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### Drought effects on morphological traits of bean (*Phaseolus vulgaris* L.) genotypes

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#### ABSTRACT

*In order to evaluation Some morphological traits in the stress condition, experimental was conducted 2010 by two situation (stress and non stress) with 16 genotype based on complete block design with three replications Agricultural Research Station, Islamic Azad University Tabriz. Combined results of analysis of variance showed that there are significant differences between all traits. Also interaction genotype×condition was significant for all characters that represent, respectively, and different modes of genetic diversity and its reaction to the experimental conditions. Leaf dry weight traits showed the highest percentage loss of tension that was 36.%.And highest yield Genotype was 3and the lowest yield of 7 genotypes, respectively, as the most tolerant and most sensitive genotypes were introduced*

**Key words:** beans, sensitive genotype, tolerant genotype, yield.

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#### INTRODUCTION

The grains and dried beans contain high nutritional value and are capable of maintaining good and most important food sources rich in protein (18 to 32 percent) are considered in addition ,the ability to fix nitrogen in the plants, put them in rotation, cropping systems will help to stabilize [1]. Bean grown in warm temperate areas with average rainfall is common, and like a burst of flowers and seeds to grow the beans in some need more water but It requires dry weather during harvest. The best planting areas where the rainfall does not occur at the end of the growing season of plants [2].

Among the stressors, Drought, salinity, cold and warm, Drought is the most important factors reducing crop yield, And yield of crops by up to 50 percent decrease [3].

According to other researchers In non-biological stress is less than 82 percent of the potential function [4].

Padylaz *et al* [5] in a three-year research on bean cultivars under irrigation and without irrigation were. The drought caused a significant reduction in yield, biomass accumulation and the rate of accumulation and harvest index. Other researchers also reported that drought stress reduces the yield of bean [6, 7]

The purpose of this study stress on some morphological traits is beans.

## MATERIALS AND METHODS

Agricultural research was conducted during 2010 on Agricultural Research Station, Azad University of Tabriz.. Soil sandy loam type of experiment location and soil PH Place in the range of low to moderate alkaline salt is without limitation. 16 genotypes of bean lines have been prepared Khomein city Randomized complete block design with three replications in 16 bean genotypes in two separate experiments under two condition drought stresses (irrigation after flowering) and without stress. Experimental plot consists of three lines with two-meter by spacing lines was 50 cm and spaces on row was 5 cm. Irrigation in both experiments according to experimental conditions, climatic zone was carry every week. And finally flowering stage under drought stress experiment was discontinued. Harvesting was carried out in early September, separately for each cultivar. Traits related length pod, dry weight per plant, Wight pod, harvest index, biomass wet, Dry weight of leaf, stem dry weight and Yield. Was measured. The combined variance and LSD mean comparison test was conducted at the 5% level. And also The highest and the lowest yield and the Relevant genotype was determined.. Statistical software used included SPSS, EXCEL, MSTATC were.

## RESULTS AND DISCUSSION

Combined analysis of variance showed that genotype  $\times$  environment interaction is significant for all traits studied (Table 2). The results of the comparison showed Harvest index the maximum of amount was eight genotype (average of 63/91 and 58/32) under both conditions. And the lowest amount In the non-stress conditions was belonged the genotype 14 (average 24/14) and the stress was to genotype 7 (average 23/09). The impact of drought on grain yield, harvest index, reduced stress [8].

In connection with the pod weight, respectively under the without the stress and stress maximum of amount was 8 genotype (average of 12/59 and 11/67). And the lowest amount was 7 genotype (mean 3/45, under non-stress conditions and 1/90 under stress of conditions).

Of stress damage to property was estimated at about 29 percent. Maximum of amount dry weight per plant under non-stress and stress were belonged 11,6 genotypes( average of 9/31 and 6/29) and the lowest amount was respectively non-stress and stress were 4 and 5 genotypes (with average 3/75). This trait of drought stress showed a 29 percent reduction Although the plant dry weight in Dehydration decreases but the intensity genotype also depend [9]. Also reported large differences between drought stress in the dry matter accumulation in Bean varieties. Under non-

stress conditions, maximum of amount biomass wet was the 11 genotype with an average of 68/46 and the lowest was 4 genotype with an average of 20/15.

