed. in first season and spike length (cm.) in the second season. These results may be due to the good distribution of plants in Afir drill, Afir in furrows method, and the short period of plant development of Sids-١٢ and Shandawel-١ cultivars, which prevent competition, compared of Afir broadcasting method and Sakha-٩٤ cultivar.

Effect of the interaction between seeding rates and wheat cultivars:

The obtained results in Table ٦ indicate that, the interaction between seeding rates and wheat cultivars was significant in both seasons for all characters studied except of kernels weight/spike. However, the largest No. of spikelets/spike and No. of spikes/m^٢ were obtained from sown by Sids-١٢ cultivar when ٦٠ kg seed/fed. were used in both seasons, ١٠٠٠-grain weight and harvest index in the second season. The highest values of spike weight and No. of kernels/spike obtained from the same cultivar when ٤٠ kg seed/fed. were used in both seasons. On the other hand, the highest values of spike length obtained from Shandawel-١ cultivar with ٤٠ kg seed/fed. in both seasons and ١٠٠٠-grain weight in first season, the highest grain yield and straw yields were obtained from sown by Shandawel-١ cultivar with ٦٠ kg seed/fed. in first character and ٨٠ kg seed/fed. in second character in both seasons.

Effect of the interaction between sowing methods, seeding rates and wheat cultivars:

Results in Table ٧ indicate that the studied traits were significantly affected by the interaction between sowing methods, seeding rates and wheat cultivars. In both seasons, characters of spike length, No, of kernels/spike, kernels weight/spike, No. of spikes/m^٢, ١٠٠٠-grain weight, grain and straw yields, were significantly affected by this interaction. While, the characters of spike weight and harvest index were significantly affected in first season and No. of spikelets/spike in the second season. The largest grain yield ard./fed. were obtained by sowing Afir drill method with Sids-١٢ and Shandawel-١ cultivars when ٦٠ kg seed/fed. were used in both seasons. It could be concluded that the increased in grain yield

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ard./fed. in both seasons may be due to increase of kernels weight/spike, 1000-grain weight and No. of spikes/m².

Recommendation

From the previous results, it appears that, drilling methods and seeding rates 60 kg/fed. with Sids-12 and Shandawel-1 cultivars, respectively. Showed recommended whenever feasible to producing the highest yield.

Table 6: Effect of the interaction between seeding rates and wheat cultivars on yield and yield components of wheat in two seasons (2009/2010 and 2010/2011).

Treatments		Spike length (cm.)	No. of spikelets /spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m ²	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed)	Harvest index (%)
Seeding rates	Wheat cultivars										
First season (2009/2010)											
40 kg/fed.	Sids-12	11.3	21.1	4.4	77.2	3.0	483.3	44.1	10.8	3.54	39.8
	Shandawel-1	11.0	22.1	4.2	74.7	2.8	472.2	40.6	10.2	3.50	37.9
	Sakha-94	11.1	21.2	4.2	71.3	2.8	420.0	43.9	13.8	2.81	30.2
60 kg/fed.	Sids-12	10.2	23.7	4.3	74.9	2.8	522.2	44.2	17.4	3.94	40.0
	Shandawel-1	10.7	22.7	4.1	71.8	2.7	497.7	43.6	17.3	3.76	41.8
	Sakha-94	11.4	22.1	3.9	70.3	2.7	403.3	43.8	14.7	3.40	41.4
80 kg/fed.	Sids-12	10.4	20.6	3.6	53.6	2.7	503.3	43.3	17.0	3.04	40.3
	Shandawel-1	9.9	20.4	3.8	57.2	2.7	492.2	42.6	10.7	4.20	39.6
	Sakha-94	9.8	20.0	3.7	57.1	2.7	440.0	43.4	10.4	4.21	39.2
L.S.D.		0.3	0.9	0.1	2.1	NS	NS	0.8	0.97	0.90	1.1
Second season (2010/2011)											
40 kg/fed.	Sids-12	12.4	23.6	5.2	77.9	4.0	473.3	52.2	23.0	5.10	40.3
	Shandawel-1	12.4	24.9	4.0	72.2	3.0	401.1	52.1	21.8	5.20	39.3
	Sakha-94	11.7	23.1	4.4	77.2	3.3	400.0	48.8	20.0	4.70	39.8
60 kg/fed.	Sids-12	12.3	24.0	4.7	78.7	3.7	517.0	50.0	23.3	5.19	40.4
	Shandawel-1	12.3	23.9	4.7	77.4	3.1	487.0	47.9	23.8	5.38	39.0

