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Effect of Seeding Rates and Weed Management on Productivity of Two Wheat Cultivars *(Triticum aestivum* L.)

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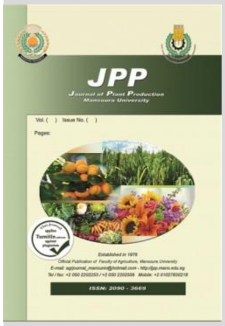

ABSTRACT

A field trial was carried out through the two consecutive wheat growing time of year, 2019/20 and 2020/21 at the Faculty of Agriculture, Kafr El-sheikh University. to investigate how various Seeding rates and weed management affect the yield of wheat cultivars Giza 168 and Giza 171. Three Seeding rates (40, 60, and 80 kg fed.$^{-1}$) and three weed management practices (unwedded check, hand-weeded twice, and weed herbicides) were tested. The study utilized a Randomized Complete Block Design (RCBD) in a split-split plot arrangement, replicated three times. The wheat cultivars were assigned to the main plots, seeding rates to the subplots, and weed management to the sub-subplots. Results showed significant variations between the two cultivars, seeding rates, and weed management on all studied characteristics in both seasons. Both Seeding rates and weed management significantly affected physiological traits, yield, and its components were assessed. Notably, variations in seeding rates did not influence the TGW in the 2020/21 season and harvest index in either season. Giza 171 was surprised for grain yield 2.552 ton/fed., in 2019/20 season, 60 kg seed/fed. and herbicide application. In the subsequent season, both herbicide and hand weeding were employed alongside the same seeding rates.

Keywords: wheat cultivars, seeding rates, weed management, yield and yield components.

INTRODUCTION

Wheat ranks first among the food grains that are consumed directly by humans and occupies approximately more than 20% of the world's cultivated land, an area larger than that of any other food crops. Higher Seeding rates play a crucial role in weed suppression, although yields decline beyond the optimal Seeding rates (Khan and Marwat, 2006). Studies have reported reductions in wheat grain yield ranging from 17% to 62%, depending on the cultivar's ability to compete with wild oat (*Avena ludoviciana* L.) (Balyan *et. al.*, 1991). Increased crop densities have the potential to suppress weeds because higher density within rows intensifies intraspecific competition within the crop population more than it enhances competition with weeds (Weiner *et al.*, 2001). Moreover, the competitive ability of weeds can be influenced by the environment.

Seeding amount and row spacing impact of condition around wheat plant for various resources such as light, water, and nutrients during crop development (Sharma and Singh, 2011). It was recorded in the first year, the effect of Seeding rates on grains/spike and TGW, did not show significant variation. However, in the second year, this effect was notable. Grains/spike and TGW decreased with an increase in Seeding rates from 40 to 60 kg/fed^{-1}. The higher number of grains per spike at lower Seeding rates was attributed to reduced competition among plants for light, moisture, and nutrients compared to higher Seeding rates.

Weed control treatments that created relatively weed-free conditions reduced crop-weed competition, resulting in good growth and yield traits, significantly impacting the yields of wheat (Verma *et.al.*, 2008).

The study aims to accomplish the following objectives:

1.To examine the effect of seed density impact on the yield of two wheat cultivars
2. To evaluate the impact of weed management on yield and its components.
3. To explore how the Seeding rates x weed management influences the yield and its components of wheat.

MATERIALS AND METHODS

The study was investigated at two field trials in the winter seasons of 2019/20 and 2020/21, at Research Station Farm, Faculty of Agriculture, Kafr El-Sheikh University, Egypt. located in the middle north Nile Delta. The Latitude of the site is 31.095, the longitude is 30.9526 and the altitude is 6 meters above mean sea level. Two wheat cultivars, Giza 168 and Giza 171, were used. The experimental setup comprised a (RCBD) featuring a split-split plot designed with three replications. The main plots were utilized for sowing Two wheat cultivars, Giza 168 and Giza 171, while the sub-plots were designated for the Seeding rates (S1=40 kg seed/fed, S2=60 kg seed/fed, and S3=80 kg seed/fed,) Three weed management treatments were allocated to the sub-subplots. The weed control treatments included (W1) an unwedded control, weeding twice (W2) at 21 and 45 days after planting by hand, and chemical control using Granstar and Topik herbicides (W3). Granstar was applied at a rate of (8 g/fed) post-emergence at 21 days after sowing, while Topik was applied at a rate of (140 g/fed.,) post-emergence at 35 days after sowing. The herbicides were

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administered utilizing a knapsack sprayer equipped with a 350 µm nozzle and applying 300 L/ha of water, pressurized at 40 psi The field was prepared by plowing and harrowing to establish a fine seedbed. Plot area as (120 cm width with 3.5 m long) = 4.2 m^2.

