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STUDYING THE DIFFERENCES BETWEEN COMMON AND INTRODUCTION DURUM WHEAT (TRITICUM DURUM DESF.) VARIETIES IN IRAQ IN TRAITS OF GROWTH, YIELD, AND ITS COMPONENTS. – NINEVAH PROVINCE

AL -Barwary . Ary Sulayman[1] and Abdullsattar Asmair Alrijabo[2]
[1](Researcher -Ministry of Agric. and Water Resources-Directorate of Res. and Extension-Erbil)
[2] (Prof.Dr.College of Agriculture and Forestry/ Mosul University, IRAQ)
This research is part 4 of PhD. Thesiss of the 1st Auther
Email : *ari84shele@hotmail.com*

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Abstract:

This study was conducted in the agricultural season 2019/2020 in Nineveh Pronince, Tel Kaif District. The field experiment, which is a simple one-factor experiment, was carried out in a randomized complete block design, R.C.B.D. The effect of the genetic factor of twenty-eight varieties of durum wheat on traits of growth, yield and its components was studied. The most important results obtained can be summarized as follows:(1)- The durum wheat varieties (Sham 9, Sardar, LDE 357, Dor 85) were distinguished by achieving the highest rate of grain yield compared to the rest of the durum wheat varieties. (2)- The durum wheat varieties (Sham 5, Bakra Joe 1, Um Rabie, Sham9) were distinguished by achieving the highest rate of the grain test weight compared to the rest of the durum wheat varieties.

Keywords: Durum Wheat--Iraqi varieties-Rainfed Area- Growth, Yield And Its Components.

INTRODUCTION

An experiment in Al-Muthanna Governorate on the use of eight genotypes (IR65, IR1105, IR1107, IR1187, IR1229, IR1245, IR1287, IR1289) of durum wheat showed that the genotype (IR1187) gave an average plant height of 91.74 cm compared with The lowest plant height was 78.62 cm in genotype (IR1289).[2].

Another results confirmed that the effect of genetic variation for durum wheat cultivars on most of the phenotypic traits that were significantly distinguished in the cultivar (Kharkovskaya 41), while the lowest values were in the cultivar (Giselle). Heads in the plant under drought conditions in Mediterranean environments as one of the two most important indicators of grain productivity for durum wheat.[14].

The trait of the harvest index is greatly affected by drought during the vegetative growth phase and the period of grain filling, so increasing the amount of carbohydrates during the period between vegetative growth and the period of grain filling is very beneficial, especially in dry environments [15].

Increasing the number of tillers plays an important role in increasing the number of grains in the plant, and this is due to the importance of the availability of water, which effectively contributes to transforming the vegetative growth into fruitful, in addition to increasing the photosynthetic products necessary for the growth and development of the spikes.[8].

The trait of grain weight in a plant is of great importance because it is a criterion for selecting varieties with high productivity because it is one of the important quantitative traits with a relatively high heritability and is controlled by a large number of genes compared to the rest of the production components. Harvest index is one of the main keys for evaluating the efficiency of the variety, and it is also used as an indicator for selection between different genotypes. The increase in the attribute of harvest index is due to the increase in the ratio of the yield of grain production to the yield of biological production. When the biological production decreases, the harvest index increases [18].

The yield of durum grains of wheat is mainly affected by the trait of the number of fertile tillers, and the number and weight of grains of the spike. While [21]showed from their study of the genotypes of durum wheat that there were significant differences between the genotypes in the trait of plant height.[14].

In a study on five varieties of durum spring wheat taken from the Russian Middle Volga regions (B 200, B 205, B 209, B Niva, Luch 25). Through the results, the best indicators of productivity and quality were determined in the two varieties (B 209 and B Niva), as they achieved the highest value for the weight of 1000 grains and the highest biological yield.[13].

