The study of morphological traits examined in 39 barley line and cultivar in laboratory conditions

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ABSTRACT: Barley is as most likely source for providing the effect food in human health among other cereals. This study was conducted in a randomized complete block design (CRD) with three replications at the Agricultural Laboratory of Islamic Azad University of Ardabil. Analysis of variance results showed that there were significant differences between lines in terms of the all evaluated traits at 1% level. Results of mean comparison showed that the variation range of seedlings fresh weight was variable between the studied lines and cultivars from 0.0997gr (Line No. 20) to 0.0357gr (Line No 14) that. Also results of lines mean showed that cultivar Sadik-02 had the highest value in terms of seedling dry weight. The results showed that the highest value in terms of seedling length had belonged to line No. 12 with 21.28cm.

*Keywords***:** Barley , morphological traits , Laboratory Condition.

INTRODUCTION

Barley is one of the most important grains and essential resources for provide animal food and human in the world. They are growing in areas where other crops not grow well due to low rainfall, soil salinity, high height and heat and cold. Almost a third of the world's total land 85 percent of land in Iran located in the dry zone (Badripour; 2004). The most important use of barley is as human and animal food, and preparing the malt. The area under cultivation of barley in the world is over 56 million hectares in 2006 and its performance is over 137 million tons and 7/1 million acres in Iran in 2005, also it is   the most important comprehensive product which is proportional to extensive growth under stress conditions. Barley cropping is for grain production and it used to be feed humans and animals, in addition, barley malt produced in the industry and is used in pastry (Khodabandeh, 2003). Barley is as most likely source for providing the effect food in human health among other cereals. So by the more production and more cheap entities associated with meat production was made possible and barley grain can have a significant role as feed infrastructure in industry livestock. It is considered the world's major crops, especially wheat, rice, barley and maize remains either directly or indirectly as a staple food of the people (Rahimian et al, 1998). Grain used as food by humans long ago and today, a variety of grain products is prepared (Salamini et al, 2002). Nickhah (2002) with studding the qualitative and quantitative traits of barley varieties and promising lines in testing of steady performance comparison of temperate zone and analysis of variance showed that the interaction between genotype and environment was significant and revealed superior numbers and lines based on the performance.

The main objective to the following research is to study of morphological traits in barley lines and cultivars in laboratory conditions.

MATERIALS AND METHODS

This study was designed at the Agricultural Laboratory of Islamic Azad University of Ardabil in 2011-2012 crop years.In this experiment, 34 barley lines received from the International Research Institute of ICARDA and varieties of Bulbul, Sadik-02, Radical, Tokak and Makooei were investigated as control. Pedigree of tested lines is included in Table 1.This study was conducted in a randomized complete block design (CRD) with three replications. First, seeds were disinfected in a solution of sodium hypochlorite 15% for 30 seconds. After placing the seeds in Petri (25 seeds per Petri) distilled water (6 mm in each Petri) was poured into the Petri and was prevented tangible changes in water potential until the end of the experiment. To prevent Bunt and disinfection of the all seeds, fungicide Karbuksyn Tyram ratio 2 in a thousand was added and mixed to distilled water. Studied traits included seedlings fresh weight, root fresh weight, seedling length, roo length, seedling dry weight and root dry weight.

Then ensuring the normal distribution of data, for data analysis with statistical methods such as analysis of variance and comparison of lines mean by Duncan's test at the 5% level. Computer software MSTAT-C was used for statistical computing.

RESULTS AND DISCUSSION

Analysis of variance and mean comparison was normally distributed by Duncan's test after examining the data distribution at the laboratory. Variance analysis of data from study of morphological traits in laboratory conditions (Table 2) showed that there were significant differences between lines in terms of the all evaluated traits at 1% level.

The analysis of variance showed that the effect on the average concentration during coleoptiles mean root length, mean of dry weight, germination, germination rate index, index of germination, final germination percentage and mean germination time was significant in 1% probability level (Alaei et al., 2010).

Results of mean comparison showed that the variation range of seedlings fresh weight was variable between the studied lines and cultivars from 0.0997gr (Line No. 20) to 0.0357gr (Line No 14) that (Table 3). Also the results showed that lines 2 with an average of 0.0630gr had the most root fresh weight and along lines 6, 8, 9, 10, 19, 20, 29 and 31 along control cultivar Tokak located at class A and there were no differences in terms of this characteristic. In contrast, line 34 had lowest root fresh weight and was ranked in the final (Table 3). The results showed that the highest value in terms of seedling length had belonged to line No. 12 with 21.28cm and along lines 2, 8, 9, 10, 19, 20, 25, 26, 28, 29 and 30 along control cultivar Radical located in the premier class and there were no differences in terms of these characteristics, in contrast, line 23 had lowest seedling length. Therefore that line 12 had the highest growth, in contrast line 23 had lower growth (Table 3). The variation range of root length was variable between the studied lines from 13.89 (Line No 29) to 4.00cm (Line No 34), so that, line 29 had accounted the highest value and along lines 1, 2, 6, 9, 10, 12, 18, 19, 20, 24, 30, 31 and 33 along control cultivars Bulbul, Radical, Makooei, Tokak and Sadik-02 were placed in superior class and were grouped with cultivars control (Table 3). Results of lines mean showed that cultivar Sadik-02 had the highest value in terms of seedling dry weight and were grouped along lines 2, 6, 8, 9, 10, 12, 19, 20, 21, 25, 28, 29, 30, 33 and control cultivars Bulbul, Radical and Makooei were placed in superior class and there were no differences in terms of this characteristic, in contrast line 13 had the lowest seedling dry weight (Table 3). Also results showed lines 3 and 33 with an average of 0.0070gr was the best in terms of root dry weight between studied lines; in contrast, lines number 13 and 34 with an average of 0.0017gr had the lowest root dry weight(Table 3).