Table 1. The Trade, common and chemical names of the herbicides used in the study were as follows:

Trade name	Common name	Chemical name
Topik 15% WP	Clodinafop-propargyl	{2-propnil (®-2-[4-(5-chloro-3-fluoro-2-pyridnyloxy) phenoxy]-propionate}
Granstar 75%	Df Tribenuron-methyl	[Methyl 2-(N- (4-methoxy-6-methyl-1, 3, 5 triazin 2–cultivars [13, 14].Y) methylamine) caronyl) amino) sulful) benzoate.

Table 2. physical and chemical analysis in 2019/2020 and 2020/21.

Seasons	Soil depth cm	Particle size distribution Sand %	Silt %	Clay %	Texture	Chemical analysis N (exchang-eable ppm)	P (exchang-eable ppm)	K (exchang-eable ppm)	Soil pH
2019/20	0-15	17.9	28.7	50.4	Clay	29.0	19.5	400	8.00
	15-30	20.4	28.4	49.3	Clay				
	30-45	26.8	20.6	48.6	Clay				
2020/21	0-15	18.1	38.4	41.6	Clay	29.3	27.8	418	7.75
	15-30	20.3	39.0	40.5	Clay				
	30-45	20.1	39.5	42.3	Clay				

Phosphorus (100kg P_2O_5/fed., as a single super phosphate) were broadcasting during preparation of soil, and nitrogen fertilizer was applied at the rate of 150 kg in the form of Urea 46.5% in three portions the first at 20% after sowing and before irrigation, the second 40% at first irrigation and third 40% before the second irrigation.

According to the full recommendations of Ministry of Agriculture, the improved package of agricultural practices for growing wheat were followed, except the factors under study.

Agronomic characters:

heading date, maturity date, plant height (cm), flag leaf area (cm^2). Number of fertile tillers (m^2), TGW (1000 grain weight), number of grain/spike, spike length (cm), number of spikelets/spike, grain yield (ton/fed.), straw yield (ton/fed.) and harvest index %.

(one fed.=4200 m^2).

Statistical analysis:

The data underwent statistical analysis in accordance with the experimental design, Cultivar means, seeding rates, and weed management methods were compared utilizing the Duncan Multiple Range Test (Duncan, 1955). Subsequently, the data means were presented in tabular format.

RESULTS AND DISSECTION

A. Varietal differences in wheat cultivars:

The data provided in Table (3) reveal significant variations between wheat cultivars regarding the number of days to heading in 2019/20 and 2020/21 growing seasons. There was also a highly significant difference in days to maturity in the 2019/20 season and plant height in 2019/20 and 2020/21 seasons. Giza 168 was the earliest cultivar, heading 96.0 and 85.0 days in the 2019/20 and 2020/21 growing seasons. Maturity period for Giza 168 was 140.7 days, while Giza 171, 139.4 days to mature. Giza 171 exhibited the tallest plant height, measuring 99.6 cm, 84.4 cm compared to Giza 168 with heights of 95.2 cm, 75.3 cm in 2019/20 and 2020/21 seasons, respectively.

Table (4) indicate varietal differences in flag leaf area, number of spikes/m^2, and TGW. There were significant differences in flag leaf area in 2020/21 season, highly significant differences in number of spikes/m^2 in 2019/20 and 2020/21 seasons, and significant differences in TGW in 2019/20 season. Giza 168 exhibited a wider leaf area of 35.8 cm² compared to Giza 171 with a narrower leaf area of 32.5 cm². Giza 171 had 429.4 and 359.3 in 2019/20 and 2020/21 seasons, respectively. Giza 171 also had the highest TGW 41.4 g in 2019/20 season.

Table (5) showed the differences were observed among wheat cultivars for number of grain /spike in 2020/21 season, significant for spike length in 2019/20 and 2020/21 seasons, and highly significant variation for number of spikelets/spike in 2020/21 season. Giza 171 recorded 53.9 grains/spike, while Giza 168 had the lowest number (51.1) in the second season. Giza 168 had 11.9 and 10.6 cm spike length in 2019/20 and 2020/21 seasons. For number of spikelets/spike, Giza 171 recorded 17.3 in the 2020/21 season.

Illustrates in Table (6), highly significant varietal differences were observed for grain, significant for straw yield, and harvest index, in the 2019/20 season. Giza 171 was superior for grain and straw yield with 2.552 and 4.919 tons per fed., respectively, and a harvest index of 34.3% compared to Giza 168, which had 2.389 tons per fed. for grain yield, 4.662 tons per fed. for straw yield, and a harvest index of 33.9%.

