

Effect of Sowing and Harvesting Dates on Yield and Yield Components of Some Barley Cultivars

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Abstract

Two field experiments were conducted at Moshtohor region, Kalubia Governorate, Egypt, during 2019/20 and 2020/21 seasons, to study the effect of three sowing dates (1st November, 15th November, 1st December) and three harvesting dates (Harvesting at 150 DAS after sowing, Harvesting at 165 DAS after sowing, Harvesting at 180 DAS after sowing) on yield and yield components of two barley cultivars (Giza 2000 and Bhoth 244). The experimental design was randomized complete block design using split split-plots arrangement with three replications. Sowing dates was arranged in the main plots and barley cultivars was arranged at random in the sub plots, while harvesting dates were arranged randomly by in the sub sub-plots. The main results were as follows: Sowing at 1st or 15th of November gave the highest values of all studied traits except spike length and harvest index in first season and plant height in second season. Meanwhile, Bhoth 244 cultivar gave the highest values of spike length, No. spikelets spike⁻¹, spike weight, No. grains spike⁻¹, grain yield fed⁻¹ and straw yield fed⁻¹, whereas Giza 2000 cultivar gave the highest values of plant height, 1000-kernel weight and harvest index in the first and second seasons. Harvesting at 150 DAS increased significantly spike weight, No. grains spike⁻¹, 1000-kernel weight and straw yield fed⁻¹ compared with the other harvesting dates, while spike length, No. spikelets spike⁻¹, grain yield fed⁻¹ and harvest index increased significantly by harvesting at 180 DAS in both seasons. Plant height, spike weight, No. grains spike⁻¹, grain yield fed⁻¹ and straw yield fed⁻¹ were affected by the interaction between sowing dates and barley cultivars in both seasons except plant height in the second season and No. grains spike⁻¹ in the first season. Moreover, plant height, spike length, spike weight, No. grains spike⁻¹, 1000-kernel weight, grain yield fed⁻¹, straw yield fed⁻¹ and harvest index were affected by the interaction between sowing dates and harvesting dates in both seasons except plant height, spike length, straw yield fed⁻¹ and harvest index in the first season. While, plant height, No. spikelets spike⁻¹, spike weight, No. grains spike⁻¹, 1000-kernel weight, grain yield fed⁻¹, straw yield fed⁻¹ and harvest index were affected by the interaction between barley cultivars and harvesting dates in both seasons except plant height, No. spikelets spike⁻¹, grain yield fed⁻¹, straw yield fed⁻¹ and harvest index in the first season. Regarding the interaction effect, among sowing dates, barley cultivars and harvesting dates were significant differences of plant height, spike weight, No. grains spike⁻¹, 1000-kernel weight, grain yield fed⁻¹, straw yield fed⁻¹ and harvest index in both seasons except straw yield fed⁻¹ and harvest index in the first season. It can be concluded that sowing Bhoth 244 cultivar in 1st or 15th November and harvesting at 180 DAS produced the height yield productivity under the conditions of this experiment.

Key Words: *Sowing dates, Barley cultivars, Harvesting dates, Yield and yield components.*

Introduction

Barley (*Hordeum vulgare* L.) is an important cereal crop not only in Egypt but also all over the world. Among cereals, it ranks fourth in terms of cereal acreage and total production after wheat, maize and rice (FAO, 2021). Barley is a winter cereal crop in Egypt and usually used as human food and animal feed. Barley is production throughout the temperate, because good adaptability to wide range of climate. It responds well to date of sowing, varieties and harvesting dates which varies from country to country. The recent climate change is characterized by decreasing precipitation and increasing temperature, resulting in greater aridity. In this concern, sowing date differ in barley yield and yield components as reported by Chaudhary *et al* (2017), Pal *et al* (2018), Reddy *et al* (2018), Lee and Kim (2019), Amarjeet *et al* (2020) and Moustafa *et al* (2021).

Effect of cultivars on barley yield and yield components were studied by several researches Kokare *et al* (2014), Chaudhary *et al* (2017), Pal *et al* (2018), Dari *et al* (2019), Singh *et al* (2020) and Moustafa *et al* (2021).