Five genotypes introduced from durum wheat (Atlhagy, Nano, Uramy, Miki3, Ouhassan) and a local cultivar Svevo for the purpose of comparison. The genotypes Ouhassan, Atlhagy and Nano showed a significant superiority in the number of The grains were in the spike, while the (Atlhagy) cultivar was superior in the biological yield, the (Ouhassan) was the superior in the grain yield, and the (Uramy) cultivar was superior in the weight of 1000 grains. [1]

In the study of five genotypes of durum wheat (Al-Latifia, Babel 30, Babel 31, Babel 32, and Babel 86) compared with two registered, approved and common cultivars planted in Iraq, the genotypes varied significantly among themselves. In most of the studied traits, the genotype (Babylon-32) outperformed the rest of the genotypes with the highest mean number of rams, number of spikes, grain yield, biological yield, and percentage of protein. While the genotype (Babel-86) outperformed the rest of the genotypes in both plant height and 1000-grain weight.[5].

MATERIALS AND METHODS:

This experiment was conducted during the agricultural season (2019-2020) in the field of farmer in Telkief District in Nineveh Province .

The field experiment was designed as a simple experiment with one factors: for 28 durum wheat varieties, with three replications according to a randomized complete block design (R.C.B.D). The comparison between the averages was done using the LSD test at the level (0.05) to compare the studied traits means. Sowing date was in 27/12/2019, after the first effective rain falls .Soil sample was taken from field at a depth of 0-30 cm before sowing for analysis and knowledge of the physical and chemical properties of the soil. The data of rainfall for Telkief site were obtained from the Directorate of Agriculture of Nineveh Table (1) .

The grains of all cultivars were planted at a constant sowing rate of 300 grains.m-2 according to the recommendation of [9], and the field was fertilized with 80 kg.ha^{-1} DAP Di Ammonium Phosphate fertilizer with 80 kg.ha-1 Urea.

Table (1) Soil analysis and rainfall ppt. in (2019-2020) season.

Measurement type	Value	Rain Monthly precipitation	mm.
pH	7.3	Oct. 2019	13
EC ds.m^{-1}	0.26	Nov. 2019	3
available Nitrogen mg.kg^{-1}	59.12	Dec. 2019	130.5
Organic Matter %	3.62	Jan. 2020	98
Available Phosphorous mg.kg^{-1}	48.07	Feb. 2020	225
Available Potassium mg.kg^{-1}	260	Mar. 2020	31.5
Clay %	20.30	Apr. 2020	31.5
Silt%	45.20	May 2020	0
Sand %	34.50	Total ppt. mm.	532.5 mm.
texture	Silt Loam		

RESULTS AND DISCUSSIONS

1-Plant height (cm).

It is clear from Table (2) that the genetic factor has a clear impact on the plant height, it was possible to divide the durum wheat varieties according to the height of their plants into several groups based on the LSD value of (11.961), the variety Ari was distinguished by achieving the highest plant height of (132.17 cm). with a significant difference from most varieties. Followed by the two varieties (Bakra jo, Karoneyah) (107.22, 101.29 cm), followed in descending order by a group (Fada 98 - Kardenenay), then a group (Atras - Parasiful), then a group (Iraqi 7, and Zvico), while the shortest variety in plant height was variety (Dor 85) and height (51.67 cm). These results are in agreement with what was shown by [17]. that the genotypes differ among themselves in the phenotypic traits of plants, including plant height. This is due to the genetic factor controlling this traits mainly due to the absence of an influence of the environmental factor due to the cultivation of this site with one sowing date.

Table (2) Effect of varieties on the trait of plant height (cm) in durum wheat.