B. Effect of seeding rates:

Table (3) shows the effect of seeding rates on heading date. There were highly significant effects in the first season and significant effects in the second season. using Seeding rates up to 80 kg/fed., resulted in a decreased number of days to heading. Seeding rate of 80 kg/fed. Had 94.7 and 88.1 days, while 40 kg/fed., resulted in (98.2 and 85.1 days) in both seasons, respectively. Table (3) showed that a highly significant effects of seeding rates on maturity in 2019/20 and 2020/21 growing seasons. Generally, sowing with a seeding rate of 80 kg/fed., resulted in the lowest number of days to maturity in both seasons (138.7 and 136.3 days) compared to the low seeding rate of 40 kg/fed., (141.4 and 139.3 days).

The impact of seeding rate on plant height was highly significant effects in 2019/20 and 2020/21 growing seasons Table (3). Uses 80 kg seed/fed., had tallest plants (108.9 and 88.8 cm) in 2019/20 and 2020/21 seasons, respectively.

Table (4) shows significant effects on flag leaf area in 2019/20 and 2020/21 seasons. A seeding rate of 40 kg/fed., had (36.1 and 35.4 cm²) in 2019/20 and 2020/21, while increases Seeding rates and sowing with 80 kg/fed., decreases and recorded 33.4 and 33.2 cm² in 2019/20 and 2020/21 seasons, respectively.

In terms of the deference's number of spikes/m^2 they were highly significant (> 0.01) in 2019/20 and 2020/21 seasons, the lowest number of tillers 314.9 and 269.7 recorded with 40 kg seed/fed., compared with 80 kg seed/fed., 461.9 and 346.9 in 2019/20 and 2020/21, Table (4)

Increasing Seeding rates from 40 kg/fed., to 80 kg seed/fed., resulted in a decrease in TGW from (43.1 to 33.8 g) in the 2021/20 season.

The effect of seeding rates on number of grain/spike were >0.01 in 2019/20 and 2020/21, Table (5) . Increasing the Seeding rates resulted in a decrease in the number of grain/spike. A Seeding rates of 40 kg/fed., recorded (53.6 and 54.7) compared to 80 kg/fed., which recorded (47.8 and 49.5) in both seasons, respectively.

Seeding rates had a significant effect (>0.05) on spike length in both the 2019/20 and 2020/21 seasons, and a highly significant effect (>0.01) in the same seasons. Seeding rates of 80 kg/fed., recorded 11.6 and 10.8 cm, while 40 kg/fed., recorded 11 and 9.7 cm in 2019/20 and 2020/21 seasons, respectively.

The number of spikelets/spike significantly affected (>0.01) affected by Seeding rates in 2019/20 and 2020/21 seasons. Increasing the Seeding rates decrease in the number of spikelets/spike. A Seeding rates of 80 kg/fed., recorded 17.6 and 16.1 compared to 40 kg/fed. which recorded 19.2 and 17.7 in 2019/20 and 2020/21 seasons, respectively.

The variations in grain yield significant (>0.01) in both 2019/20 and 2020/21 seasons. A Seeding rates of 60 kg/fed., recorded 2.629 and 2.655 ton/fed., while a Seeding rates of 80 kg/fed., recorded 2.363 and 2.388 ton/fed. in 2019/20 and 2020/21 seasons, respectively Table 6.

The effect of Seeding rates on straw yield was not significant (>0.05) in both seasons. A Seeding rates of 60 kg/fed., recorded 5.019 and 5.424 ton/fed., in 2019/20 and 2020/21 seasons, respectively. However, the effect of Seeding rates on harvest index was insignificant in 2019/20 and 2020/21 seasons.

C. Effect of weed management:-

The effect of weed treatments, Table (3, 4, 5, and 6) shows that weed treatments had a significant (>0.01) effect on all growth characters. Chemical treatment had highest number of days to heading (99.7 and 90.3), days to maturity (143.9 and 142.3), plant height (107.3 and 89.4) Table (3), and flag leaf area (37.4 and 39.7 cm^2) compared to the unwedded or hand weed treatments in 2019/20 and 2020/21 growing seasons, respectively.

For yield components, chemical treatments resulted in the highest values for the number of spikes/m^2 449.8 and 358.1, TGW 44.5 and 44.4 Table (4), number of grain/spike 57.7 and 58.4, spike length 13.2 and 11.3 cm, and number of spikelets/spike 20.7 and 20.1 Table (5).

Data presented in Table (6), show the effect of weed management on grain yield, straw yield and HI in 2019/20 and 2020/21 seasons. Chemical control increased grain yield 2.940 and 2.879 ton/fed., straw yield 5.440 and 5.821 ton/fed., in 2019/20 and 2020/21 seasons, respectively. However, the unwedded treatment had the highest values for harvest index 41.2 and 38.3% in both seasons, respectively.