Consequently, many researchers reported that harvesting dates is the most limiting factor to increase barley yield and yield components among those are Kharub *et al* (2007), Pal and Kumar (2009), Sharma (2009), Jain and Nagar (2010), Kaur *et al* (2013) and Nadimpoor and Mojaddam (2015).

The objective of this study was to investigate the suitable agricultural management practices such as planting and harvesting dates for two barley cultivars grown on a clay soil in Kalubia Governorate.

Materials and Methods

Two field experiments were carried out at Moshtohor region, Kalubia Governorate, Egypt, in 2019/2020 and 2020/2021 seasons, to study the effect of three sowing dates (1st November, 15th November and 1st December) and three harvesting dates (Harvesting at 150 (DAS), Harvesting at 165 (DAS) and Harvesting at 180 (DAS) on yield and yield components of two barley cultivars (Giza 2000 and Bhoth 244). The soil was clay in texture with a PH value of 7.94 and 7.96 and an organic matter content of 17.5 and 17.2 mg kg⁻¹ and total N of 0.15 and 0.13% during the first and second seasons, respectively. Eighteen

Every experiment included eighteen treatments which were the combination of three sowing dates, two barley cultivars and three harvesting dates. The experimental design was a Randomized Complete Blok Design using a split split-plot with three replications. The three sowing dates were arranged at random in the main plots, the sub plots were assigned random by to the two barley cultivars randomly and the three harvesting dates were arranged random by in the sub sub-plots. The sub sub-plot area was 10.5 m² (3 × 3.5m).

During land preparation, calcium super phosphate (12.5%), at a rate of 25 kg P₂O₅ fed⁻¹ was applied. Barley kernels were hand drilled in rows and the experimental unit area was 10.5 m² consisting 15 rows each of 3.5 m in length and 20 cm apart. Sowing date was on Nov. 1st, 15th and 1st Dec. in both seasons. The preceding summer crop was corn in both seasons. Nitrogen fertilizer at a rate of 70 kg N fed⁻¹ was split into two equal doses applied before the first and the second irrigations in the both seasons. The used N carrier was urea (46.5% N). Other agricultural practices were done as recommended in similar region.

Random samples of 10 guarded plants were taken from sub sub-plots at harvesting time to determine the following characters: plant height (cm), spike length (cm), No. spikelets spike⁻¹, spike weight (g) and No. grains spike⁻¹. For determining 1000-grain weight (g) a sample of one square meter from each sub

sub-plot was taken. Grain and straw yields (kg fed⁻¹) were estimated on whole sub sub-plot basis. Harvest index: grain yield kg fed⁻¹ divided by Biological yield kg fed⁻¹ × 100.

Analysis of variance was done for the data of each season separately according to Snedecor and Cochran (1980). Treatment means were compared using least significant difference test at 0.05 level of significance, using the MSTAT-C Statistical Software package (Michigan State University, 1983)

Results and Discussion

-Effect of sowing dates:

Data in Table 1 illustrated the results of the influence of sowing dates on plant height, spike length, No. spikelets spike⁻¹, spike weight, No. grains spike⁻¹, 1000-kernel weight, grain yield fed⁻¹, straw yield fed⁻¹ and harvest index in two growing seasons. Plant height, spike length, No. grains spike⁻¹ and straw yield fed⁻¹ were significantly in 1st Nov sown over that of 15th Nov and 1st Dec sown barley in both seasons except plant height in the second season and spike length in the first season. While, sowing date at mid-Nov. produced significantly highest values for spike weight (3.66 and 3.64 g), 1000-kernel weight (42.91 and 42.53 g), grain yield fed⁻¹ (2370 and 2373 kg) and harvest index (29.10 and 31.24%) in the first and second seasons, respectively. Lastly, No. spikelets spike⁻¹ was significantly in 1st Dec. sown over that of 1st Nov. in the first season and sown over that of 1st and 15th Nov. in the second season. That might be due to that late sowing decreased the effective rate of grain filling, shortened the effective duration of grain filling and plant growth rate during grain filling was slower because of low daily incident radiation and radiation use efficiency. Generally, sowing date first or mid Nov. were significantly better than first Dec. date. Sowing date first-Nov. furnished suitable environmental resources i.e climatic and edaphic factors to barley kernels to well germination and seedling establishment. These results trend to agree with those obtained by Chaudhary *et al* (2017), Pal *et al* (2018), Reddy *et al* (2018), Lee and Kim (2019), Amarjeet *et al* (2020) and Moustafa *et al* (2021).

