SHORT COMMUNICATION

CORRELATION AND PATH ANALYSIS FOR YIELD AND YIELD ATTRIBUTING CHARACTERS IN SOYBEAN (*GLYCINE MAX* L.)

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Abstract: A study was conducted atfield experimentcenter of department of Genetics and Plant Breeding, Allahabad School of Agricultural, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, U.P. during kharif 2010 on 42 genotypes of soybean to determine the correlation and path analysis of yield and its components. Genotypic correlations were higher than the phenotypic and environmental ones for most of the characters exhibiting high degrees of genetic association among traits under consideration. Correlation coefficient for plant height, number of pods/plant, number of branches/ plant, biological yield /plant, seed index, harvest index and days to 50 % flowering showing positive significant correlation with grains yield per plant whereas days to maturity and number of grains per pod showing positive non-significant correlation with grain yield per plant at genotypic level.

Path coefficient analysis revealed that biological yield had maximum positive direct effect on grains yield per plant followed by harvest index, pod length, plant height, days to maturity and number of branches per plant.

Keywords: Soybean,correlation coefficient, path analysis

INTRODUCTION

Soybean (2n = 40), is a very important leguminous seed crop; known for its highly valued protein and oil owing to its use in food, feed, and industrial applications. It enriches the soil by fixing nitrogen in symbiosis with bacteria. In the international world trade markets, soybean is ranked number one in world among the major oil crops such as rapeseed, groundnut, cottonseed, sunflower, linseed, sesame and safflower.

The use of correlation coefficient is to establish the extent of association between yield and yield attributing traits, which are having decisive role in influencing the yield and determined the component characters in which selection can be based for genetic improvement in yield. However, it is only genetic variation which is heritable and hence important in any selection programme.

Path analysis provides information about the cause and effect situation in understanding the cause of association between two variables. It is quite possible that a trait showing positive direct effect on yield may have a negative indirect effect via other component traits. Path analysis permits the examination of direct effect of various characters on yield as well as their indirect effect via other component traits. Thus through the estimates of direct and indirect effects, it determines the yield components. Yield is complex character governed by a large number of quantitative characters, which are especially important in breeding programme.

MATERIAL AND METHOD

Forty two diverse genotypes of soybean RKS 63, PS 1476, JS 2030, NSO 81, VLS 77, KSO 245, PS 1477, US (SH) 2003.8, DS 15-2, MAUS 449, SL 778, PS 1480, VLS 76, JS 20-34, AMS-MB-5-18, MACS 1311, DSb – 20, KS 203, CSB 08-08, MAUS 453, NRC-86, AMS-MB-5-19, MACS 1336, RKS 61, US 20-29, NRC 85, TS 10, Dsb 18, SL 871, CSB 08-09, DS 27-11, NRC 87, Himso 1680, AMS 243, MACS 1201, BAUS 40, KDS 344, KBS 8, NRC 88, Bragg (check), SL – 525 (check) were grown in *kharif*2010 season at field experimentcenter of department of Genetics and Plant Breeding, Allahabad School of Agricultural, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, U.P. These forty two genotypes included two checks were grown in RBD with three replication and with a plot size of 3 rows of 3m long. Each genotype was planted in plot consisting of row of 3m long with spacing of 45x10 m between rows and plants. Average data recorded on five randomly selected plants from each treatments in every replication for these characters plant height, number of branches per plant, days to 50% flowering, number of pod per plant, days to maturity, number of grain per pod, grain yield per plant, biological yield per plant and 100 seeds weight were used for statistical analysis.Correlation coefficient was computed at genotypic and phenotypic levels between pair of characters adopting following method by Johnson *et al.* (1955). Path coefficient analysis technique performed according to the method suggested by Dewey and Lu (1959).

RESULT

Correlation coefficient analysis

The total correlation coefficients with respect to various characters under study are presented in Table 1. The results regarding genotypic and phenotypic coefficients of correlation showed that the genotypic correlations were higher than the phenotypic for most of the characters exhibiting high degree of genetic association among traits under consideration. The environmental correlation coefficients were not very important in most of the cases indicating low

environmental influence in the experiment. Chand (1999) performed experiments on different varieties of soybean and revealed that the genotypic correlation coefficients for all characters studied were higher than the phenotypic and environmental correlation coefficients.

Grain yield per plant had significant positive association with biological yield per plant, number of branches per plant, harvest index (%), number of pod per plant, plant height, seed index, days to 50% flowering, , and pod length whereas grain yield per plant showed positive non-significant association with days to maturity and grains per pod at phenotypic level. Similar results were also reported by Harer and Deshmukh (1992).

