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Study of yield and its components for twenty genotypes of Triticale under different planting dates

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Abstract

In this study, 20 genotypes of triticale (RWAIDA, AMAL, MOHAND, FRAH, POLLMER, LIRON, HUI/TUB, HUI/TUB-1, CENT/1715, BW32-1-1, CMH80, CMH82, POPP-CAAL, CAAL, LIRON -1, LIRON -2, LIRON -3, LIRON -4, LIRON -5, and LIRON -6) were used the experiment was planted according to the design of randomized complete block design by the split-plot arrangement the plant dates putting in main plot (5 November, 20 November, and 5 December), and genotypes in subplot the results show: the first date exceeded the grain yield per plant, number of spikes per plant, number of grains per spike, weight 1000 (g), as it reached 17.16 gm plant^{-1}, 5.91spike, 86.33 grain, and 40.22 gm respectively. The LIRON-2 genotype was superior in the number of spikelets per spike with a mean of 40.15 and number of grain per spike with a mean of 97.28 and yield of grain with a mean of 18.71 gm plant^{-1} and the genotype of LIRON-3 in some spikes with a mean of 5.64 and biological yield of 47.65 gm plant^{-1}.

Keywords: Triticale, planting dates, genotypes, yield and its components

Introduction

Triticale is a self-pollinated crop it is distinguished by containing 11.5-22.5% protein of total seed weight and 3.7% of lysine which is one of the essential amino acids in the protein that most other crops do not contain featuring by the quality of improved protein by containing the acids Amino is important in animal feeding many studies indicate to many researchers it's importance and role in poultry feeding because it is an important source of energy [1].

Therefore the importance of studying to dates of planting is due to the variations in climatic and weather factors from one date to another, and the response of each genotype to these factors and these factors show their effect the on growth and development of planted overall biological processes that occur in it and what is reflected in growth yield, and its components also qualitative qualities through which a date plant is determined appropriate to objectives of the study in addition to the fact that the date of the plant is of great importance in the cultivation of crops and since it varies according to the locations in which it is grown the dates of cultivation are a complex issue so it must be determined the appropriate date for genotypes with unknown environmental adaptation [2].

Understanding how varieties perform in different environmental conditions including the date of plant facilitates directing field service operations based on a scientific study as optimum temperatures and optical duration have a significant impact on the growth and formation of organs which is reflected in an increase in productivity [3]. The study aimed to determine the best genotype at any plant date for traits of growth yield, and its components for triticale.

Materials and Methods

A field experiment was conducted in the Faculty of Agriculture at the University of Kirkuk during the winter season of 2018 - 2019 to evaluate genotypes from different planting dates and their effect on the traits yield and its components. Division of the field was performed according to a split-plot arrangement in a randomized complete block design with three replications the means were analyzed between factors according to Duncan Multi-Range Test [4]. The study included 3 planting dates(5 November, 20 November, and 5 December) In the main plot 20 genotypes of Triticale (table 1) Put were distributed on a subplot each replication contained sixty experimental units, and the experimental unit contained one line with a length of 4m the distance between lines 0.3 m and between plant and other 0.1m, Nitrogen fertilizer was added at a rate of 120 kg nitrogen h^{-1} in twice half of the quantity when planting and another half at the beginning branch stage, and phosphate fertilizer at a rate of 120 kg phosphorus pentoxide h^{-1} as once when planting, to study plant height, number of spikes per plant, spike length cm, number of spikelets per spike, number of grain per spike, the weight of 1000 grain gm, biological yield gm $plant^{-1}$, and grain yield $plant^{-1.}$

Table (1): Name pedigree, and origin for all genotypes

No	Genotype	Pedigree	Origin
1.	RWAIDA	LOCAL CHECK**RWAIDA	
2.	Amal	LOCAL CHECK	Ministry of Technology and Science
3.	Mohand	LOCAL CHECK	Ministry of Technology and Science
4.	Frah	LOCAL CHECK	Ministry of Technology and Science
5.	POLLMER	POLLMER_2.1.1 CTY88.547-22RES-1M-0Y-2M-1Y-0M-1B-OY	MXI07-08 C41ITYN190001

