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COMPARATIVE CORRELATION AND PATH ANALYSIS IN LOCAL AND EXOTIC GERMPLASM IN LENTIL.

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ABSTRACT

Two sets of germplasm, one of local collection and another of introduced lines comprising 89 and 50 lines respectively were evaluated in 1980-81 and in 1981-82 respectively. Correlation coefficients among various characters as well as path analysis of five characters were estimated for the both sets of germplasm. Seed yield was found to have high positive correlation with pods/plant, primary and secondary branches in both sets of germplasm. Seed weight did not show any relationship with yield in the local germplasm but showed high positive association with yield in the exotic germplasm. Pods/plant was found to have high positive correlation with primary and secondary branches. In both sets of germplasm, pods/plant had high direct effect on seed yield, but only in the exotic germplasm, pods/plant had high direct effect on seed yield, but only in the exotic germplasm 100-seed weight had high direct effect on seed yield. Secondary branches had no direct effect on seed, but its indirect effect through pods/plant was high.

Lentil (*Lens culineris* Medik.) is one of the most important pulse crops in Bangladesh. It stands 2nd in acreage (196,000 acres), with a minimal yield of 650 lbs/acre. Recent reports have shown, however, a general decreasing trend in both production and acreage of lentil (Anon., 1980). In order to halt this declining trend, high yielding varieties with stability of production are needed. Expression of complex characters like yield depends upon the interrelationship of a number of component characters. A clear understanding and knowledge of the variability present, and association and contribution of various yield components is needed to undertake a selection programme for high yielding lines. As more variables are included in correlation studies, the indirect associations become complex. Path coefficient analysis devised by wright (1921) has been found to be useful in these situations. It furnishes a knowledge of the paths through which the component characters influence the expression of economic characters like yield. Since information on these aspects is scanty on lentil in Bangladesh, a study was conducted to work out correlations and path coefficients in lentil.

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Materials and Methods

Two sets of germplasm, one of local collection and another of introduced lines comprising 89 and 50 respectively were evaluated in an adaptation trial at Bangladesh Agricultural Research Institute, Joydebpur, Dacca. The local germplasm lines were evaluated in 1980-81 *rabi* season in non replicated 4 metre rows. The row to row distance were 30 cm and plant to plan, 10 cm. The exotic germplasm lines were grown in 1981-82 rabi season with 1.5 metre non replicated rows. The row to row distance were 25 cm and plant to plant 10 cm. In each of the sets 10 randomly choosen plants were tagged and all observations were recorded from these 10 plants. Data were recorded on plant height, primary branches, secondary branches, pods/plant, seeds/pod, 100-seed weight, yield/plant and additional observation on days to maturity were taken for exotic germplasm.

The mean values of ten plants were used for statistical analysis. Correlations were worked out according to the formula given by Robinson *et al.* (1951). Direct and indirect effects were calculated according to the formula given by Dewey and Lu (1959).

Results and Discussion

The correlation coefficients estimated among various pairs of characters in both the local and exotic germplasm are given in Table 1.

Table 1

Correlations among various yield components in local and exotic germplasm in lentil

Characters		Days to maturity	Plant height	Primary branches	Secondary branches	Pods/plant	Seeds/pod	100-seed weight
Plant height	L	—						
	E	0.526**						
Primary branches	L	—	0.117					
	E	—0.273**	—0.233					
Secondary branches	L	—	0.03	0.808**				
	E	0.057	0.283*	0.252				
Pods/plant	L	—	0.280**	0.685**	0.727**			
	E	—01.71	0.023	0.327**	0.648**			
Seeds/pod	L	—	0.093	0.069	0.113	0.051		
	E	0.253	—0.036	—0.195	0.001	—0.066		
100 seed weight	L	—	0.316**	—0.053	—0.156	—0.059	0.050	
	E	—0.500**	0.267	0.054	0.131	0.048	—0.426**	
Yield/plant	L		0.360**	0.606**	0.687**	0.858**	0.145	—0.001
	E	—0.424**	0.102	0.277*	0.512**	0.786**	—0.149	0.519**

* Correlation coefficient of local germplasm were obtained from Doza *et al.* (1982)

L = local; E = exotic

In the local germplasm seed yield had strong positive correlation with plant height, primary branches, secondary branches and pods/plant. Pods/plant was significantly correlated with plant height, primary branches and secondary branches. Significant association was also found between primary and secondary branches, and plant height and 100-seed weight. In the exotic germplasm, seed yield had significant positive correlation with primary branches, secondary branches, pods/plant and 100-seed weight. But strong negative association was found between days to maturity and yield/plant. Days to maturity also had strong negative association with primary branch and 100-seed weight. Pods/plant had high positive correlation with primary and secondary branches. Seeds/pod was negatively correlated with 100-seed weight, and plant height had positive correlation with secondary branch.

