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Full Length Research Paper

Determinatıon of seed yield and some yield components through path and correlation analyses in many six-rowed barley (*Hordeum vulgare* conv. *hexastichon)*

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This study was carried out to determine the selection criteria suitable for higher yield of barley in breeding studies. For this purpose, methods of path and correlation analyses were performed on 10 barley cultivars and 43 lines. Depending on the findings of this study, no statistically significant relation was observed between seed yield and plant height. It can be inferred from the results obtained that besides other yield components, 1000- seed weight can function as the most important selection criterion in a study performed in order to improve yield; although ıt is advisable that other yield components should be taken into account.

Key words: Barley, yield components, path analysis.

INTRODUCTION

In agronomic and breeding studies, correlation coefficients are generally employed to determine the relation of seed yield with yield components. However, correlation coefficients mostly bring forth the interrelations of independent components. However, in plant production, the seed yield is a function of many parameters which have interrelations among themselves and affect the seed yield directly or indirectly. For this reason, as a tool, the correlation coefficients become insufficient in using yield components for selection criteria to improve seed yields. It is reasonable to know whether any yield component has a direct or an indirect effect on yield, so that the selection studies can be carried out successfully.

Here, the path analysis brings a solution to this problem and is used to determine the direct or indirect effect of any yield component on yield in relation to the other yield components. Many researches were done on wheat breeding in which both correlation and path analysis methods were simultaneously used; however, few studies were on barley. Some researchers reported a positive and significant correlation between plant height and yield (Naik et al., 1998; Sing et al., 1999; Anwar et al., 2009); however, a study in the literature reported a negative correlation between them (Bilinski et al., 1997). In many studies, it has been reported that seed number/ spike has a positive effect on yield (Begum and Khatu, 1997; El-Hennawy, 1997; Naik et al., 1998; Sing et al., 1999; Bisht and Gahalain, 2009; Dogan, 2009). Seed weight/ spike has been found to have a positive effect on yield (Schittenhelm et al., 1996; Dogan, 2009). In correlation, in a path analyses carried out by a large number of researches, it has been observed that a1000-seed weight has a positive effect on yield (Bilinski et al., 1997; El-Hennawy, 1997; Irfan-ul haq et al., 1997; Sing et al., 1999; Verma et al., 1998; Mohammed et al., 2008).

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MATERIALS AND METHODS

Cultivars and lines were obtained from Anatolia Agricultural Research Center in Turkey. These plant entries were seeded onto pilots arranged in randomized block design with three replications, each entry in a row 2 m long. From each variety and line in every pilot ten plants were taken randomly and some agronomic traits such as plant height, seed number/spike, seed weigh/spike and

Table 1. Correlation coefficients and levels of importance determined over a two-year avarege data.

Parameter	Plant height (cm)	Spike length (cm)	Spikelet number/Spike (adet)	Seed Number/spike (adet)	Seed weight/Spike (g)	1000 seed weight (g)
Yield	-0.001^{ns}	-0.164^{ns}	0.613**	0.383 **	0.815 **	0.969**
Plant Height	-	0.044^{ns}	0.01^{ns}	0.145^{ns}	0.128^{ns}	0.028^{ns}
Spike Length	-	-	-0.049^{ns}	0.055^{ns}	-0.114^{ns}	-0.146^{ns}
Spikelet number/spike		-	-	0.70**	0.593**	0.596**
Seed number /spike	-	-	-	-	0.565**	0.374**
Seed weight/spike	-	-	-	-	-	0.806**

Table 2. Path analysis of seed yield and yield components over two year avarage experimental values.

Direct effect	Indirect effect	Correlation coefficient	Path coefficient	Impact percentage
Plant height		-0.001	-0.0364	42.3
	Spike length		-0.0009	1.0
	Spikelet number/spike		0.0036	4.1
	Seed number /spike		-0.0062	7.2
	Seed weight /spike		0.0151	17.5
	1000 seed weight.		0.0239	27.8
Spike length		-0.164	-0.0198	12.0
	Plant height		-0.0016	0.9
	Spikelet number/spike		-0.0034	2.0
	Seed number /spike		-0.0023	1.4
	Seed weight /spike		-0.0135	8.2
	1000 seed weight		-0.1232	75.2
Spikelet number /spike		0.163	0.07	10.3
	Plant height		-00019	0.3
	Spike length		-0.0010	0.2
	Seed number /spike		-0.0299	4.4
	Seed weight /spike		0.0700	10.4
	1000 seed weight		0.5039	74.5
Seed Number /spike		0.383	-0.0427	8.9
	Plant height		-0.0053	1.0
	Spike length		-0.0011	0.2
	Spikelet number/spike		0.0489	10.2
	Seed weight /spike		0.0667	13.8
	1000 seed weight		0.3161	65.7
Seed weight /spike		0.815	0.1181	13.5
	Plant height		-0.0047	0.5
	Spike length		0.0023	0.3
	Spikelet number/spike		0.0415	4.8
	Seed number /spike		-0.0241	2.7
	1000 seed weight		0.6823	78.2
1000 seed weight		0.969	0.8460	84.4
	Plant height		-.0010	0.1

Table 2. Contd.

	Spike length	0.0029	0.2
	spikelet number /spike	0.0417	4.2
	Seed number /spike	-0.0160	1.6
	Seed weight /spike	0.0952	9.5

1000- seed weight were measured on these plants and seed yields of pilots were simultaneously determined.