6.	LIRON	LIRON_2/5/DIS B5/3/SPHD/PVN/YO-GUI_6/4/KER_3/6/BULL_10/… CTSS01Y00040S-1M-5Y-3Y-3M-0Y	MXI07-08 C41ITYN 190003
7.	HUI/TUB	HUI/TUB//CENT.TURKEY/3/CAAL/7/LI-RON_2/5/DISB5/3/SPHD/… CTSS02B00107T-19Y-1M-3Y-4M-1Y-0M	MXI07-08 C41ITYN 190012
8.	HUI/TUB-1	HUI/TUB//CENT.TURKEY/3/CAAL/7/LI-RON_2/5/DISB5/3/SPHD/… CTSS02B00107T-21Y-2M-3Y-1M-2Y-0M	MXI07-08 C41ITYN190013
9.	CENT/1715	1715/CENT.DOUKALA/7/LIRON_2/5/DIS/B5/SPHD/PVN//… CTSS02B00134T-20Y-5M-1Y-2M-2Y-0M	MXI07-08 C41ITYN190014
10.	BW 32-1-1	BW32-1/CENT.SARDEV/7/LIRON_2/5/DIS B5/3/SPHD/PVN//… CTSS02B00149T-28Y-1M-1Y-4M-1Y-0M	MXI07-08 C41ITYN 190018
11.	CMH80	CMH80.1212/CMH81A.1239/3/YOGUI_3/ER-IZO_11//ONA_2/… CTSS02B00253T-34Y-4M-2Y-4M-1Y-0M	MXI07-08 C41ITYN190028
12.	CMH82	CMH82.1082/ZEBRA 31/7/LIRON_2/5/DIS B5/3/SPHD/PVN//… CTSS02B00268T-53Y-5M-1Y-1M-2Y-0M	MXI07-08 C41ITYN 190030
13.	POPP-CAAL	POPPI_2/CAAL//THELIN#2/5/PRESTO//2*TESMO_1/MUSX 603/4CTSS02B00342T-21Y-6M-2Y-4M-1Y-0M	MXI07-08 C41ITYN90033
14.	CAAL	CAAL/3/T1494_WG//ERIZO_10/2*BULL_1-1 CTSS02B00380S-6Y-3M-4Y-2M-1Y-0M	MXI07-08 C41ITYN190036
15.	LIRON -1	LIRON_2/5/DIS B5/3/SPHD/PVN//YO-GUI_6/4/KER_3/6/BULL_10/… CTSS02B00413S-22Y-2M-3Y-1M-1Y-0M	MXI07-08 C41ITYN190039
16.	LIRON -2	LIRON_2/5/DIS B5/3/SPHD/PVN//YO-GUI_6/4/KER_3/6/BULL_10/… CTSS02B00413S-22Y-2M-3Y-2M-1Y-0M	MXI07-08 C41ITYN190040
17.	LIRON-3	LIRON_2/5/DIS B5/3/SPHD/PVN//YO-GUI_6/4/KER_3/6/BULL_10/… CTSS02B00413S-22Y-2M-3Y-3M-2Y-0M	MXI07-08 C41ITYN190041
18.	LIRON-4	LIRON_2/5/DIS B5/3/SPHD/PVN//YO-GUI_6/4/KER_3/6/BULL_10/… CTSS02B00418S-22Y-4M-4Y-2M-1Y-0M	MXI07-08 C41ITYN190044
19.	LIRON-5	LIRON_2/5/DIS B5/3/SPHD/PVN//YO-GUI_6/4/KER_3/6/BULL_10/… CTSS02B00419S-10Y-5M-3Y-2M-2Y-0M	MXI07-08 C41ITYN 190045
20.	LIRON-6	LIRON_2/5/DIS B5/3/SPHD/PVN//YO-GUI_6/4/KER_3/6/BULL_10/… CTSS02B00419S-10Y-5M-3Y-4M-2Y-0M	MXI07-08 C41ITYN 190046

Results and Discussion

Table (2) shows sources of difference that show the effect of planting dates genotypes, and interactions between levels of factors, and it shows the significance of each planting date, genotypes, and interactions between them for all studied traits except a number of spikelets in spike for plant date and the interaction between planting dates and genotype, this result agrees with [5], [6] and [7] these found significant in yield and its compound in studies.

Table (2): Analysis of variance for yield and its compound studied traits.

S.o.V	**d.f**	**height plant (cm)**	**No. of the spike. plant-1**	**spike length (cm)**	**No. of spikelet spike-1**
Replications	2	1687.89	21.05	86.76	970.80
Planting date	2	10469.63**	55.40**	26.26**	10.59n.s
Replications (Planting date)	4	20.31	0.44	0.96	2.55
Genotypes	19	588.57**	1.36**	25.66**	69.90**
Planting date × Genotypes	38	146.91**	0.83**	1.52**	5.50n.s
Error	114	33.11	0.11	0.51	11.26
S.o.V	d.f	No. of grains. spike-	Weight 1000 seed g	Biological yield g	grains yield g plant-1
Replications	2	3611.08	2471.69	2437.27	514.92
Planting date	2	720.08**	164.40**	1394.56**	325.12**
Replications (Planting date)	4	79.11	14.58	36.31	1.75
Genotypes	19	536.27**	221.68**	241.192**	33.64**
Planting date × Genotypes	38	53.56**	93.43**	32.56**	11.56**
Error	114	25.29	13.25	16.05	2.74