	Varieties	**Mean**
1	Dor-85	51.67
2	Zeviko	63.53
3	Iraqi-7	64.99
4	Parasiful	70.87
5	Bahgdad-2	73.06
6	LDE 357	73.42
7	Svevo	73.42
8	Aum Rabee3	73.75
9	Wahat aliraq	74.08
10	Acsad-65	75.91
11	Smito	77.5
12	Guayakan	77.87
13	Sardar	78.33
14	Erbil-3	79.08
15	Firat-93	79.42
16	Saribasak	81.44
17	Secondrous	82.17
18	Atras	82.29
19	Kardenenay	83.17
20	Cham-5	84.17
21	Cham-9	84.83
22	Miki-3	85.5
23	Dor-29	85.83
24	Cham-3	88.31
25	Fadda-98	94.53
26	Karoneyah	101.29
27	Bakrajo-1	107.22
28	Ari	132.17
	Mean Varieties	**81.67**
(0.05)		
	d.f.	**56**
	LSD	**11.961**

2-Number of spikes.m^{-2}.

In the traits of the number of spikes. m^{-2} Table (3) The durum wheat was classified into groups based on the LSD value of (67.13) as the two varieties (Dor 85, Sardar) achieved the highest values in the traits of the number of spikes, which amounted to (663.1, 650 spikes. m^{-2}) respectively and with a significant difference from the rest of the varieties. The Wahat aliraq variety (588.7 Spike. m^{-2}) is superior to the varieties of the following group (Smito - Erbil 3), followed by the group (Ari - Zviko), then the group (Iraqi 7 - Atras), then the group (Cham 3- Cham 5).), and finally the variety (Karoneyah), which is less significant than the rest of the varieties in terms of the number of spikes (211 spikes. m^{-2}). These results are in agreement with what was stated by [7].

3-The number of grains in spike. grain.spike^{-1}

In the number of grains of the spike Table (4), the durum wheat varieties that achieved the highest value in the number of grains of the spike were determined based on the LSD value of (10.483). It was represented in the group of varieties (Koyakan - Iraqi 7) and the highest value achieved was in the variety Koyakan (59.82 grains. spike^{-1}). It was followed by the group of varieties (Parasiful - Svevo), while the lowest significant value was achieved in the variety Firatl 93 (35.41 grains. spike^{-1}). These results are in agreement with [12].

Table (3) Effect of varieties on the number of spikes.m^{-2} in durum wheat.

Varieties		Mean
1	Karoneyah	211
2	Cham-5	242
3	Fadda-98	250
4	Parasiful	251
5	Miki-3	255
6	Kardenenay	271
7	Cham-3	280
8	Atras	299.5
9	Bakrajo-1	318
10	Aum Rabee3	347.3
11	Saribasak	348
12	Iraqi-7	357.3
13	Zeviko	386
14	Acsad-65	403
15	Secondrous	412.5
16	Dor-29	424
17	LDE 357	425
18	Guayakan	431
19	Ari	450
20	Erbil-3	477.8
21	Bahgdad-2	485.3
22	Svevo	495
23	Firat-93	500
24	Cham-9	513.2
25	Smito	518
26	Wahat aliraq	588.7
27	Sardar	650
28	Dor-85	663.1
	Mean Varieties	398.22
(0.05)		
	d.f.	56
	LSD	67.13

Table (4) Effect of varieties on the number of grains in spike. grains.Spike^{-1} in durum wheat.

	Varieties	Mean
1	Firat-93	35.41
2	Svevo	38.53
3	Bakrajo-1	39.62
4	Erbil-3	40.37
5	Wahat aliraq	41.79
6	LDE 357	42.77
7	Ari	43.06
8	Zeviko	43.12
9	Miki-3	43.19
10	Dor-29	43.22
11	Atras	43.81
12	Kardenenay	44.2

13	Karoneyah	44.43
14	Aum Rabee3	44.63
15	Cham-3	44.88
16	Dor-85	47.22
17	Cham-9	47.56
18	Cham-5	48.06
19	Parasiful	48.4
20	Iraqi-7	49.92
21	Sardar	50.2
22	Acsad-65	50.56
23	Secondrous	52.74
24	Smito	54.3
25	Fadda-98	55.59
26	Bahgdad-2	57.71
27	Saribasak	57.77
28	Guayakan	59.82
	Mean Varieties	**47.07**
(0.05)		
	d.f.	**56**
	LSD	**10.483**

4-Weight of 1000 grains.gm.

