



Comparison of Some Agronomic Character and yield of Triticale (*X Triticosecale Wittmack*) lines at Halabja and Qlyasan Regions of Kurdistan/Iraq

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ABSTRACT

The main aim of this study was to determine the optimum line of triticale (*X Triticosecale Wittmack*) and best location for cultivating. The experimental design used in this study was randomized complete block design with two replications. In this study 29 lines of triticale were applied to assess some agronomic character (Plant Height (cm), No. of Days from Seeding to 50% Anthesis, No. of Days from Seeding to Physiological maturity, No. of Days from 50% Anthesis to Physiological maturity, No. of Fertile Tiller/Plant), yield character (Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index). Plowing methods were used twice for the area of the study in each region. In Qlyasan region sowing started on 21 December and on 25 December in Halabja region. A total of 29 triticale lines developed from the hybridized winter triticale lines were used with a set name of 41ITYN and was taken from The International Maize and Wheat Improvement Center (CIMMYT). The 29 triticale lines consisted of (802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829 and 830). The result illustrated that) the maximum plant height, No. of Days from Seeding to 50% Anthess, No. of Days from Seeding to Physiological maturity, No. of Days from 50% Anthesis to Physiological maturity and No. of Fertile Tiller/Plant was observed in lines (804, 809, 830, 827 and 807). The highest agronomic character was observed under cultivation of triticale in the Halabja location. The maximum Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index was observed in lines (802, 828 and 827). Cultivation of the plant in Halabja region also gave the highest yield.

Keywords: Triticale lines, agronomic, yield, Kurdistan

1. INTRODUCTION

Triticale is a relatively new crop; it is the first grain crop produced by crossing wheat (*Triticum*) with rye (*Secale*). In 1875, the first report on receiving a wheat-rye hybrid was published [5]. Poland, Germany, France, and Belarus are the world's leading producers of triticale, and the cultivation area of this most promising culture is expanding both globally and in Russia. According to Roskomstat, Russia's crop page was 624 thousand tons in 2017 (Pankratov & Kandrov, 2017). Triticale (*Triticosecale Wittmack*) is a demand species for the production of the fodder in those regions where temperature decreases in winter and effects on the productivity of wheat and barley (Aydoğan & Köksal Yağdı, 2010). Global warming in these years affects mainly the reduction of production of international cereal crops (Xiao, Cao, Bai, Qi, & Shen, 2017). Sowing date was postulated as the main factor of higher cereal grain yield output without

any extra economical inputs (Vieira, Oliveira, & Daros, 2019). The climate of Kurdistan region is known as WANA area (West Asia and North of Africa) and the yearly of rainfall is between 200 and 600 mm with variation in the time and regions (Tow, Cooper, Partridge, & Birch, 2011). For the production of enterprises of poultry grain of triticale can be counted as an alternative to wheat and maize which is cheaper than wheat (Jahan, Amin, Barma, Babar, & Bodruzzaman, 2001).

However, in some of the studies triticale is cultivated for the production of grain but several research works identified triticale as having potentiality to be used as two functioned crops (Santiveri, Royo, & Romagosa, 2004). Due to this the two function usage of triticale was known as an amazing modern option for the production of forage and grain as well (Jahan et al., 2001). Selecting cultivars with the highest grain yields without clipping can be used to breed for dual purpose grain with the most forage productivity and there is a strong link between grain yield acquired after forage removal and grain yield attained without forage removal (Estrada-Campuzano, Slafer, & Miralles, 2012). Until recently, Triticale grain was thought to be a rye equivalent, at least in terms of technological qualities (Grabovets, Dremucheva, & Karchevskaya, 2013).