(**) Significance at 1% probability level. ANOVA

Plant Height cm

Table (3) shows the means of planting dates show the first date was superior to the second and third dates with a mean of 131.07 cm and a significant difference in contrast to the third date was lowest in a mean of this trait reaching 105.86cm this result is consistent with [8], finding differences between planting dates in height plant (cm). As for genotypes, RWAIDA superior a mean of 164.00 cm a significant difference from all other genotypes unlike genotype Bw 32-1-1 was lowest in height of the plant as it gave 117.93 cm which did not differ significantly from genotype Liron-6 and rest genotypes took the disparity between highest and lowest mean This can benefit planting dates more than genotype. Genotype may be due to genetic differences or differences in the number and length of internodes [9], as they found significant differences between genotypes of plant height trait (cm). As for the interaction between levels of factors, the same genotype showed RWAIDA a desirable superiority at the first date with a mean of 146.56 with a significant difference from all combining factors unlike two genotypes LIRON-3 and LIRON-6 at the second date that took the lowest mean in this trait reaching 88.04, and 86.81 cm respectively, the rest of combine factors were taken to vary between the highest and lowest mean this significant interference may be due to variation in the length of internodes or the amount of their response to environmental conditions in this trait.

Table (3): Effect of Planting date, Genotype, and their Interaction in height plant cm

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	133.73 b-e	141.96 b	146.56 a	164.00 a
AMAL	124.13 d-j	114.33 ij	123.97 cd	133.46 b-e
MOHAND	125.13 c-i	115.96 h-k	124.63 cd	132.80 b-e
FRAH	125.06 c-i	125.00 c-i	128.62 bc	135.80 b-d
POLLMER	133.00 b-e	123.50 e-j	130.85 b	136.06 b-c
LIRON	116.80 g-k	113.60 j-m	117.53 e-g	122.20 e-j
HUI/TUB	126.66 c-h	94.95 p-s	118.36 e-d	133.46 b-e
HUI/TUB-1	116.66 g-k	92.95 q-s	112.58 gh	128.33 c-g
CENT/1715	125.26 c-i	100.13 n-r	117.28 e-g	126.46 c-h
BW32-1-1	118.26 f-k	92.31 rs	109.50 h	117.93 f-k
CMH80	128.13 c-g	103.24 m-q	120.65 d-f	130.60 c-e
CMH82	124.93 c-i	95.76 p-s	117.54 e-g	131.93 b-e
POPP-CAAL	126.40 c-h	107.86 k-o	121.75 d-e	131.00 b-e
CAAL	127.60 c-h	109.96 k-n	121.54 ef	127.06 c-h
LIRON -1	124.80 c-i	108.23 k-o	120.01 d-f	127.00 c-h
LIRON -2	125.46 c-i	99.28 n-r	117.25 e-f	127.00 c-h
LIRON -3	126.53 c-h	88.04 s	115.17 f-h	130.93 b-e
LIRON -4	128.66 c-f	98.76 o-r	120.04 d-f	132.70 b-e
LIRON -5	130.53 c-e	104.81 l-p	120.80 d-f	127.06 c-h
LIRON -6	118.46 f-k	86.81 s	110.31 h	125.66 c-i
Planting mean	131.07 a	125.31 b	105.86 c	

Numbers with the same letter do not differ significantly at the 5% level.

Number of spike per plant

Table (4) shows the means of planting dates the first date showed significant superiority over the second and third dates with a mean of 5.91 spikes and a decrease in the number of spikes on the third date may be due to high temperature and length of period photo plant growth stage which negatively affected the photosynthesis, and this was reflected in carbohydrates, and this reduced the chance that it would survive to give spikes this result is in line with [10], as they found differences between planting dates in terms of a number of spikes. As for the comparison of the mean of genotypes, the superiority of the LIRON-3 genotype appeared with a mean of 5.64 with a significant difference with most genotypes while two genotypes POLLMER, and LIRON took the lowest means for this trait they were 4.14, and 4.12 respectively, with a significant difference with all genotypes for this trait This finding is consistent with results [11], is found significant differences between genotypes of a number of spikes trait. The result of comparison between means of interaction between the levels of treatment exceeded the LIRON-6 genotype at the first date with a mean of 6.86 spikes with a significant difference from most treatment factors the POLLMER genotype was given for the second date and LIRON-5 genotype at third date were taken with means 3.20 and lowest means for this trait, This difference between genotypes may be attributed to a difference in its response to climatic changes resulting from different plant dates which affected the production of the tiller to convert them into fertile tiller at the end of the season.

