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An Evaluation on Seed Yield and Yield Components in Various Lentil Genotypes under Rain fed and Irrigated Conditions

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Abstract: To evaluate the seed yield and yield components in 25various lentil genotypes, including 23Ardabil local genotypes and two control genotypes, a study was conducted in Ardabil IAU Agricultural Research Station (Hasanbaruq) in two rain fed and irrigated conditions in randomized complete block design in 2010. Results suggested that there was a significant difference between studied genotypes on number of filled pods, number of seeds per plant, seed small diameter, seed large diameter, seed weight and grain yield. Genotype No. 7 has the highest seed yield.

Key words: Lentil · Yield · Yield components

INTRODUCTION

Lentil (Lens culinaris Medikus) is a legume like the cold, probably originated from the Near East's Fertile Crescent. Lentils have been two macros perm and micros perm. A macros perm group has overcome in the Mediterranean region and Asia. The seeds are large and usually yellow split peas and with very little pigment or no pigment in the flowers or green germination parts. Micros perm groups have shorter height, more pigment and leaves, leaflets and pods are smaller than macros perm groups. Micros perm group are the dominant in the Indian subcontinent and parts of the Near East. Seedlings are less than 6 mm (diameter) with orange or yellow split peas [1]. It is obvious that lentil plant can do Protein supply and nitrogen fixation of by its roots, Which can be an important crop in the rotation cycle of the plants, especially in leguminous family. Lentil crop acreage is 220,000 ha in Iran which 92% is grown in dry land conditions [2]. Lentil is one of the most digestible Beans that is Valuable source of protein which is 25 percent and straw, shell pods contain high nutritional value that consume livestock [3].

There are various factors which lead to low lentil yield. Among the main factors which result in low yield are low yield potential and local genotypes' incompatibilities with rainfed conditions [4]. Similar to other environmental stresses, drought has adverse effects on crops' yield. Water shortages are among the main factors which decrease the yield in most regions [5]. A vast majority of breeding studies are focusing on plant modification and reactions to water shortages [6].

The following research tries to evaluate the seed yield and yield components in various lentil genotypes under two rain fed and irrigated conditions.

MATERIALS AND METHODS

This experiment was conducted on research farm of Islamic Azad University of Ardabil in 2010 (Ardabil West 5 km). The climate is semi-arid and cold, winter temperatures were often below zero degrees. Altitude was 1350 meters and latitude and longitude were 38.15 north and 48.2 east, respectively. Average annual minimum and maximum temperature and maximum absolute temperature were -1.98, 15.18 and 21.8°C, respectively and mean annual precipitation have been reported 310.9 mm. The experiment soil was clay *alluvial* soils; its acidity varies between 8.2-7.8.

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A study was conducted in Ardabil IAU Agricultural Research Station (Hasanbaruq) in two rain fed and irrigated conditions in randomized complete block design in 2010.

Each variety consists of 4 lines 5/2 meters, the distance 25 cm from each other, so planting was in the first half of May. The lateral two lines were as the margin and middle two line was considered as a resource for each treatment. The main problem was in the weeds. Because most weeds are dominant over the lentils. Thus carried hand-weeding out mostly in 2 to 4 leaf stage of weeds. The weeding was about 3 to 4 times, the irrigated operation was carried out regularly without stress. When the lentils reach to ripening stages, crops harvested by considering both sides and 20 cm from the beginning and end of the line as the border between the middle lines as calculating performance.

The traits that were evaluated during testing are following:

The small and large diameter grains, The number of full pod, The number of seeds per plant, Grain yield per plant, 100 seed weight, Time of harvest maturity (when the lower one-third of the plants begins to yellow and greenish yellow color of the scabbard, as was the harvest time. The number of days from planting to harvest was recorded as days to maturity). Grain yield in each experimental unit (Removing the margins, the entire remaining part of the test material and seed weight was calculated). The amount of seed weight per plant as the sample was collected and calculated from each experimental unit. And finally, as the number of grain yield was recorded in the experimental unit.

In any of the methods according to need and was used MSTATC & spss software.

