



## LOCAL VARIETIES AND INTRODUCED GENOTYPES RESPONSE TO BREAD WHEAT (*TRITICUM AESTIVUM* L.) FOR FOUR PLANTING DATES

Ali A.H. Al-Jiashi and Faisal M.M. Al-Taher

Agriculture College, Al-Muthanna University, Iraq.

### Abstract

The study was conducted during the winter season 2018-2019, at the extension station of the Agricultural Extension Service, Ministry of Agriculture, using 15 local varieties and newly introduced genotypes (Iba 99, Bohoth 22, Al-Rasheed, Tamos 2, Baghdad, Latifa, Wafiyah, Babil, Iraq, Abu Ghraib, Coa, Nwewya, Nacowy potas, N1, N2), under the influence of four planting dates (November 1, November 15, December 1, and December 15), to know the effect of planting dates on the yield and its components of the varieties, the split-plot system was implemented with Randomized Complete Block Design (R.C.B.D) with three replicates, main plots included planting dates, while secondary plots included wheat bread items. The date of planting, November 15, gave the highest cereal yield of 5.97 tons.ha<sup>-1</sup>, superiority in the number of pills in the spike 49.06 grain.Spike<sup>-1</sup>, 1000 grains weighed 40.40 g, harvest index 32.26 on the rest of the planting dates, while the date of planting on January 1 gave the lowest grain yield of 4.08 tons.ha<sup>-1</sup>. The local wheat varieties and the genotypes introduced differed significantly between the studied characteristics, Wafiyah variety gave the highest mean in the number of fertile spike 432.0 spike. m<sup>-2</sup>, the weight of 1000 grains 40.12 g, the grain yield is 6.82 tons. Ha<sup>-1</sup>, while Bohoth 22 gave the highest averages in the number of grains per spike, 54.56 grain. Spike<sup>-1</sup>, genetic composition N2 outperformed the harvest index trait and gave the highest average score of 36.21.

**Keywords:** Local varieties, introduced genotypes, bread wheat (*Triticum aestivum* L.), planting dates.

### Introduction

Cereal crops were among the most important and oldest crops known to man, the main material in his food, the source of energy, contains a high content of essential carbohydrates (Al-Anbari, 2004). Wheat (*Triticum aestivum* L.), belonging to the Poaceae evangelical family, the most important, because contains protein, the basis for making bread, staple food for the world's population (Jamali *et al.*, 2000). The grain consists of 63-71% starch, 8-17% protein, 8-17% water, 2-5.5% cellulose, 1.5-2% fat, 2-3% sugar and 1.5-2% mineral elements (Al-Shammari, 2007). The global cultivated area is 736.5 thousand hectares, expected to produce about 739.9 million tons (FAO, 2017). In Iraq, the total production for the year 2019 reached more than 4 million tons (Agricultural Statistics Directorate, 2016).

The success of growing any crop depends on optimum management in terms of service operations, the abundance of growth factors, especially varieties appropriate to the environment and planted with appropriate dates, the final result increases the quotient per unit area, due to the role of climatic conditions affecting the physiological processes that take place in the plant, impact on the rates of growth and the duration of its life cycle (Riaz *et al.*, 2010). The inter of new varieties into the region aims to increase yields per unit area, depends on the suitability of the environmental conditions of these items, especially temperature and light, rise or decrease have a significant impact on the length or shortness of any stage of growth and development, the most important were the flowering period and the duration of full seed (Al-Rifai, 2000).

This study was aimed to find out the performance of newly introduced genotypes, local varieties are certified under the influence of different planting dates, and determine the most suitable ones to the local environment (Muthanna Governorate).

### Materials and Methods

The study was conducted during the winter season 2018-2019, at the extension station of the Agricultural Extension Service, Ministry of Agriculture, using 15 local varieties and newly introduced genotypes (Iba 99, Bohoth 22,