Table (4): Effect of Planting date, Genotype, and their Interaction in No. spike in plant

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	5.66 e-g	4.53 m-o	4.00 o-g	4.73 g
AMAL	6.40 a-c	5.70 e-j	4.5 n-p	5.53 ab
MOHAND	5.80 c-i	5.83 c-i	4.36 n-p	5.33 a-c
FRAH	6.26 a-e	5.40 g-j	4.20 n-p	5.28 bc
POLLMER	5.73 e-j	3.20 r	3.50 qr	4.14 h
LIRON	4.66 l-o	4.20 n-p	3.50 qr	4.12 h
HUI/TUB	5.53 f-j	5.30 i-l	4.30 n-p	5.04 c-g
HUI/TUB-1	6.30 a-d	4.53 m-o	3.53 qr	4.78 fg
CENT/1715	5.80 c-i	5.73 c-j	4.13 n-q	5.22 b-e
BW32-1-1	6.06 b-g	5.26 i-l	3.23 r	4.85 e-g
CMH80	5.46 g-j	5.06 j-m	4.20 n-p	4.91 e-g
CMH82	5.73 c-j	5.26 i-l	4.36 n-p	5.12 c-f
POPP-CAAL	5.53 f-j	5.60 e-j	4.33 n-p	5.15 c-f
CAAL	6.53 ab	4.26 n-p	3.83 p-r	4.87 e-g
LIRON -1	6.16 b-f	5.06 j-m	4.10 n-q	5.11 c-f
LIRON -2	5.60 f-j	5.33 i-k	4.26 n-p	5.06 c-g
LIRON -3	6.16 b-e	6.26 a-e	4.50 m-p	5.64 a
LIRON -4	5.37 h-j	6.03 b-h	4.70 k-n	5.37 a-c
LIRON -5	6.66 a	4.73 k-n	3.20 r	4.86 e-g
LIRON -6	6.86 a	5.53 f-j	3.36 r	5.25 b-d
Planting mean	5.91 a	5.14 b	4.00 c	

Numbers with the same letter do not differ significantly at the 5% level.

Spike Length cm

It appears in table (5) means the first date showed significant superiority over the second and third dates with a mean of 13.41cm, and the reason for this superiority may be due to the availability of environmental conditions for photosynthesis during the pre-expulsion phase with third peace elongation and growth while the decrease in the third date due to delay in the date of planting and rise in temperature in a period of ejection of the spikes the inappropriate conditions lead to reducing dry matter manufactured in the leaves and stems and transferred to the spike which leads to reducing the length of spike and weight due to insufficient representation of the state of competition for those products with the leg that is at the same time elongating stage [12]. This result is consistent with [13], as they found differences between planting dates in the trait of spike length. From the comparison of the mean of genotypes, the superiority of the POLLMER genotype with a mean of 16.10 cm significant difference from the RWAIDA genotype which gave a mean of 15.90cm in contrast to the LIRON and LIRON-5 genotypes which showed the lowest means of 9.86, and 9.80 respectively while the rest of genotypes were taken the difference between the highest and lowest mean of this trait is due to the different genetic structure of these genotypes and that this trait is one of the traits that are affected by genetic factors more than environmental factor. As for the mean of interactions between the levels of factors the superiority of the RWAIDA genotype at the first date shows a mean of 16.93cm with a significant difference when most other interaction factors in contrast to the LIRON-5 genotype at a second date it gave the lowest mean of 8.26cm and the rest of factors were taken to vary between highest means the lowest mean of this trait is that the reason for this variation is due to difference in the response of genotypes to climatic conditions which is due to different agricultural dates.

Table (5): Effect of Planting date, Genotype, and their Interaction in length spike cm

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	16.93 a	14.86 c-e	15.90 a-c	15.90 a
AMAL	13.40 f-k	14.60 d-f	14.00 e-h	14.00 c
MOHAND	15.53 b-d	12.73 g-q	14.13 e-g	14.13 c
FRAH	16.60 ab	13.13 g-n	14.86 c-e	14.86 b
POLLMER	16.16 ab	13.60 b-d	16.10 a-c	16.10 a
LIRON	11.13 s-u	8.60 vw	9.86 uv	9.86 j
HUI/TUB	10.86 tu	10.93 tu	10.90 t-v	10.90 i
HUI/TUB-1	12.93 g-o	13.40 f-k	13.16 g-m	13.16 d-e
CENT/1715	12.93 g-o	11.26 r-t	11.96 k-t	12.05 gh
BW32-1-1	12.66 h-r	13.13 f-l	12.80 g-p	12.86 d-f
CMH80	13.33 f-l	13.33 f-l	13.70 e-g	13.45 cd
CMH82	12.66 h-r	11.66 n-t	11.90 l-t	12.07 gh
POPP-CAAL	13.26 f-l	12.06 k-s	12.66 h-r	12.66 e-g
CAAL	12.80 g-p	11.60 o-t	12.20 k-t	12.20 f-h
LIRON -1	11.66 o-t	11.73 n-t	11.70 n-t	11.70 h
LIRON -2	13.60 e-j	11.46 p-t	12.53 k-s	12.53 e-d
LIRON -3	12.46 i-s	12.00 k-t	12.23 k-s	12.23 f-h
LIRON -4	13.36 f-k	9.86 uv	11.60 o-t	11.61 h
LIRON -5	11.33 r-t	8.26 w	9.80 uv	9.80 j
LIRON -6	14.10 e-h	11.46 p-t	12.76 h-q	12.77 d-g
Planting mean	13.41 a	12.08 c	12.74 b	

Numbers with the same letter do not differ significantly at the 5% level.

