Journal of Novel Applied Sciences
Available online at www.jnasci.org
©2013 JNAS Journal-2013-2-6/152-156
ISSN 2322-5149 ©2013 JNAS

The study of morphological traits examined in 58 bread wheat lines in laboratory conditions

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ABSTRACT: Wheat is the most important agriculture goods in international market and also it is one of the strategic agricultural productions which have daily and universal consumption. This study was conducted in a randomized complete block design (CRD) with three replications at the Agricultural Laboratory of Islamic Azad University of Ardabil. Results from analysis of variance for study of morphological traits in laboratory conditions suggest that there was a significant difference between study lines and cultivars in terms of all evaluated traits at 1% probability level. Results of mean comparison showed that the highest value in terms of seedlings fresh weight had belonged to line No. 25 with 0.0997gr. Also results of lines mean showed that line 5 had the highest value in terms of seedling dry weight, in contrast line 50 had the lowest seedling dry weight. Results showed line 8 with an average of 0.0070gr was the best in terms of root dry weight between studied lines; in contrast, lines number 18, 39, 49 and 50 with an average of 0.00017gr had the lowest root dry weight.

***Keywords*:** Wheat , Morphological Traits , Laboratory Condition.

INTRODUCTION

Wheat is the most important agriculture goods in international market and also it is one of the strategic agricultural productions which have daily and universal consumption (Mobbaser et al., 2008). There is a need to increase in wheat productivity world wide, in particular in developing countries and for further increase wheat yield potential genetically, it is important for us to understand the physiological and genetic basis of yield (Shahryari et al, 2008; Yang et al, 2006). Regarding the fact that the world population as of the beginning of 21st century is already more than 6 billion people which more than 700 millions of them are struggling with the lack of food and famine and up to 3 billion suffer from malnourishment (Aulinger, 2002). Apart from its important commercial aspect in the world, wheat is an increasingly functional tool in political and global relations. Although Iran boasts only around 1% of the world population, it consumes roughly 2.5% of wheat produced in the world .Wheat is a strategic good like energy and is considered one of the important indices of agriculture (Akbari et al, 2010). Seed germination is one of the critical steps in seedling establishment and successful plant growth in the later stages of its life (Almansouri et al., 2001). Any plant for germination has urgent need for a specific range of environmental conditions (Lu et al., 2006). Seed quality is very important to optimum growth and yield production in farm which influenced by many factors such as genetic characteristics, viability, germination percent, vigor, moisture content, storage conditions, survival ability and seed health, but their most important is germination percent and vigor (Akbari et al., 2004).

The main objective to the following research is to study of morphological traits in wheat 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, 55 wheat lines received from the International Research Institute of Wheat and Maize (CIMMYT) and varieties of Bezostaya, Katya and Konya 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, root 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.

Table 1: Pedigree and characteristics of 58 wheat lines and cultivars

12Entry No	Cross	CROSS ID	ORIGIN COUNTRY
check1	BEZOSTAYA	CHECK	RUS
check2	KATIA1	CHECK	BG-KC
check3	KONYA	CHECK	TR
1	LOCAL CHECK		
2	SHARK-1/3/AGRI/BJY//VEE/4/SHARK/F4105W2.1	TCI012033	TCI
3	RSK/CA8055//CHAM6/4/NWT/3/TAST/SPRW//TAW12399.75	TCI-02-47	TCI
4	PYN/PARUS/3/VPM/MOS83-11-4-8//PEW/4/Bluegil	TCI011322	TCI
5	F6038W12.1/ERYT25221//F6038W12.1	TCI012174	TCI
6	4WON-IR-257/5/YMH/HYS//HYS/TUR3055/3/DGA/4/VPM/MOS	TCI-02-80	TCI
7	Ns46.11/3/Sdy/Ti.Rese1//KtA1/4/55.1744/MEX67.1//NO57/3/ATTILA	TCI011413	TCI
8	BSP01/18 (Duzi)		SA
9	CH111.14422	WW	SWITZERLAND
10	ID800994.W/VEE//PIOPIO/3/MNCH/4/FDL4/KAUZ	TCI011378	TCI
11	PBI1013.13.3/3233.35/3/STAR//KAUZ/STAR	CMSW01WM00425S	MX-TCI
12	PYN/PARUS/3/VPM/MOS83-11-4-8//PEW/4/Bluegil	TCI011322	TCI
13	PSK/NAC//SABALAN/3/GUN91/MNCH	TCI011656	TCI
14	SONMEZ		TE-TCI
15	TRK13 RESEL//TRAP#1/BOW/3/JAGGER 'SIB'	TCI-02-678	TCI
16	093.44/N057/3/[258.2.2]/NAD//BEZ/6/IAS58/IAS55//ALD/3/MRNG/4/ALD/IAS58.103A//ALD/5/BUC/7/KAUZ//KAUZ/STAR	CMSW01WM00803S	MX-TCI
17	DEMETRA		UKR-MIR
18	ECONOMKA		UKR-MIR
19	T06/13		SA
20	Olifants		SA
21	SULTAN95		MX-OR
22	00*0100-51		US-AGRIPRO
23	POSTROCK		US-AGRIPRO
24	KUMA		RUS-KRAS
25	ANDIJON1		UZB