Table (5) shows the significant differences between durum wheat varieties in the trait of weight of 1000 grains based on the LSD value of (5.846), as the durum wheat was classified into three groups. The first group included the highest varieties in the weight of 1000 grains, and it was seven varieties, starting with the variety (Firat 93) (49.83 gm) and ending with the variety (Bakra jo1) (43.99 gm).While the second group included ten varieties, starting from (Dor 85) (43.74 gm) and ending with the variety (Wahat aliraq) (37.89 gm). As for the third group, the lowest in the weight of 1000 grains, it included the group of varieties (Guayakan - Baghdad 2), as the variety (Baghdad 2) recorded the lowest value in the weight of 1000 grains, which amounted to (31.74 gm).

It seems that the distinct increase in the number of spike grains in the variety (Baghdad 2) (57.71 grians.spike^{-1}) was negatively reflected on the value of the weight of 1000 grains in it, as it was the least significant value in this trait (31.74 gm), and the small number of grains in spike of the variety (Firat 93) (35.41 grains. spike^{-1}) led to an increase in the nutrient abundance synthesized for a small number of grains in the spike, which led to an increase in the weight of 1000 grains in this variety (49.83 gm) for a clear physiological reason related to the nutritional balance within the plant during the stage of grain filling.

5-Biological yield gm.m^{-2}:

Table (6) shows that the durum wheat varieties can be divided into four groups according to the LSD value of (231.0), as the first group, which is the highest group in the biological yield, represented four varieties, starting with the one with the highest weight of the biological yield, which is the variety (Dor 85) with a biological yield of (2078 gm. m^{-2}) and ending with the variety (LDE 357) with a biological yield of (1903 g. m^{-2}), followed by the second group, which includes 11 varieties, starting with the variety (Smito) (1816 gm. m^{-2}).) and ends with the variety (Zviko) (1586 gm. m^{-2}), and the third group starts with the variety (Saribasak) (1552 gm. m^{-2}) and ends with the variety (Baghdad 2) (1421 gm. m^{-2}). As for the fourth group, it starts with the variety (Bakra jo1) (1277 gm. m^{-2}) and ends with the variety (Parasiful) (1127 gm. m^{-2}). For the lowest variety in the value of the biological yield, it is represented by the variety (Svivo) (1015 gm. m^{-2}).

These results are in agreement with what was reported by [10] and [3]. It is clear from the results that the two varieties (Dor 85) and Sardar, which achieved the highest value in the number of spikes.m^{-2}, also achieved the highest values in the trait of the biological yield, and the lowest varieties in the value of the number of spikes such as the varieties (Karoneyah, Parasiful, Kardenenay , Cham 3) was also the lowest in the trait of the biological yield, which indicates that the trait of the number of spikes.m-2 was the most influential in the value of the biological yield.

6-Grains yield gm.m^{-2}:

Table (7) shows the effect of the genetic factor on the trait of grains yield, as it was possible to divide the durum wheat varieties under study according to the grains yield into four groups based on the LSD value of (124.35). The first group, which is the highest group in grain yield, represented four varieties, namely (Cham 9, Sardar, LDE 357, and Dor 85) with a grains yield of (1168.1, 1140.1, 1063, and 1058.3 gm.m^{-2}) respectively. Followed by the group (Smito, Guayakan, Ari, Wahat aliraq) with values (1015.5, 971.4, 962.6, 920.2 gm.m^{-2}), respectively, followed by the third group, which includes 11 varieties , starting with the variety (Erbil 3) (863.5 gm.m^{-2}) and ending with the

variety (Fada 98) (613.5 gm.m^{-2}), while the fourth group included nine varieties , starting with the variety (Iraqi 7) (608.9 gm.m^{-2}) and ending with the variety (Karoneyahn) (375.1 gm.m^{-2}).