No. Spikelets per spike

Table (6) shows the mean planting dates appeared with no significant difference this may be because this trait is influenced by a genetic factor more than an environmental factor. The competition between genotypes gave LIRON-2 a high mean at 40.15 spike-lets significantly differing from all genotypes while giving LIRON-5 genotype had the lowest mean for this trait of 28.99 spikelets. The rest of the genotypes were close to the highest and lowest mean, and the reason for this difference between genotypes may be due to the nature of the genotype of each composition as the difference of the genotypes in a number of spikelets is due to their difference in spike length and length of time required to form and grow the spikelets this finding is consistent with [14], as they found significant differences between genotype of a number of spikelets trait. As for the comparison of means of interaction between factors levels the Duncan Multi-Range Test showed the superiority of LIRON-2 genotype at the first date with a mean of 40.66 spikelets and a significant difference from some other interaction treatment, unlike the LIRON-5 genotype at the second date that gave the lowest mean of this trait to 24.06 spikelets rest of interaction treatment taking the difference between the highest mean and lowest mean for this traits the reason for this decrease is due to exposure of plants to inappropriate climate conditions such as high temperature in early stages of plant growth as the number of prefixes that will turn into spikelets is determined when the growth of five leaves is completed and the developing summit passes by a phase of transformation and continues to grow and form until the formation of the spiegel pre-fixes that are determined It has the total number of spikelets for the spike, the formation of the maximum number of spikelets coincides with the beginning of the elongation of the stem, therefore most of the material represented is directed towards supporting and completing the elongation stage so abortion and death occur for the spikelets due to the insufficiency of the represented material to complete the formation and formation of the spikelets [15].

Table (6): Effect of Planting date, Genotype, and their Interaction in spikelets per spike

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	33.64 b-e	33.10 c-e	33.35 b-e	33.36 b-d
AMAL	35.59 a-e	34.66 a-e	35.13 a-e	35.13 b
MOHAND	25.44 fg	32.26 de	32.74 c-e	30.14 de
FRAH	29.97 d-g	29.37 e-g	29.67 d-g	29.67 e
POLLMER	32.55 de	32.61 d-e	32.58 d-e	32.58 b-e
LIRON	34.28 a-e	33.11 c-e	33.70 b-e	33.69 d
HUI/TUB	29.86 de	29.66 d-g	29.77 d-e	29.76 e
HUI/TUB-1	31.99 de	30.77 d-f	31.38 d-f	31.38 c-e
CENT/1715	34.33 a-e	33.22 c-e	33.39 b-e	33.64 b-d
BW32-1-1	36.26 a-e	35.24 a-e	35.75 a-e	35.75 b
CMH80	36.53 a-d	35.22 a-e	35.87 a-e	35.87 b
CMH82	36.39 a-d	35.46 a-e	35.93 a-e	35.93 b
POPP-CAAL	34.95 a-e	34.44 a-e	34.69 a-e	34.69 bc
CAAL	34.55 a-e	33.81 a-e	34.18 a-e	34.18 bc
LIRON -1	36.44 a-d	35.70 a-e	36.10 a-e	36.08 b
LIRON -2	40.66 a	39.64 a-e	40.15 a-e	40.15 a
LIRON -3	36.44 a-d	35.64a-e	36.02 a-e	36.03 b
LIRON -4	35.53 a-e	35.33 a-e	35.43 a-e	35.43 b
LIRON -5	31.71 d-f	24.06 g	31.22 d-f	28.99 e
LIRON -6	32.95 c-e	31.93 d-f	32.44 d-f	32.44 b-e

Planting mean	34.00 a	33.26 a	33.97 a	

Numbers with the same letter do not differ significantly at the 5% level.

