CORRELATION STUDY ON MORPHOLOGICAL AND YIELD PARAMETERS OF MUNGBEAN (*VIGNA RADIATA*)

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ABSTRACT

The present study was conducted to determine correlation among different yield contributing traits of mungbean, at Agricultural Research Farm of the NWFP Agricultural University, Peshawar, during the growing season 2004. Correlation was worked out among plant height, days to flowering, days to maturity, total dry weight plot^{-1}, yield plant^{-1}, 100-grain weight, harvest index and yield ha^{-1}. Significant differences were observed among different populations for all the parameters. Correlation analysis revealed that earliness had negative correlation with plant height and dry weight per plot while 100-seed weight and harvest index were recorded to be positively correlated. Dry weight per plot was found to have positive correlation with days to maturity, seeds pod^{-1} and plant height while negatively correlated with yield per hectare and harvest index. 100-grain weight showed positive correlation with pods plant^{-1} and harvest index while it had negative correlation with days to maturity, seeds pods^{-1} and plant height. Seed yield plot^{-1} was found to be non-significantly correlated with 100-grain weight. Harvest index had significant positive correlation with seed yield plant^{-1} while it had significant negative correlation with days to maturity, seed pod^{-1}, plant height and dry weight per plot. Similarly, seed yield per plant was positively correlated with pods plant^{-1}, yield ha^{-1} and harvest index. On the other hand, its correlation with plant height was significantly negative.

Key words: Mungbean, correlation, morphological and yield traits.

INTRODUCTION

Improvement of Mungbean [*Vigna radiata* (L.) wilczek], being important pulse crop of Pakistan, is an important task for pulses breeders. Our yields are still lower than other mungbean countries. Development of improved varieties with more genetic potential will increase our yield to a greater extent. A huge amount of diversity is present worldwide to be exploited by mungbean breeders. Variation does exist among different mung populations (Biaswas and Bhadra, 1997), which can be used for improvement. However, selection for seed yield, which is a quantitative trait, is difficult. Thus correlation must be determined among morphological and yield traits in different mungbean populations.

Different researchers have reported correlations among different parameters. Sharma and Gupta (1994) evaluated various lines for their diversity and observed positive correlation between pod length and yield per plant. Chhabra *et al.* (1991) analyzed simple and multiple correlations between yield and its component traits in mungbean. Islam *et al.* (1999) also studied genetic variability and correlation between yield and yield components in mungbean and found significant differences among various genotypes. Variation, however, does exist in their findings. Plant height and seeds pod^{-1}, for example have been reported to be positively correlated by Naidiu and Satyanarayana (1991) while Khan (1988) and Singh *et al.* (1988) have reported negative correlation for the pair. Similarly, Bhadara *et al.* (1987) reported non-significant correlation between 100-seed weight and seed yield, while Patil and Deshmukh (1988) reported it to be significant. These deviations may be due to the differences in genotypes, the range of the character and the experimental conditions where these experiments were conducted.

The present study was thus made to work out correlation among different morphological and yield characters under the climatic condition of Peshawar.

MATERIAL AND METHODS

The experiment was conducted at Agriculture research farm of NWFP Agricultural University, Peshawar during summer 2004. The experiment was laid out in randomized complete block design with three replications. Following 26 genotypes, obtained from Nuclear Institute for Food and Agriculture, Tarnab-Peshawar, were evaluated.

Sowing was done in mid of April 2004, keeping plant to plant distance of 15 cm and row to row distance of 30 cm with 3 m row length with plot size of 4.5m^2. Data was collected on plant height, days to flowering, days to maturity, total dry weight 100-seed weight, harvest index and seed yield per plant. The data were statistically analyzed using analysis of variance technique appropriate for Randomized Complete Block design. Means and standard deviations were calculated and correlation was worked out. Means were compared using LSD test at 0.05 level of probability when the F-values were significant (Steel and Torrie, 1984).

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RESULTS AND DISCUSSION

Plant height (cm)

Perusal of the data on plant height revealed significant differences among the tested genotypes (Table I). Correlation of the trait with other parameters is shown in Table II. Correlation analysis revealed that plant height at maturity was significantly and positively correlated with days to maturity, seeds per pod and dry weight per plot while it was observed to be negatively correlated with 100-seed weight and harvest index. Correlations with pods plot^{-1} and seed yield plant^{-1} were found to be negative but non-significant. Our results are in agreement with those of Naidiu and Satyanarayana (1991) who also reported significant positive correlation between plant height and seeds pod^{-1}. While these results are against those of Khan (1988) and Singh *et al.* (1988) who reported negative correlation between plant height and seed yield. The deviation noted from the pervious workers may be attributed to the difference in genotypes, the range of the character and the experimental conditions where these experiments were conducted.

