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Correlation Between Grain Yield and Agronomic Parameters in Mungbean *Vigna radiata* (L.) Wilcizk

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Abstract: In order to test the correlation between grain yield and yield components five promising mungbean (*Vigna radiata* L.) germplasm i.e. two each from Swat, Dir and one from Chitral were planted at the Research Farm of NWFP Agricultural University Peshawar on May 22, 1997. Grain yield varied significantly from 719 (CH.MB.1) to 1121 kg/ha (D.MB.7). Grain yield showed positive correlation with pod length, pods per plant, 100-seed weight and harvest index and negative correlation with days to maturity, plant height, branches per plant, seeds per pod and dry matter yield. Dry matter yield showed positive correlation with days to maturity, plant height and branches per plant and negative correlation with pods per plant. Pods per plant showed negative correlation with days to maturity, plant height and branches per plant. Days to maturity showed positive correlation with plant height and branches per plant. The correlation between plant height and branches per plant was also positive.

Key words: Correlation studies, yield components, mungbean, *Vigna radiata*

Introduction

Mungbean is an important pulse crop in many Asian countries including Pakistan where the diet is mostly cereal-based. Prospects of mungbean in Pakistan are particularly bright due to increasing demand and hence rising prices, for pulses in general. The multiple uses of mungbean further add to the crop's potential for introduction into new areas. With growing population and increasing demand for food in Pakistan, the mungbean has high prospects to play a useful rule in supplying protein and vitamins.

Grain yield depends largely on agronomic parameters. Correlation provides the information on the correlated response of these parameters with grain yield. Various workers have studied the correlation between yield and yield components in blackbean and mungbean. Ramaswami and Oblisami (1984) reported that seed yield increased with duration. However, the increase in seed yield was not proportional to that of the total biological yield as harvest index was significantly higher in the short duration entries. Khalil *et al*. (1986) reported that days to maturity exhibited significantly positive association with plant height and 100-seeds weight, while correlation of plant height with yield was significantly positive for one year and significantly negative during the next year. Hundred seed weight showed strong negative correlation with yield. Khan *et al*. (1988) reported that the correlation of grain yield with pods/plant was positive and highly significant, while the association of yield with days to maturity was negative. Francisco and Maeda (1989) reported that number of days to first flowering was positively correlated with plant height and number of primary branches but negatively correlated with seed yield. They found that early flowering cultivars produced less total DM and vegetative DM than late flowering cultivars but had higher seed:stem ratios, harvest index and seed yield. Stem DM was negatively correlated with seed: stem ratio and harvest index. Seed yield was determined mainly by the number of pods/plant. Number of seeds/pod, 100-seed weight and pod length tended to compensate for reduced pod number. Satyan *et al*. (1989) reported that seed yield was positively and significantly correlated with plant height, number of branches/plant, number of clusters/plant, number of pods/plant, number of pods/cluster, number of seeds/pod, pod length and days to maturity. Jan *et al*. (1993) noted that number of pods/plant and harvest index had positive correlation with grain yield while, days to first flowering and plant height had negative correlation with grain yield. Islam *et al*. (1993) reported that 100-seed weight had negative significant relationship with seeds/plant and pods/plant. Seeds/plant and pods per plant had significant relationship with plant height and number of main branches/plant. Harvest index (HI) was also significantly related with yield. Naidu (1993) observed that seed yield was significantly and positively correlated with days to 50% flowering, days to maturity, plant height, number of clusters/plant, pods/plant and 1000-seed weight. Pods/plant and 1000-seed weight had maximum positive directed effects on seed yield. The study aimed to determine the significance of various parameters through meaningful correlation studies in increasing or decreasing the economic yield of mungbean.

Materials and Methods

An experiment consisting of 5 mungbean germplasm was carried out on May 22, 1997 at the Research Farm of NWFP Agricultural University, Peshawar. For the sake of identification, accession numbers were assigned on the basis of the crops and their site of collection. The first portion of accession number designates the area from where the germplasm was collected, second portion designates the common name of the crop, while the number given at the end of each accession represents the series of germplasm of that crop collected within that particular area. Where SW stands for Swat, D for Dir, CH for Chitral and MB for mungbean. Each germplasm was considered as treatment and planted in randomized complete block design with three replications by assigning each individual germplasm to a plot of 6 m^2. Each plot consisted of 4 rows, 3 m long and 0.5 m apart. Seedbed was prepared at proper vattar conditions. A basal dose of 25 kg N and 64 kg P_2O_5 per hectare was applied as DAP and incorporated into the soil during ploughing. Irrigation was applied when required. Weeds were controlled manually at the proper time. Data were collected on days to maturity, plant