No. of grain per spike

Table (7) shows the means for planting dates that the first date came out with a significant difference from a third date and a mean of 86.33 and was not significant from the second date that gave 85.78 the difference between planting dates may be due to environmental conditions that made conditions appropriate for the first date to increase the number of spikelets fertile in spike and not suitable for the third date which causes a decrease in a number of fertile flowers in a spike as well as competition that occurs on photosynthesis for not supplying the necessary nutrients this result is consistent with [16], As they found differences between planting dates in a number of grains Spike, as for the comparison of the mean of the genotypes showed the superiority of genotype LIRON-2 with a mean of 97.28 with a significant difference from most other genotypes the reason for the superiority of this composition may be due to its superiority in a number of spikelets, Some genotypes gave lowest this difference between the genotypes may be due to their variation in their genetic nature in giving them more grain in spike other genotypes were optimistic between the highest and lowest mean in this trait. This result is consistent with results of [17], as they found significant differences between genotypes of a number of grains, It is noted from means of interactions factorial that the LIRON-2 genotype significantly increased at the second date with a mean of 107.60 over most other interaction factors unlike the FRAH genotype at the first and second dates gave lowest means as it reached 71.73 for each of them, the rest treatment takes variation between highest and lowest mean for this trait and this disparity may be due to the suitability of environmental factors for different stages of growth during the third date and the suitability of environmental factors with first and second dates.

Table (7): Effect of Planting date, Genotype, and their Interaction in No. of grain per spike

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	82.53 h-s	82.00 h-t	82.30 h-s	82.27 ef
AMAL	75.26 p-u	77.80 n-u	76.20 o-u	76.42 gh
MOHAND	82.20 h-s	84.40 g-q	83.80 h-r	83.46 ef
FRAH	71.73 u	71.73 u	71.86 tu	71.77 h
POLLMER	75.00 r-u	74.86 r-u	73.26 s-u	74.37 h
LIRON	87.05 e-n	79.46 k-u	81.56 h-t	82.69 ef
HUI/TUB	76.60 o-u	73.86 r-u	73.66 r-u	74.71 h
HUI/TUB-1	75.93 o-u	73.00 s-u	73.13 s-u	74.02 h
CENT/1715	90.53 c-j	88.33 d-m	80.43 j-u	86.43 c-e
BW32-1-1	96.40 b-d	94.20 b-g	83.63 h-r	91.41 b-d
CMH80	97.33 b-d	95.40 b-f	90.93 c-h	94.55 ab
CMH82	97.00 b-d	95.06 b-f	85.96 f-o	92.67 ab

POPP-CAAL	85.13 g-p	90.93 c-i	82.53 h-s	86.43 c-e
CAAL	90.93 c-h	88.86 e-l	80.90 i-u	86.90 c-e
LIRON -1	98.80 a-c	94.00 b-g	82.16 h-s	91.65 bc
LIRON -2	102.53 ab	107.60 a	81.73 h-t	97.28 a
LIRON -3	91.60 c-g	101.33 ab	81.13 h-u	91.35 b-d
LIRON -4	89.60 c-k	88.80 d-l	82.40 h-s	86.93 c-e
LIRON -5	78.40 m-u	74.93 r-u	73.33 s-u	75.55 h
LIRON -6	82.01 h-t	79.06 l-n	80.53 l-u	80.53 f-g
Planting mean	86.33 a	85.78 a	80.07b	

Numbers with the same letter do not differ significantly at the 5% level.

Weight 1000 grain gm

Table (8) shows means of planting dates the first date was superior to the second date with a significant difference and a mean of 40.22 gm, while it did not differ significantly from the third date that gave a mean of 39.30 gm they cause to environmental factors temperature and light period stages of plant growth that determine the size of flower and amount of increased or decreased final grain weight, this finding is consistent with[18], as they found differences between planting dates in a 1000-grain weight trait, as for genotypes results showed the superiority of FRAH genotype with a mean of 47.71 gm with a significant difference from some genotypes and taking MOHAND genotype the lowest mean for this trait was 31.87 gm which did not differ with some other genotypes while the rest of genotypes were taken to differentiate between the highest and lowest mean the reason for increase and decrease is due to genetic factors of each composition on ability or inability of plants to provide growth rates for grain which leads to an increase or decrease in weight of grains this finding is consistent with [19], finding significant differences between genotypes of a weight 1000 of grain trait. As for the comparison of means of interactions between dates and genotypes, it showed the superiority of genotype POPP-CAAL at the first date with a mean of 58.07 gm a significant difference from all other interaction factors as for genotype MOHAND at the second date it gave the lowest mean of 23.85 gm the increase or decrease in weight of 1000 grain, had It is due to the appropriateness or inappropriateness of environmental factors from the temperature and light duration of different growth stages and extent of their influence on the accumulation of dry matter that is reflected in the weight of grains.