Table 1. Yield and its components of barley as affected by sowing dates in 2019/2020 and 2020/21 seasons

Characters	2019/20 season			LSD at 5%	2020/21 season			LSD at 5%
	1 st Nov.	15 th Nov.	1 st Dec.		1 st Nov.	15 th Nov.	1 st Dec.	
Plant height (cm)	125.1	118.3	117.2	5.1	100.0	98.9	102.2	NS
Spike length (cm)	9.00	8.88	8.55	NS	9.16	8.72	8.44	0.40
No. spikelets spike ⁻¹	20.16	20.77	21.44	0.90	20.22	20.38	21.55	0.73
Spike weight (g)	3.19	3.66	3.32	0.08	3.27	3.64	3.33	0.11
No. kernels spike ⁻¹	65.55	65.33	60.44	3.7	66.77	62.33	60.38	2.12
1000-kernel weight (g)	41.71	42.91	41.58	0.79	41.26	42.53	41.41	0.32
Grain yield (kg fed ⁻¹)	2211	2370	2128	15	2200	2373	2123	22
Straw yield (kg fed ⁻¹)	6205	5849	5509	165	6042	5321	5366	62
Harvest index	27.32	29.10	28.09	NS	27.34	31.24	28.69	0.66

NS=No significance

-Varietal differences:

The results reported in Table 2 indicate clearly that, there were significant differences between barley cultivars in all studied traits in the first and second seasons except harvest index in the first season. Bhoth 244 cultivar gave the highest values and increased significantly spike length (10.07 and 9.88 cm), No. spikelets spike⁻¹ (23.40 and 23.14 spikelet), spike weight (3.60 and 3.58 g), No. kernels spike⁻¹ (66.22 and 64.48 kernel), grain yield fed⁻¹ (2298 and 2299 kg) and straw yield fed⁻¹ (6204 and 5925 kg) in the first and second seasons, respectively. Whereas, Giza 2000 cultivar gave the highest values and increased significantly plant height (124.0 and 104.2

cm), 1000-kernel weight (44.60 and 44.14 g) and harvest index (28.53 and 29.87%) in the first and second seasons, respectively. It could be concluded that varietal differences between barley cultivars may be due to genetical make up. The superiority of Bhoth 244 cultivar in grain yield fed⁻¹ over Giza 2000 cultivar might be due to the increase in yield components, namely, spike length, No. spikelets spike⁻¹, spike weight and No. grains spike⁻¹. The results obtained by Kokare *et al* (2014), Chaudhary *et al* (2017), Pal *et al* (2018), Dari *et al* (2019), Singh *et al* (2020) and Moustafa *et al* (2021) indicated marked differences among barley varieties in yield and yield components.

Table 2. Yield and its components of barley as affected by cultivars 2019/20 and 2020/21 seasons

Characters	2019/20 season		LSD at 5%	2020/21 season		LSD at 5%
	Giza 2000	Bhoth 244		Giza 2000	Bhoth 244	
Plant height (cm)	124.0	116.3	3.3	104.2	96.6	3.4
Spike length (cm)	7.55	10.07	0.17	7.66	9.88	0.46
No. spikelets spike ⁻¹	18.18	23.40	0.81	18.29	23.14	0.66
Spike weight (g)	3.18	3.60	0.14	3.24	3.58	0.10
No. kernels spike ⁻¹	61.33	66.22	2.28	61.85	64.48	1.69
1000-kernel weight (g)	44.60	39.53	0.31	44.14	39.33	0.50
Grain yield (kg fed ⁻¹)	2174	2298	13	2165	2299	14
Straw yield (kg fed ⁻¹)	5505	6204	147	5228	5925	96
Harvest index	28.53	27.81	NS	29.87	28.32	0.89