And under stress conditions maximum of amount were 11 and 12 genotypes with an average 26/91 and the lowest amount was 7 genotype with an average 11/1. Percent loss of tension in this trait was estimated at about 34 percent. Maximum length of pod under tension and without tension belonged to 3 genotype. Respectively in 11/13 and 9/13 cm. respectively, under non-stress and stress the lowest amount of was 11 genotype with an Average 5/43 and 3/72 cm. This trait of drought stress showed a 19 percent reduction.

Reduction in pod length in Drought conditions during the flowering has been reported by Vaezi and et al [10] on red beans and Bagayi [11] on wax bean. maximum of amount associated with stem dry weight Traits Respectively under conditions of stress and non stress were Genotypes 14 and 1 with an average of 4/01 and 3. Minimum value for this trait under conditions without stress and tension, respectively, was relevant to genotype 3 and 5 with an average of 1/89 and 1/27. Stem dry weight under stress than non-stress conditions decreased nearly 15 percent. Lukovic and et al [12] stated that plants are different from response of the dry type and speed and Depends on the genetic background and ecotype. The difference in the type and speed of response to drought could be due to differences in photosynthesis. Flyshr and et al [13] also stated that the drought reduced growth of stems. . Maximum of amount Dry weight of leaf traits related to 15 genotype with an average of 3/82 and Minimum of amount was 8 genotype, with an average 2/32 under non stress. And also in drought conditions, maximum of amount were 6 and 9 genotypes respectively with an average of 3/10 and the lowest amount was 5 genotype with an average 1/48. Percentage of damage caused by drought stress in this trait was about 36 percent.

The trait of yield under stress and without stress to respectively the maximum value of 10 genotypes and 3 (with an average 884/70 and 623/03 g/m<sup>2</sup>). And lowest amount under no stress and stress related to genotype 7 respectively, Under no stress and tension (with an average of 304/04 and 115/48 g/m<sup>2</sup>) was applied. Yield reduction under drought stress than non-stress conditions was 30%. The cues of Yield reduction in drought conditions is reduced yield Components.

**Table 1 - the names of bean genotypes used in the design**

Genotype names	number	Genotype names	number	Genotype names	number	Genotype names	number
Ks31164	13	Ks21481	9	Ks21487	5	Ks21193	1
akhtar	14	Ks21189	10	Ks21684	6	Ks21488	2
pak	15	Ks31169	11	Ks21486	7	Ks21485	3
shukufa	16	41105	12	Ks21191	8	Ks21689	4

Stress caused a significant decrease in the yield of beans. The amount of reduction depending on the duration and severity of stress and genotype, is different [14,15]. Overall results imprisonment showed significant difference. The figures of most traits investigated in two experimental conditions and reduced the value of attributes. The effect of drought stress.

Evaluation of the damage on the yield stress of the genotypes studied shows The genotype 3 with 24 / 2 percent with minimal damage and genotype 7 with 62/01% the most damage suffered from stress (table.4).

**Table 2- ANOVA analysis combined data on all traits in genotypes of bean under no water stress and drought**

	Degrees of freedom	Length pod	Wight pod	Stem dry weight	Wet biomes	Mean squares	Per plant weight	Leaf dry weight	Harvest index	Grain yield
Change Resources										
Test conditions	1	29/793*	152/284*	4/217 <sup>ns</sup>	31/579*	75/881**	31/579*	94/070 <sup>ns</sup>	9/294**	
Error1	4	3/261	8/819	1/269	3/628	1/436	3/628	382/053	0/186	
Genotype	15	10/224**	32/367**	0/670**	0/712**	7/230**	0/712**	578/181**	2/066**	
Genotype * condition	15	1/815**	13/644**	0/380*	0/801**	3/835**	0/801**	137/371*	0/315**	
Error2	60	0/589	2/160	0/181	0/221	1/308	0/221	70/942	0/037	
Coefficient of variation0/0		12/07	22/74	19/01	18/15	20/37	18/15	20/47	11/99	