Continued table 1: Pedigree and characteristics of 58 wheat lines and cultivars

12Entry No	Cross	CROSS ID	ORIGIN COUNTRY
26	CORDIALE		UK
27	SERI		MX
28	SULTAN95		MX-OR
29	HEREWARD		UK
30	Bul 5052-1/6/C126-15/Cofn/3/N10B/P14//P101/4/21183/CO652643//Lcr/KS6/5/Rpb 8-68/Chrc	TE 5649	TR-TE
31	1-60-1//Emu"s"/Tjb84/3/1-12628/MV17		IR-Karadj
32	Chamran/5/Bez/4/On/6*Ph//Kf/3/Tob"s"/Napo//No66/6/Spn/Mcd//Cama/3/Nzt/4/Urles*2/Prl"s"		IR-Mashhad
33	Alamoot/Shiroodi		IR-Mashhad
34	Vopona/Hd2402/3/Tirchmir/Ico//Sabalan		IR-Mashhad
35	Alamoot/4/Gv/D630//Ald"s"/3/Azd		IR-Ardebil
36	(KS95U522/TX95VA0011)F1/Jagger	AP05T2413	AgriPro South
37	HATCHER		US-COL
38	MV-TALLER		HU-MV
39	DB 66		BG-KC
40	CADET/6/YUMAI13/5/NAI60/3/14.53/ODIN//CI13441/CANON	TCI-02-417	TCI
41	Sau41/Sad1/5/Agri"S"/093-44/3/Kkk/ltd/Lov29/4/FKong15//Bow/Pwn/6/1518-4-38K	TE 5857	TR-TE

42	PLK/LIRA/5/NAI60/3/14.53/ODIN//[CI13441]/4/GRK79/6/MNCH/7/CROC_ 1/AE.SQUARROSA (213)//PGO	CMSW01WM00578S	MX-TCI
43	SERI		MX
44	SULTAN95		MX-OR
45	JI5418/MARAS//SHARK/F4105W2.1	TCI011194	TCI
46	AGRI/BJY//VEE/3/BUL6687.12/4/F6038W12.1	TCI992137-030YE-0E-1E-0E-2E-0E	TR-YE
47	SONMEZ		TE-TCI
48	CATBIRD//CNO79*2/HE 1	A-29707	CHL
49	RAINER	RAINER	AUSTRIA
50	KOMAROM	KOMAROM	AUSTRIA
51	SOISSANA	SOISSANA	AUSTRIA
52	GT 4131-2KK	GT 4131-2KK	BG
53	GT 01N62-62	GT 01N62-62	BG
54	Lau/Agd/3/Odes95//Olv/B16	TE 5402	TR-TE
55	BETTA		S.AFRICA

RESULTS AND DISCUSSION

Results from analysis of variance for study of morphological traits in laboratory conditions (Table 2) suggest that there was a significant difference between study lines and cultivars in terms of all evaluated traits at 1% probability level. This indicates that the genetic diversity between lines and cultivars to choose the desired traits.
The analysis of variance showed that the effect on the average concentration during coleoptiles mean root length, mean of dry weight was significant in 1% probability level (Alaei et al., 2010).

Jafari et al (2013) reported that there were significant differences between studied lines and cultivars in terms of the germination index at 1% level.