Table (8): Effect of planting date, Genotype, and their Interaction in weight 1000 grain gm

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	47.84 b-e	43.13 b-k	44.65 b-i	45.20 ab
AMAL	45.07 b-g	33.29 o-w	40.51 f-o	39.62 a-g
MOHAND	39.90 f-p	23.85 x	31.87 r-w	31.87 i
FRAH	47.06 b-f	48.35 b-d	47.73 b-e	47.71 a
POLLMER	37.96 i-r	30.32 s-x	34.01 n-w	34.01 hi

LIRON	27.46 v-x	38.39 h-r	32.93 p-w	32.93 hi
HUI/TUB	43.60 b-j	42.16 c-m	46.21 b-g	43.99 a-d
HUI/TUB-1	48.83 bc	31.89 r-w	40.36 f-o	40.36 d-f
CENT/1715	32.34 q-w	39.27 h-p	35.80 m-t	35.80 hi
BW32-1-1	29.95 t-x	37.71 i-r	36.16 k-t	34.61 hi
CMH80	34.27 n-v	35.84 k-t	35.06 m-u	35.06 hi
CMH82	35.61 m-t	35.16 m-t	38.43 h-r	36.40 g-h
POPP-CAAL	58.07 a	33.24 o-w	48.54 bc	46.62 ab
CAAL	37.26 j-t	48.22 bc	43.09 b-l	43.09 b-e
LIRON -1	41.33 d-n	27.92 u-x	34.62 n-v	34.62 hi
LIRON -2	45.46 b-h	34.43 n-v	39.95 f-p	39.95 e-g
LIRON -3	39.57 g-q	27.02 wx	33.29 o-w	33.29 hi
LIRON -4	40.44 f	33.17 o-w	36.63 j-t	36.75 f-h
LIRON -5	37.59 i-s	49.69 b	45.30 b-h	44.19 a-c
LIRON -6	46.34 b-f	46.34 b-g	40.99 e-n	40.77 c-e
Planting mean	40.22 a	37.00 b	39.30 a	

Numbers with the same letter do not differ significantly at the 5% level.

Biology yield gm plant^{-1}

Table (9) shows a comparison of means of planting dates that first date showed significant superiority by giving the largest biomass compared to second and third dates with a mean of 39.06 gm plant^{-1} the increase in biological yield in plants of the first date as a result of ideal environmental conditions to supply the plants with requirements which gave high growth rates and this was reflected in the growth of the crop as green covering was most in the interception of solar radiation during the growing season and reflected this on biomass either cause of the decrease or decrease in mass vitality is due to inappropriate environmental factors reducing the number of tillers and plant height which is reflected in the biomass, this finding is consistent with [8], as they found differences between planting dates in biomass trait, while mean of genotypes the superiority of LIRON-3 genotype is noted with a mean of 47.65 gm plant^{-1} without a significant difference from LIRON-4 genotype which gave a mean of 44.09 gm plant^{-1} and POLLMER genotype gave the lowest mean of 26.34 gm plant^{-1} with a significant difference from most other genotypes the rest of genotypes were taken with a difference between highest mean and lowest mean for this trait the difference between genotypes may be due to different nature of its growth which contributes to the accumulation of dry matter and the nature of its branches which may be attributed to genetic factor of each genotype, this result is consistent with results [20], as they found significant differences between genotypes of the biomass trait. From the means of interaction between levels of factorial treatments it is shown that LIRON-3 genotype superiority at the second date with a mean of 53.26 gm plant^{-1} with a significant difference from some other treatments, unlike POLLMER genotype at a second date which gave the lowest mean of 21.10 gm plant^{-1}, this may be due to nature of this genotype composition by giving it lowest means which did not differ significantly with some other interaction treatments rest of treatment factors it was taken to differentiate between highest mean and lowest mean for this trait.

Table (9): Effect of planting date, Genotype, and their Interaction in biology yield gm plant^{-1}

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	40.61 c-n	31.38 j-s	30.99 k-s	34.33 cd
AMAL	34.36 f-p	24.69 r-t	24.19 st	27.74 fg
MOHAND	34.31 f-p	34.39 f-o	29.40 l-s	32.70 c-e
FRAH	39.26 c-j	29.94 k-s	25.82 a-t	31.67 d-f
POLLMER	32.55 i-r	21.10 t	25.39 a-t	26.34 g
LIRON	37.02 d-l	30.53 k-s	28.79 m-t	32.11 d-f
HUI/TUB	40.74 c-h	32.49 i-q	28.68 m-t	33.97 cd
HUI/TUB-1	41.93 b-f	24.78 r-t	25.53 a-t	30.74 d-f
CENT/1715	33.33 h-q	26.22 p-t	25.88 a-t	28.48 e-g
BW32-1-1	37.05 d-l	26.52 o-t	27.80 n-t	30.45 d-f
CMH80	41.49 c-f	30.73 k-s	30.73 k-s	34.29 cd
CMH82	40.39 c-i	27.09 o-t	28.85 m-t	32.11 d-f
POPP-CAAL	42.59 b-d	27.86 n-t	30.22 k-s	33.56 cd
CAAL	36.52 d-l	30.30 k-s	28.42 m-t	31.74 d-f
LIRON -1	35.68 e-n	29.85 k-s	31.12 k-s	32.21 d-e
LIRON -2	46.37 bc	40.18 c-i	33.12 h-q	39.89 b
LIRON -3	46.04 bc	53.26 a	43.64 b-d	47.65 a
LIRON -4	42.49 b-e	49.03 ab	40.76 c-h	44.09 a
LIRON -5	40.78 c-h	35.55 e-n	33.54 g-q	36.62 b-o
LIRON -6	37.80 d-k	28.66 m-t	26.54 o-t	31.06 d-f
Planting mean	39.06 a	31.72 b	29.98 b	

Numbers with the same letter do not differ significantly at the 5% level.