RESULTS AND DISCUSSION

Combined analysis of variance (Table 1) suggested that there was a significant difference between studied genotypes on days to number of filled pods, number of seeds per plant, seed small diameter, seed large diameter, seed weight and grain yield. However, there was no significant difference found between other studied traits. Hence, it could be claimed that there is a proper diversity between genotypes for selection of most traits. There are various factors which lead to low lentil yield. Among the main factors which result in low yield are low yield potential and local genotypes' incompatibilities with rain fed conditions [4]. Temperature applies limitations on seed weight and yield during grain filling period through reducing the grain filling period. Environmental conditions affect plant metabolic activities and cold and heat stresses could lead to reduce the grain filling period or even stop the grain growth [7].

Table 2 indicates that genotype No. 7 at Hasanbaruq station had the highest seed yield. The genotype had the highest values in number of filled pods, seeds per plant, seed small diameter while it had low values in seed large diameter and seed weight. Due to the interaction between genotype and environment, evaluating new cultivars in various environments by modifiers seems to be essential. Since, popular analysis methods such as combined analysis of variance could only provide information on interaction between genotype and environment; researchers have applied various criteria for to determine the cultivars sustainability and introduction [8]. The interaction between genotype × environment is among the main issues in breeding which has a great role in developing modified cultivars. Genotype interaction in

Table 1: Combined Analysis Of Variance on 25 Lentil Genotypes in Two Conditions of Irrigated and Rainfed in Hasanbaruq Station

		MS						
S.O.V	df	Number of full pod	Number of grain per plant	Weight of grain per plant	Small diameter grains	Large diameter grains	100 seed weight	Grain yield in plot
Conditions	1	0.349^{ns}	0.414^{ns}	0.003^{ns}	0.099^{ns}	0.152^{ns}	1.077^{ns}	0.63*
Error 1	4	0.583	0.647	0.032	0.035	0.726	7.033	0.299
Genotype	24	0.086**	0.098**	0.007^{ns}	0.045**	2.443**	5.082**	0.094**
C*G	24	0.006^{ns}	0.005^{ns}	0.002^{ns}	0.014^{ns}	0.124^{ns}	0.146^{ns}	0.005^{ns}
Error 2	96	0.031	0.034	0.005	0.011	0.192	0.431	0.028
CV %		14.45	14.52	13.77	4.1	6.99	9.71	8.77

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

Table 2: Comparison of Means of the traits on 25 Lentil Genotypes

	Traits					
Genotype	Number of full pod	Number of grain per plant	Small diameter grains	Large diameter grains	100 seed weight	Grain yield in plot
1	17.74	18.88	2.645	6.787	8.060	74.47
2	16.52	16.98	2.475	6.822	7.255	79.61
3	15.78	16.56	2.590	6.817	7.665	84.53
4	19.99	22.23	2.683	5.622	5.792	83.56
5	18.88	23.17	2.547	5.965	6.180	76.03
6	9.87	12.73	2.665	5.748	6.198	12.08
7	27.29	30.91	2.848	4.873	4.892	144.2
8	12.89	13.21	2.527	7.028	7.893	84.33
9	20.47	23.77	2.648	6.413	6.918	99.08
10	11.97	11.77	2.477	6.727	7.210	50.58
11	23.23	28.18	2.705	5.592	5.745	97.05
12	21.38	27.29	2.687	5.365	5.498	117.5
13	11.40	12.19	2.512	6.927	7.572	65.92
14	17.82	18.24	2.630	5.433	5.670	88.71
15	20.66	22.91	2.667	6.268	6.890	79.06
16	14.59	17.49	2.652	6.020	6.752	105.44
17	16.07	18.83	2.602	6.628	7.207	56.75
18	18.71	20.32	2.600	6.788	7.592	87.71
19	16.48	18.79	2.485	6.630	7.763	110.66
20	8.32	10.19	2.587	6.962	7.507	38.19
21	11.89	12.27	2.565	6.617	7.113	69.18
22	18.81	23.17	2.498	5.703	5.860	116.7
23	18.41	21.28	2.577	5.967	6.075	94.84
24	16.41	18.83	2.547	7.150	7.975	100.0
25	19.72	21.82	2.630	5.525	5.683	94.62
LSD	0.210	0.220	0.125	0.522	0.782	0.199

the environment indicates the various reactions to various environments; that is, the best genotype in an environment is not necessarily the best genotype in other environments [9].

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