Al-Rasheed, Tamos 2, Baghdad, Latifa, Wafiyah, Babil, Iraq, Abu Ghraib, Coa, Nwewya, Nacowy potas, N1, N2), under the influence of four planting dates (November 1, November 15, December 1, and December 15), to know the effect of planting dates on the yield and its components of the varieties, the split-plot system was implemented with Randomized Complete Block Design (R.C.B.D) with three replicates, main plots included planting dates, while secondary plots included wheat bread items. The experimental unit area was 2x2 m, 10 lines included, with a cultivation distance of 20 cm between the lines, the total number of experimental units reached 180 experimental units, wheat seeds were planted according to study dates, the seed quantity amounted to 120 kg. ha<sup>-1</sup>, soil service, irrigation and fertilization were carried out according to scientific recommendations, the nitrogen fertilization was carried out 200 kg N. ha<sup>-1</sup> (Jado'a, 1995), phosphate fertilizer was added at 80 kg p. ha<sup>-1</sup> of the P2O5 fertilizer before planting, potassium fertilizer was added in the form of potassium sulfate (42% K) with a quantity of 60 kg K. ha<sup>-1</sup> (Al-Taher, 2005), traits were studied number of spikes. m<sup>2</sup>, the number of grain per spike, the weight of 1000 grains, grain yield and biological yield.

The data were statistically analyzed according to the design used in the statistical program (GenStat), the difference between mean was compared according to the L.S.D test under the probability level of 5% (Al-Rawi and Khalaf Allah, 2000).

### Results and Discussions

#### Number of fertile spike (Spike. m<sup>2</sup>):

Table 1 shows that Wafiyah variety was significantly superior to the other varieties, an average of 432.0 spike. m<sup>2</sup>, while Iraq variety gave the lowest average number of spike. m<sup>2</sup>, it reached 310.6 spike. m<sup>2</sup>, without a significant difference with the varieties Rashid, Baghdad and the genotype Coa, The reason is due to the superiority of the variety in the length of flowering period, which means the long period of producing the tillers, pushed the plant towards increasing its growth rates and dry matter production, in the manner that prompted the increase in the number of abuses, transformation into fertile spikes due to the lack of

competition within the same plant (Al-Amiri and Al-Obeidi 2016). As for the effect of planting dates, gave the results of wheat beyond the first date (1/11), gave an average of 398.2 spike.m<sup>2</sup>, whereas the fourth date (15/12) gave a lower average of 298.4 spike.m<sup>2</sup>,

The reason for the early dates of wheat crops exceeding the length of flowering, allow prolongation of the formation of tillers, as well as increasing leaf area and the dry weight of the plant, more effective photosynthesis and dry matter production, reflect on the increase in the number of fertile spikes, due to the development of these tillers naturally to Spikes, lack of competition for the abundance of represented materials (Al-Amiri and Al-Obeidi 2016).

As for interaction, (Wafiyah genotype x date 1/11) showed the highest average of 540.3 spike. m<sup>2</sup>, whereas (Iraq genotype x date 15/12) gave the lowest average of 259.3 spike. m<sup>2</sup>.

### The number of grain per spike (grain. Spike<sup>-1</sup>)

Table 2 showed the superiority of Iraq variety, gave an average of 54.56 grain.spike<sup>-1</sup>, without a significant difference from the Al-Rasheed variety, while the class gave Tamos 2 the lowest average was 39.31 grain.spike<sup>-1</sup>, without a significant difference from the composition N1, the reason for the superiority of varieties Iraq and rational to the genetic side, as the quality of the number of grains is a genetically determined quantitative trait (Jassim *et al.*, 2016).

Exceeded the date of 15/11, without a significant difference with the date 1/11, average records of 49.06 and 48.05 grain.spike<sup>-1</sup>, respectively, while the appointment gave 15/12 the lowest average of 41.14 grain.spike<sup>-1</sup>, the superiority of early dates is due to the long flowering period, which helped increase the number of grain in a spike, compared to late dates, as the short duration of small spikes formed due to the high temperatures, leads to death in pollen, decrease in the number of fertilized flowers in spike, thus the number of grains decreased (Jassim *et al.*, 2016).

(Al-Rasheed variety X date 15/11) gave the highest average of 61.00 grain.spike<sup>-1</sup>, whereas (Wafiyah variety X date 15/12), the lowest mean was 35.77 grain.spike<sup>-1</sup>.

### 1000 grain weight (g)

Table 3. showed that the Wafiyah variety gave the highest average quality for this trait of 40.12 g, without a moral difference with the Iraq variety, the composition gave Nacowy potas the lowest average of 19.40 g, the reason behind the superiority of the faithful varieties and Iraq is due to the low number of grains (Table 2), followed by a lack of competition between the pills, increases the weight of grains (Al-Tahir and Hamdaoui, 2017).

As for planting dates, it was revealed that they exceeded the date of 15/11, without a significant difference with the date 1/11 as they averaged 40.24 and 40.40gm, respectively, whereas, the date was 12/15, the lowest average weight of 1000 grains amounted to 28.83 g. the reason for the low weight of the fourth date is due to the high temperatures during the full period of the grain, leads to atrophy of the grain or its small size due to the rapid loss of moisture, reduces its storage capacity, thus a decrease in the weight of 1000 grains (Al-Ajibi 2014).