Russian breeders, on the other hand, have enabled the development and introduction of new promising Triticale cultivars into agricultural practice. The wheat genotype predominates in these varieties, which has an impact on the phenotypic characteristics of Triticale kernels, such as size, shape (sphericity coefficient 0.8), color, and structural, mechanical, and technical characteristic (Aydoğan & Köksal Yağdı, 2010). New information regarding the technological features, biochemical composition, and varietal characteristics of Triticale grain and its products has been obtained as a result of current research. The research yielded novel Triticale flour production technologies as well as a new grit variety with unique qualities that will be in high demand in the baking, macaroni, confectionery, starch, meat, and other culinary industries (Kh, Starichenkov, & Shteynberg, 2015). A high protein content, necessary amino acids, and a well-balanced amino acid composition are all factors that contribute to nutritional value. The biological value of triticale grain is determined by the presence of vitamins, macro- and micronutrients, as well as the prevalence of water and salt-soluble protein fractions, which leads to a higher degree of assimilation of triticale proteins. (Meleshkina, Pankratov, Vitol, Kandrov, & Tulyakov, 2017). Therefore, this study was aimed to compare and illustrate the best triticale lines that can be obtained in two different locations (Halabja and Qlyasan).

2. RESEARCH METHOD

This experiment was conducted in two locations under rain fed in winter the locations consisted of (Halabja and Qlyasan). Halabja region which is located 84 km south east of Sulaimanya (Lat 35° 11' 43" N; 45° 58' 36" E, 690 masl and at qlyasan region which is located in

Sulaimanya city in the North of Iraq (Lat 35° 34' 30" N; Long 45° 21' 43" E, 765 masl). In this study 29 lines of triticale were applied to assess some agronomic character (Plant Height (cm), No. of Days from Seeding to 50% Anthesis, No. of Days from Seeding to Physiological maturity, No. of Days from 50% Anthesis to Physiological maturity, No. of Fertile Tiller/Plant), yield character (Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index).

Plowing methods were used twice for the area of the study in each region. In Qlyasan region sowing started on 21 December and on 25 December in Halabja region. A total of 29 triticale lines developed from the hybridized winter triticale lines were used with a set name of 41ITYN and was taken from The International Maize and Wheat Improvement Center (CIMMYT). The 29 triticale lines consisted of (802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829 and 830). The experiment was laid out in randomized complete block design with two replications. The statistical analysis and analysis of variance was determined by Statistical Analysis System (SAS) (release 9.4, SAS Institute Inc., Cary, NC, USA). For comparison of the treatments mean, Fisher's Least Significant Differences (LSD) was used when F values were significant at ($P \leq 0.05$).

3. RESULTS AND DISCUSSION

Agronomic Characters

The results of analysis of variance (ANOVA) of Triticale lines, cultivation location and their interaction effects on some agronomic character of triticale (*X Triticosecale Wittmack*) are shown in (Table 1). The main effect of lines was highly significant for plant height and significant for No. of Days from Seeding to 50% Anthesis. While the same effect was not significant for the remaining agronomic characters. The main effect of cultivation location was not significant for the plant height, highly significant for No. of Days from Seeding to Physiological maturity and No. of Days from 50% Anthesis to Physiological maturity and significant for No. of Fertile Tiller/Plant while the same effect was not significant for plant height. The interaction effects of lines and cultivation locations were highly significant for plant height and significant for No. of Days from Seeding to 50% Anthesis. While, not significant for other agronomic characters.

Table 1: Analysis of variance (ANOVA) Comparison of triticale lines (*X Triticosecale Wittmack*) agronomic characters. in different locations.

S.O.V.	MS					
	DF	Plant Height (cm)	No. of Days from Seeding to 50% Anthesis	No. of Days from Seeding to Physiological maturity	No. of Days from 50% Anthesis to Physiological maturity	No. of Fertile Tiller/Plant
Block	1	44.269ns	30.0086ns	10.56*	2.491ns	0.139ns
Lines	28	533.46**	30.632*	2.67ns	14.67ns	0.162ns
Locations	1	314.491ns	2910.01**	84.491**	3904.56**	0.746*
Lines*Locations	28	321.63**	30.9908*	3.795ns	14.543ns	0.1378ns

Error	57	97.86	10.50	2.63	10.81	0.13
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*, ** and ns represent significant at $P \leq 0.05$, $P \leq 0.01$ and non-significant, respectively. S.O.V.: Source of Variance, DF: Degree of Freedom and MS: Mean Square.