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	Sakha- ⁹ £	11.1	22.8	£.2	60.8	3.2	£80. 6	£8.9	23.7 1	0.0. 8	38.7
8. kg/fed.	Sids- ¹²	11.9	23.6	0.0	71.£	3.7	0.7. 7	£9.9	23.2 .	0.£3 7	39.1
	Shandawel- ¹	12.1	2£.£	£.2	63.0	3.1	£71. 1	£7.0	23.6 8	0.71 6	£1
	Sakha- ⁹ £	11.0	23.0	3.9	62.2	3.2	£77. .	£8.3	23.£ 8	0.0. 0	39
	L.S.D.	NS	NS	0.£	3.1	NS	20.9	1.6	0.30	0.3£ 7	1.1

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Table V A: Effect of the interaction between sowing methods, seeding rates and wheat cultivars on yield and yield components of wheat in two seasons (2009/2010 and 2010/2011).

Treatments			Spike length (cm.)	No. of spikelets /spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m ²	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed)	Harvest index (%)
Sowing methods	Seeding rates	Wheat cultivars										
First season (2009/2010)												
Drilling	4 kg/fed.	Sids-12	11.8	21.3	4.6	70.7	3.0	016.7	46.0	16.0	3.66	41.8
		Shandawel-1	11.4	21.0	4.9	72.7	3.0	016.7	44.9	14.4	3.98	36.7
		Sakha-94	11.4	22.0	4.2	74.0	3.0	486.7	46.2	14.1	3.01	36.3
	6 kg/fed.	Sids-12	10.2	20.3	4.0	71.3	3.1	04.0	42.8	17.1	4.19	39.4
		Shandawel-1	10.0	23.0	3.9	77.3	3.3	016.7	44.9	18.3	3.72	42.7
		Sakha-94	10.2	23.0	4.2	70.0	3.7	47.0	42.7	16.7	3.79	40.0
	8 kg/fed.	Sids-12	9.9	21.3	4.1	06.7	3.0	476.7	42.7	17.9	4.71	40.4
		Shandawel-1	10.0	20.3	3.7	03.7	3.7	473.7	44.8	16.7	4.37	40.7
		Sakha-94	10.2	21.3	4.2	00.7	3.0	480.0	41.0	16.4	3.42	40.8
B.casting	4 kg/fed.	Sids-12	11.0	21.0	4.2	08.7	3.7	003.7	43.2	13.1	3.03	38.7
		Shandawel-1	10.8	21.0	4.7	79.3	3.0	486.7	40.0	13.1	2.80	37.1
		Sakha-94	10.6	22.3	4.0	70.0	3.2	380.0	40.0	14.6	3.00	34.4
	6 kg/fed.	Sids-12	11.2	22.7	3.9	77.7	3.9	493.7	40.0	17.1	3.10	41.0
		Shandawel-1	11.1	21.0	4.4	70.7	3.0	413.7	41.0	10.0	4.12	40.7
		Sakha-94	10.9	22.7	3.9	09.7	3.6	406.7	40.3	13.0	4.14	41.0

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Furrows	٨٠ kg/fed.	Sids-١٢	٩.٩	٢٠.٠	٣.٧	٦٧.٧	٣.٠	٤٨٦.٧	٤٦.٤	١٥.٢	٤.٠٧	٤٠.٦
		Shandawel-١	٩.٢	٢٠.٠	٣.٤	٦٠.٧	٣.٠	٤٦٦.٧	٤٢.٧	١٦.٨	٤.٧١	٤٠.٢
		Sakha-٩٤	٩.٥	٢٠.٠	٣.٢	٥٩.٧	٢.٦	٤١٣.٣	٤٥.٩	١٣.٦	٣.٨٤	٣٩.٤
	٤٠ kg/fed.	Sids-١٢	٩.٩	٢١.٠	٣.٧	٥٥.٧	٣.١	٥٠٦.٧	٤٦.٣	١٦.٢	٣.٨٠	٣٤.٥
		Shandawel-١	١١.١	٢١.٧	٣.٦	٥٧.٠	٢.٨	٤٩٣.٣	٤٥.٥	١٧.٢	٣.٥٥	٤٠.٤
		Sakha-٩٤	١٠.٣	٢٢.٠	٣.٩	٥١.٧	٣.٢	٤٣٦.٧	٤٢.٥	١٥.٧	٢.٧٤	٣٨.٩
	٦٠ kg/fed.	Sids-١٢	١١.٣	٢٣.٠	٤.٠	٥٩.٠	٢.٥	٥٣٣.٣	٤٢.٥	١٧.٥	٣.٨٩	٤٢.٩
		Shandawel-١	١١.٧	٢٢.٣	٤.٦	٧٠.٠	٢.٧	٥٦٠.٠	٤٦.٢	١٧.٧	٣.٤٦	٤١.٦
		Sakha-٩٤	١٠.٧	٢٢.٣	٣.٧	٥٦.٣	٢.٩	٤٩٣.٣	٤٢.٠	١٣.٣	٣.٠٤	٣٩.٧
٨٠ kg/fed.	Sids-١٢	١١.٧	٢٠.٣	٣.٥	٥٩.٠	٢.٧	٤٨٠.٠	٤٣.٣	١٦.٦	٣.٣٩	٣٧.٤	
	Shandawel-١	٩.٣	١٩.٧	٣.٩	٥٨.٣	٢.٥	٤٥٦.٧	٤٤.٥	١٦.٦	٣.٥٦	٣٧.٧	
	Sakha-٩٤	٩.٨	٢٠.٠	٣.٦	٥٦.٠	٢.٤	٤٠٠.٠	٤٣.٣	١٤.٤	٤.٠٤	٣٩.٨	
L.S.D.			٠.٦	NS	٠.٢	٣.٦	٠.٣	٣١.٤	١.٤	١.٧	٠.٥٧	٠.٢