Grain yield gm plant^{-1}

Show table (10) comparison of means of the dates that the first date showed significant superiority over second and third dates with a mean of 17.16 the reason for the increase in grain yield may be due to environmental conditions in the first date or to number of spikes, number of grains, and weight of 1000 grains which were reflected in this trait, this result consists [21], as they found differences between planting dates in a grain of yield The comparison of genotypes indicates the superiority of the LIRON-2 genotype significantly over most other genotypes with a mean of 18.71 gm plant^{-1} and did not differ significantly with genotypes LIRON-2, POPP-CAAL, and LIRON-4 which gave means 18.28, 17.47, and 17.38 gm plant^{-1} respectively in contrast to the two genotypes LIRON, and POLLMER which took lowest means were 11.12, and 11.44 gm plant^{-1} respectively which differed significantly from all other genotypes while the rest of genotypes showed a difference between the highest and lowest mean the superiority of genotypes may be due to superiority of those genotypes in one or more of components of the yield such as a number of spikes and number of grains in spike, this finding is consistent with results [22], as they found significant differences between genotypes of grain yield trait. As for the comparison of means of interaction between factorial levels the LIRON-3 genotype showed superiority at the second date with a mean of 23.51 gm plant^{-1} with a significant difference from all other interaction treatments unlike the POLLMER genotype at the third date that gave the lowest mean of 8.85 gm plant^{-1} the rest of interaction factors were taken to differentiate between higher and lower mean which caused the increase or decrease in grain yield to the response of genotypes or their lack of response to differences in environmental conditions for first second and third dates in addition to superiority of those genotype in one or more of components of yield which was reflected in the grain of yield.

Table (10): Effect of planting date, Genotype, and their Interaction in grain yield gm plant^{-1}

Genotypes	Planting date			Genotypes mean
	5- Nov.	20- Nov.	5- Dec.	
RWAIDA	16.04 f-m	14.60 h-n	14.59 h-m	15.08 c-e
AMAL	16.46 e-l	17.18 d-j	13.76 l-q	15.80 b-d
MOHAND	14.56 h-n	14.52 h-n	11.60 n-s	13.56 e
FRAH	16.43 e-l	16.52 e-k	14.45 h-n	15.81 b-d
POLLMER	12.48 n-r	13.00 m-q	8.85 s	11.44 f
LIRON	13.14 l-q	10.71 q-s	9.53 rs	11.12 f
HUI/TUB	18.37 b-f	13.62 k-q	14.57 h-n	15.52 cd
HUI/TUB-1	18.43 b-f	12.09 n-r	10.59 q-s	13.70 e
CENT/1715	16.78 f-k	16.18 f-m	12.00 n-r	14.98 c-e
BW32-1-1	17.94 c-g	18.03 c-j	11.12 o-s	15.69 b-d
CMH80	16.12 f-m	17.66 h-s	13.46 k-q	15.74 b-d
CMH82	16.26 e-k	16.09 f-m	14.32 i-m	15.67 b-d
POPP-CAAL	20.27 b-d	14.78 g-m	11.27 d-i	17.47 ab
CAAL	18.32 b-f	16.63 e-k	13.46 k-q	16.14 bc
LIRON -1	18.42 b-f	12.13 n-r	11.82 n-s	14.12 de
LIRON -2	20.80 a-c	21.48 ab	13.84 j-q	18.71 a
LIRON -3	19.22 b-f	23.51 a	12.11 n-r	18.28 a
LIRON -4	18.48 b-f	19.60 b-e	14.05 i-p	17.38 ab
LIRON -5	18.03 c-j	16.43 e-l	10.90 p-s	15.14 c-e
LIRON -6	16.16 f-m	19.22 b-f	12.41 n-r	15.93 b-d
Planting mean	17.16 a	16.20 b	12.73 c	

Numbers with the same letter do not differ significantly at the 5% level.

Consideration of the first date best for superiority in most of the attributes, such as number of spikes per plant, number of grains spike, weight 1000 of grains gm, and grain yield gm plant^{-1}. The superiority of LIRON-3 Genotype in the first date and LIRON-2 in the first and second dates yield and its components traits.

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