Table 1: Days to maturity and plant height (cm), branches per plant, seeds per pod and pod length of mungbean germplasm

Acc. No.	Days to maturity (cm)	Plant height	Branches per pod	Seeds per cm	Pod length
D.MB.7	57 C	70 D	7.7 D	10.7	10.9
SW.MB.10	57 C	73 D	8.3 CD	11.0	8.6
D.MB.1	58 C	80 C	10.5 B	11.0	9.5
SW.MB.11	81 B	103 B	14.0 A	11.7	9.8
CH.MB.1	87 A	111 A	10.0 BC	10.3	8.8
LSD 5%	2.443	6.348	0.432	NS	NS

Mean values in the same column carrying similar letters do not differ significantly at 5% level of probability using LSD test

Table 2: Pods/plant, 100-seed weight, DM yield, harvest index and grain yield of mungbean germplasm.

Acc. No	Pods per plant	100-seed weight (g)	DM yield kg/ha	Harvest index (%)	Grain yield
D.MB.7	93.0 A	5.68 A	3611 D	31.48 A	1121 A
SW.MB.10	85.0 B	3.10 B	6389 C	16.74 B	1060 A
D.MB.1	72.0 C	3.22 B	8611 B	9.74 C	837 B
SW.MB.11	56.0 D	2.72 B	11110 A	6.69 C	745 B
CH.MB.1	47.0 E	2.71 B	7778 BC	9.33 C	719 B
LSD 5%	5.649	0.558	1766	4.732	176.6

Mean values in the same column carrying similar letters do not differ significantly at 5% level of probability using LSD test

Table 3: Correlation coefficients between grain yield and agronomic parameters in mungbean

Character	Plant height	Branches per plant	Seeds per pod	Pod length	Pods per plant	100-seed weight (g)	DM yield kg/ha	Harvest index (%)	Grain yield kg/ha
Days to maturity	0.98**	0.62^{NS}	-0.03^{NS}	-0.27^{NS}	-0.93**	-0.57^{NS}	0.58^{NS}	-0.62^{NS}	-0.83*
Plant height	-	0.67^{NS}	-0.01^{NS}	-0.34^{NS}	-0.98**	-0.66^{NS}	0.67^{NS}	-0.72^{NS}	-0.91**
Branchea/plant	-	-	0.69^{NS}	-0.05^{NS}	-0.74^{NS}	-0.62^{NS}	0.94**	-0.77^{NS}	-0.79^{NS}
Seeds/pod	-	-	-	0.15^{NS}	-0.01^{NS}	-0.25^{NS}	0.61^{NS}	-0.33^{NS}	-0.13^{NS}
Pod length	-0.33^{NS}	0.13^{NS}	-	-	0.43^{NS}	0.81^{NS}	-0.35^{NS}	0.63^{NS}	0.36^{NS}
Pods/pod	-	-	-	-	-	0.76^{NS}	-0.75^{NS}	0.83^{NS}	0.97**
100-Seed weight	-	-	-	-	-	-	-0.83^{NS}	0.95**	0.76^{NS}
DM Yield	-	-	-	-	-	-	-	-0.93**	-0.84^{NS}
Harvest indwx	-	-	-	-	-	-	-	-	0.89*

NS = Non-significant, ** = Significant at 1% level of probability, * = Significant at 5% level of probability

height, branches per plant, pods per plant, seeds per pod, pod length, 100-seed weight, grain yield, dry matter yield and harvest index (%). The data were statistically analyzed, means were compared using LSD test and correlation co-efficients were calculated using Mstat-C.

Results and Discussion

Statistical analysis of the data revealed that days to maturity, plant height and branches per plant varied significantly while that of seeds per pod and pod length had no significant in differences (Table 1). Response of mungbean germplasm towards maturity was observed statistically significant with maximum of 87 days for CH.MB.1 and minimum of 57 days each for SW.MB.11 and D.MB.1. Genetic variability of different germplasm could be the possible reason of this variation. Plant height varied significantly among mungbean germplasm. Maximum plant height was obtained by CH.MB.1 (111 cm), followed by SW.MB. 11 (103 cm). Minimum plant height was recorded for D.MB.7 (70 cm), followed by SW.MB.11 (73 cm). Plant height showed positive correlation with days to maturity Similar response was reported by Khalil *et al*. (1986). Branches per plant varied significantly among mungbean germplasm with maximum (14) and minimum (7.7) for SW.MB.11 and D.MB.7, respectively. Branches per plant showed positive correlation with days to maturity and plant height. Francisco and Maeda (1989) reported positive correlation between branches and days to first flowering. Though differences in seeds per pod were statistically non-significant, however it ranged from 10.3 for CH.MB.1 to 11.7 for SW.MB.11. The differences in pod length were statistically significant with maximum of 10.9 cm for D.MB.7 and minimum of 8.6 cm for SW.MB.10. Pod length showed positive correlation with seeds per pod. Pod length showed positive correlation with pods per plant. However, Francisco and Maeda (1989) reported negative correlation between pods per plant and pod length.