The distinction of the variety (Cham 9) in the traits of the grains yield is due to its superiority in the traits of the weight of 1000 grains, and the relative number of grains in the spike, as well as being in its fifth sequence among the varieties in the trait of the number of spikes .m^{-2}. For the distinction of the variety (Sardar) in the grains yield, it is due to its distinction in the two traits of the number of spikes.m^{-2}, and the number of grains in the spike. These results are in agreement with [16] and [10].

Table (5) Effect of varieties on the weight of 1000 grains. gm. in durum wheat.

	Varieties	**Mean**
1	Bahgdad-2	31.74
2	Cham-3	32.47
3	Kardenenay	33.34
4	Karoneyah	33.5
5	Svevo	34.5
6	Saribasak	35.00
7	Dor-29	35.01
8	Sardar	35.5
9	Secondrous	35.5
10	Cham-5	35.89
11	Iraqi-7	36.07
12	Guayakan	37.33
13	Wahat aliraq	37.89
14	Atras	39.83
15	Parasiful	40.00
16	Fadda-98	40.19
17	LDE 357	40.85
18	Smito	42.7
19	Aum Rabee3	42.89
20	Zeviko	43.5
21	Dor-85	43.74
22	Bakrajo-1	43.99
23	Acsad-65	44.75
24	Ari	45.19
25	Erbil-3	45.5
26	Miki-3	46.00
27	Cham-9	47.88
28	Firat-93	49.83
	Mean Varieties	**39.30**
(0.05)		
	d.f.	**56**
	LSD	**5.846**

Table (6) Effect of varieties on the biological yield gm.m^{-2} in durum wheat.

	Varieties	**Mean**
1	Svevo	1015
2	Parasiful	1127
3	Karoneyah	1185
4	Iraqi-7	1187
5	Cham-3	1203
6	Kardenenay	1220
7	Bakrajo-1	1277

8	Bahgdad-2	1421
9	Dor-29	1421
10	Atras	1429
11	Miki-3	1432
12	Secondrous	1486
13	Cham-5	1519
14	Saribasak	1552
15	Zeviko	1586
16	Acsad-65	1607
17	Fadda-98	1653
18	Guayakan	1688
19	Wahat aliraq	1693
20	Erbil-3	1705
21	Cham-9	1757
22	Aum Rabee3	1767
23	Firat-93	1812
24	Smito	1816
25	LDE 357	1903
26	Sardar	1953
27	Ari	1984
28	Dor-85	2078
	Mean Varieties	**1558.01**
(0.05)		
	d.f.	**56**
	LSD	**231.0**

Table (7) Effect of varieties on grains yield, gm.m^{-2} in durum wheat.

	Varieties	**Mean**
1	Karoneyah	375.1
2	Cham-3	402.7
3	Kardenenay	410.6
4	Parasiful	473.2
5	Atras	507.5
6	Cham-5	508
7	Miki-3	512.6
8	Bakrajo-1	594
9	Iraqi-7	608.9
10	Fadda-98	613.5
11	Svevo	619.6
12	Dor-29	658.6
13	Aum Rabee3	680.5
14	Saribasak	684.1
15	Secondrous	736.8
16	Zeviko	799.5
17	Bahgdad-2	804.3
18	Acsad-65	853.7
19	Firat-93	862.8
20	Erbil-3	863.5
21	Wahat aliraq	920.2

22	Ari	962.6
23	Guayakan	971.4
24	Smito	1015.5
25	Dor-85	1058.3
26	LDE 357	1063
27	Sardar	1140.1
28	Cham-9	1168.1
	Mean Varieties	**740.18**
(0.05)		
	d.f.	**56**
	LSD	**124.35**

7-Harvest index %:

Table (8) shows the effect of the genetic factor on the traits of the Harvest index %, as it was possible to divide the durum wheat varieties under study into four groups according to the LSD value of (9.977), the first group represented the highest group in the Harvest index % of six varieties, starting with the variety (Cham 9) (66.0%) and ending with the variety (Smito) (56.13%), followed by the second group, which includes 12 varieties, starting with the variety (Wahat aliraq) (54.43%) and ending with the variety (Dor 29) (46.54%). As for the third group, it included eight varieties , starting with (Saribasak) (44.04%) and ending with Cham 3 (34.97%).