NS=No significance

-Effect of harvesting dates:

Results in Table 3 indicate that grain yield and its components of barley were affected by different harvesting dates. Harvesting at 150 DAS increased significantly spike weight, No. grains spike⁻¹, 1000-kernel weight and straw yield fed⁻¹ compared with the other harvesting dates, while spike length, No. spikelets spike⁻¹, grain yield fed⁻¹ and harvest index increased significantly by harvesting at 180 DAS in

both seasons. Such results may be due to the proper crop stand and also the production of individual plant through balancing the plant to plant competition and facilitating the conversion of light energy to harvest yield of crop. Similar results were reported by Kharub *et al* (2007), Pal and Kumar (2009), Sharma (2009), Jain and Nagar (2010), Kaur *et al* (2013) and Nadimpoor and Mojaddam (2015).

Table 3. Yield and its components of barley as affected by harvesting dates (days after sowing, DAS) in 2019/20 and 2020/21 seasons

Characters	2019/20 season			LSD at 5%	2020/21 season			LSD at 5%
	150 DAS	165 DAS	180 DAS		150 DAS	165 DAS	180 DAS	
Plant height (cm)	121.1	119.9	119.5	NS	101.4	101.2	98.5	NS
Spike length (cm)	8.38	8.83	9.22	0.46	8.44	8.72	9.16	0.40
No. spikelets spike ⁻¹	20.33	20.16	21.44	0.56	20.33	20.61	21.22	0.59
Spike weight (g)	3.71	3.36	3.10	0.13	3.71	3.34	3.19	0.09
No. kernels spike ⁻¹	65.72	63.05	62.55	1.57	65.16	61.61	62.72	2.16
1000-kernel weight (g)	44.47	41.99	39.75	0.27	44.27	41.57	39.36	0.27
Grain yield (kg fed ⁻¹)	2074	2311	2324	11	2078	2308	2309	12
Straw yield (kg fed ⁻¹)	6704	5677	5181	232	6414	5561	4754	96
Harvest index	24.69	28.65	31.17	1.95	25.08	29.42	32.77	0.75

NS=No significance

- Effect of the interactions:

The significant interactions among sowing dates, barley cultivars and harvesting dates on the studied traits are shown in Tables (4A, 4B, 4C and 5)

The combination of sowing dates with barley cultivars indicated that the highest values were

obtained by sown in 1st Nov. with Giza 2000 and Bhoth 244 cultivars for plant height (134.6 cm) and No. kernels spike⁻¹ (68.11 kernel) in the first and second seasons, respectively and the highest values of straw yield fed⁻¹ (6421 and 6250 kg) obtained by sown in 1st Nov. with Bhoth 244 cultivar in the first and

second seasons, respectively. Whereas Bboth 244 cultivar at sown in 15th Nov. gave the heaviest values for spike weight (4.12 and 4.01 g) and grain yield fed⁻¹ (2445 and 2447 kg) in the first and second seasons, respectively (Table 4A). On the other hand, the lowest

values of plant height was obtained by sown in 1st Nov. Bboth 244 cultivar in the first season and spike weight, No. kernels spike⁻¹, grain yield fed⁻¹ and straw yield fed⁻¹ were obtained by sown in 1st Dec. with Giza 2000 cultivar in both seasons.

Table 4A. Effect of the interaction between sowing dates and barley cultivars on yield and yield components in 2019/20 (First) and 2020/21 (Second) seasons

Characters	Sowing dates cultivar	1 st November		15 th November		1 st December		LSD at 5%
		G 2000	B 244	G 2000	B 244	G 2000	B 244	
Plant height (cm)	First	134.6	115.6	119.9	116.7	117.7	116.7	5.6
	Second	104.0	96.0	101.9	95.9	106.7	97.8	NS
Spike weight (g)	First	3.50	2.88	3.21	4.12	2.84	3.80	0.25
	Second	3.65	2.88	3.27	4.01	2.80	3.86	0.17
No. kernels spike ⁻¹	First	63.88	67.22	62.66	68.00	57.44	63.44	NS
	Second	65.44	68.11	63.11	61.55	57.00	63.77	2.93
Grain yield (kg fed ⁻¹)	First	2172	2250	2295	2445	2056	2200	23
	Second	2148	2251	2299	2447	2048	2198	24
Straw yield (kg fed ⁻¹)	First	5988	6421	5372	6327	5154	5863	255
	Second	5835	6250	4987	5656	4863	5869	166