As it's shown in (Table 2) the maximum plant height, No. of Days from Seeding to 50% Anthesis, No. of Days from Seeding to Physiological maturity, No. of Days from 50% Anthesis to Physiological maturity and No. of Fertile Tiller/Plant was observed in lines (804, 809, 830, 827 and 807) which were (109.08 cm, 130.25 days, 165.25 days, 42.5 days and 2.33) respectively. While the minimum plant height, No. of Days from Seeding to 50% Anthesis, No. of Days from Seeding to Physiological maturity, No. of Days from 50% Anthesis to Physiological maturity and No. of Fertile Tiller/Plant was observed in lines (826, 806, 827, 827 and 809) which were (59 cm, 120 days, 162.5 days, 42.25 days and 1.66) respectively.

The Plant height is an essential trait for triticale which have a great role for the resistance of the plant against lodging, total biomass (Gowda et al., 2011) and as well as the harvest index (Goyal et al., 2011). However, in some research study it have been concluded that the optimum height of triticale is 120 cm while in this study the highest plant exceeded (109.08 cm) which is in line with other study works that determined that In small grain cereals, plant height is an essential agronomic feature that influences crop performance, particularly lodging and, as a result, grain production and quality. Crop height reduction has thus been an important breeding target for many decades (Griffiths et al., 2012).

As its illustrated the line that reached 50% the anthesis early was 806, it is clear that Anthesis time is a vital stage in the life cycle of a plant, since it impacts the quantity of seeds and final yield in many crops (Craufurd & Wheeler, 2009) and environmental variables that affect plant growth tend to influence flowering dynamics (Rao et al., 2015). The minimum No. of Days from 50% Anthesis to Physiological maturity was observed in line 827 which is in line with a result of a study in which observed that optimum No. of Days from 50% Anthesis to Physiological maturity of triticale is 42 days (Bezabih, Girmay, & Lakewu, 2019). No. of Fertile Tiller/Plant was observed in lines (807) which were (2.33) which indicated the grain yield of the crop and its clarified that the tiller number per plant determines panicle number which is a key component of grain yield (P. Krishnan, 2011).

Table 2: Comparison of triticale lines (*X Triticosecale Wittmack*) agronomic characters.

Lines	Plant Height (cm)	No. of Days from Seeding to 50% Anthesis	No. of Days from Seeding to Physiological maturity	No. of Days from 50% Anthesis to Physiological maturity	No. of Fertile Tiller/Plant
802	104.42	121.50	163.75	42.24	2.25
803	85.58	127.75	165.25	39.75	2.32
804	109.08	123.25	163.75	40.50	1.75
805	77.50	125.75	164.50	39.00	2.25
806	99.17	120.00	163.50	42.00	2.08

807	80.66	126.50	163.75	37.50	2.33
808	98.58	122.00	164.25	42.00	1.75
809	95.92	130.25	164.50	34.75	1.66
810	100.08	124.00	164.00	39.75	1.83
811	101.25	120.50	163.00	40.25	2.16
812	96.25	124.50	162.75	38.50	2.25
813	103.83	126.25	164.25	38.50	2.00
814	97.33	123.00	162.75	39.75	2.00
815	108.00	122.75	163.00	40.00	2.16
816	96.83	128.25	163.75	37.25	2.25
817	74.50	122.25	163.75	41.75	2.16
818	103.33	127.25	164.00	36.75	2.08
819	86.17	128.50	165.25	36.50	1.83
820	83.00	124.25	163.50	39.00	2.30
821	96.75	121.25	162.75	41.50	1.66
822	87.25	123.00	162.75	40.00	2.00
823	99.92	124.00	163.25	38.75	2.16
824	87.75	126.25	164.25	38.25	2.00
825	84.16	123.25	163.25	39.75	2.00
826	59.00	124.75	164.75	40.00	2.17
827	105.83	120.00	162.50	42.25	1.92
828	97.33	122.00	164.25	42.23	2.16
829	83.42	127.00	165.00	39.50	2.08
830	102.50	127.75	165.25	37.75	1.83
L.S.D. 5%	14.01	4.59	2.30	4.65	0.51