As for the fourth group, the lowest in Harvest index %, it included three varieties , starting with (Kardenenay) (33.66%) and ending with the variety (Karoneyah) (31.64%), which was the lowest in the value of the Harvest index %, without a significant difference from the rest of the group's varieties . The continued distinction of the variety (Cham 9) in the traits of Harvest index % is due to its superiority in the traits of grain yield and its ratio to the traits of the biological yield. These results are in agreement with [6] and [4].

8-Test weight kg.hl^{-1}

Table (9) shows the effect of the genetic factor on the test weight traits at the Mosul site Telkaif location, as it was possible to divide the durum wheat varieties under study according to the values of the test weight into six groups based on the LSD value of (0.8659), as the first group represented the highest group in test weight of four Varieties are (Cham 5, Bakra jo1, Umm Rabie, and Cham 9) with values of (83.5, 83.17, 82.97, 82.83 kg.hl^{-1}) respectively, followed by the second group, which includes seven varieties starting from the variety (Dor 85) (82.37 kg.hl^{-1}) and ending with the variety (Atras) (81.50 kg.hl^{-1}), then the third group that includes seven varieties , starting with the variety (Secondrous) (81.33 kg.hl^{-1}) and ending with the variety (Parasiful) (80.67 kg.hl^{-1}).

Then the fourth group, which includes five varieties , starting with the variety Iraqi-7 (80.33 kg.hl^{-1}) and ending with the variety (Ari) (79.63 kg.hl^{-1}), followed by the fifth group, which includes two varieties (Dor 29 and Acsad 65) with values (79.17 and 79.00 kg.hl^{-1}), respectively, while the lowest values in the test weight were in the varieties (Fada 98, Karoneyah and Erbil 3), then the variety (Miki 3) the lowest in this trait with a value of (76.17 kg.hl^{-1})). This is consistent with what was found by [20] and [19].

Table (8) Effect of varieties on Harvest index % of durum wheat.

	Varieties	**Mean**
1	Karoneyah	31.64
2	Cham-5	33.56
3	Kardenenay	33.66
4	Cham-3	34.97
5	Atras	35.00
6	Miki-3	36.39
7	Fadda-98	37.37
8	Aum Rabee3	38.63
9	Parasiful	42.05
10	Saribasak	44.04
11	Dor-29	46.54
12	Bakrajo-1	46.54
13	LDE 357	48.00
14	Firat-93	48.23

15	Ari	48.48
16	Secondrous	49.79
17	Erbil-3	50.55
18	Zeviko	50.96
19	Dor-85	51.29
20	Iraqi-7	52.03
21	Acsad-65	53.12
22	Wahat aliraq	54.43
23	Smito	56.13
24	Bahgdad-2	56.54
25	Guayakan	57.76
26	Sardar	58.48
27	Svevo	60.94
28	Cham-9	66.00
	Mean Varieties	**46.93**
(0.05)		
	d.f.	**56**
	LSD	**9.977**

Table (9) Effect of varieties on the test weight (kg.hl^{-1}) of durum wheat.