NS=No significance

The combination of sowing dates with harvesting dates showed that the highest values of plant height (108.3 cm) was obtained by sown in 1st Dec. with harvest at 150 DAS in the second season, spike length (9.66 cm) was obtained by sown in 1st Nov. with harvest at 180 DAS in the second season, spike weight (4.01 and 4.00 g) was obtained by sown in 15th Nov. with harvest at 165 DAS in the first and second seasons, respectively, No. kernels spike⁻¹ (69.33 and 69.33 kernel) and 1000-kernel weight (45.08 and 44.65 g) were obtained by sown in 15th Nov. with harvest at 150 DAS in the first and second seasons, respectively, grain yield fed⁻¹ (2471 and 2474 kg) in the first and second seasons, respectively were obtained by sown in 15th Nov. with harvest at 180 DAS, straw yield fed⁻¹ (6796 kg) obtained by sown in 1st Nov. with harvest at 180 DAS in the second season,

lastly harvest index (35.62%) obtained by sown in 15th Nov. with harvest at 180 DAS in the second season (Table, 4B). On the other hand, sown in 1st Dec. with harvest at 180 DAS gave the lowest value of plant height in the second season, sown at in 1st Dec. with harvest at 150 DAS gave the lowest value of spike length in the second season, sown in 1st Nov. with harvest at 180 DAS gave the lowest value of spike weight in both seasons, sown in 1st Dec. with harvest at 180 DAS gave the lowest values of No. kernels spike⁻¹ and 1000-kernel weight in both seasons, sown in 1st Dec. with harvest at 150 DAS gave the lowest values of grain yield fed⁻¹ in both seasons, moreover sown in 15th Nov. with harvest at 180 DAS gave the lowest value of straw yield fed⁻¹ in the second season, lastly sown at in 1st Dec. with harvest at 150 DAS gave the lowest values of harvest index in both seasons.

Table 4B. Effect of the interaction between sowing dates and harvesting dates on yield and yield components of barley in 2019/20 (First) and 2020/21 (Second) seasons

Characters	sowing dates Harv. dates	1 st November			15 th November			1 st December			LSD at 5%
		150 DAS	165 DAS	180 DAS	150 DAS	165 DAS	180 DAS	150 DAS	165 DAS	180 DAS	
Plant height (cm)	First	125.8	124.8	124.5	122.5	117.0	115.3	114.8	118.0	118.6	NS
	Second	95.7	102.8	101.5	100.2	95.0	101.5	108.3	105.8	92.5	5.8
Spike length (cm)	First	8.66	8.33	9.50	8.16	9.16	9.33	8.33	8.50	8.83	NS
	Second	8.83	9.00	9.66	8.50	8.66	9.00	8.00	8.50	8.83	0.70
Spike weight (g)	First	4.00	3.10	2.48	3.51	4.01	3.46	3.63	2.96	3.36	0.24
	Second	3.95	3.13	2.73	3.50	4.00	3.43	3.68	2.90	3.41	0.15
No. kernels spike ⁻¹	First	63.50	66.83	66.33	69.33	61.83	64.83	64.33	60.50	56.50	2.72
	Second	62.66	68.33	68.66	69.33	57.00	61.83	64.16	60.00	56.00	3.75
1000-kernel weight (g)	First	43.91	42.08	39.15	45.08	42.83	40.83	44.41	41.06	39.26	0.47
	Second	43.81	41.65	38.33	44.65	42.45	40.50	44.35	40.63	39.26	0.47
Grain yield (kg fed ⁻¹)	First	2082	2275	2276	2183	2456	2471	1958	2203	2224	20
	Second	2095	2269	2235	2191	2455	2474	1950	2202	2218	21
Straw yield (kg fed ⁻¹)	First	6890	6125	5599	6816	5561	5170	6405	5347	4774	NS
	Second	6796	6050	5280	6372	5119	4473	6075	5514	4509	167
Harvest index	First	25.84	26.80	29.31	24.29	30.57	32.45	23.93	28.57	31.76	NS
	Second	25.09	27.21	29.72	25.59	32.52	35.62	24.56	28.55	32.95	1.31