Table V B:

Treatments			Spike length (cm.)	No. of spikelets /spike	Spike weight (g.)	No. of kernel /spike	Kernels weight /spike (g.)	No. of spikes /m	1000-grain weight (g.)	Grain yield (ard /fed.)	Straw yield (ton /fed)	Harvest index (%)
Sowing methods	Seeding rates	Wheat cultivars										
Second season (٢٠١٠/٢٠١١)												
Drilling	٠ kg/fed.	Sids-١٢	١١.٧	٢٤.٣	٥.٥	٧٦.٧	٤.٥	٥٠٠.٠	٤٩.٨	٢٢.٣٤	٥.٣٨٩	٣٩.٢
		Shandawel-١	١١.٨	٢٤.٠	٥.٧	٨٦.٧	٣.٣	٥٢٣.٣	٦٢.٨	٢٤.٠٢	٥.١٣٦	٣٩.٥
		Sakha-٩٤	١٢.٠	٢٢.٧	٤.٣	٦٨.٣	٣.٥	٥١٠.٠	٤٩.٩	٢٣.٥٠	٥.٣٢٢	٣٩.٣
	٠ kg/fed.	Sids-١٢	١١.٩	٢٥.٣	٥.٤	٧٨.٣	٣.٧	٤٧٦.٧	٥٦.٨	٢٦.٢٧	٥.٢٧٩	٤١.٣
		Shandawel-١	١١.٦	٢٤.٠	٤.٣	٨٠.٧	٣.١	٥٣٠.٠	٤٦.٤	٢٤.٥٧	٥.٦٧٧	٤٠.١
		Sakha-٩٤	١١.٥	٢٣.٠	٣.٦	٦٥.٠	٣.٢	٥٠٣.٣	٤٩.٤	٢٤.٤٠	٥.٢٤٥	٣٩.٦
٨٠ kg/fed	Sids-١٢	١٣.٢	٢٣.٧	٥.٥	٧٢.٠	٣.٦	٤٧٣.٣	٥٢.١	٢٣.٢٨	٥.٧٥٩	٣٨.٧	