According to the result which is shown in (Table 3) the highest plant height, No. of Days from Seeding to Physiological maturity and No. of Days from 50% Anthesis to Physiological maturity was observed under cultivation of triticale in Halabja location which were (94.93 cm, 164.69 days and 45.31 days) respectively while, the lowest plant height, No. of Days from Seeding to Physiological maturity and No. of Days from 50% Anthesis to Physiological maturity in the same location were (91.94 cm, 162.98 days and 33.71 days) respectively. The maximum No. of Days from Seeding to 50% Anthesis and No. of Fertile Tiller/Plant were determined under Qlyasan cultivation location as (129.41 days and 2.13) respectively. While the lowest No. of Days from Seeding to 50% Anthesis and No. of Fertile Tiller/Plant were determined under Halabja cultivation location as (119.40 days and 1.97) respectively.

Table 3: Comparison of triticale lines (*X Triticosecale Wittmack*) agronomic characters in different locations.

Locations	Plant Height (cm)	No. of Days from Seeding to 50% Anthesis	No. of Days from Seeding to Physiological maturity	No. of Days from 50% Anthesis to Physiological maturity	No. of Fertile Tiller/Plant
Halabja	94.93	119.40	164.69	45.31	1.97
Qlyasan	91.64	129.41	162.98	33.71	2.13
L.S.D. 5%	3.68	1.20	0.60	1.22	0.14

The interaction result is illustrated in (Table 4). The maximum plant height, No. of Days from Seeding to Physiological maturity and No. of Fertile Tiller/Plant were determined under Qlyasan cultivation location in lines (804, 809 and 802) which were (120.3 cm, 142 days and 2.66) respectively. According to a research study done by Ukalska and Kociuba (2013) the optimum plant height for triticale should be 120 cm. The highest No. of Days from Seeding to Physiological maturity and No. of Days from 50% Anthesis to Physiological maturity were observed in lines (808 and 829) cultivated in Halabja location which were (166.5 days and 46.53 days) respectively. The minimum plant height, No. of Days from Seeding to Physiological maturity and No. of Fertile Tiller/Plant were determined under Halabja cultivation location in lines (826, 812 and 813) which were (54.0 cm, 118 days and 1.5) respectively. The lowestt No. of Days from Seeding to Physiological maturity and No. of Days from 50% Anthesis to Physiological maturity were observed in lines (827 and 809) cultivated in Qlyasan location which were (161 days and 24 days) respectively.

Table 4: Comparison of triticale lines agronomic characters (*X Triticosecale Wittmack*) and interaction with locations.

