



## EFFECT OF VARIETY AND PLANTING DATE ON GROWTH AND YIELD OF BARLEY (*HORDEUM VULGARE* L.)

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### Abstract

The experiment was conducted in the fields of one of the farmers of Al-Musaib region (30 km north of Babylon province) during the agricultural season 2017-2018 to study the response of three cultivars of barley at different planting dates. Experimental factorial is applied according to complete randomized blocks design (R.C.B.D) which included two factors: The first factor included three cultivars of barley (Samir, Warka, Local) which symbolized by (V3, V2, V1), respectively, and the second factor included three planting dates (1 November, 15 November, 1 December) which symbolized by (D3, D2, D1), respectively. The average difference was measured according to the Least Significant Design (L.S.D) under the probability level of 5 % using the statistical program Genstat. The results were summarized as follows: Samir V1 was superior to the other cultivars in vegetative growth traits {plant height (cm)}, tillages number, flag leaf area (cm<sup>2</sup>/plant) and yield traits (number of spikes, Length of spike, number of grains per spike and 1000-grain weight (gm) While the first date (1 November) D1 excelled in all studied traits except flag leaf area cm<sup>2</sup>/plant, The interaction treatment (Samir + 1 November) was excelled on all the interactions in all studied traits.

**Key words :** Barley, Cultivars, Planting Dates.

### Introduction

*Hordeum vulgare* L. is one of the important grain crops, followed by wheat in terms of importance and production, and as an important Feed crop as well as its industrial uses. It can also be used as an alternative to rice after the removal of its husk (Alsqaer, *et al.*, 1983) Its cultivation in Iraq still suffers from many problems which were a major cause of the decline in productivity in the unit area compared to the world rates and agricultural developed countries, where the area of cultivated in Iraq, which accounted for approximately 36% of the total area planted with grain crops and productivity of 1278 thousand tons (Directorate of Agricultural Statistics, 2016). The success of planting any crop depends on the good management in terms of service operations, and the abundance of growth factors,

especially the suitable cultivars for the environment and planting on the appropriate dates, thus increasing the production unit area, for the role of climatic conditions affecting the physiological processes in the plant and its impact on growth rates and life cycle (Riza *et al.*, 2010). The southern central regions of Iraq, including (Babylon) encourage cultivated this crop in terms of abundance of agricultural land and suit the environmental conditions prevailing in the region, However, the productivity is still low due to the lack of scientific methods adopted from the side and the adoption of certain cultivars and generations from the other side, which led to deterioration and reflected on the production. The selection of cultivars and cultivating with appropriate agricultural dates makes the crop able to express itself, both physically and genetically, through their quality (Boyd *et al.*, 2003). The delay in the date of cultivation leads to a reduction in the duration of vegetative growth and the number of days

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from emergence to physiological maturity, dry weight of the plant and the number of seedlings in the plant, as well as barley responds to the early planting date, and the delay in the date lead to reducing the amount and dry matter accumulated (Al-Mohammadi *et al.*, 2015). This study was conducted to find out which of these cultivars respond to the planting dates and determine the most appropriate ones to the environment (local) under the conditions of Iraq, especially (MUSSAIB).

**Materials and Methods**

The experiment was conducted in the fields of one the farmers of Al-Mussaib region (30 km north of Babylon province) During the agricultural season 2017-2018 to study the Effect of Variety and Planting Date in Growth and Yield of Barley. Experimental factorial is applied according to complete randomized blocks design (R.C.B.D) which included two factors: The first factor included three cultivars of barley (Samir, Warka, Local) which symbolized by (V3, V2, V1), respectively, and the second factor included three planting dates (1 November, 15 November, 1 December) which symbolized by (D3, D2, D1 ), respectively. The random samples were taken from the soil of the field before the planting season for the depth (0-30 cm) to know the properties of physical and chemical soil. Soil samples were analyzed in the Soil Department laboratories-college of Agriculture / Al-Qasim green University as shown in Table 1.

The experiment land was plowed into two orthogonal plots, smoothing and settled, then divided to three blocks each block contains 9 experimental units. The experimental unit includes 4 lines with a length of 1 m and the distance between them is 15 cm. The seeds were cultivated at the above-mentioned dates. Field soil was fertilized with phosphate fertilizer at a rate of 120 kg / ha (46% P<sub>2</sub>O<sub>5</sub>) one batch before planting. Nitrogen fertilizers at a rate of 240 kg / ha (46% urea) was used in the two first stages during agriculture and the second at the beginning of the forest stage (Abedi, 2011). The following traits were studied (plant height (cm), tillages number, flag leaf area (cm<sup>2</sup>/plant), number of spikes, Length of spike, number of grains per spike and 1000-grain weight (gm)). The average difference was measured according to the Least Significant Desgin (L.S.D) under the probability level of 0.05 using the statistical program

