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Study of correlation and relationships between seed yield and yield components in Lentil (*Lens culinaris Medik*)

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ABSTRACT

In this study yield and seed yield components of twenty nine lentil (Lens culinaris Medik) genotypes were compared in a used Pilot project used augmented as a randomized complete block design with three replications, was carried out in Ardabil Agricultural Research Station, in 2010. traits Average based on 10 plant competitors who were randomly selected and analyzed following measurements: green Percent, days to flowering time, number of hooks, hook size, grain yield per unit area, days to reach a plant height, Height, lowest pod, harvest index, number of filled pods per plant, empty pods per plant, seed number per 100 pods, number of primary branches per plant, number of secondary branches per plant, biomass and seed weight. Results showed highly significant correlation between grain yield and green Percent, plant height, number of filled pods per plant, biological yield, plant height, pod number per plant, seed number per 100 pods, biomass and seed weight. Stepwise regression analysis of grain yield with other traits showed that the increase in biomass and reduce the number of secondary branches will have a positive effect on yield.

Key words: Correlation, quantitative traits, lentil, multiple regression

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INTRODUCTION

Lentil (*Lens culinaris* Medik.) may have been one of the first agricultural crops grown more than 8,500 years ago. Production of this cool season annual crop spread from the Near East to the Mediterranean area, Asia, Europe and finally the Western Hemisphere. It may have been introduced to the United States in the early 1900s. The crop has received little research attention to improve its yield and quality. It grows well in limited rainfall areas of the world (Oplingera et al, 1990). Lentil is a pulse (grain legume) crop. In North America much of the acreage is in eastern Washington, northern Idaho, and western Canada where drier growing season conditions prevail. It has been grown in that area since the 1930s as a rotation crop with wheat. Most of the lentil production in the United States and Canada is exported, but domestic consumption is increasing. Lentil is a protein/calorie crop. Protein content ranges from 22 to 35%, but the nutritional value is low because lentil is deficient in the amino acids methionine and cysteine. Lentil is an excellent supplement to cereal grain diets because of its good protein/carbohydrate content. It is used in soups, stews, casseroles and salad dishes. Sometimes they are difficult to cook because of the hard seed coats that result from excessively dry production conditions. (Oplingera et al, 1990). Lentils which fail to meet food grade standards (graded #3 or below) can be used as livestock feed because of their high protein content and lack of digestive inhibitors. Lentil can be used as a green manure crop and one particular Canadian variety, Indianhead, provides a large amount of fixed nitrogen (estimated to be 20 l b/acre). The principal aim of lentil production is to obtain high yield. Therefore, we must use the available lentil species towards this aim. Genotype and environmental conditions are dominant factors influencing the amount of harvested yield. Even though environmental conditions are partially controllable, genotype of the plant can only be changed by breeding. It is well known that while there is a positive and significant relationship among the number of pod, biological yield and the number of seed/plant; a negative significant correlation between yield and the number of seed in pod and 1000 seed weight were reported (Luthra and Sharma, 1990). Tikka et al (1997) reported that seed yield is a function of plant height, the number of the pod/per plant and the number of seed/per pod and there are positive correlations among the given traits. Biological yield, harvest index, the number of seed/per plant, the number of the pod/per plant the number of main and lateral branches and the number of seed/per pod are the yield components determining the amount of seed yield (Çiftçi et al., 1998; Karadavut, 2009). This investigation was done for determination Cause and effect relations between yield and some of its related traits in lentil genotypes.

MATERIALS AND METHODS

Genotypes and environment

In this experiment were used of 29 lentil genotypes. Seed samples were produced, of beans Research Center Agriculture and Natural Resources in Ardebil province east Cost of IRAN.

Experimental procedure

We used Pilot project used augmented design as a randomized complete block design with three replications a split-plot design with three replications.

Traits

traits Average based on 10 plant competitors who were randomly selected and analyzed following measurements: green Percent, days to flowering time, number of hooks, hook size, grain yield per unit area, days to reach a plant height, Height, lowest pod, harvest index, number of filled pods per plant, empty pods per plant, seed number per 100 pods, number of primary branches per plant, number of secondary branches per plant, biomass and seed weight.

Statistical procedures

SAS program used for analysis of variance and SPSS program for correlation parameter.