NS=No significance

The data presented in Table 4C demonstrated that maximum values of plant height (106.7 cm) in the second season was obtained by sown Giza 2000 cultivar with harvested at 180 DAS, 1000-kernel weight (47.17 and 46.86 g) in the first and second seasons, respectively was obtained by sown Giza 2000 cultivar with harvested at 150 DAS, while No. spikelets spike⁻¹ (23.33 spikelet) in the second season was obtained by sown Bhoth 244 cultivar with harvested at 180 DAS, spike weight (3.85 and 3.81 g) and No. kernels spike⁻¹ (69.77 and 68.66 kernel) in the first and second seasons, respectively were obtained by sown Bhoth 244 cultivar with harvested at 150 DAS, also straw yield fed⁻¹ (6980 kg) in the second season was obtained by sown Bhoth 244 cultivar with harvested at 150 day, whereas grain yield fed⁻¹ (2392 kg) and harvest index (32.82%) in the second season were obtained by sown Bhoth 244 cultivar with harvested at 180 DAS.

Regarding the interaction effect, among sowing dates, barley cultivars and harvesting dates significant differences were detected for plant height, spike weight, No. grains spike⁻¹, 1000-kernel weight, grain yield fed⁻¹, straw yield fed⁻¹ and harvest index in both seasons except straw yield fed⁻¹ and harvest index in the first season (Table 5). Sowing at 1st Nov. with Giza 2000 when harvested at 165 DAS gave the highest values of plant height (140.0 and 110.0 cm) in the first and second season, respectively, moreover sowing at 1st Nov. with Giza 2000 when harvested at 150 DAS gave the highest values of spike weight (4.53 and 4.60 g) in the first and second season, respectively. Sown in 1st Dec. with Bhoth 244 cultivar under harvested at 150 DAS gave the highest values of No. kernels spike⁻¹ (74.00 and 73.66 kernel) in the first and second seasons,

Table 4C. Effect of the interaction between barley cultivars and harvesting dates on yield and yield components in 2019/20 (First) and 2020/21 (Second) seasons

Characters	cultivars Harvesting dates	Giza 2000			Bhoth 244			LSD at 5%
		150 DAS	165 DAS	180 DAS	150 DAS	165 DAS	180 DAS	
Plant height (cm)	First	124.2	125.6	122.3	117.8	114.3	116.7	NS
	Second	104.2	101.7	106.7	98.5	100.8	90.3	4.7
No. spikelets spike ⁻¹	First	17.44	18.11	19.00	23.22	23.11	23.88	NS
	Second	17.33	18.44	19.11	23.33	22.77	23.33	0.84
Spike weight (g)	First	3.57	3.20	2.77	3.85	3.52	3.43	0.19
	Second	3.61	3.17	2.94	3.81	3.51	3.44	0.13
No. kernels spike ⁻¹	First	61.66	60.44	61.88	69.77	65.66	63.22	2.22
	Second	61.66	61.11	62.77	68.66	62.11	62.66	3.06
1000-kernel weight (g)	First	47.17	44.40	41.76	42.24	39.58	37.52	0.38
	Second	46.86	44.04	41.51	41.67	39.11	37.22	0.38
Grain yield (kg fed ⁻¹)	First	2016	2251	2255	2133	2370	2392	NS
	Second	2025	2244	2226	2131	2373	2392	17
Straw yield (kg fed ⁻¹)	First	6244	5404	4866	7164	5951	5496	NS
	Second	5849	5233	4602	6980	5889	4907	136
Harvest index	First	24.64	29.24	31.71	24.73	28.05	30.64	NS
	Second	26.77	30.11	32.72	23.38	28.74	32.82	1.07