Lines	Locations	Plant Height (cm)	No. of Days from Seeding to 50% Anthesis	No. of Days from Seeding to Physiological maturity	No. of Days from 50% Anthesis to Physiological maturity	No. of Fertile Tiller/Plant
802	Halabja	98.00	120.50	166.00	45.50	1.83
	Qlyasan	110.83	122.50	161.50	39.00	2.66
803	Halabja	102.50	120.50	166.50	45.50	2.33
	Qlyasan	68.67	135.00	164.00	34.00	2.33
804	Halabja	97.83	119.50	165.00	45.50	2.00
	Qlyasan	120.33	127.00	162.50	35.50	1.50
805	Halabja	87.00	120.00	165.50	46.00	2.00
	Qlyasan	68.00	131.50	163.50	32.00	2.50
806	Halabja	101.33	119.50	165.00	45.50	2.17
	Qlyasan	97.00	120.50	162.00	38.50	2.00
807	Halabja	93.00	118.50	163.00	45.00	2.16
	Qlyasan	68.33	134.50	164.50	30.00	2.50
808	Halabja	95.33	120.00	166.50	46.00	1.83
	Qlyasan	101.83	124.00	162.00	38.00	1.66
809	Halabja	90.83	118.50	163.00	45.50	1.50
	Qlyasan	101.00	142.00	166.00	24.00	1.83
810	Halabja	93.16	119.50	165.50	45.50	1.67
	Qlyasan	107.00	128.50	162.50	34.00	2.00
811	Halabja	99.50	119.00	164.00	45.00	2.00
	Qlyasan	103.00	122.00	162.00	35.50	2.33
812	Halabja	98.16	118.00	162.00	44.50	2.17
	Qlyasan	94.33	131.00	163.50	32.50	2.33
813	Halabja	91.83	119.00	164.50	46.00	1.50
	Qlyasan	115.83	133.50	164.00	31.00	2.50
814	Halabja	89.17	118.50	163.00	44.50	2.17
	Qlyasan	105.50	127.50	162.50	35.00	1.83
815	Halabja	107.83	119.00	164.00	44.50	2.00
	Qlyasan	108.17	126.50	162.00	35.50	2.33
816	Halabja	96.83	119.50	165.00	45.50	2.33

	Qlyasan	96.83	137.00	162.50	29.00	2.16
817	Halabja	92.83	119.50	165.50	46.50	2.17
	Qlyasan	56.17	125.00	162.00	37.00	2.16
818	Halabja	100.83	118.50	163.00	44.50	1.83
	Qlyasan	105.83	136.00	165.00	29.00	2.33
819	Halabja	95.17	120.00	165.00	44.50	1.83
	Qlyasan	77.17	137.00	165.50	28.50	1.83
820	Halabja	94.50	119.00	164.00	44.50	2.17
	Qlyasan	71.50	129.50	163.00	33.50	2.50
821	Halabja	99.33	119.00	164.00	45.00	1.66
	Qlyasan	94.17	123.50	161.50	38.00	1.66
822	Halabja	96.50	118.50	163.00	45.00	1.67
	Qlyasan	78.00	127.50	162.50	35.00	2.33
823	Halabja	97.50	119.00	164.00	44.00	1.83
	Qlyasan	102.33	129.00	162.50	33.50	2.50
824	Halabja	95.50	120.00	165.00	45.50	2.00
	Qlyasan	80.00	132.50	163.50	31.00	2.00
825	Halabja	91.16	119.00	164.00	44.50	2.00
	Qlyasan	77.16	127.50	162.50	35.00	2.00
826	Halabja	54.00	120.50	166.50	46.00	2.17
	Qlyasan	64.00	129.00	163.00	34.00	2.17
827	Halabja	96.33	119.00	164.00	44.50	2.17
	Qlyasan	115.33	121.00	161.00	40.00	1.67
828	Halabja	98.50	120.00	166.50	46.52	2.00
	Qlyasan	96.17	124.00	162.00	38.00	2.33
829	Halabja	103.33	120.50	166.50	46.53	2.17
	Qlyasan	63.50	133.50	163.50	32.50	2.00
830	Halabja	95.33	120.50	166.50	46.51	1.83
	Qlyasan	109.66	135.00	164.00	29.00	1.83
L.S.D. 5%		19.81	6.49	3.25	6.58	0.73

Yield

The results of analysis of variance (ANOVA) of Triticale lines, cultivation location and their interaction effects on the yield components of triticale (*X Triticosecale Wittmack*) are shown in (Table 5). The main effect of cultivation locations was highly significant for Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index. While the main effect of lines was not significant for the yield components. The interaction effects of lines and cultivation locations were not significant for Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index. As it's shown in (Table 6) the maximum Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index was observed in lines (802, 828 and 827) which were (737.5(t/ha), 31.8(t/ha) and 0.5) respectively. While the minimum Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index was observed in lines (807, 817 and 825) which were (286.0 (t/ha), 8.1(t/ha) and 0.3) respectively.