	Varieties	**Mean**
1	Miki-3	76.17
2	Erbil-3	77.23
3	Karoneyah	77.33
4	Fadda-98	77.83
5	Acsad-65	79.00
6	Dor-29	79.17
7	Ari	79.63
8	Cham-3	79.72
9	Guayakan	79.90
10	Iraqi-7	80.08
11	Parasiful	80.67
12	Bahgdad-2	80.83
13	Saribasak	80.95
14	Svevo	81.00
15	Wahat aliraq	81.17
16	Sardar	81.33
17	Secondrous	81.33
18	Atras	81.50
19	Kardenenay	81.65
20	Zeviko	81.67
21	Smito	82.00
22	LDE 357	82.20
23	Firat-93	82.32
24	Dor-85	82.37
25	Cham-9	82.83
26	Aum Rabee3	82.97
27	Bakrajo-1	83.17

28	Cham-5	83.50
	Mean Varieties	**80.68**
(0.05)		
	d.f.	**56**
	l.s.d.	**0.8659**

CONCLUSION

1- Due to the promising results of the Cham 9 variety in the trait of the grain yield at Telkaif location and its distinction from the rest of the varieties, we recommend choosing it for cultivation under rainy conditions and supplementary irrigation, as well as the two varieties LDE357 and Dor 85 for their distinction in the Telkaif location.

2- Through the results of the test weight trait of durum wheat grains and , the following guide was prepared for grains test weight of durum wheat in Iraq by calculating the arithmetic mean value of the trait value.

Appendix (1) Ary and Alrijabo Prepared guide (2022) for test weight kg.hl^{-1} of durum wheat varieties in Iraq.

78.99 –77.5 kg.hl–1	79.99 –79 kg.hl–1	80.99 –80 kg.hl–1	81.99 –81 kg.hl–1	More than 82 kg.hl–1
Karoneyah	Acsad 65	Cham 9	Dor 85	LDE 357
Ari	Iraqi 7	Zvico	Sardar	Cham 5
Miki 3	Dor 29	Svevo	Wahat aliraq	
Erbil 3	Baghdad 2	Cham 3	Um Rabie	
Fada 98		Guayakan	Atras	
Parasiful		Secondrous	Saribasak	
		Bakra jo1	Kardenenay	
			Smito	
			Firat 93	

REFERENCES

1. 1-Abd al-dahi, W. T., & al-Taweel, M. S. (2021). The effect of sowing dates and seed rates on new inputs of Durum Wheat under drought conditions. Euphrates Journal of Agriculture Science, 13(2).
2. 2-Al-Aajibi, Nasser Abdul-Hassan Dahesh (2014). Response of durum wheat (Triticum durum Desf.) genotypes to planting dates. Master's thesis - College of Agriculture - University of Al-Muthanna.
3. 3-Alam, Md. Parwaiz, Satyender Kumar, Naiyar Ali, Ram Prasad Manjhi, Nargis Kumari, Rajni Kiran Lakra and Tajwar Izhar (2013). Performance of wheat varieties under different sowing dates in Jharkhand. J. Wheat Res. 5 (2): 61-64.
4. 4-AL-Asseel, A. S. M., & Madb, D. S. (2019). Response of bread wheat (Triticum aestivum L.) cultivars for sowing dates. Tikrit Journal for Agricultural Sciences Agric. Res. Office- Ministry of Agric. **College of Agric.-Tikrit University 18(2), 41-53.
5. 5-Al-Hiti, M. J. H., & Al-Ubaidi, M. A. G. (2021, November). Study of Yield and its Components for Several Genotypes of Durum Wheat (Triticum Durum L.) Newly Derived Under Three Seeding Rate in the Conditions of Anbar Governorate. In IOP Conference Series: Earth and Environmental Science (Vol. 904, No. 1, p. 012031). IOP Publishing.
6. 6-Ali, A. G., Omar, M. A., Nawar, A. I., & El-Tabbakh, S. S. (2016). Effect of sowing date and nitrogen fertilization level on growth and productivity of some durum and bread wheat varieties. Journal of Alexandria Science Exchange, 37(4), 542-549.
7. 7-Ali, A. H., and Hamza, H. R. (2013). Effect of different cultivation methods on the growth and yield of four cultivars of bread wheat. Al Furat Journal of Agricultural Sciences, 5(4): 94-103.