NS=No significance

respectively. While, sown in 15th Nov. with Giza 2000 cultivar under harvested at 150 DAS gave the highest values of 1000-kernel weight (47.73 and 47.36 g) in the first and second seasons, respectively. The heaviest of grain yield fed⁻¹ (2520 and 2524 kg) in the first and second seasons, respectively produced by sowing barley kernels in 15th Nov. with Bhoth 244 cultivar under harvested at 180 DAS treatment. The maximum value of straw yield fed⁻¹ (7126 kg) in the

second season produced by sowing barley kernels in 1st Nov. with Bhoth 244 cultivar under harvested at 150 DAS treatment. Lastly, sown in 15th Nov. with Giza 2000 cultivar under harvested at 180 DAS gave the highest value of harvest (36.19%) in the second season. It can be concluded that sowing Bhoth 244 cultivar in 1st or 15th November and harvesting at 180 DAS after sowing under the conditions of the experiment.

Table 5. Effect of the interaction between sowing dates, barley cultivars and harvesting dates on yield and yield components in 2019/20 (F) and 2020/21 (S) seasons

Sowing dates	Cult.	HA	Plant height (cm)		Spike weight (g)		No. kernels spike ⁻¹		1000-kernel weight (g)		Grain yield (kg fed ⁻¹)		Straw yield (kg fed ⁻¹)		Harvest index	
			F	S	F	S	F	S	F	S	F	S	F	S	F	S
1 st Nov.	G2000	150	129.7	102.0	4.53	4.60	60.00	59.00	46.50	45.96	2050	2083	6800	6466	23.01	27.37
		165	140.0	110.0	3.46	3.33	63.66	69.00	44.50	44.63	2246	2223	5853	5810	27.13	27.67
		180	134.0	101.7	2.50	3.03	68.00	68.33	41.96	40.00	2220	2138	5313	5228	29.46	29.02
	B244	150	122.0	89.3	3.46	3.30	67.00	66.33	41.33	41.66	2115	2106	6981	7126	28.68	22.81
		165	120.0	97.3	2.73	2.93	70.00	67.66	39.66	38.66	2303	2315	6396	6291	26.47	26.76
		180	115.0	101.3	2.46	2.43	64.66	70.33	36.33	36.66	2333	2333	5886	5333	29.16	30.43
15 th Nov.	G2000	150	125.0	104.0	3.23	3.26	70.33	71.33	47.73	47.36	2056	2066	6243	5960	24.77	25.73
		165	119.0	93.3	3.56	3.73	56.33	56.66	45.13	44.63	2407	2408	5195	4725	31.68	33.75
		180	115.6	108.3	2.83	2.83	61.33	61.33	43.50	43.26	2422	2424	4677	4275	34.11	36.19
	B244	150	120.0	96.3	3.80	3.73	68.33	66.00	42.43	42.03	2310	2316	7390	6784	23.81	25.45
		165	115.0	96.7	4.46	4.26	67.33	56.33	40.53	40.26	2505	2503	5928	5513	29.46	31.28
		180	115.0	94.7	4.10	4.03	68.33	62.33	38.16	37.73	2520	2524	5663	4672	30.79	25.06
1 st Dec.	G2000	150	118.0	106.7	2.96	2.96	54.66	54.66	47.30	47.26	1943	1928	5690	5121	26.16	27.22
		165	117.7	103.3	2.56	2.46	61.33	57.66	43.56	42.86	2101	2101	5165	5165	28.92	28.91
		180	117.3	103.3	3.00	2.96	56.33	58.66	41.26	41.26	2124	2116	4609	4304	31.54	32.97
	B244	150	111.7	110.0	4.30	4.40	74.00	73.66	41.53	41.33	1974	1971	7121	7029	21.70	21.90
		165	118.3	108.3	3.36	3.33	59.33	62.33	38.56	38.40	2304	2302	5529	5864	28.23	28.19
		180	109.7	75.0	3.73	3.36	56.33	55.33	37.26	37.26	2324	2320	4940	4715	31.97	32.99
LSD at 5%			9.1	8.2	0.34	0.22	3.85	5.31	0.67	0.66	28	29	NS	237	NS	1.85

Cult. = Barley cultivars

HA=Harvesting at

NS=No significance

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تأثير ميعاد الزراعة والحصاد على المحصول ومكوناته لبعض أصناف الشعير

