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Bean genotypes grouped by cluster analysis of morphological traits under two conditions of stress and non stress

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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, All traits studied in this research except that seeds per pod and number of pod in main branch were a significant effect of genotype ×environment conditions.The cluster analysis under of both environmental conditions in genotypes studied were divided into two groups. In non-stress conditions, the first cluster includes genotypes were 12,16,15,11,1,10,3,4,5,8,9 and 2,14,7,13,6 genotypes were in cluster two. And in stress condition that the first cluster includes genotypes 4, 16,8,9,5,3,1,10,11 . And 2, 13, 7, 12, 15,14,6 genotypes were in cluster 2. 3,4,5,8,9,10,11,16 the genotypes according to the experimental conditions in were the one cluster ,The majority of traits, particularly traits related to yield components The beans have a higher value than the average total. And the cluster analysis chose them for both conditions.
KEYWORDS: beans, cluster analysis, stress, non stress.

INTRODUCTION

Scientific name bean phaseolus vulgaris L. Is an annual herbaceous plant. Bean plant was selfing. And various species of the plant, pod length and seeds per pod and grain size are different [Afkari 2003]. Beans as a main product in many parts of the world, especially Central America, South America and Africa And an excellent food for humans and no cholesterol, the source of protein, phosphorus, iron, vitamin B1 and fiber should be considered [Anderson:2003]. Most water requirements of plants in the flowering stage and develop is the pod [Hodges and etal :2008]. Among the stress factors of drought, salinity, cold and heat, drought is the most important factors reducing crop yield and yield of many crops by up to 50 percent decrease [Kanani 2003 and Rodriguez 2005]. Salehi and etal (2010) A cluster analysis of bean genotypes, them, were divided into three groups high yield, rather high and medium . The purpose of this study examines genotypes under stress and without stress. And grouped them based on cluster analysis and discriminate function analysis in under both environmental conditions.

MATERIALS AND METHODS

Research was conducted on 16 genotypes of bean lines developed in Khomein city (Table 1) during 2009-2010 on Agricultural Research Station, Islamic Azad University, and Tabriz Branch. Soil type was sandy loam at experimental location, soil pH in the range of low to moderate alkaline and salinity without limitation. Randomized complete block design was with three replications in 16 bean genotypes in two separate experiments under two conditions (drought stress and non stress). Experimental plot consisted of three lines of 2 m, spacing between lines was 50 cm and space in row was 5 cm. Irrigation in both experiments was according to experimental conditions. Finally, in flowering stage, in one experiment under drought stress irrigation was discontinued. Harvesting was carried out in early September, separately for each cultivar. Plant height, leaf area, chlorophyll content, number of seeds per plant, seeds per pod, total number of pods, seed weight and 100 kernel weight were measured. On traits and combined analysis of variance comparison of means was done using LSD test at the 5% level. Grouping genotypes based on cluster analysis method AND the results of the them were confirmed by discriminate function analysis. Statistical software used included spss and MSTAT-C.

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RESULTS AND DISCUSSION

The grouping of data, cluster analysis based on an all traits, using standardized data And the Ward method was performed for each experimental condition. And both condition No stress and stress were divided into genotypes in the two clusters. Function of detection also in both situations Incision of the dendrogram And the group has done Confirmed.rezazade(2010) and. Gebyehu(2006) Under stress conditions on nine bean genotypes by Using cluster analysis, divideGenotypes into two groups And under stress conditions divided into 3 groups. In non-stress conditions, the first cluster includes genotypes were 12,16,15,11,1,10,3,4,5,8,9thatTraits of leaves, leaf fresh weight, plant height, branch number, pod number of main branches, the number of seeds per plant, seed weight, number of nodes, chlorophyll content, pod weight, leaf area, harvest index , more biomass. Total number of pods, seeds per pod and seed yield Values were higher than average total and 2,14,7,13,6 genotypes were in cluster two Weight of seed, stem and leaf dry weight, number of empty pod, pod length and dry weight values were higher than average. Therefore, given that the genotype of cluster1 most of the studies traits, values were higher than average total. So they can be any desired genotypes in non-stress conditions are considered. Results from cluster analysis, under stress conditions were showed that the first cluster includes genotypes 4, 16,8,9,5,3,1,10,11. The plant height, number of branches, pod length, number of seeds per plant, seed weight, node number, seed weight, pod weight, harvest index, number of seeds per pod and grain yield values were higher than the overall average. And 2, 13, 7, 12, 15,14,6 genotypes were in cluster 2. The characteristics of the biomass, the total number of pods, dry weight, leaf number, leaf wet weight, pod number of main and sub-branches, the number of empty pod, chlorophyll content, leaf area and dry weight of stems and leaves have a higher value than the average whole. Given the genotypes of the first cluster in most of traits relevant to yield, Values were higher than average total. So they can only desirable genotypes in stress reported. By comparing the results of cluster analysis in both conation stress and non- stress, It can be stated, ,3,4,5,8,9,10,11,16 the genotypes according to the experimental conditions in were the one cluster ,The majority of traits, particularly traits related to yield components The beans have a higher value than the average total. Therefore recognized as suitable genotypes in breeding programs to produce genotype can be used with high yield.