Days to 50% flowering showed positive and significant correlation with days to maturity, plant height, number of pods per plant, biological yield per plant, grain yield per plant. While, it showed positive non- significant correlation of seed index and number of branches per plant, number of grain per pods, harvest index and pod length showed negative non-significant association with days to 50% flowering. Number of pods per plant showed positive and significant correlation with number of branches per plant, biological yield per plant, plant height and grains yield per plant. While number of grains per pod has positive non- significant association with number of pods per plant.

The trait pod length, number of grains per pod and grains yield per plant showed positive significant correlation while seed index, harvest index, number of branches per plant, biological yield per plant and number of branches per plant found the positive non-significant correlation. Positive and significant association of plant height was observed for biological yield per plant and grains yield per plantwhile, it has positive non- significant correlation of seed index, number of grains per pod and days to maturity. In case of days to maturity seed index showed significant and positive correlation while biological yield per plant, grains yield per plant and harvest index showed positive non-significant correlation with days to maturity.

However, the number of grains per pod showed positive non- significant correlation with harvest index and grains yield per plant. Seed index showed positive significant association with grains yield per plant and showed positive association with harvest index and biological yield per plant. Biological yield per plant as well as harvest index showed positive significant correlation with grains yield per plant.

Path coefficient analysis

Path analysis provides an aid for sorting out the total correlation into direct and indirect effect of different traits on yield. The result of path analysis (Table 2) revealed the highest direct positive effect on grain yield was expressed by biological yield per plant followed by number of branches per plant, harvest index (%), plant height, number of pod per plant, pod length, seed index, days to 50% flowering and grains per pod. Similar findings were reported by Srinives *et al*. (1986) and Arshad *et al*. (2006). Result of present study thus indicated that selection based on number of branches per plant plant height, number of pod per plant, pod length, seed index, days to 50% flowering and grains per pod can bring out grain yield improvement in soybean.

Table 1: Estimation of phenotypic correlation of different quantitative character with seed yield per plant in soybean

Character	Days to 50% flowering	No. of pods /plant	Pod length	Number of branches / plant	Plant height	Days to maturity	Number of grains / pod	Seed index	Biological yield /plant (g)	Harvest Index %	Grain yield per plant
Days to 50% flowering	1.000	0.282**	-0.050	0.139	0.331**	0.518**	-0.114	0.021	0.240**	-0.051	0.181*
Number of pods / plant		1.000	-0.006	0.476**	0.300**	-0.043	0.079	-0.093	0.432**	-0.172	0.236**
Pod length			1.000	0.057	-0.025	-0.011	0.246**	0.134	0.048	0.071	0.197*
Number of branches / plant				1.000	0.307**	0.119	0.245**	-0.060	0.552**	0.014	0.541**
Plant height					1.000	0.014	0.050	0.065	0.383**	-0.156	0.277**
Days to maturity						1.000	-0.129	0.297**	0.108	0.018	0.097
Grains / pod							1.000	-0.162	-0.045	0.170	0.108
Seed index								1.000	0.103	0.174	0.193*

Biological yield / plant									1.000	-0.321**	0.681**
Harvest index %										1.000	0.430**

*, ** are significant at 5% and 1% level respectively.

Table 2. Direct and indirect effect of yield component traits attributing seed yield in soybean at phenotypic level.

Character	Days to 50% flowering	No. of pods /plant	Pod length	Number of branches / plant	Plant height	Days to maturity	Number of grains / pod	Seed index	Biological yield /plant (g)	Harvest Index %	Grain yield per plant
Days to 50% flowering	**0.017**	0.005	-0.001	0.003	0.006	0.009	-0.002	0.001	0.004	-0.001	0.181
Number of pods / plant	-0.022	**-0.077**	0.001	-0.037	-0.023	0.004	-0.006	0.007	-0.032	0.014	0.236
Pod length	-0.006	-0.001	**0.114**	0.007	-0.003	-0.002	0.028	0.015	0.005	0.008	0.196
Number of branches / plant	0.009	0.029	0.004	**0.061**	0.019	0.007	0.015	-0.004	0.033	0.001	0.541
Plant height	0.019	0.017	-0.002	0.017	**0.056**	0.001	0.003	0.004	0.022	-0.009	0.277
Days to maturity	-0.011	0.001	0.001	-0.003	-0.001	**-0.020**	0.003	-0.006	-0.002	-0.001	0.097
Grains / pod	0.003	-0.002	-0.005	-0.005	-0.001	0.003	**-0.021**	0.003	0.001	-0.004	0.108
Seed index	-0.004	0.004	-0.006	0.003	-0.003	-0.013	0.007	**-0.042**	-0.005	-0.008	0.192
Biological yield / plant	0.212	0.382	0.042	0.487	0.338	0.095	-0.040	0.090	**0.884**	-0.283	0.680
Harvest Index (%)	-0.036	-0.122	0.051	0.010	-0.111	0.013	0.120	0.123	-0.228	**0.712**	**0.429**

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