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أجريت تجربتان حقليةتان بمنطقة مشتهر - محافظة القليوبية - مصر خلال موسمي 2020/2019 و 2021/2020 م لدراسة تأثير ثلاثة مواعيد زراعة (أول نوفمبر ، منتصف نوفمبر ، أول ديسمبر) وثلاثة مواعيد حصاد (حصاد بعد 150 ، 165 ، 180 يوم من الزراعة) على المحصول ومكوناته لصنفين من أصناف محصول الشعير (صنف جيزة 2000 مصري ، بحوث 244 عراقي) . وكان التصميم المستخدم قطاعات كامله العشوائية في ثلاث مكررات بتوزيع القطع المنشقة مرتين حيث وضع مواعيد الزراعة في القطع الرئيسية ووضعت الأصناف في القطع الشقية الأولى بينما وضعت مواعيد الحصاد في القطع الشقية الثانية .

وتتلخص أهم النتائج بالآتي:

- سجل ميعادي الزراعة في الاول و منتصف نوفمبر أعلى القيم بفروق معنوية لمعظم الصفات المدروسة لكلا موسمي الزراعة.
- سجل صنف الشعير بحوث 244 أعلى المتوسطات وبفروق معنوية لكل من طول السنبله (سم) ، عدد سنيبلات السنبله ، وزن السنبله (جم) ، عدد حبوب السنبله ، محصول الحبوب والقش (كجم فدان⁻¹). بينما أعطي صنف الشعير جيزة 2000 أعلى متوسطات وبفروق معنوية لكل من طول النبات (سم) ، وزن الـ 1000 حبة (جم) ، النسبة المئوية لدليل الحصاد لكلا موسمي الزراعة.
- أظهر ميعاد الحصاد بعد 150 يوم من الزراعة أعلى القيم وبزيادة معنوية عن مواعيد الحصاد الأخرى لكل من وزن وعدد حبوب السنبله ، وزن الـ 1000 حبة ومحصول القش للقدان. بينما أعطى ميعاد الحصاد بعد 180 يوم من الزراعة أعلى القيم وبزيادة معنوية عن مواعيد الحصاد الأخرى لكل من طول السنبله ، عدد سنيبلات السنبله ، محصول الحبوب للقدان ودليل الحصاد لكلا موسمي الزراعة.
- تأثر معنويا كل من طول النبات ، وزن وعدد حبوب السنبله ، محصول الحبوب والقش للقدان بالتفاعل بين مواعيد الزراعة وأصناف الشعير لكلا الموسمين ما عدا طول النبات في الموسم الثاني وعدد حبوب السنبله في الموسم الأول كانتا غير معنويتين.
- أثر التفاعل بين مواعيد الزراعة ومواعيد الحصاد تأثيرا معنويا على كل من طول النبات والسنبله ، محصول القش للقدان والنسبة المئوية لدليل الحصاد في الموسم الثاني فقط ، وزن وعدد حبوب السنبله ، وزن الـ 1000 حبة ومحصول الحبوب للقدان لكلا الموسمين الزراعيين أيضا.
- تأثر معنويا كل من طول النبات ، عدد سنيبلات السنبله ، محصول الحبوب والقش للقدان ، النسبة المئوية لدليل الحصاد في الموسم الثاني فقط. وزن وعدد حبوب السنبله ، وزن الـ 1000 حبة بالتفاعل بين أصناف الشعير ومواعيد الحصاد للموسمين الاول والثاني.
- أثر التفاعل بين مواعيد الزراعة وأصناف الشعير ومواعيد الحصاد تأثيرا معنويا على كل من طول النبات ، وزن وعدد حبوب السنبله و وزن الـ 1000 حبة ومحصول الحبوب للقدان للموسمين. بينما تأثر معنويا محصول القش للقدان ، النسبة المئوية لدليل الحصاد في الموسم الثاني فقط.
- توصي هذه الدراسة تحت ظروف تلك التجربة بزراعة صنف الشعير بحوث 244 في ميعاد الاول أو المنتصف من نوفمبر والحصاد بعد 180 يوم من الزراعة.