Pods per plant, 100-seed weight, dry matter yield, harvest index and grain yield varied significantly in different germplasm (Table 2). Maximum of 93 pods were recorded for D.MB.7, followed by SW.MB.10 with 85 pods per plant. Minimum number of 47 pods were noted for CH.MB.1, followed by SW.MB.11 with 56 pods per plant. Pods per plant demonstrated negative correlation with days to maturity, plant height and branches per plant. However, Islam *et al*. (1993) reported positive correlation of pods per plant with plant height and branches per plant. Differences in mungbean germplasm were statistically significant in seed weight where maximum (5.68 g/100 seeds) and minimum (2.71 g/100 seeds) values were recorded for D.MB.7 and CH.MB.1, respectively. Days to maturity and seeds per pod showed negative correlation with seed weight. However, Khalil *et al*. (1986) reported positive correlation between 100-seed weight and maturity. 100-seed weight showed positive correlation with pods per plant. These results are in contrast with those of Islam *et al*. (1993) and Francisco and Maeda (1989) who reported negative correlation between 100-seed weight and pods per plant. The correlation of 100-seed weight with pod length was positive (Table 3).

All germplasm were statistically different in gaining dry matter yield. Germplasm SW.MB.11 produced maximum and D.MB.7 produced minimum dry matter yield of 11110 and 3611 kg ha^{-1} respectively. Dry matter yield showed positive correlation with days to maturity, plant height branches per plant and negative correlation with pods per plant, 100-seed weight, grain yield and harvest index. These results are in confirmation with those of Francisco and Maeda (1989) who also reported positive correlation of dry matter yield with days to maturity and negative correlation with harvest index. Ramaswami and Oblisami (1984) reported negative correlation between grain yield and dry matter yield. Harvest index varied significantly among mungbean germplasm with maximum of 31.48% for D.MB.7 and minimum of 6.69% for SW.MB.11. Harvest index showed negative correlation with days to maturity, plant height, branches per plant), seeds per pod and dry matter yield. Harvest index showed positive correlation with pod length, pods per plant, 100-seed weight and grain yield. Ramaswami and Oblisami (1984) and Francisco and Maeda (1989) also reported significantly higher harvest index in the short duration entries. Francisco and Maeda (1989) also reported negative correlation between harvest index and dry matter. Jan *et al*. (1993) and Islam *et al*. (1993) reported positive correlation between harvest index and grain yield.

Grain yield was statistically significant in mungbean germplasm. Maximum grain yield (1121 kg/ha) was obtained from D.MB.7, followed by SW.MB.10 (1060 kg/ha). Minimum grain yield (719 kg/ha) was recorded for CH.MB.1, followed by SW.MB.11 (745 kg/ha). Grain yield showed negative correlation with days to maturity, plant height, branches per plant, seeds per pod and dry matter yield. Ramaswami and Oblisami (1984) reported positive correlation between maturity and grain yield and negative correlation between grain yield and dry matter yield. Khalil *et al*. (1986) reported positive correlation for one year and negative correlation for the second year between plant height and grain yield. Khan *et al*. (1988) and Jan *et al*. (1993) reported negative while Satyan *et al*. (1989) and Naidu (1993) reported positive correlation of grain yield with maturity and plant height. Satyan *et al.* (1989) reported positive correlation of grain yield with branches per plant and seeds per pod. Grain yield showed positive correlation with pod length, pods per plant, 100-seed weight and harvest index. Satyan *et al*. (1989) also reported positive correlation between pod length and grain yield. Khalil *et al*. (1986) reported negative while Naidu (1993) reported positive correlation between 100-seed weight and grain yield. Khan *et al*. (1988), Francisco and Maeda (1989), Satyan *et al*. (1989) and Naidu (1993) reported positive correlation between grain yield and pods per plant. Jan *et al*. (1993) and Islam *et al.* (1993) also reported positive correlation between grain yield and harvest index.

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