Results of mean comparison showed that the highest value in terms of seedlings fresh weight had belonged to line No. 25 with 0.0997gr and along lines 3, 7, 11, 13, 14, 24, 34, 35, 38, 41, 43 and 47 located in the premier class and there were no differences in terms of these characteristics, in contrast, line 19 had lowest seedling fresh weight (Table 3). Also the results showed that lines 7 and 40 respectively with an average of 0.0630 and 0.0637gr had the most root fresh weight and along lines 2, 3, 4, 15, 25 and 34 located at class A and there were no differences in terms of this characteristic. In contrast, line 46 had lowest root fresh weight and was ranked in the final (Table 3). The results showed that the variation range of seedling length was variable between the studied lines from 21.56 cm (Line No. 55) to 8.59 cm (Line No 50) that line 55 had the highest growth, in contrast line 50 had lower growth; therefore, it had smaller seedlings length (Table 3). The variation range of root length was variable between the studied lines from 13.88 (Line No 34) to 3.55 cm (Line No 44), so that, line 34 had accounted the highest value and along lines 1, 2, 3, 4, 5, 6, 7, 11, 14, 15, 17, 23, 24, 25, 29, 35, 36, 38, 40, 42, 43, 53, 54 and 55 along control variety Bezostaya were placed in superior class and were grouped with Bezostaya control (Table 3). Results of lines mean showed that line 5 had the highest value in terms of seedling dry weight and were grouped along lines 13, 14, 24, 25, 26, 38 and 55 were placed in superior class and there were no differences in terms of this characteristic, in contrast line 50 had the lowest seedling dry weight (Table 3). Results showed line 8 with an average of 0.0070 gr was the best in terms of root dry weight between studied lines; in contrast, lines number 18, 39, 49 and 50 with an average of 0.00017gr 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 highest value in terms of seedlings fresh weight had belonged to line No. 25 and along lines 3, 7, 11, 13, 14, 24, 34, 35, 38, 41, 43 and 47 located in the premier class, in contrast line 5 had the highest value in terms of seedling dry weight and were grouped along lines 13, 14, 24, 25, 26, 38 and 55 were placed in superior class.

Table 2. Analysis of variance of study morphological traits in laboratory condition for 58 wheat 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	57	0.0006**	0.0004**	19.24**	19.98**	0.00001**	0.000005**
Error	116	0.00005	0.00004	4.25	2.59	0.000002	0.000001
CV%		10.08	18.62	14.78	20.13	16.66	26.44