Days to flowering

Significant differences were found in the mean values for days to 50% flowering among the mungbean genotypes (Table I). The earliest flowering was noted in the genotype I (55.00 days), while flowering was found most delayed in the genotype F (58.33 days). Correlation was worked out for the trait with other parameters revealed that days to flowering was positively associated with days to maturity number of pods plant^{-1}, plant height and dry weight plot^{-1} while it had negative association with number of seed pod^{-1}, seed yield plant^{-1}, 100-seed weight and harvest index (Table II). However, the strength of the association was non-significant. Singh *et al*. (1986) also found negative correlation between days to flowering and seed yield. Similarly, Balooch (1993) have also reported significant variability among various mungbean genotypes for different phenotypic traits.

Days to maturity

Highly significant differences were recorded among the genotypes for days to maturity ranging from 67 days for genotype V40-14 to 75 days for genotype A (Table I). Correlation analysis revealed that days to maturity had significantly positive correlation with plant height and dry weight per plot while 100-seed weight and harvest index were recorded to be negatively correlated (Table II). Correlation between pods plot^{-1} and seed plant^{-1} was found to have negative but non-significant correlation with days to maturity. Our results are in line with those of Singh *et al.* (1986) who also observed negative correlation between days to maturity and seed yield. They suggested that high temperature was responsible to cause detrimental effects in longer reproductive phase of plant development resulting in negative correlation of the maturity with seed yield.

Dry weight plot^{-1}

Variability for total dry weight per plot was found to be significant for tested genotypes (Table I). Maximum total dry weight per plot (3.233 kg) was recorded for genotype A while minimum for genotype V26/1 (1.325 kg). These results are supported by previous results of Farrage (1995) who also reported significant variation for number of seed pod^{-1} among different mungbean genotypes. Dry weight per plot was found to have positive and highly significant correlation with days to maturity, seeds pod^{-1} and plant height while significant negative correlation was found with yield per hectare and harvest index (Table II). This may be due to the fact that late maturing varieties are provided with more time duration for growth and thus have more dry matter yield or biological yield.

100-Seed weight (g)

The data on 100-grain weight varied significantly, ranging from 7.017 g for genotype V40/14 to 3.48 g for genotype G (Table I). In our study, 100-grain weight gave significant positive correlation with pods plant^{-1} and harvest index while it had significant negative correlation with days to maturity, seeds pods^{-1} and plant height (Table II). Seed yield polot^{-1} was found to be non-significantly correlated with 100-grain weight. Previously, Bhadara *et al*. (1987) have also reported non-significant correlation between 100-seed weight and seed yield. However, Patil and Deshmukh (1988) reported significant correlation between 100-grain weight and seed yield. Such deviations are, however, quite frequently observed in biological experiments.

Harvest Index

Harvest index varied significantly ranging from 15.9% for Genotype V26/1 to 4.33% for genotype A. Harvest index had significant positive correlation with seed yield plant^{-1} and yield ha^{-1} while it had significant negative correlation with days to maturity, seed pod^{-1}, plant height and dry weight per plot (Table II). Ghafoor *et al.* (1990) and Malik *et al.* (1986) found positive correlation between harvest mode and seed yield which shows agreement to the present work. The results of Naidu and Satyanarayana (1993), Natarajan *et al*. (1988), Patil & Deshmukh (1988) Khan (1988), Patil & Narikhede (1987) and Singh *et al*. (1988) are all in concordance to the present findings who also observed significant

positive correlation of seed yield with pods plant^{-1} and seeds pod^{-1}.

Seed yield plant^{-1} (g)

Analysis of the data on seed yield plant^{-1} revealed significant variability among the genotypes with maximum seed yield for genotype V39/15 (5.773 g) and minimum seed yield plant^{-1} for genotype J (2.587 g). Seed yield per plant was significantly positively correlated with pods plant^{-1} and harvest index. On the other hand, its correlation with plant height was significantly negative (Table II). Our results are in accordance with those of Natarajan *et al*. (1988) and Singh *et al*. (1988).

L-1	N	L-2	Q
L-3	E	L-4	B
L-5	NM-2021	L-6	C
L-7	V16/3	L-8	D
L-9	NHM-37	L-10	V26/1
L-11	562-1	L-12	G
L-13	M	L-14	V-25/4
L-15	H	L-16	F
L-17	1122-1	L-18	V40/14
L-19	A	L-20	K
L-21	V22/2	L-22	L
L-23	I*1	L-24	I*2
L-25	121-25	L-26	V39/15