Simple correlation coefficients of seed yield and components were calculated by the method developed by Sokal and Rohlf (1969). Path coefficients were determined by using method suggested by Dewey and Lu (1959). İn the path analysis, plant height, seed number/spike, seed weight/spike, 1000- seed weight were treated as independent components whereas the yield was considered to be a dependent variant.

RESULTS AND DISCUSSION

It is a well known fact that plant height, seed number/ spike, seed weight/spike and 1000- seed weight have a significant effect on yield in cereals. Plant height was the first component we investigated, and the findings of our analysis, which have been presented in Table 1, indicate that the correlation between plant height and yield is of no statistical significance. In the path analysis, depending on a two-year average data, plant height has been found to have a negative effect on yield at a rate of 42.3%. While our findings are in compliance with those of some researches (Bilinski et al., 1997), they are contrary to the results suggested by some others (Naik et al., 1998; Sing et al., 1999; Anwar et al., 2009) (Table 2). Also, the seed number/spike has been seen to have a statistically significant effect on both seed weight/spike and a1000-seed weight (Table 1). Some researches have already shown that seed number, has positive relations with yield (Begum and Khatu, 1997; El-Hennawy, 1997; Naik et al., 1998; Sing et al., 1999; Bisht and Gahalain, 2009; Dogan, 2009).

These results are parallel to those of the correlation analysis we obtained from our study. As a result of our path analysis, we have found that seed weight/ spike has a negative and small effect (at a rate of 1%) on yield, especially when the value of the two-year period is taken into consideration. Nevertheless, its indirect effect was caused by 1000-seed weight is positive and its rate is 65.7%. These results are in contradiction with those reported by some researchers (El-Hennawy, 1997; Naik et al., 1998; Verma et al., 1998; Fathi and Rezaeimoghdam, 2000). Another component we studied was seed weight/spike. As can be seen in Table 1, the correlation analysis we have carried out to determine the relation between seed weight/spike and yield indicates that the values of each year and the two-year period have a positive effect on yield. The same positive effect has been observed in the path analysis; however, the direct effect of seed weight/spike on yield has been found to be smaller than its indirect effect on 1000-seed weight (Sinebo, 2002) (Table 2).

The effect of 1000-seed weight on yield has been found to be of statistical significance when each two-year period and the general average of the two-year period have been taken into consideration. Besides plant height, seed number/spike and seed weight/spike have been observed to have a statistically significant effect on 1000-seed weight (Table 1). Many a researcher have reported that there is a strong correlation between yield and 1000-seed weight (Bilinski et al., 1997; El-Hennawy, 1997; Irfan-ul haq et al., 1997; Sing et al., 1998; Verma et al., 1998; Mohammed et al., 2008), which is consistent with the results of our correlation analysis. Also, we obtained similar results from our path analysis and they are consistent with the findings reported by many researchers (Bilinski et al., 1997; El-Hennawy, 1997; Irfan-ul haq et al. 1997; Sing et al., 1998; Verma et al., 1998; Fathi and Rezaeimoghdam, 2000; Mohammed et al., 2008). The effect of 1000- seed weight on yield was 97.2% in 1998 to 1999 and it was 98.8% in 1999 to 2000. The average value for the two-year period was 8.6%.

We have come to the conclusion from the results obtained that although 1000-seed weight can function as the most important selection criterion in a study to be performed, in order to improve yield, it is advisable that other yield components should be taken into account.

REFERENCES

Anwar J, Ali MA, Hussain M, Sabir W, Khan MA, Zulkiffal M, Abdullah M (2009). Assessment of yield criterıa in bread wheat through correlation and path analysis. J. Anim. Plant. Sci., 19(4): 185-188.

Bilinski ZR, Kudla M, Gacek E (1997). Usefulness of selected genotypes in breeding barley cultivars resistant to net blotch (*Pyrenophora teres Drechls*). Biuletyn Instytutu Hodowli-I Aklimatyzacji Roslin, 201: 237-245.

Dewey DR, Lu KH (1959). A correlation and path coefficient analysis of components of crested wheat grass seed production. Agro. J., 9: 515-518.

Dogan R (2009). The correlatıon and path coeffıcıent analysıs for yıeld and some yield components of durum wheat (*Triticum turgidum var. durum L.*) in West Anatolia conditions, Pak. J. Bot. ,41(3):1081-1089.

El-Hennawy MA (1997). Genetic variability and path coefficient analysis of some agronomic characters in barley (*Hordeum vul. L.*). Ann. Agric. Sci., 35(2): 773-783.

Fathi, GH, Rezaeimoghddam, K(2000). Path analysis of seedyield and yield components for some barley cultivars in Ahvaz region. Agric. Sci. Technol., 14(1): 39-48.

Irfan-ul haq S, Bhutta WM, Rizwan K, Shami I, Khaliq R (1997). Path coefficient analysis of some quatitative characters in husked barley. Pak. J. Agric. Sci., 34(1-4): 108-110.

Naik VR, Hanchinal RR, Maled BG, Patil BN (1998). Correlation and path analysis in barley. Karnataga J. Agric. Sci., 11(1): 230-232.
Sokal RR, Rohlf FC (1969). Biometry, the principal and pratice of statistic in biological research W.H. Freeman and Company, San Fransisco, p. 776.
Verma SK, Lamba R, Kumar N (1998). Study of direct and direct influences of contributing traits on seed yield in barley (*Hordeum vul. L.*). Crop Res. Hisar, 16(3): 333-336.