Table 3. The effect of seeding rates, weed management on two cultivars of wheat for number of days to heading, number of days to maturity, plant height and their interaction in 2019/20 and 2020/21 growing seasons.

traits	Days to heading		Days to maturity		Plant height	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Cultivars (c)						
Giza 168	96.0	85.0	140.7	137.2	95.2	75.3
Giza 171	96.6	88.3	139.4	138.1	99.6	84.4
F test	*	*	**	NS	**	**
Seeding rates kg/fed. (S)						
40	98.2a	88.6a	141.4a	139.3a	82.6c	69.2c
60	96.0b	86.4b	140.1b	137.4b	100.8b	81.6b
80	94.7c	85.1c	138.7c	136.3c	108.9a	88.8a
F test	**	*	**	**	**	**
Weed management (W)						
W1	93.3c	83.3c	136.3c	133.9c	86.4c	70.2c
W2	95.9b	86.5b	140.0b	136.8b	97.9b	79.9b
W3	99.7a	90.3a	143.9a	142.3a	107.9a	89.4a
F test	**	**	**	**	**	**
Interactions						
C x S	NS	NS	NS	NS	NS	**
C x W	NS	NS	NS	NS	NS	NS
S x W	NS	NS	**	NS	**	*
C x S x W	NS	NS	**	NS	**	NS

*,** and NS; significant, highly significant and insignificant.

Table 4. Mean of flag leaf area, number of fertile tiller/m^2 and TGW (g) and their interaction as affected by seeding rate, weed management on two cultivars of wheat in 2019/20 and 2020/21 growing seasons.

	Flag leaf area		No. spikes/m^2		TGW	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Cultivars (c)						
Giza 168	35.6	35.8	360.7	264.6	34.7	36.9
Giza 171	33.2	32.5	429.4	359.3	41.4	38.5
F test	NS	*	**	**	*	NS
Seeding rates kg/fed.(S)						
40	36.1a	35.4a	314.9c	269.7c	43.1a	38.9
60	33.7b	33.9b	408.4b	319.2b	37.2b	38.3
80	33.4b	33.2c	461.9a	346.9a	33.8c	36.0
F test	*	*	**	**	**	NS
Weed management (W)						
W1	30.9c	29.8c	352.5c	267.8c	33.7c	30.6c
W2	34.9b	33.0b	382.8b	310.0b	36.0b	38.1b
W3	37.4a	39.7a	449.8a	358.1a	44.5a	44.4a
F test	**	**	**	**	**	**
Interactions						
C x S	NS	NS	NS	NS	NS	*
C x W	NS	NS	*	NS	**	NS
S x W	NS	NS	NS	NS	*	*
C x S x W	NS	NS	NS	NS	*	NS

*, ** and NS; significant, highly significant and insignificant.

Table 5. Number of grain/spike, spike length, number of spikelets/spike and their interaction as affected by seeding rate, weed management on two cultivars of wheat in 2019/20 and 2020/21 growing seasons.

	No. grain/spike		Spike length		No. Spikelets/spike	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Cultivars (c)						
Giza 168	50.3	51.1	11.9	10.6	18.4	16.8
Giza 171	52.0	53.9	10.8	9.6	18.6	17.3
F test	NS	**	*	*	NS	**
Seeding rates kg/fed (S)						
40	53.6a	54.7a	11.0b	9.7b	19.2a	17.7a
60	52.0b	53.3b	11.5ab	9.8b	18.7b	17.4ab
80	47.8c	49.6c	11.6a	10.8a	17.6c	16.1c
F test	**	**	*	**	**	**
Weed management (W)						
W1	43.9c	46.6c	9.8c	8.8c	15.8c	14.5c
W2	51.8b	52.6b	11.1b	10.2b	18.9b	16.6b
W3	57.7a	58.4a	13.2a	11.3a	20.7a	20.1a
F test	**	**	**	**	**	**
Interactions						
C x S	NS	*	NS	NS	NS	*
C x W	*	NS	**	NS	*	**
S x W	NS	**	NS	NS	*	**
C x S x W	**	NS	NS	NS	*	**

***,** and NS; significant, highly significant and insignificant.**

Table 6. Grain (ton/fed.), straw (ton/fed.), harvest index % and their interaction as affected by seeding rate, weed management on two cultivars of wheat in both growing seasons.