As for the interaction, (Iraq variety, appointment date 15/11) were significantly increased and gave an average of

49.23 g, without a moral difference with the other, whereas (Nacowy potas variety X date, 15/11), the lowest average recorded was 24.30 g, with no significant difference with the other.

### Harvest index

Table 4. showed that the wheat varieties differed significantly between them in the characteristics of the harvest index, the genotype gave N2 the highest average of 36.21, without a significant difference with the Wafiyah variety, which gave an average of 35.49, while Nacowy potas variety scored the lowest average of 25.85, without a significant difference with N1 and Iraq, the variation of varieties in the harvest guide is due to the difference in the genotypes in the value of the cereal and bio-yields, the ability of each variety in terms of conversion efficiency of the produced materials (Al-Ajibi, 2014).

As for planting dates, the results showed that there were no significant differences between the dates (1/11, 15/11 and 1/12), whose averages were 32.94, 32.26 and 31.95, respectively, however, it significantly outperformed the 12/15 appointment, which gave the lowest average of 28.62, the reason for the early date to outperform the original grain yield, consequently, the harvest manual was raised, it may also be due to the difference in the efficiency of plants in the distribution of photosynthesis products to grains, the ability of cereals to absorb these products (Al-Baldawi, 2006).

There was also significant interaction between cultivars and planting dates, it gave (genotype N1 X date 15/11) the highest average harvest index of 41.79, no significant differences with the other, while it gave (Nacowy potas X appointment 15/11) the lowest average of 22.70, no significant difference with the other.

### Grain yield (tons.ha<sup>-1</sup>)

Table 5 showed highly significant differences between the varieties in the grain yield in Wafiyah variety achieved the highest average 6.83 tons. ha<sup>-1</sup>, without a significant difference with the Bohoth 22 which recorded an average of 6.42 tons.ha<sup>-1</sup>, whereas, Latifia variety gave the lowest mean quality of this characteristic to 5.05 tons. ha<sup>-1</sup>, without significant difference with a number of varieties, the reason for the superiority of the above varieties over the remaining varieties and compositions is due to their superiority originally in the weight of 1000 grains (Table 3) and in the number of spikes. M<sup>1</sup> (Al-Tahir, 2014).

As for the effect of planting dates, the results showed that the date exceeded the second date 15/11 significantly over the rest of the dates by giving it the highest average grain yield of 5.97 tons. ha<sup>-1</sup>, without a significant difference with the first date 1/11 which recorded an average of 5.82 tons. ha<sup>-1</sup>, while the fourth date recorded 15/11 the lowest average was 4.08 tons. ha<sup>-1</sup>, the superiority of the date 15/12 due to superiority in the components of the yield of 1000 grain weight (Table 3) and the number of grains per spike (Table 2), which in turn reflects positively on the grain yield (Al-Ajibi, 2014).

As for interaction record (Wafiyah variety X date 1/11) significantly outperformed and gave an average grain yield of 7.84 tons. ha<sup>-1</sup>, without a significant difference with the other, whereas, (N1 variety X 15/12 date) gave the lowest average cereal yield of 3.30 tons.ha<sup>-1</sup> without significant difference with the other.

**Table 1 :** The effect of varieties, planting dates and interaction on the number of fertile spike.m<sup>2</sup>.

Variety	Date	1/11	15/11	1/12	15/12	Means
	Tamos 2		402.7	374.5	369.9	293.2
Nacowy potas		492.8	364.8	349.2	347.2	388.7
Wafiyah		540.3	490.4	404.8	292.7	432.0
Coa		355.4	404.2	320.4	289.4	342.3
N1		331.0	429.1	347.0	295.7	350.7
Latifia		329.9	426.9	372.7	333.7	365.8
Baghdad		386.4	371.5	303.7	282.2	336.0
Iraq		344.6	333.2	305.2	259.3	310.6
Abu Ghraib		396.5	358.1	375.5	326.3	364.1
Nwewya		410.4	364.6	374.5	300.2	362.4
Al-Rasheed		337.7	318.8	293.6	303.1	313.3
Bohoth 22		407.4	375.5	397.7	290.2	367.7
Iba 99		492.2	358.7	368.5	283.0	375.6
Babil		348.2	358.5	366.7	291.8	341.3
N2		397.1	362.5	370.2	288.0	354.4
Means		398.2	379.4	354.7	298.4	
L.S.D <sub>0.05</sub>	Date	15.59		22.69		Interaction
						45.61