8. 8-Al-Mahasna, h. (2012). Evaluation of the performance of wheat cultivars to withstand water stress in Damascus city conditions. Damascus University Journal of Agricultural Sciences, 28(2): 127-141.
9. 9-Alrijabo Abdulsattar A. and Hassan H. hassan (2011) Effect of seed grading , seed rate and zero tillage planting method on growth, yield and its components of durum wheat (Triticum durum DESF.) under rain fed area . Mesopotamia Agric. J. No. 1 Vol. 39.
10. 10-Hefny,Yasser A.M.and Naheif E. Mohammed. (2018). Behavior of some Bread Wheat Genotypes under Different Planting Dates and Nitrogen Fertilizer Levels in Sohag Governorate. Assiut J. Agric. Sci.,(49) No. (2) (1-14).
11. 11-Khosravi, V., Khajoie-Nejad, G., Mohammadi-Nejad, G., & Yousefi, K. (2010). The effect of different sowing dates on yield and yield components of wheat (Triticum aestivum L.) cultivars. Int. J. Agron. Plant Prod., 1,77-82.
12. 12-Kneževic, D., Radosavac, A., and Zelenika, M. (2015). Variability of grain weight per spike in wheat grown in different ecological conditions. Acta Agriculturae Serbica, 39(2):85-95.
13. 13-Lozhkin, A. G., Malchikov, P. N., Makushev, A. E., Vasiliev, O. A., Shashkarov, L. G., & Pushkarenko, N. N. (2020). Evaluation of spring durum wheat varieties by yield, structure and grain quality. In IOP Conference Series: Earth and Environmental Science (Vol. 433, No. 1, p. 012045). IOP Publishing.
14. 14-Lozinska T and Fedoruk Yu (2017) Realization of productivity potential of durum spring wheat Varieties under the conditions of forest steppe of Ukraine. Agrobiology 2 65.
15. 15-Niama M. Z., Toshan, H., Nachit, M., and Suleiman, N. (2011). Evaluation of the performance of some durum wheat cultivars (Triticum durum L) under water deficit conditions based on some morphological, physiological and productivity indicators. Arab Journal of Dry Environments. 4(1):4-17.
16. 16-Shirinzadeh, A., Abad, H. H., Nourmohammadi, G., Haravan, E. M., and Madani, H. (2017). Effect of planting date on growth periods, yield, and yield components of some bread wheat cultivars in Parsabad Moghan. International J. of Farming and Allied Sci.s, 6(4): 109-119.
17. 17-Sulieman, A. S (2010). The Influence of (Triticum aestivum L.) seeding rates and sowing patterns on the vegetative characteristics in shambat soil under irrigation.
18. 18-Wnuk, A., Górny, A. G., Bocianowski, J., and Kozak, M. (2013). Visualizing harvest index in crops. Communications in Biometry and Crop Scienc, 8(2): 48–59.
19. 19-Yusuf, M., Kumar, S., Dhaka, A. K., Singh, B., & Bhuker, A. (2019). Effect of Sowing Dates and Varieties on Yield and Quality Performance of Wheat (Triticum aestivum L.). Agricultural Science Digest, 39(4).
20. 20-Zangana, Dawar Dilshad Ali (2019). Effect of spraying with amino acids on the quality and baking traitistics of bread wheat (*Triticum aestivum* L.) cultivars. Department of Field Crops - College of Agriculture - University of Kirkuk.
21. 21-Zubaidi, Khaled Mohammed Daoud, Ahmed Hawas Abdullah and Sabah Ahmed Mahmoud Al-Daoudi (2018). Selection guide technique at levels of supplemental irrigation. Egyptian Journal of Plant Breeding. 22 (7): 1617–1633.