	Grain yield ton/fed.		Straw yield ton/fed.		HI %	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Cultivars ©						
Giza 168	2.389	2.415	4.662	5.000	33.9	32.7
Giza 171	2.552	2.502	4.919	5.286	34.3	32.6
F test	**	NS	*	NS	*	NS
Seeding rates kg/fed. (S)						
40	2.418b	2.333b	4.662b	5.022b	34.1	32.0
60	2.629a	2.655a	5.019a	5.424a	34.1	32.4
80	2.363c	2.388b	4.691b	4.984b	34.2	33.5
F test	**	**	*	*	NS	NS
Weed management (W)						
W1	1.635c	1.768b	3.535b	3.837b	41.2a	38.3a
W2	2.835b	2.730a	5.397a	5.772a	27.1c	27.5c
W3	2.940a	2.879a	5.440a	5.821a	34.1b	32.2b
F test	**	**	**	**	**	**
Interactions						
C x S	*	**	**	*	*	**
C x W	**	NS	*	*	NS	NS
S x W	*	NS	*	**	NS	NS
C X S x W	NS	NS	NS	NS	NS	NS

***, ** and NS; significant, highly significant and insignificant.**

D-Interaction effects:-

Interaction of Wheat Cultivars X Seeding rates:-

Table (7) shows the interaction between wheat cultivars X Seeding rates. Sowing Giza 171 with 80 kg seed/fed., had the highest values for plant height, TGW, number of grain/spike and number of spikelets/spike in 2020/21 season, while the highest grain yield values recorded with 60 kg seed/fed., in 2019/20 and 2020/21 seasons. Meanwhile, Giza 171 with 80 kg seed/fed., produced the highest values for straw yield in both seasons. Giza 168 with 80 kg seed/fed., recorded the highest values for HI in 2019/20 and 2020/21 seasons.

Interaction between Wheat Cultivars and weed management:

Table (8) showed that the chemical control treatment recorded the highest values, especially with the wheat cultivar Giza 171, for the number of spikes/m^2. Giza 168 recorded the highest values with the chemical control treatment (W3) for the number of grains per spike, the number of spikelets per spike, spike length, and the number of spikelet per spike. The hand weed treatment (W2) and the chemical control treatment (W3) recorded the highest values for grain yield and straw yield in both seasons. Giza 168 with W2 or W3 recorded the highest grain yield in 2020/21 season.

Effect of the interaction between Seeding rates and weed management:

Data in Tables (9) and (10) presented the effect of the interaction between Seeding rates X weed management on the number of days to maturity, plant height, TGW, spike length, the number of grains/spike, the number of spikelets /spike, grain yield/fed., and straw yield/fed., The Seeding rates of 80 kg/fed., with chemical control treatment was recorded the longest days to maturity in the first season and the tallest plants in both seasons. The Seeding rates of 40 kg/fed., with chemical control treatment recorded the heaviest TGW in 2019/20 and 2020/21 seasons and the highest number of spikelets /spike in the 2019/20 season. On the other hand, the Seeding rates of 60 kg/fed., with chemical control was recorded the highest number of grains /spike, number of spikelets /spike in the 2020/21 season, grain yield in the 2019/20 season, and straw yield in 2019/20 and 2020/21 seasons.

The interaction between Wheat Cultivars , Seeding rates and weed management :

The interaction between wheat cultivars (Giza 168, Giza 171) X Seeding rates (80 kg/fed., 40 kg/fed.), X chemical treatment on various trait Table (11). Giza 168 with 80 kg /fed. and chemical treatment recorded the highest number of days to maturity and number of grains/spike in the 2019/20 season. On the other hand, Giza 171 with 40 kg seed/fed., and chemical treatment recorded the highest number of spikelets/ spike in 2019/20 and 2020/21 seasons. Giza 171 with 80 kg /fed., and chemical treatment recorded the tallest wheat plant in the 2019/20 season, as well as the highest TGW and number of grains/spike. Furthermore, Giza 168 recorded the highest number of grains/pike in the 2019/20 season and the number of spikelets /spike in 2019/20 and 2020/21 seasons.

Table 7. Mean of plant height, 1000- grain weight, number of grain/spike, number of spikletes/spike, grain yield, straw yield and harvest index in 2019/20, 2020/21 as affected by interaction between wheat cultivars and Seeding rates.

Cultivar	Seeding rates	Plant height	1000 grain weight	No. grains/ spike	No. spikelets/spike	Grain yield (ton/fed.)		Straw yield (ton/fed.)		Harvest index (%)	
	Year	2020/21				2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Giza 168	40	67.9e	35.0b	49.1c	16.1c	2.302d	2.220d	4.746bc	5.189ab	33.3b	30.2c
	60	76.8d	37.6ab	51.0c	17.0b	2.552b	2.573b	4.989ab	5.265ab	33.6b	32.4bc
	80	81.3c	38.1ab	53.3b	17.3b	2.312bc	2.452bc	4.252d	4.547c	34.9a	35.5a
Giza 171	40	70.6e	36.9ab	50.1c	16.0c	2.534bc	2.446bc	4.578cd	4.854bc	34.9a	33.9ab
	60	86.4b	38.9a	55.5a	17.8a	2.707a	2.736a	5.048ab	5.583a	34.7a	32.5bc
	80	96.2a	39.6a	56.1a	18.1a	2.413cd	2.325cd	5.130a	5.421a	33.4b	31.5bc
F test		**	*	*	*	*	*	**	**	*	**

Table 8. Mean of number of spikes/m^2, TGW, number of grain/spike, spike length, number of spikelets/spike, grain and straw yield in 2019/20 and 2020/21 as affected by interaction between wheat cultivars and weed management.