Table 5: Analysis of Variance (ANOVA) Comparison of Triticale Lines (*X Triticosecale Wittmack*) Yield characters in Different Locations.

S.O.V.	MS			
	DF	Grain Yield (t/ha)	Biological Yield (t/ha)	Harvest Index
Block	1	465822*	2544.42**	0.00878ns
Lines	28	44884.3ns	100.881ns	0.00472ns
Locations	1	2509339**	989.88**	0.0762**
Lines*Locations	28	41436.44ns	105.763ns	0.0074ns

Error	57	66184.2	102.715	0.00578
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*, ** and ns represent significant at $P \leq 0.05$, $P \leq 0.01$ and non-significant, respectively. S.O.V.: Source of Variance, DF: Degree of Freedom and MS: Mean Square.

As it's shown in (Table 6) the maximum Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index was observed in lines (802, 828 and 827) which were (737.5(t/ha), 31.8(t/ha) and 0.5) respectively. While the minimum Grain Yield (t/ha), Biological Yield (t/ha) and Harvest Index was observed in lines (807, 817 and 825) which were (286.0 (t/ha), 8.1(t/ha) and 0.3) respectively.

Table 6: Comparison of Triticale Lines (*X Triticosecale Wittmack*) Yield Characters.

Lines	Grain Yield (t/ha)	Biological Yield (t/ha)	Harvest Index
802	737.5	18.2	0.40
803	460.0	11.4	0.40
804	417.8	16.2	0.41
805	692.5	8.5	0.35
806	529.0	16.8	0.42
807	286.0	11.2	0.40
808	716.3	12.5	0.40
809	628.8	12.8	0.40
810	521.3	15.3	0.40
811	395.0	16.5	0.40
812	581.3	15.7	0.40
813	602.5	15.1	0.40
814	720.0	14.4	0.33
815	612.5	23.3	0.40
816	493.8	12.7	0.40
817	523.8	8.1	0.40
818	677.0	20.2	0.40
819	530.0	9.4	0.32
820	426.5	13.5	0.40
821	688.8	11.2	0.40
822	572.5	9.4	0.40
823	581.3	16.7	0.40
824	531.3	12.5	0.40
825	537.5	9.0	0.3
826	400.0	8.9	0.40
827	643.8	17.4	0.50
828	502.5	31.8	0.31
829	572.5	10.5	0.40
830	635.0	16.9	0.40
L.S.D. 5%	364.27	14.35	0.11

Based on the results determined in (Table 7) the maximum Grain Yield (t/ha) and Harvest Index was observed under cultivation of the plant in Halabja location which were (712.21 (t/ha), and 0.40) respectively. While the minimum Grain Yield (t/ha) and Harvest Index was observed in under cultivation of the plant in Qlyasan location which were (418.05 (t/ha), and 0.35) respectively. The highest Biological Yield (t/ha) was obtained when the plant was cultivated in

Qlyasan location which was (17.19 (t/ha)) while, the minimum Biological Yield (t/ha) was 11.35 (t/ha) under Halabja cultivation location.

Table 7: Comparison of Triticale lines (*X Triticosecale Wittmack*) Yield characters in Different Locations.

Locations	Grain Yield (t/ha)	Biological Yield (t/ha)	Harvest Index
Halabja	712.21	11.35	0.40
Qlyasan	418.05	17.19	0.35
L.S.D. 5%	95.66	3.77	0.03

The interaction result is illustrated in (Table 8). The maximum Grain Yield (t/ha) was determined in line (805) under Halabja cultivation location which were (910 (t/ha)) and the minimum Grain Yield (t/ha) was observed in line (807) under Qlyasan cultivation location which was (129.0 (t/ha)). The highest Biological Yield (t/ha) and Harvest Index was observed in lines (828 and 827) under Qlyasan cultivation location which were (52.09 (t/ha) and 0.53) respectively. While, the lowest Biological Yield (t/ha) and Harvest Index was observed in lines (817 and 814) under same cultivation location which were (4.9 (t/ha) and 0.17) respectively. Grain yield was influenced primarily by lines, followed by meteorological circumstances. Variations in grain yield response to lines by year were most likely caused by climatic variability (Varughese, 1996). When grown in the same habitat as its parent species, triticale has increased vigor and grain output (Zhang, Hamill, & Weaver, 1996).