Average of traits for genotypes showed that genotype originated from nakhjavan3 (Azerbaijan) in coleoptiles length, root length, the average fresh weight and mean dry weight was the maximum average. This genotype seems to be a good potential among genotypes has (Alaei et al., 2010).

Alaei et al (2012) in their study concluded that Sardari had the highest shoot length and Gascogne had the lowest shoot length among studied cultivars. On shoot dry weight, Sardari was the best and Zagros was the lowest mean. On root dry weight, Gascogne was the highest and Azar 2 was the lowest mean.

CONCULSION

The results showed that the was the best line 20 because had the highest amount seedlings fresh weight, root fresh weight, seedling length, root length and seedling dry weight.

Table 1: Pedigree and characteristics of 39 barley lines and cultivars

No	SOURCE	ORIGIN	RTTH	No	SOURCE	ORIGIN	RTTH
Bulbul	CHECK	TURKEY	2	L16	IBON12_W_INC11	ICARDA	2
Radical	CHECK	RUSSIA	6	L17	IBON12_W_INC11	ICARDA	2
Makooei	CHECK	-	6	L18	IBON12_W_INC11	ICARDA	2
Tokak	CHECK	TURKEY	2	L19	IBON12_W_INC11	ICARDA	2
Sadik-02	CHECK	ICARDA	2	L20	IBON12_W_INC11	ICARDA	2
L1	IBON12_W_INC11	ICARDA	2	L21	IBON12_W_INC11	ICARDA	2
L2	IBON12_W_INC11	ICARDA	2	L22	IBON12_W_INC11	ICARDA	2
L3	IBON12_W_INC11	ICARDA	2	L23	IBON12_W_INC11	ICARDA	2
L4	IBON12_W_INC11	ICARDA	2	L24	IBON12_W_INC11	ICARDA	2
L5	IBON12_W_INC11	ICARDA	2	L25	IBON12_W_INC11	ICARDA	2
L6	IBON12_W_INC11	ICARDA	2	L26	IBON12_W_INC11	ICARDA	2
L7	IBON12_W_INC11	ICARDA	2	L27	IBON12_W_INC11	ICARDA	2
L8	IBON12_W_INC11	ICARDA	2	L28	IBON12_W_INC11	ICARDA	2
L9	IBON12_W_INC11	ICARDA	2	L29	IBON12_W_INC11	ICARDA	2
L10	IBON12_W_INC11	ICARDA	2	L30	IBON12_W_INC11	ICARDA	2
L11	IBON12_W_INC11	ICARDA	2	L31	IBON12_W_INC11	ICARDA	2
L12	IBON12_W_INC11	ICARDA	2	L32	IBON12_W_INC11	ICARDA	2
L13	IBON12_W_INC11	ICARDA	2	L33	IBON12_W_INC11	ICARDA	2
L14	IBON12_W_INC11	ICARDA	2	L34	IBON12_W_INC11	ICARDA	2
L15	IBON12_W_INC11	ICARDA	2				

Table 2. Analysis of variance of Study morphological traits in Laboratory Condition for 39 barley line and cultivar

S.O.V	df	Mean Square					
		Seedlings fresh weight	Root fresh weight	Seedling length	Root length	Seedling dry weight	Root dry weight
Lines	38	0.0007**	0.0003**	17.88**	17.56**	0.000013**	0.000004**
Error	78	0.00005	0.00004	4.03	2.53	0.000002	0.0000014
CV%		9.32	14.02	13.18	16.17	13.22	16.92