Cultivars	Weed managem-ent	No. spikes/m^2	TGW	No grain/spike	Spike length (cm)	No. spikelets/spike		Grain yield ton/fed.		Straw yield ton/fed.	
		2019/20				2019/20	2020/21	2019 /20	2020/21	2019/20	2020/21
Giza 168	W1	322.9d	28.0f	42.9d	9.8e	15.3d	15.7e	1.450d	1.670b	3.632c	3.899c
	W2	370.4c	34.0e	50.0c	11.7c	18.8b	16.2d	2.788b	2.704a	5.131b	5.514b
	W3	388.9b	42.2b	57.9a	14.3a	21.0a	21.9b	2.928a	2.871a	5.224b	5.588b
Giza 171	W1	382.1b	39.4c	44.9d	9.8e	16.3c	16.3d	1.820c	1.866b	3.438c	3.775c
	W2	395.3b	38.0d	53.6b	10.4d	19.0b	19.2c	2.882a	2.755a	5.662a	6.030a
	W3	510.7a	46.8a	57.6a	12.1b	20.4a	22.3a	2.952a	2.886a	5.656a	6.053a
F test		*	**	*	**	*	*	**	*	*	*

Table 9. Mean of number of days to maturity, plant height, TGW and number of grain/spike in 2019/20 and 2020/21 as affected by interaction Seeding rates X weed treatment.

Treatments		Days to maturity	Plant height (cm)		TGW		Number of grain/spike
		2019/20	2019/20	2020/21	2019/20	2020/21	2020/21
40 kg/fed	W1	135.3f	70.5g	58.2e	36.3cd	27.4d	42.7
	W2	138.0d	81.3f	67.7d	43.1b	34.9c	49.3d
	W3	142.7bc	95.8d	81.8c	50.0a	45.7a	59.2a
60 kg/fed	W1	136.3ef	90.8e	72.5c	35.4de	30.8	47.0e
	W2	140.5cd	100.2c	81.0c	32.7def	39.9b	53.5c
	W3	143.5b	111.3b	91.3b	43.6b	44.1a	59.3a
80 kg/fed	W1	137.3e	97.8cd	80.0c	29.3f	33.6c	50.0d
	W2	141.5c	112.2b	91.2b	32.2ef	39.6b	55.0b
	W3	145.5a	116.7a	95.2a	39.9bc	43.3a	56.8b
F test		**	**	*	*	*	**

Table 10. Mean of number of grain/spike, number of spikelets/spike, grain yield and straw yield in 2019/20 and 2020/21 as affected by interaction between Seeding rates and weed management.

treatments		No spikelets/spike		Grain yield (ton/fed.)	Straw yield (ton/fed.)	
Seeding rates	Weed management	2019/20	2020/21	2019/20	2019/20	2020/21
40 kg/fed	W1	14.3e	13.0e	1.565f	3.733d	4.054c
	W2	18.0c	15.8c	2.802c	5.083c	5.453b
	W3	21.6a	19.3a	2.888c	5.170c	5.557b
60 kg/fed	W1	16.6d	14.7d	1.731e	3.425d	3.705c
	W2	19.3b	16.8bc	3.032b	5.768ab	6.177a
	W3	20.1b	20.7a	3.125a	5.863a	6.391a
80 kg/fed	W1	16.5d	15.8c	1.610f	3.447d	3.751c
	W2	19.3b	17.2b	2.672d	5.338bc	5.685b
	W3	20.3b	20.2a	2.807c	5.288c	5.514b
F test		*	**	*	*	**

Table 11. Mean of days to maturity, plant height, 1000- grain weight , number of grain/spike and number of spikelets/spike in 2019/20 and 2020/21 as affected by interaction between wheat cultivars, Seeding rates and weed management.