**Table 2 :** Effect of varieties, planting dates and interaction on the number of grains in spike<sup>-1</sup>.

Variety	Date	1/11	15/11	1/12	15/12	Means
	Tamos 2		40.33	43.67	37.43	35.8
Nacowy potas		48.63	43.40	44.13	38.30	43.62
Wafiyah		44.13	45.50	45	35.77	42.60
Coa		46.00	50.47	50.03	43.57	47.52
N1		42.00	46.77	41.40	38.40	42.14
Latifia		45.53	43.23	46.33	44.50	44.90
Baghdad		50.00	52.90	54.83	40.43	49.54
Iraq		58.67	55.77	45.00	41.23	50.17
Abu Ghraib		39.67	47.60	43.50	38.90	42.42
Nwewya		50.17	50.23	48.00	43.83	48.06
Al-Rasheed		56.43	61.00	52.70	42.73	53.22
Bohoth 22		55.07	59.17	56.67	47.33	54.56
Iba 99		52.07	46.00	52.63	45.23	48.98
Babil		45.50	46.23	45.77	38.37	43.97
N2		46.57	44.00	53.57	42.67	46.79
Means		48.05	49.06	47.80	41.14	
L.S.D <sub>0.05</sub>	Date	2.69		3.67		Interaction
						7.42

**Table 3 :** Effect of varieties, planting dates and interaction on the weight of thousand grains (g).

variety	Date	1/11	15/11	1/12	15/12	Means
	Tamos 2		33.13	38.70	31.07	26.70
Nacowy potas		33.10	31.20	28.33	24.30	29.23
Wafiyah		45.43	44.93	37.70	32.40	40.12
Coa		44.07	42.73	36.53	31.37	38.68
N1		41.20	40.73	31.90	27.87	35.43
Latifia		36.93	37.57	29.50	27.10	32.78
Baghdad		41.70	41.47	28.80	30.30	35.57
Iraq		48.07	49.23	36.57	26.20	40.02
Abu Ghraib		38.70	40.50	33.00	24.63	34.21
Nwewya		36.23	40.57	31.53	30.00	34.58
Al-Rasheed		39.17	38.43	30.73	27.17	33.88
Bohoth 22		44.23	45.93	35.93	33.07	39.79
Iba 99		44.10	43.10	35.20	32.43	38.71
Babil		38.77	34.93	30.97	30.30	33.74
N2		38.77	35.90	31.60	28.63	33.73
Means		40.24	40.40	32.62	28.83	
L.S.D <sub>0.05</sub>	Date	0.72		1.62		Interaction
						3.19

**Table 4 :** Effect of varieties, planting dates and interaction in the harvest index.

Variety \ Date	1/11	15/11	1/12	15/12	Means
Tamos 2	38.91	26.26	26.20	31.14	31.13
Nacowy potas	29.18	22.70	26.10	25.42	25.85
Wafiyah	35.08	36.94	38.84	31.09	35.49
Coa	33.74	28.57	38.98	30.34	32.91
N1	30.44	26.80	29.78	24.41	27.86
Latifia	32.38	28.58	29.80	30.22	30.25
Baghdad	34.00	33.25	33.67	32.94	33.46
Iraq	28.23	30.86	27.87	24.34	27.82
Abu Ghraib	32.61	30.01	32.47	31.04	31.53
Nwewya	33.72	33.24	29.73	26.80	31.37
Al-Rasheed	34.58	33.53	30.54	25.67	31.08
Bohoth 22	30.83	34.72	32.54	28.22	31.63
Iba 99	30.92	33.08	32.95	25.83	30.69
Babil	34.43	41.57	32.63	28.88	34.38
N2	35.12	41.79	37.00	30.92	36.21
Means	32.94	32.26	31.95	28.62	
L.S.D <sub>0.05</sub>	Date		variety		Interaction
	2.49		2.87		5.90