Pods/plant was reported to have high positive correlation with seed yield (Narisinghani *et al.*, 1978; Singh *et al.*, 1970; Singh, 1977; Todorov, 1980 and Tikka *et al.*, 1977). In the present study also, pods/plant showed highly significant positive correlation with seed yield. Singh *et al.*, (1970), Singh (1977), Dixit (1974) and Tikka *et al.*, (1977) have reported that plant height, primary and secondary branches were positively correlated with seed yield. Similar results were obtained in the present study. In this study, plant height showed positive correlation with yield only in the local germplasm, while primary and secondary branches showed positive correlation in both sets of germplasm. Singh *et al.* (1970) have reported no correlation between seed weight and seed yield, while Singh (1977) found that seed weight was negatively correlated with seed yield. In the present study seed weight did not show any relationship with yield in the local germplasm, but showed significant and positive correlation with yield in the exotic germplasm. This is possibly due to lack of variability for seed weight in the local germplarm. Dixit (1974) reported that primary branches had high positive correlation with secondary branches and pods/plant. Similar results were obtained in the present study except in the exotic germplasm for secondary branches. He also reported positive association between primary and secondary branches which is in agreement with the results of the present study.

The path coefficients estimates among four yield components and yield in local and exotic germplasm are given in Table 2. Path analysis was used to determine the direct effects of plant height, pods/plant, 100-seed weight and secondary branches on seed yield. From the table it is evident that in the local germplasm pods/plant had high direct effects on seed yield followed by secondary branches. Plant height had indirect effects on seed yield through pods/plant. Though secondary branches had little direct effect on seed yield

its indirect effect through pods/plant was large. Seed weight did not have any significant influence either directly or indirectly in the local germplasm.

TABLE 2

Direct and indirect effects of variables in local and exotic germplasm

Variables correlated	Path coefficient	
	Local	Exotic
1. Plant height vs. grain yield (r)	0.360	0.102
Direct effect of plant height	0.160	—0.035
Indirect effect via pods/plant	0.188	0.023
Indirect effect via 100-seed weight	0.006	0.133
Indirect effect via secondary branches	0.006	0.018
2. Pods/plant vs. grain yield (r)	0.858	0.786
Direct effect of pods/plant	0.670	0.805
Indirect effect via plant height	0.045	—0.001
Indirect effect via 100-seed weight	—0.001	0.042
Indirect effect via secondary branches	0.144	0.042
3. 100-seed weight vs. grain yield (r)	—0.001	0.519
Direct effect of 100 seed weight	0.019	0.498
Indirect effect via plant height	0.051	—0.009
Indirect effect via pods/plant	—0.040	0.039
Indirect effect via secondary branches	0.031	—0.099
4. Secondary branches vs. grain yield (r)	0.687	0.512
Direct effect of secondary branches	0.198	—0.065
Indirect effect via plant height	0.005	—0.010
Indirect effect via pods/plant	0.487	0.522
Indirect effect via 100-seed weight	—0.003	0.065
Residual effect.	0.481	0.382

In the exotic germplasm also pods/plant had high direct effect on seed yield followed by 100-seed weight. Indirect effect of 100-seed weight does not have much contribution towards yield. Plant height and secondary branches do not have any direct contribution to yield but contribute significantly via pods/plant.

In both sets of germplasm, pods/plant had high direct effect on seed yield, but 100-seed weight had high direct effect on seed yield only in the exotic germplasm. It is interesting to note that though secondary branches had no direct effect on seed yield, its indirect effect through pods/plant is very high in both types of germplasm. Plant height had low direct effects on seed yield in both cases. 100-seed weight had low direct effects on seed yield in the local germplasm. Similar results were reported by Singh *et al.* (1970) and Singh (1977)

indicating that pods/plant was the direct contributor to seed yield followed by seed weight and plant height.

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