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B. casting		Shandawel-1	11.7	26.3	4.6	70.7	2.8	010.0	48.3	23.74	0.780	38.8
		Sakha-94	10.0	24.3	4.4	72.0	2.8	433.3	46.7	22.76	0.014	40.2
	4 kg/fed	Sids-12	12.9	23.0	0.3	73.0	3.6	430.0	0.4	22.00	0.362	40.6
		Shandawel-1	13.0	24.3	4.7	70.3	3.0	426.7	48.2	19.90	0.100	38.4
		Sakha-94	12.0	23.3	4.0	72.3	4.1	420.0	48.0	18.83	4.744	39.0
	7 kg/fed	Sids-12	11.4	23.0	4.7	73.3	3.6	400.0	0.2	23.61	4.868	39.8
		Shandawel-1	12.1	23.7	4.3	72.3	2.7	0.333	40.8	22.83	0.726	40.1
		Sakha-94	10.7	23.0	4.0	08.0	3.4	433.3	40.2	23.60	0.049	39.7
	8 kg/fed	Sids-12	11.2	23.3	4.4	73.0	3.0	480.0	47.6	20.71	0.761	39.1
		Shandawel-1	10.9	23.7	3.8	71.7	3.2	016.7	49.2	23.41	0.600	38.9
		Sakha-94	11.2	22.0	3.9	73.0	3.4	436.7	40.9	22.94	4.738	41.7
	Furrows	4 kg/fed	Sids-12	12.4	23.3	4.9	82.3	3.8	443.3	49.7	23.01	4.684
		Shandawel-1	14.2	26.7	4.2	71.3	3.6	433.3	48.9	22.06	4.839	38.3
		Sakha-94	11.0	23.3	4.3	73.7	3.0	476.7	49.2	20.43	4.274	40.0
7 kg/fed		Sids-12	12.8	23.7	4.8	79.0	4.1	026.7	49.0	22.80	0.341	39.9
		Shandawel-1	12.4	24.0	4.0	72.3	3.8	026.7	48.4	20.46	0.298	39.3
		Sakha-94	11.2	22.3	4.1	70.3	2.8	496.7	0.8	24.21	0.604	38.6
8 kg/fed		Sids-12	12.3	23.7	4.3	76.3	3.9	473.3	49.9	24.33	4.770	39.4
		handawel-1	12.0	23.3	4.0	77.3	3.0	493.3	48.1	23.84	0.439	39.2
		Sakha-94	10.8	22.7	4.0	02.7	3.3	400.0	48.9	21.23	4.910	41.2
		L.S.D.		1.1	1.3	NS	0.4	0.0	36.1	2.8	0.60	0.602

L.S.D. at 0.05 levels.

B.casting = Broadcasting

REFERENCES

- Eissa, A. M. K.; M. M. Hamed and A. Abd El-Kareem (1993).** The effect of sowing methods on wheat grain yield in old and new lands at Qena, Sohag and New Valley. Nile Valley Regional on cool-season Food Legumes and Cereals ICARDA, NVRP-Doc. 30-1992/93, p111-114.
- El-Far, I. A. and A. Y. Allam (1990).** Response of some wheat cultivars to sowing methods and drought at different stages of growth. Assiut J. Agric. Sci., 26(1): 267-277.
- El-Hefnawy, N. N.; A. M. Eissa and T. M. Shehab El-Din (1991).** Response of some Egyptian wheat cultivars to difference sources of nitrogen fertilizers. Minufiya J. Agric. Res., 16 (2): 1301-1309.
- El-Kalla, S. E.; A. A. Leila; A. H. Basiony and S. H. Hussein (1994).** Effect of irrigation and foliar nutrition treatments on growth and yield of some wheat cultivars under Al-Arish area conditions. Proc. 7th Conf. Agron. Azhar Univ., Egypt, 1: 360-378.
- El-Karamity, A. E. (1998).** Response of some wheat cultivars to seeding and fertilization rates. J. Agric. Sci. Mansoura Univ., 22(2): 643-650.
- FAO. (2010)** Statistical and Agricultural Economic, Food Outlook Report, April, 2010.
- Gomez, K. A. and A. A. Gomez (1984).** Chi-square test. Pages 408-477 in Statistical Procedures for Agricultural Research. John Wiley and Sons. Toronto.
- Hassan, A. A. (1999).** Determination of optimum seeding rate for newly released wheat cultivars. Bull. Fac. Agric. Cairo Univ. 50(4): 621-628.
- Khalil, H. E. and M. M. El-Ganbeehy (2004).** wheat productivity and agronomic traits as influenced by plant population densities and deferent nitrogen sources. J. adv. Agric. Res., 9 (3) 563-576.
- Mobarak, O. M. M. A. (2008).** Effect of sowing methods, fertilization and some weed control treatments on wheat

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productivity. Msc. Thesis, Fac. Agric., El-Minia Univ. Egypt

- Muhammad, T. N.; M. Muhammad; W. Muhammad; A. M. T. Asghar; M. A. N. A. Iqbal and M. Atta Ullah (۲۰۱۱).** Nutrient and seed rate effect on yield and yield contributing characters of wheat at agro-climatic (subtropical) condition of Faisalabad. Agric. Sci. Res. J. ۱(۱): ۴۴ – ۴۹.
- Njuguna M. N.; M. Munene; H. G. Mwangi; J. K. Waweru and T. E. Akuja (۲۰۱۰).** Effect of seeding rate and nitrogen fertilizer on wheat grain yield in marginal areas of eastern Kenya J. of Animal & Plant Sci., ۷(۳): ۸۳۴- ۸۴۰.
- Salem, A. A.; Z. R. Yehia and H. M. Ibrahim (۱۹۹۳).** Effect of wet sowing and Grasp application on the control of wild oat in wheat fields. Nile Valley regional Program on Cool-Season Food Legumes and Cereals ICARDA/NVRP-Doc-۰۳۰-۱۹۹۲/۱۹۹۳. P. ۱۴۷.
- Shalaby, E. E.; M. M. EL-Genbeehy and M. H. EL-Sheikh (۱۹۹۳).** Responase of several wheat genotypes to different levels of nitrogen fertilization, Menofiya J. Agric. Res., ۱۸(۲): ۱۰۷۹-۱۰۹۶.