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

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

Lines & Cultivars	Characters											
	Seedlings fresh weight		Root fresh weight		Seedling length		Root length		Seedling dry weight		Root dry weight	
BEZOSTAYA	0.0847	b-g	0.0373	f-n	16.65	a-e	9.10	a-l	0.0110	b-f	0.0047	b-h
KATIA1	0.0827	c-j	0.0330	h-t	17.45	a-e	7.97	b-m	0.0103	c-h	0.0040	d-j
KONYA	0.0790	c-l	0.0300	j-s	14.97	a-f	6.05	e-m	0.0110	b-f	0.0037	e-k
1	0.0763	e-n	0.0407	d-k	14.11	b-f	10.00	a-l	0.0097	d-j	0.0050	a-g
2	0.0763	e-n	0.0517	a-e	15.16	a-f	10.66	a-g	0.0100	c-i	0.0057	a-e
3	0.0980	ab	0.0587	ab	12.33	c-f	11.11	a-f	0.0107	b-g	0.0057	a-e
4	0.0690	j-r	0.0523	a-e	13.33	c-f	10.72	a-g	0.0073	h-m	0.0043	d-j
5	0.0653	i-k	0.0307	i-r	11.50	d-f	11.72	a-e	0.0140	a	0.0040	c-i
6	0.0593	o-u	0.0400	d-l	11.66	a-f	8.55	a-m	0.0083	e-m	0.0040	d-j
7	0.0903	a-e	0.0630	a	15.61	a-f	12.72	a-d	0.0107	b-g	0.0067	ab
8	0.0637	m-u	0.0407	d-k	12.99	b-f	7.02	d-m	0.0083	e-m	0.0070	a
9	0.0703	h-p	0.0330	h-t	14.16	c-f	5.66	f-g	0.0067	j-m	0.0033	f-k
10	0.0593	o-u	0.0257	m-t	13.05	c-f	7.66	c-m	0.0067	j-m	0.0033	f-k
11	0.0893	a-e	0.0480	b-g	13.16	d-f	10.25	a-h	0.0103	c-h	0.0047	b-h
12	0.0597	o-u	0.0337	h-p	10.88	d-f	4.66	h-m	0.0063	k-m	0.0033	f-k
13	0.0863	a-e	0.0423	c-j	16.22	a-e	7.94	b-m	0.0117	a-d	0.0050	a-g
14	0.0927	abc	0.0443	c-i	19.44	abc	10.55	a-g	0.0113	a-e	0.0053	a-f
15	0.0823	c-j	0.0597	ab	15.66	a-f	13.11	abc	0.0100	c-i	0.0067	ab
16	0.0530	s-u	0.0343	h-p	12.38	c-f	6.66	e-m	0.0083	e-m	0.0027	h-k
17	0.0803	c-k	0.0410	d-k	21.27	abc	13.44	abc	0.0130	abc	0.0063	abc
18	0.0513	t-v	0.0223	o-t	13.22	c-f	6.38	e-m	0.0060	l-m	0.0017	k
19	0.0357	w	0.0197	q-t	10.72	d-f	4.22	j-m	0.0060	l-m	0.0030	g-k
20	0.0550	r-u	0.0307	i-r	12.00	d-f	7.11	d-m	0.0067	j-m	0.0033	f-k
21	0.0587	o-u	0.0317	h-r	13.49	c-f	7.88	b-m	0.0080	f-m	0.0053	a-f
22	0.0673	k-s	0.0313	h-r	11.55	d-f	6.33	e-m	0.0077	g-m	0.0040	d-j
23	0.0553	q-u	0.0317	h-r	14.27	b-f	9.50	a-k	0.0080	f-m	0.0047	b-h
24	0.0880	a-e	0.0493	b-f	14.50	a-f	9.55	a-k	0.0113	a-e	0.0057	a-e
25	0.0997	a	0.0530	a-d	18.11	a-d	10.88	a-f	0.0117	a-d	0.0057	a-e
26	0.0843	b-h	0.0353	g-p	12.94	c-f	7.05	d-m	0.0113	a-e	0.0033	f-k
27	0.0587	o-u	0.0323	h-r	12.77	c-f	7.16	d-m	0.0070	i-m	0.0030	g-k
28	0.0500	u-v	0.0283	k-s	10.11	e-f	5.88	f-g	0.0067	j-m	0.0040	d-j
29	0.0607	o-u	0.0320	h-r	10.88	d-f	8.61	a-m	0.0073	h-m	0.0033	f-k
30	0.0840	b-i	0.0357	g-o	15.55	a-f	7.16	d-m	0.0100	c-i	0.0060	a-d
31	0.0713	f-o	0.0320	h-r	14.55	a-f	7.22	d-m	0.0077	g-m	0.0040	d-j
32	0.0700	i-p	0.0293	j-s	12.00	d-f	7.05	d-m	0.0087	d-l	0.0050	a-g
33	0.0777	d-m	0.0397	d-l	15.94	a-f	7.00	e-m	0.0100	c-i	0.0047	b-h
34	0.0923	abc	0.0550	abc	14.83	a-f	13.88	a	0.0107	b-g	0.0053	a-f
35	0.0860	a-e	0.0290	j-s	15.22	a-f	10.05	a-h	0.0097	d-j	0.0033	f-k
36	0.0587	o-u	0.0450	c-h	12.11	c-f	8.38	a-m	0.0067	j-m	0.0047	b-h
37	0.0710	g-o	0.0240	n-t	11.44	d-f	6.33	e-m	0.0070	i-m	0.0037	e-k
38	0.0920	a-d	0.0323	h-r	14.11	b-f	9.55	a-k	0.0137	ab	0.0070	a
39	0.0630	n-u	0.0190	r-t	12.88	c-f	3.99	klm	0.0090	d-l	0.0017	k
40	0.0710	g-o	0.0637	a	15.16	a-f	11.22	a-f	0.0083	e-m	0.0050	a-g