**Table 1:** Physical and chemical properties of soil.

Character	pH	Ec	Nppm	Pppm	Kppm	Organic Matter(%)	Soil separators			Texture
							Sand gm.kg <sup>-1</sup> soil	Loamy gm.kg <sup>-1</sup> soil	Clay gm.kg <sup>-1</sup> soil	
Value	7.2	5.3	6.53	14.21	6.44	0.71	267	345	388	loamy

Genstat (Al-Rawi *et al.*, 1980)

**Results**

**Plant height (cm)**

Table 2 shows that the V1 is excelled on the other two cultivars by giving it the highest average of 58.2 cm and not significantly different from V2. As for the dates planting, the first date D1 significantly exceeded the other dates by recorded the highest average height of the plant was 67.1 cm, while the third date D3 gave the average height of 46.1 cm. The interaction treatment (V1 + D1) gave the highest average height of the plant was 69.6 cm, in contrast to the interaction treatment (V3 + D3) gave the lowest average of 41.7 cm.

**Table 2:** Effect of different Planting Dates and cultivars on plant height cm.

Cultivars \ Planting dates	V1	V2	V3	Average
D1	69.6	66.5	65.3	67.1
D2	55.5	54.7	51.8	54.0
D3	49.6	46.8	41.7	46.1
Average	58.2	56.0	52.9	
L.S.D <sub>(0.05)</sub>	V=0.38	D=0.38	V*D=0.76	

**Tillages number**

Table 3 indicates that the treatment V1 is superior on the other cultivars in the tillages number by giving it the highest average of 3.9, while the V3 gave lowest average of 2.6. As for the dates, the first date D1 significantly exceeded the other dates and recorded the highest average of tillages number was 4.3, while the average of third date D3 for this trait was 2.2, For the interaction, the interaction treatment (V1 + D1) was significantly excelled on the other interaction by recorded the highest average of 5.3 while the interaction (V3 + D3) gave the lowest average of tillages number.

**Flag leaf area (cm<sup>2</sup>/plant)**

Table 4 indicates that the V1 is significantly excelled on the other cultivars in the flag leaf area by giving it the highest average of 23.06 cm<sup>2</sup> / plant, while the V3 gave a lower average of 18.5 cm<sup>2</sup>. The dates did not differ significantly between them in the flag leaf area cm<sup>2</sup>/plant, the first date D1 gave the highest average of flag leaf area was 21.03 cm<sup>2</sup> / plant, while the third date D3 gave

**Table 3:** Effect of different Planting Dates and Cultivars on the tillages number.

Cultivars \ Planting dates	V1	V2	V3	Average
D1	5.3	4.1	3.6	67.1
D2	3.8	3.3	2.3	54.0
D3	2.7	2.2	1.8	46.1
Average	3.9	3.2	2.6	
L.S.D <sub>(0.05)</sub>	V=0.40	D=0.40	V*D=0.80	

lowest average for this trait was 20.4 cm<sup>2</sup> / plant, the interaction treatment (V1 + D1) was significantly excelled on the rest of the interactions by giving it the highest average was 23.3 cm<sup>2</sup> / plant while the interaction (V3 + D3) gave the lowest average flag leaf area of 18.0 cm<sup>2</sup>/ plant.

**Table 4:** Effect of different Planting Dates and Cultivars on the flag leaf area (cm<sup>2</sup>/plant).

Cultivars \ Planting dates	V1	V2	V3	Average
D1	23.3	20.7	19.1	21.03
D2	23.1	20.2	18.5	20.6
D3	22.8	19.5	18.0	20.4
Average	23.06	20.1	18.5	
L.S.D <sub>(0.05)</sub>	V=1.2	D=1.2	V*D=2.4	

#### Number of spikes (spikes number / m<sup>2</sup>)

Table 5 shows that the V1 was significantly excelled in this traits by giving it the highest average of (1476.4 spikes number / m<sup>2</sup>), while the V2 gave an average of (911 spikes number / m<sup>2</sup>). The dates planting differed significantly in the number of spikes, where the first date D1 excelled on other dates by giving it the highest average of (1204.2 spikes number / m<sup>2</sup>), while the third date gave the lowest average reached of (1002.0 spikes number / m<sup>2</sup>). The interaction treatment (V1 + D1) recorded the highest average of (1004.0 spikes number / m<sup>2</sup>). while interaction (V2 + D3) gave the lowest average of number of spikes of (800.0 spikes number / m<sup>2</sup>).