*ns, \*, \*\*: Respectively without significant, significant, levels of 5 and 1Percent*

**Table 3 - Comparison of mean traits in bean genotypes according to LSD test at 5%. levels.**

Genotype	Length pod(cm)		Wight pod(gr)		Stem dry weight(gr)		Wet biomes(gr)		Per plant weight(gr)		Leaf dry weight(gr)		Harvest index		Grain yield(g m units)	
	No stress	stress	No stress	stress	No stress	stress	No stress	stress	No stress	stress	No stress	stress	No stress	stress	No stress	stress
1	6/71	5/03	10/95	11/67	4/01	2/07	27/58	24/42	7/95	4/16	3/41	1/71	45/82	58/32	799/97	608/07
2	7/02	4/38	4/51	7/91	2/72	2/15	20/87	19/53	7/17	4/11	3/71	2/16	30/40	45/39	376/93	351/68
3	9/13	11/13	6/72	5/59	1/89	1/66	24/29	15/16	4/38	4/53	3/49	1/78	53/39	50/89	623/03	609/03
4	7/02	5/90	7/54	4/83	2/09	1/67	20/15	15/31	3/75	4/37	2/67	1/86	53/63	46/08	512/13	367/70
5	7/08	7/49	7/83	3/57	2/53	1/27	27/37	19/54	4/88	3/76	2/49	1/48	42/87	41/30	437/36	308/47
6	7/89	5/42	5/84	3/33	2/73	3	34/68	18/87	8/35	6/29	3/20	3/11	28/05	29/68	392/39	311/51
7	7/29	6/05	3/45	1/90	1/95	1/73	23/46	11/01	4/90	4/49	3/33	1/78	34/04	23/09	304/04	115/48
8	6	5/42	12/59	4/74	2/09	2/03	24/16	14/41	4/24	3/85	2/32	2/05	63/91	43/64	870/97	530/82
9	6/93	5/64	9/60	5/30	2/07	2/04	33/29	15/37	6/11	5/09	2/53	3/10	53/22	40/18	819/90	360/11
10	6/46	5/91	10/93	8/91	2/54	1/97	32/05	22/64	7/94	4/61	2/85	2/03	52/18	47/60	884/70	553/25
11	5/34	3/72	7/98	8/13	2/71	2/01	46/68	26/91	9/31	5/71	3/30	1/51	37/39	48	666/64	646/70
12	6/25	4/42	6/65	4/80	1/95	1/93	34/51	26/90	5/98	5/72	3/67	1/73	39/58	37/09	468/52	326/96
13	5/60	3/91	4/40	3/23	2/66	2/24	21/12	18/58	6/59	5/12	2/91	2/03	30/21	33/70	338/61	305/28
14	7/62	6/49	4/73	2/19	3/05	1/67	36/08	21/50	8/91	3/79	3/46	1/54	24/14	28/54	347/65	143/29
15	6/58	4/42	7/58	3/97	2/62	2/89	30/62	25/90	8/41	5/52	3/82	2/51	31/96	25/42	509/64	260/42
16	6/10	4/2	6/83	3/14	2/52	1/81	35/30	17/15	7/94	4/45	3/24	1/83	34/01	43/50	511/72	441/10
LSD./5	1/407	1/02	2/03	2/58	2/23	2/87	0/92	0/56	1/51	2/11	6/159	5/187	12/40	14/30	98/62	60/92

**Table 4- Estimates of damages caused by drought stress on grain yield of beans**

Percent loss	Genotype names	Percent loss	Genotype names	Percent loss	Genotype names	Percent loss	Genotype names
9/84	Ks31164	57/07	Ks21481	29/47	Ks21487	23/98	Ks21193
58/78	akhtar	37/46	Ks21189	20/61	Ks21684	6/65	Ks21488
49/90	pak	30/29	Ks31169	62/01	Ks21486	2/24	Ks21485
13/80	shukufa	29/78	41105	39/05	Ks21191	28/20	Ks21689

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