Table 8: Comparison of Triticale lines(*X Triticosecale Wittmack*) Yield characters and Interaction with Locations.

Lines	Locations	Grain Yield (t/ha)	Biological Yield (t/ha)	Harvest Index
802	Halabja	872.50	9.84	0.45
	Qlyasan	602.50	26.64	0.39
803	Halabja	592.50	13.19	0.42
	Qlyasan	327.50	9.61	0.35
804	Halabja	305.50	11.86	0.41
	Qlyasan	530.00	20.51	0.38
805	Halabja	910.00	10.71	0.41
	Qlyasan	475.00	6.37	0.24
806	Halabja	465.51	14.19	0.43
	Qlyasan	592.50	19.40	0.39
807	Halabja	443.09	12.06	0.44
	Qlyasan	129.00	10.27	0.27
808	Halabja	767.50	9.30	0.41
	Qlyasan	665.00	15.65	0.35
809	Halabja	837.50	8.05	0.41
	Qlyasan	420.00	17.47	0.42
810	Halabja	820.00	9.15	0.39
	Qlyasan	222.50	21.36	0.36
811	Halabja	740.00	12.17	0.40
	Qlyasan	395.00	16.46	0.35

812	Halabja	837.50	11.93	0.43
	Qlyasan	325.00	19.47	0.31
813	Halabja	780.00	7.74	0.44
	Qlyasan	425.00	22.40	0.41
814	Halabja	795.00	11.59	0.45
	Qlyasan	645.00	17.22	0.17
815	Halabja	732.50	13.01	0.41
	Qlyasan	492.50	33.64	0.40
816	Halabja	645.00	12.00	0.43
	Qlyasan	342.50	13.37	0.30
817	Halabja	870.00	11.36	0.41
	Qlyasan	177.50	4.90	0.32
818	Halabja	827.50	11.73	0.38
	Qlyasan	526.50	28.67	0.37
819	Halabja	532.50	8.98	0.38
	Qlyasan	527.50	9.82	0.28
820	Halabja	687.50	12.51	0.39
	Qlyasan	165.52	14.54	0.35
821	Halabja	867.50	8.23	0.44
	Qlyasan	510.00	14.16	0.35
822	Halabja	760.00	9.00	0.41
	Qlyasan	385.00	9.78	0.33
823	Halabja	717.50	11.84	0.37
	Qlyasan	445.00	21.66	0.49
824	Halabja	707.50	12.07	0.41
	Qlyasan	355.00	12.92	0.36
825	Halabja	775.00	12.87	0.32
	Qlyasan	300.00	5.20	0.34
826	Halabja	662.50	12.84	0.41
	Qlyasan	137.50	4.93	0.40
827	Halabja	692.50	12.54	0.39
	Qlyasan	595.00	22.30	0.53
828	Halabja	565.00	11.58	0.39
	Qlyasan	440.00	52.09	0.31
829	Halabja	707.50	14.97	0.41
	Qlyasan	437.50	5.96	0.32
830	Halabja	737.50	11.89	0.30
	Qlyasan	532.50	21.89	0.41
L.S.D. 5%		515.16	20.29	0.15

4. CONCLUSIONS

According to the results of this study which is shown in (table 4 and 8) it can be concluded that there is a variation between the Triticale lines for the agronomic characters and yield. The best Triticale line that gave optimum agronomic character differs for each parameter. As well as the best Triticale lines that resulted highest yield was also varied between the lines. While, the best location for cultivation of triticale in Kurdistan region is Halabja location which gave the highest grain yield and harvest index.

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