**Table 5:** Effect of different Planting Dates and Cultivars on the number of spikes.

Cultivars \ Planting dates	V1	V2	V3	Average
D1	1004.0	1313.6	1295.0	1204.2
D2	1827.6	931.0	986.0	1242.2
D3	1288.0	800.0	918.0	1002.0
Average	1476.2	911.0	1066.0	
L.S.D <sub>(0.05)</sub>	V=75.2	D=75.2	V*D=150.4	

#### Length of spike (cm)

Table 6 shows that the V1 is excelled on the other

two cultivars by giving it the highest average of (23.0 cm) while the V3 has lowest average length of spike length of (18.7 cm). As for the dates planting, the first date D1 was significantly excelled on the other dates by giving it the highest record for the length of the spike was (21.06 cm), while the third date D3 has lowest average was (18.6 cm). The interaction treatment (V1 + D1) gave the highest average length of the spike was (23.3 cm), in contrast, the interaction (V3 + D3) gave an average of (18.1 cm).

**Table 6:** Effect of different Planting Dates and Cultivars on the Length of spike.

Cultivars \ Planting dates	V1	V2	V3	Average
D1	23.3	20.7	19.2	21.06
D2	23.1	20.2	18.9	20.7
D3	22.6	19.4	18.1	18.6
Average	23.0	20.1	18.7	
L.S.D <sub>(0.05)</sub>	V=0.41	D=0.41	V*D=0.82	

#### Grains per spike

Table 7 indicates that the V1 was excelled on the other cultivars in the number of grains / spike by giving it the highest average of 45.3 grain, while the V3 gave a lower average of 33.5 grain. The dates were significantly higher than the first date of D1, with the highest average number of grains / spike of 44.9 grain, while the third data D3 recorded the lowest, the average of this trait was 35.1 grain. for the interactions, the interaction (V1 + D1) The highest average was 47.7 tablets while the interaction (V3 + D3) gave the lowest average number of grains / spike of 26.5.

**Table 7:** Effect of different Planting Dates and Cultivars on the number of grains per spike.

Cultivars \ Planting dates	V1	V2	V3	Average
D1	47.7	45.1	41.1	44.9
D2	42.4	36.1	33.1	37.8
D3	45.3	33.6	26.5	35.1
Average	45.3	38.9	33.5	
L.S.D <sub>(0.05)</sub>	V=1.9	D=1.9	V*D=3.8	

#### 1000-grain weight (gm)

Table 8 shows that the V1 Cultivars was significantly excelled in this traits by recording an average of 44.6 gm, while V3 Cultivars gave an average of 40.8 gm. The dates planting differed significantly in the 1000 grain weight, the first date D1 excelled on the other dates by gave the highest average of 46.8 gm, while the third date gave the lowest average of 39.4 gm.

**Table 8:** Effect of different Planting Dates and Cultivars on the 1000-grain weight (gm).

Cultivars \ Planting dates	V1	V2	V3	Average
D1	48.2	48.3	44.1	46.8
D2	44.4	45.3	41.5	43.7
D3	41.4	40.0	36.8	39.4
Average	44.6	44.5	40.8	
L.S.D. <sub>(0.05)</sub>	V=0.6	D=0.6	V*D=1.2	

### Discussion

The cultivars and date planting are itself a change in environmental conditions, which are the most important factors that determine the growth and yield of the product, many researchers pointed out that the cultivars vary in their interactions with environmental conditions, which affects the traits of growth and yield. The superiority of V1 on the other cultivars in vegetative and yield traits may be due to the genetic differences among them. It may also be explained by genetic and environmental interaction and climate differences during the research period in its effect on growth and its reflection on studied traits, especially temperature. This result was agreed with (Hussein *et al.*, 2009; Hamdaoui 2017; Jaduir 2012). In terms of dates, it may be due to the first date D1 in the traits of vegetative growth and yield to climatic conditions, As it was on the first date more appropriate for fertilization and this in turn reflected on the vegetative growth and yield, This result was agreed with (Rashid *et al.*, 2010; Hesan *et al.*, 2012; J Jassim *et al.*, 2016). The increase in the number of tillage as shown in table 3 is positively reflected in the increase in the number of spikes as shown in table 5, which in turn leads to increased number of grain/ spike as shown in table 7 and the weight of 1000 grains as shown in table 8. The interaction between the factors of the study may be due to the superiority of the c (V1 + D1) in the studied traits to the reasons mentioned earlier in the discussion of the impact of individual workers studied. This may be due to the difference in the response of cultivars to different planting dates, due to the different environmental conditions that accompany each of these dates, especially temperature and lighting, and the suitability of these conditions for each cultivars.

### Conclusions

In the light of the results obtained from the study we can conclude that the variety Samir V1 and the first date planting D1 are appropriate to obtain the best vegetables growth yield of barley.

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