RESULTS AND DISCUSSION

Usually Understanding the genetic characteristics of important trait and the special relationship between them, they are also unaffected were intended for achieve desired goals in plant breeding in order to achieve desirable and identification of these features are important in predicting outcomes. To evaluate the relationship between traits and common variation in phenotypic was calculated of the correlation coefficient between them using the average data (Table1). Highly significant correlation between grain yield and green Percent, plant height, number of filled pods per plant, biological yield, plant height, pod number per plant, seed number per 100 pods, biomass and seed weight. (Table1). These results are in agreement with findings of other researchers (Ramgiry et al., 1989; Zaman et al., 1989; Luthra et al., 1990; Anjam et. al., 2005). While plant height had highly Positive and significant correlation with number of hooks, hook size, number of filled pods per plant, seed number per 100 pods, it had a Positive significant correlation with all treaties except for green Percent, days to flowering, harvest index and empty pods per plant. Correlation coefficients between the others traits were given in Table 1. There are similar results in the literature (Luthra and Sharma, 1990; Çiftçi et al., 1998; Ramgiry et al., 1989; Zaman et al., 1989).

Stepwise regression analysis of grain yield with other traits The experimental errors using the dorbin- Watson's test took and showed that the errors are independent of each other. Statistics as well as lower variance inflation factor (VIF) of 10 indicates that there are few collinarity. In stepwise regression analysis, was considered grain yield as the dependent variable (Y) and other traits have been evaluated as independent variable (X) based on Stepwise regression results remained biomass and number of secondary branches in the model And about 84% change in the yield of these traits are controlled. There is a significant factor the regression equation represents that the traits are effective the yield increase.

So that the increase in biomass and reduce the number of secondary branches will have a positive effect on yield and t-test results show Significant coefficients the traits. With regard to biomass (X1), the number of secondary branches (X2) and yield (Y) was obtained the following equation.

Y = 23. 303ns + 0. 323 * (X1) - 10. 862 ** (X2)

*, ** And ns =, respectively, significant at 1% level, 5% and non-significant

Table 1. Correlation coefficients between the plant characters

	green Percent	days to flowering	number of hooks	hook size,	grain yield	maturty	height	lowest pod	harvest index	number of filled pods per plant	empty pods per plant	seed number per 100 po	primary branches per plant	secondary branches	biomass
days to flowering	-.544**														
number of hooks	-0.236	.473**													
hook size,	-0.29	0.286	.685**												
grain yield	.446*	-0.192	0.331	.370*											
maturty	-0.312	0.321	.694**	.997**	0.328										
height	-0.179	0.355	.750**	.943**	.415*	.947**									
lowest pod	-0.303	0.165	.485**	.854**	0.353	.834**	.723**								
harvest index	-.441*	.444*	0.207	0.187	0.126	0.177	0.194	0.17							
number of filled pods per plant	0.074	-0.075	.575**	.667**	.522**	.655**	.735**	.452*	-0.014						
empty pods per plant	-0.126	0.283	0.264	0.207	-0.058	0.239	0.245	0.086	-0.003	0.124					
seed number per 100 po	-0.228	0.316	.725**	.963**	.435*	.964**	.920**	.775**	0.193	.687**	0.287				
primary branches per plant	-0.303	.390*	.722**	.887**	0.268	.906**	.883**	.703**	0.12	.555**	.388*	.883**			
secondary branches	-0.194	0.143	.632**	.815**	0.262	.824**	.793**	.605**	-0.096	.674**	0.174	.762**	.853**		
biomass	.435*	-0.079	.523**	.542**	.893**	.514**	.606**	.442*	-0.119	.631**	0.099	.591**	.469*	.492**	
100 seed weight	-0.008	0.236	.591**	.682**	.486**	.681**	.694**	.453*	0.141	.565**	0.265	.729**	.612**	.498**	.622**

***. Correlation is significant at the 0.01 level. And *. Correlation is significant at the 0.05 level.*

CONCLUSION

The relationship between grain yield and plant height, pod fill, seed number per 100 pods, biomass and 100 grain weight were significant and positive. based on Stepwise regression results, biomass and number of secondary branches are controlled about 84% change in the yield. So that the increase in biomass and reduce the number of secondary branches will have a positive effect on yield.

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