Treatments			No. days to maturity	Plant height (cm)	1000- grain weight	No. Grain/spike	No. spikelet/spike	
cultivars	Seeding rates	Weed management	2019/20	2019/20	2019/20	2019/20	2019/20	2020/ 21
Giza 168	40 kg fed	W1	135.7f	67.0j	24.5h	41.3he	18.2c	21.1b
		W2	139.0d	81.3h	29.9fgh	46.7g	20.4a	22.6ab
		W3	143.3b	96.7f	37.3de	54.0d	21.2a	23.8a
	60 kg seed	W1	137.0ef	86.3g	25.6gh	42.0h	17.5d	19.6c
		W2	141.3c	96.3f	30.9fg	50.7e	18.3c	21.5b
		W3	143.3b	109.7cd	42.4bcd	59.0a	20.6a	22.1b
	80 kg seed	W1	137.7e	98.0f	33.9ef	45.3gh	17.2d	19.1cd
		W2	142.0b	108.0de	41.3bcd	52.7de	17.8d	21.1b
		W3	147.0a	113.3bc	47.0b	60.7a	19.6b	22.6ab
Giza 171	40 kg seed	W1	135.0fg	74.0i	34.1ef	39.0g	18.7c	22.6ab
		W2	137.0e	81.3h	34.6ef	48.7e	19.6b	23.7a
		W3	142.0b	95.0f	42.7bcd	57.0b	21.6a	24.6a
	60 kg seed	W1	135.7f	95.3f	45.2b	48.0ef	18.5c	20.1c
		W2	139.7d	104.0e	34.5ef	57.0b	19.4b	21.1bc
		W3	143.7b	113.0bc	44.8bc	55.3c	21.5a	23.1a
	80 kg seed	W1	137.0e	97.7f	38.8cde	47.7f	18.5c	19.6c
		W2	141.0c	116.3ab	44.9bc	55.0c	18.1c	20.8c
		W3	144.0b	120.0a	53.0a	60.3a	20.6a	22.5ab
F test			**	**	*	**	*	**

Discussion

Various variations among wheat genotypes arose from the distinct genetic backgrounds of the cultivars. Several studies have investigated the performance of wheat cultivars under different conditions and found Profoundly significant variations Amidst the wheat cultivars for agronomic and yield components, influenced by the genetic makeup and the interaction among genetics and conditions of environment. These results support with findings from earlier studies conducted by El hag, Walaa (2011), Abdel-Hameed (2012), Haroun *et.al.,* (2012), Yang *et.al.*, (2013), Omar *et.al.,* (2014), Fazal *et.al.*, (2015), El-Nakhlawy *et.al.,* (2015), Mumtaz *et. al.,* (2015), El hag, Dalia (2016), Kandil *et.al.*, (2016), El hag- Dalia (2017) and Soad *et.al.,* (2018). This suggests consistency in the observed outcomes across multiple studies in the field. El Hag-Dalia (2008) and Dalia *et.al.,* (2021) discovered that sowing with the rate of seed 150 kg per ha., promoted competition among wheat plants for light, resulting in early maturity. They also indicated that lower seeding rate increased number of days to flowering and physiological mature, while increasing seeding rat increased competition between plants for light, nutrients, and water, resulting in a shorter flowering and ripening period as a survival strategy. Iqbal *et. al.,* (2020) reported that higher seeding rate improved both number of spikes/m^2, grain yield by 3-7% for all wheat varieties, even though the spikes/ plant, the number of grains/spike, and the TGW declined. These outcomes were consistent according to the findings of Yassin and Kittan (2009) and Tewodros *et.al.,* (2017).

Menshawy (2007a), Refay (2011), Eslami *et.al.,* (2014) found that a higher Seeding rates of 500 plants/m^2 resulted in a higher number of grains/spike, spike weight, the TGW, biological yield, and grain yield. Babaei and Saeedipour (2015) founded that increasing the seeding rate increased grain yield and the number of spikes/m^2, while the TGW decreased. Furthermore, compared to the weedy check, the application of herbicides increased biological & grain yield. The interaction effect between seeding rate X weeding regime was found to be significant and concerning grain yield and its components. Amit *et. al.,* (2008) discovered that mutual competition between plants at higher Seeding rates led to a decrease in the number of grains/spike and TGW. Variation in Seeding rates had a significant effect on the yield. The highest values were observed at a Seeding rates (125 kg/ha.,) which was similar results with seeding rate 100 kg/ha., but markedly better than the other Seeding rates.