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تأثير طرق الزراعة ومعدلات التقاوى على المحصول ومكوناته لبعض أصناف القمح

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أجريت تجربتان حقليتان في محطة البحوث الزراعية بملوى والتابعة لمركز البحوث الزراعية- بمحافظة المنيا خلال موسمي ٢٠١٠/٠٩، ٢٠١١/١٠. لدراسة تأثير بعض طرق الزراعة (التسطير - البدار - الخطوط) ومعدلات التقاوى (٤٠ - ٦٠ - ٨٠ كجم/فدان) على المحصول ومكوناته لبعض أصناف القمح وهي (سدس ١٢- شندويل ١- سخا ٩٤). وقد استخدم في هذه الدراسة تصميم القطع المنشقة مرتين في ثلاث مكررات حيث وزعت طرق الزراعة عشوائياً في القطع الرئيسية، ووزعت معدلات التقاوى في القطع الشقية ووزعت أصناف القمح في القطع تحت الشقية وأوضحت هذه الدراسة ما يلي:

١. تفوقت طريقة الزراعة التسطير على باقى الطرق الأخرى فى صفات المحصول ومكوناته فى كلا الموسمين حيث أعطت هذه الطريقة أعلى القيم لعدد السنبيلات/سنبلة ووزن السنبلة وعدد حبوب السنبلة وعدد السنايل/م^٢ ووزن الألف حبة ومحصول الحبوب (أردب/فدان) والقش (طن/فدان).
٢. تأثرت صفة عدد السنبيلات/سنبلة وعدد السنايل/م^٢ ومحصول الحبوب والقش ودليل الحصاد تأثيراً موجياً بزيادة معدل التقاوى الى ٦٠ كجم/فدان بينما سجل نقصاً تدريجياً فى طول السنبلة وعدد ووزن حبوب السنبلة ووزن الألف حبة مقارنة بالمعدل ٤٠ كجم/فدان.
٣. تأثرت جميع الصفات محل الدراسة تأثيراً معنوياً بأصناف القمح الثلاثة حيث تفوق الصنفين سدس ١٢ وشندويل ١ فى جميع الصفات محل الدراسة.

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٤. تأثير التفاعل بين طرق الزراعة العفير ومعدلات التقاوى تأثيراً معنوياً على صفة وزن السنبله وعدد ووزن حبوب السنبله وعدد السنابل/م^٢ ووزن الألف حبة ومحصول الحبوب فى كلا الموسمين بينما كانت الزيادة فى طول السنبله ومحصول القش ودليل الحصاد فى الموسم الأول فقط.
 ٥. أدى التفاعل بين طرق الزراعة العفير وأصناف القمح المختلفة الى زيادة معنوية لطول ووزن السنبله وعدد ووزن حبوب السنبله وعدد السنابل/م^٢ ووزن الألف حبة ومحصول الحبوب فى كلا الموسمين بينما كانت الزيادة لمحصول القش ودليل الحصاد فى الموسم الأول فقط.
 ٦. بين التفاعل بين معدلات التقاوى وأصناف القمح المختلفة تأثيراً معنوياً لوزن السنبله وعدد حبوب السنبله ووزن الألف حبة ومحصول الحبوب والقش ودليل الحصاد فى كلا الموسمين بينما تأثرت صفة طول السنبله وعدد السنييلات/سنبله معنوياً فى الموسم الأول وصفة عدد السنابل/م^٢ فى الموسم الثانى فقط.
 ٧. أدى التفاعل الثلاثى بين طرق الزراعة العفير ومعدلات التقاوى وأصناف القمح المختلفة تأثيراً معنوياً لطول السنبله وعدد ووزن حبوب السنبله وعدد السنابل/م^٢ ووزن الألف حبة ومحصول الحبوب والقش فى كلا الموسمين بينما كانت الزيادة فى وزن السنبله ودليل الحصاد فى الموسم الأول فقط.
- توصى الدراسة للحصول على أعلى انتاجية من محصول القمح من وحدة المساحة استخدام الزراعة التسطير مع معدل التقاوى ٦٠ كجم/فدان والصنفين سدس ١٢ وشندويل ١ على التوالى.