* and **: Significant at $p < 0.05$ and < 0.01, respectively

Table 3. Mean comparison of traits being studied for barley lines and cultivars

Lines & Cultivars	Characters										
	Seedlings fresh weight		Root fresh weight		Seedling length		Root length		Seedling dry weight		Root dry weight	
Bulbul	0.0763	a-j	0.0407	b-i	14.11	bcd	10.00	h	0.0097	a-f	0.0050	a-e
Radical	0.0763	a-j	0.0517	a-e	15.17	a-d	10.67	a-h	0.0100	a-f	0.0057	a-d
Makooei	0.0980	a	0.0587	ab	12.33	cd	11.11	e-h	0.0107	a-f	0.0057	a-d
Tokak	0.0690	b-k	0.0523	a-e	13.33	bcd	10.72	a-h	0.0073	def	0.0043	a-e
Sadik-02	0.0653	d-k	0.0307	e-i	11.50	cd	11.72	a-g	0.0140	a	0.0040	a-e
1	0.0593	h-l	0.0400	b-h	11.67	cd	8.56	a	0.0083	c-f	0.0040	a-e
2	0.0903	abc	0.0630	a	15.61	a-d	12.72	e-h	0.0107	a-f	0.0067	ab
3	0.0637	e-k	0.0407	b-i	13.00	bcd	7.03	e-h	0.0083	c-f	0.0070	a
4	0.0703	b-k	0.0330	d-i	14.17	bcd	5.67	d-h	0.0067	ef	0.0033	b-e
5	0.0593	h-l	0.0257	ghi	13.06	bcd	7.67	e-h	0.0067	ef	0.0033	b-e
6	0.0893	a-d	0.0480	a-f	13.17	bcd	10.25	a-h	0.0103	a-f	0.0047	a-e
7	0.0597	h-k	0.0337	c-i	10.89	d	4.67	fgh	0.0063	f	0.0033	b-e
8	0.0863	a-f	0.0423	a-h	16.22	a-d	7.94	e-h	0.0117	a-d	0.0050	a-e
9	0.0927	ab	0.0443	a-h	19.44	ab	10.56	e-h	0.0113	a-e	0.0053	a-d
10	0.0823	a-h	0.0597	ab	15.67	a-d	13.11	a-f	0.0100	a-f	0.0067	ab
11	0.0530	jkl	0.0343	c-i	12.39	cd	6.67	a-h	0.0083	c-f	0.0027	de
12	0.0803	a-h	0.0410	b-i	21.28	a	13.44	a-h	0.0130	abc	0.0063	abc
13	0.0513	kl	0.0223	hi	13.22	bcd	6.39	e-h	0.0060	f	0.0017	e
14	0.0357	l	0.0197	i	10.72	d	4.22	c-h	0.0060	f	0.0030	cde
15	0.0550	i-l	0.0307	e-i	12.00	cd	7.11	e-h	0.0067	ef	0.0033	b-e

16	0.0587	h-l	0.0317	d-i	13.50	bcd	7.89	h	0.0080	def	0.0053	a-d
17	0.0673	c-k	0.0313	d-i	11.56	cd	6.33	e-h	0.0077	def	0.0040	a-e
18	0.0553	i-l	0.0317	d-i	14.28	bcd	9.50	ab	0.0080	def	0.0047	a-e
19	0.0880	a-e	0.0493	a-f	14.50	a-d	9.56	e-h	0.0113	a-e	0.0057	a-d
20	0.0997	a	0.0530	a-d	18.11	abc	10.89	abc	0.0117	a-d	0.0057	a-d
21	0.0843	a-g	0.0353	c-i	12.94	bcd	7.06	a-f	0.0113	a-e	0.0033	b-e
22	0.0587	h-l	0.0323	d-i	12.78	bcd	7.17	b-h	0.0070	def	0.0030	cde
23	0.0500	kl	0.0283	f-i	10.11	d	5.89	gh	0.0067	ef	0.0040	a-e
24	0.0607	g-k	0.0320	d-i	10.89	d	8.61	a-g	0.0073	def	0.0033	b-e
25	0.0840	a-g	0.0357	c-i	15.56	a-d	7.17	c-h	0.0100	a-f	0.0060	a-d
26	0.0713	b-k	0.0320	d-i	14.56	a-d	7.22	fgh	0.0077	def	0.0040	a-e
27	0.0700	b-k	0.0293	f-i	12.00	cd	7.06	e-h	0.0087	c-f	0.0050	a-e
28	0.0777	a-i	0.0397	b-h	15.94	a-d	7.00	a-d	0.0100	a-f	0.0047	a-e
29	0.0923	ab	0.0550	abc	14.83	a-d	13.89	a-h	0.0107	a-f	0.0053	e
30	0.0860	a-f	0.0290	f-i	15.22	a-d	10.06	a-e	0.0097	a-f	0.0033	b-e
31	0.0587	h-l	0.0450	a-g	12.11	cd	8.39	a-f	0.0067	ef	0.0047	a-e
32	0.0710	b-k	0.0240	ghi	11.44	cd	6.33	a-f	0.0070	def	0.0037	a-e
33	0.0920	ab	0.0323	d-i	14.11	bcd	9.56	a-f	0.0137	ab	0.0070	a
34	0.0630	f-k	0.0190	i	12.89	bcd	4.00	a-g	0.0090	b-f	0.0017	a-d
Total Mean	0.0719		0.0379		13.7507		8.5584		0.0091		0.0045	

Differences between averages of each column which have common characters are not significant at probability level of 5%.

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