**Table 5 :** Effect of varieties, planting dates and interaction in grain yields (tons. ha<sup>-1</sup>).

Variety \ Date	1/11	15/11	1/12	15/12	Means
Tamos 2	6.10	5.02	4.60	4.28	5.00
Nacowy potas	5.01	4.63	4.65	3.90	4.55
Wafiyah	7.84	7.74	7.10	4.67	6.83
Coa	6.30	5.66	6.56	4.50	5.75
N1	4.88	5.13	4.72	3.30	4.51
Latifia	5.59	5.59	4.76	4.27	5.05
Baghdad	5.39	5.22	4.92	4.26	4.95
Iraq	4.87	5.51	4.85	3.74	4.74
Abu Ghraib	5.46	5.20	5.63	4.40	5.18
Nwewya	5.87	6.20	5.00	3.96	5.26
Al-Rasheed	6.20	5.90	5.06	3.78	5.23
Bohoth 22	6.83	7.70	6.84	4.30	6.42
Iba 99	6.00	6.79	6.13	3.81	5.68
Babil	5.18	6.26	4.89	3.65	4.99
N2	5.83	7.03	6.02	4.34	5.81
Means	5.82	5.97	5.45	4.08	
L.S.D <sub>0.05</sub>	Date		variety		Interaction
	0.20		0.40		0.80

## References

- Agricultural Statistics Directorate (2016). Estimating wheat and barley production. Ministry of Planning and Cooperation. central Statistical Organization. Iraq.
- Al-Ajibi, N.A.D. (2014). Genetic response from coarse buckwheat *Triticum durum* Desf. For planting dates. Master Thesis, College of Agriculture, Al-Muthanna University, Iraq.
- Al-Amri, M.M.A. and Al-obeidi, M.O. (2016). Evaluation of several genotypes of wheat and tertiary crops under conditions of perennial cultivation in Sulaymaniyah Governorate. The research is drawn from the Master's thesis of the first researcher. Al-Anbar Journal of Agricultural Sciences, 41(4):163-171.
- Al-Anbari, M.A.A. (2004). Genetic Mutual Analysis and Path Factor for Genotypes of Buckwheat. *Triticum aestivum* L. PhD thesis. College of Agriculture, University of Baghdad, Iraq.
- Al-Baldawi, M.H.K. (2006). The effect of planting dates on the duration of the grain filling rate, growth rate, yield and its components in some varieties of wheat bread. PhD thesis, College of Agriculture, University of Baghdad, Iraq.
- Al-Rawi, K.M. and Khalaf Allah, A.M. (2000). Design and analysis of agricultural experiments. Dar Al Kutub Printing & Publishing Est. University of Al Mosul. Ministry of Higher Education and Scientific Research. The Republic of Iraq. 7-13.
- Al-Rifai, S.I.M. (2000). The effect of planting dates on some traits of the growing growth and its components for four varieties of wheat in Basra region. Master Thesis, College of Agriculture, University of Basrah, Iraq.
- Al-Shammari, I.A.H. (2007). Genetic variation stimulation and tolerance to dehydration in some varieties of wheat (*Triticum aestivum* L.) outside of vivo (in vitro). Ph.D.

- thesis, College of Agriculture, University of Baghdad, Iraq.
- Al-Taher, F.M.M. (2005). The effect of foliar feeding with iron, zinc, and potassium on the growth and yield of wheat *Triticum aestivum* L. PhD thesis. College of Agriculture, University of Baghdad, Iraq.
- Al-Taher, F.M.M. and Al-Hamdaoui, I.R.Z. (2017). Contribution of the science leaf, the lower leaves and the spike parts to the production of dry matter and the formation of the grain yield for three varieties of wheat. *Triticum aestivum* L. Research from the master's thesis of the second researcher. Al-Muthanna Journal of Agricultural Sciences, 4(2):13-19.
- AL-Tahir, F.M. (2014). Evaluation of Promising durum and soft Wheat Genotype at two Locations of southern Iraq. International Journal of Current Res.(6): 9014-9021.
- FAO, (2017). World Wheat market at a glance Food outlook, Economic Social Dept., 1: 1-7.
- Jado'a, K.A. (1995). Wheat facts and tips. Publications of the Ministry of Agriculture. General Authority for Agricultural Cooperation and Extension.
- Jamali, K.D.; Arain, M.A. and Mhamd, M. (2000). Comparative performance of semi-dwarf wheat (*Triticum aestivum* L.) genotypes. Wheat Information Service, (90): 45-46.
- Jassim, S.R.; Maya, T.K. and Thabet, A.J. (2016). The effect of planting dates on the growth characteristics, yield and components of wheat (*Triticum aestivum* L.). Maysan Journal of Academic Studies (29):176-185.
- Riaz, U.D.; Ahmad, G.M.N.; Hussain, M. and Rehman, A.U. (2010). Effect of temperature on development and grain formation in spring wheat. Pak. J. Bot., 42(2): 899-906.