41	0.0887	a-e	0.0277	k-t	14.00	c-f	6.08	e-m	0.0093	d-k	0.0020	j-k
42	0.0630	n-u	0.0427	c-j	12.94	c-f	9.16	a-k	0.0073	h-m	0.0043	c-i
43	0.0860	a-e	0.0480	b-g	15.50	a-f	9.77	a-j	0.0110	b-f	0.0057	a-e
44	0.0563	p-u	0.0310	i-r	10.58	e-f	3.35	m	0.0073	h-m	0.0037	e-k
45	0.0593	o-u	0.0267	l-t	11.27	d-f	6.88	e-m	0.0080	f-m	0.0030	g-k
46	0.0697	i-q	0.0150	t	12.38	c-f	3.38	lm	0.0093	d-k	0.0023	i-k
47	0.0870	a-e	0.0373	f-n	15.94	a-f	5.83	f-m	0.0117	a-d	0.0040	d-j
48	0.0617	o-u	0.0167	s-t	11.77	d-f	4.27	i-m	0.0080	f-m	0.0023	i-k
49	0.0573	o-u	0.0217	p-t	13.83	c-f	5.05	g-m	0.0077	g-m	0.0017	k
50	0.0397	v-w	0.0170	s-t	8.59	f	3.96	klm	0.0053	m	0.0017	k
51	0.0603	o-u	0.0280	k-t	13.27	c-f	6.50	e-m	0.0090	d-l	0.0030	g-k
52	0.0853	b-f	0.0170	s-t	16.77	a-e	5.05	g-m	0.0103	c-h	0.0020	j-k
53	0.0697	i-q	0.0487	b-g	15.11	a-f	8.66	a-m	0.0103	c-h	0.0050	a-g
54	0.0840	b-i	0.0500	b-f	14.55	a-f	9.16	a-k	0.0103	c-h	0.0037	e-k
55	0.0800	v-k	0.0393	e-m	21.56	a	9.06	a-m	0.0113	a-e	0.0040	d-j
Total Mean	0.0719		0.0364		13.94		8.01		0.0092		0.0042	

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

REFERENCES

Akbari GhA, Ghasemi Pirbalouti M, Najaf-Abadi Farahani M, Shahverdi M. 2004. Effect of harvesting time on soybean seed germination and vigor. J of Agr 6:9-18.

Akbari L, Jamshidi B, Chaghamirza K, Farshadfar EA. 2010. Study on response of durum wheat genotypes against drought stress in plantation of immature embryo. 11th conference on agronomy and breeding sciences of Iran. Pp: 410- 412.

Alaei M, Zaefizadeh M, Khayatnezhad M, Alaei Z, Alaei Y. 2010. Evaluation of Germination Properties of Different Durum Wheat Genotypes under Osmotic Stress. Midd- East. J. Sci. Res. 6(6):642-646.

Alaei, Y., Khabiri, E., Moosavi, S.S., Mohammadpour Khanghah, A. and Jafari, M. 2012. Effects of Biological Fertilizers on Morphological traits in Bread wheat varieties under drought stress in Greenhouse. Life Science Journal. 9(4): 3183-3187.

Almansouri M., Kinet J.M. and Lutts S. 2001. Effect of salt and osmatic stresses on germination in durum wheat (Triticum durum Desf.). Plant and Soil. 231:243-254.

Aulinger IE. 2002. Combination of intro anderogenesis and biostic transformation: An approach for breeding transgenic maize. Ph.d Thesis. Swiss Federal Institute of Technology (EHT), Zurich, Switzerland.

Jafari, M., Imani, A.A., Aminzadeh, Gh. and Shahbazi, H. 2013. The Study of lines and Different Cultivars of Wheat in Terms of Germination Index in Laboratory Condition. International Journal of Farming and Allied Sciences. 2(6): 124-128.

Lu P., Sang W. and Ma K. 2006. Effects of environmental factors on germination and emergence of croftonweed (Eupatorium adenophorum). Weed Science. 54:452–457.

Mobbaser, S., L. Zare and F. Mehravar, 2008. Importance and dispersion of Fusarium Graminearum in self- consumption seed of produced wheat from different production areas in Golestan. The First National Iranian Seed Tech and Science Congress, Gorgan, Iran.

Shahryari, R., E. Gurbanov, A. Gadimov and D. Hassanpanah, 2008. Tolerance of 42 bread wheat genotypes to drought stress after anthesis. Pak. J. Biol. Sci., 11(10): 1330-1335.

Yang, X., X. Chen, Q. Ge, B. Li, Yiping Tong, A. Zhang, Z. Li, T. Kuang and C. Lu, 2006. Tolerance of photosynthesis to photoinhibition, high temperature and drought stress in flag leaves of wheat: A comparison between a hybridization line and its parents grown under field conditions. Plant Science, 171: 389-397.