Weed control indeed stands as an important practice for production. Shaban *et.al.,* (2009) found that broad-leaved weeds caused a reduction in wheat yield of 27.5% & 19.2% in the 2006/07 and 2007/08 seasons, respectively, while grassy weeds caused reductions of 43.7% and 33.2%, and total annual weeds caused reductions of 46.8% and 46.4%. Iqbal *et.al.,* (2010) indicated that seeding rate 150 kg/ha., resulted in higher grain yield 4.10 ton/ha.,. Singh *et.al.,* (2013) found that seeding rate 80 kg/ha.,) and sowing depth, 2cm. under irrigated conditions, wheat exhibited its maximum leaf area index, coupled with enhanced yield attributes, resulting in higher overall yield in Madhya Pradesh. Sharma & Singh, 2011 found that manual weeding twice, 15 days and 30 days after sowing, proved to be the most effective method and minimizing weed dry matter accumulation. Veselinka *et.al.,* (2014) discovered that the 1000-kernel weight exhibited Highly significant differences were observed among the investigated varieties, seeding rates, and growing seasons, indicating diverse impacts on the studied parameters. Meysam and Saeedipour (2015) revealed that seeding rate had a significant impact on various variables, including spikes/m^2, the parameters studied included grains/spike, TGW, grain yield, and HI, all of which were crucial indicators of crop productivity and performance. Higher seeding rate led to an increase in grain yield and the number of spikes/m^2 but the TGW decreased. Moreover, compared to the weedy check, the uses of herbicides increased biological and grain yield.

Yadav and Dhanai (2017) investigated different nitrogen fertilizer (100, 120, and 140 kg per ha.,) and Seeding rates (100, 125, and 150 kg/ha.), found that application of 140 kg N/ha., and a Seeding rates of 150 kg/ha resulted in a significantly higher grain and biological yield compared to 100 kg/ha of nitrogen and a lower Seeding rates. This optimal combination also positively impacted plant height, spike length (cm), number of spikes/spike, number of seeds/spike, TGW, and HI. Weeds pose a significant challenge to crop yield, particularly in low-input and organic fertilizer (Clark *et. al*., 1998; Stonehouse *et. al*., 1996). Increasing crop densities can potentially suppress weeds by intensifying intra-specific competition more than the competition with weeds (Weiner *et. al.,* 2001). Additionally, environmental factors influence the competitive ability of weeds. (Khan *et. al.,* 2011).

Herbicides like Granstar and Topik are commonly used for chemical weed control in wheat fields. To enhance wheat productivity, it is crucial to effectively manage weed competition, as indicated by studies such as Soliman *et. al.,* (2011) and Shehzad *et. al.,* (2012). Hand weeding twice, combined with a post-emergence application of Granstar at 8 g/fed and Topik at 140 g/fed, has been shown to effectively control grassy weeds, broad-leaved weeds, and total weeds, leading to increase wheat grain productivity. Additionally, these weeding treatments have been found to improve wheat plant height, yield, and yield components compared to unwedded plots (Abd El-Samie *et.al.,* 2018).

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تأثير معدل التقاوى ومقاومة الحشائش على إنتاجية صنفين من القمح

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الملخص

أجريت تجربه حقلية في المزرعة البحثية- كليه الزراعة - جامعة كفر الشيخ خلال الموسمين ٢٠/٢٠١٩ و ٢٠٢١/٢٠٢٠ لدراسة تأثير معدلات التقاوي المختلفة وطرق مقاومة الحشائش على محصول القمح. لصنفى جيزة ١٦٨ وجيزة ١٧١. تم اختبار ثلاث معدلات للتقاوي (٤٠، ٦٠، ٨٠ كجم /فدان) وثلاث طرق مقاومة الحشائش 1-بدون مقاومة حشائش(مقارنه) مقاومة حشائش يدوية مرتين ومبيدات حشائش عريضة ورفيعة} في تصميم القطع المنشقة مرتين في ثلاث مكررات. تم توزيع الأصناف في القطع الرئيسية ، ومعدل التقاوى في القطع المنشقة الاولى ومقاومة الحشائش في القطع الشقية الثانية. أشارت النتائج المتحصل عليها وجود فروق معنوية بين كل من الصنفين ومعدل التقاوى ومقاومة الحشائش في جميع الصفات المدروسة في كلا الموسمين. تفوق الصنف جيزة ١٧١ فى الانتاجيه. وأثر كل من معدل التقاوى ومقاومة الحشائش على عدد الأيام من الزراعه حتى التزهير والنضج ، ارتفاع النبات ، عدد السنابل/ م^{٢} ، عدد الحبوب/السنبلة ، وزن ١٠٠٠ حبة ، طول السنبلة، عدد السنيبلات/السنبلة ، محصول الحبوب ، محصول القش معامل الحصاد. ولم تؤثر معدلات التقاوى المختلفة على وزن ١٠٠٠ حبة في الموسم الثاني ومعامل الحصاد في كلا الموسمين. أشارت النتائج إلى أن أقصى محصول حبوب (٢,٥٥٢ طن/فدان) قد تم الحصول عليه من الصنف جيزة ١٧١ مع استخدام معدل تقاوى ٦٠ كجم /فدان واستخدام مبيدات الحشائش في الموسم الأول واستخدام كلا مبيدات الحشائش العريضة والرفيعة والمقاومة اليدوية في الموسم الثاني.