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**

Table2-Cluster analysis groups the average percentage deviation from the average in bean genotypes under non stress conditions

Dry weight leaf	Leaf area	Chlorophyll content	Number of nodes	Number of sub branch	high	Wet weight of leaf	Number of leaf		Genotypes	cluster
3/07	535/32	25/49	10/18	0/68	54/02	11/27	48/67	average	10،1،11،15،16،12 9،8،5،4،3،	**1**
-2/53	3/40	5/50	1/90	11/47	5/96	0/80	0/78	percentage deviation from the average		
3/32	478/95	21/22	9/58	0/43	44/29	10/99	47/47	average	6،13،7،14،2	**2**
-28/20	-37/80	-12/16	4/10	-29/50	-13/12	-19	-1/69	percentage deviation from the average		
3/15	**517/71**	**24/16**	**9/99**	**0/61**	**50/98**	**11/18**	**48/29**	**Total average**		

2-Continue table

The number of empty pod	Pod numbers in main branch	Number of pod in sub branch	Harvest index	Total dry weigh	Wet biomass	Dry weight stem		genotypes	cluster
0/21	3/74	0/76	46/15	6/44	30/64	2/37	average	11،10،1،3،5،9،8،16،4	**1**
48/78	6/55	7/04	12/80	−3/59	3/58	−3/26	percentage deviation from the average		
0/86	3	0/61	29/37	7/18	27/24	2/62	average	6،14،15،12،7،13،2	**2**
10/76	−14/52	−14/08	−28/20	7/48	−7/91	6/93	percentage deviation from the average		
0/41	**3/51**	**0/71**	**40/91**	**6/68**	**29/58**	**2/45**	**Total average**		

2-Continue table

Seed yield	Seeds per pod	Number of total pod	100seed weight	Pod weight	Seed weight	Number of seeds per plant	Length pod		genotypes	cluster
644/60	3/15	4/73	36/83	8/65	5/41	14/26	6/69	average	،4،3،10،1،11،15،16،12 9،8،5	**1**
16/53	14/96	1/50	−4/61	17/20	16/84	20/13	−1/76	percentage deviation from the average		
351/92	1/82	4/51	42/51	4/59	2/93	6/60	7/08	average	6،13،7،14،2	**2**
−36/37	−33/57	−3/21	10/10	−37/80	−36/71	44/39	3/96	percentage deviation from the average		
553/14	**2/74**	**4/66**	**38/61**	**7/38**	**4/63**	**11/87**	**6/81**	**Total average**		

Table-3-Cluster analysis groups the average percentage deviation from the average in bean genotypes under stress conditions

Dry weigh leaf	Leaf area	Chlorophyll content	Number of nodes	Number of sub branch	height	Weight wet leaf	Number of leaf		genotypes	cluster
1/93	331/95	12/13	9/50	0/51	36/74	6/13	32/57	average	،10،1،3،5،9،8،16،4 11	**1**
-3/80	3/32	-5/67	8/69	4/08	6/83	-15/56	-3/29	Percentage deviation from the average		
2/12	385/09	13/54	7/76	0/47	31/35	8/71	35/10	Average	6،14،15،12،7،13،2	**2**
5/47	4/28	5/28	-11/21	-4/08	-8/83	97/19	4/21	Percentage deviation from the average		
2/01	343/38	12/86	8/74	0/49	34/39	7/26	33/68	Total average		

3 -Continue table

The number of empty pod	Pod numbers in main branch	Number of pod in sub branch	Harvest index	Total dry weigh	Wet biomass	Dry weight stem		genotypes	cluster
0/19	2/79	0/25	46/61	4/50	18/99	1/84	average	11،10،1،3،5،9،8،16،4	**1**
−54/76	−7	−26/47	16/08	−4/86	−3/01	−8/45	percentage deviation from the average		
0/71	3/28	0/47	31/48	5/03	20/33	2/24	average	6،14،15،12،7،13،2	**2**
69/04	9/33	38/23	−21/59	6/34	3/83	11/44	percentage deviation from the average		
0/42	**3**	**0/34**	**40/15**	**4/73**	**19/58**	**2/01**	**Total average**		

3 -Continue table

Seed yield	Seeds per pod	Number of total pod	100seed weight	Pod weight	Seed weight	Number of seeds per plant	Length pod		genotypes	cluster
03/473	49/3	11/3	80/39	21/6	11/4	11/10	18/6	average	11،10،1،3،5،9،8،16،4	**1**
60/24	20/31	14/−11	66/1	42/19	46/26	35/20	85/7	percentage deviation from the average		
52/259	58/1	99/3	33/38	90/3	16/2	21/6	16/5	average	6،14،15،12،7،13،2	**2**
63/−31	60/−40	14	09/−2	−25	53/−33	07/−26	69/−10	percentage deviation from the average		
62/379	**66/2**	**50/3**	**15/39**	**20/5**	**25/3**	**40/8**	**73/5**	**Total average**		

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