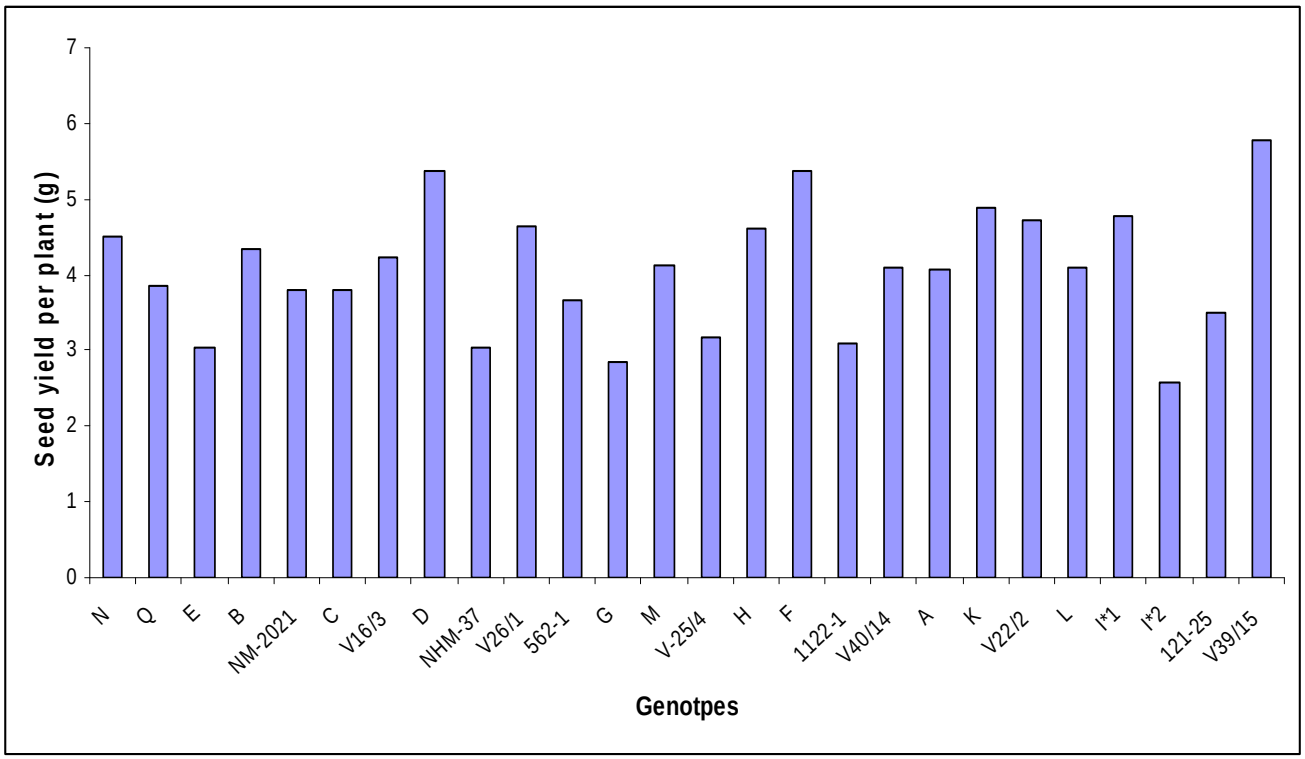

Fig. 1: Seed yield plant^{-1} (g) of 26 mungbean genotypes, grown under climatic conditions of Peshawar, during 2004.

Table I ***Data on plant height, days to 50% flowering, days maturity, total dry weight plot^{-1}, 100-seed weight and harvest index of 26 mungbean genotypes grown under agro-climatic condition of Peshawar, during 2004***

Genotype	Plant height (cm)	Days to maturity	Day to 50% flowering	Dry weight per plot (kg)	100-seed weight (g)	Harvest Index (%)
N	39.33 c-f	73.33 a-e	56.67 b-e	2.333 a-g	4.66 defghi	6.35 g-k
Q	46.47 a-d	71.67 c-g	55.67 ef	2.350 a-g	3.85 hi	5.81 h-k
E	39.73 c-f	73.33 a-e	57.67 abc	2.816 abc	3.64 i	5.75 ijk
B	40.53 b-f	72.33 b-g	57.00 a-e	2.533 a-f	4.00 ghi	5.42 f-j
NM-2021	40.60 b-f	73.00 a-f	56.67 b-e	2.433 a-f	3.70 i	7.41 f-j
C	42.73 a-e	74.00 abc	57.00 a-e	2.501 a-f	4.22 fghi	5.14 jk
V16/3	40.40 b-f	72.00 b-g	56.67 b-e	2.3 a-g	4.24 fghi	7.74 e-j
D	29.93 gh	69.67 g-j	56.67 b-e	1.95 b-h	5.55 bcdef	7.91 e-j
NHM-37	40.60 b-f	73.67 a-d	57.33 a-d	2.836 ab	3.59 i	6.06 g-k
V26/1	26.07 h	68.33 hij	57.33 a-d	1.325 h	6.51 ab	15.90 a
562-1	45.40 a-d	74.67 ab	56.33 c-f	2.333 a-g	3.89 hi	7.83 e-j
G	48.47 ab	73.33 a-e	57.33 a-e	2.116 a-d	3.48 i	4.40 k
M	40.93 b-e	72.00 b-g	57.00 a-e	1.960 fgh	4.44 d-i	9.41 c-f
V-25/4	40.33 b-f	73.00 a-f	58.00 ab	2.516 a-f	4.45 d-i	8.73 d-i
H	35.13 efg	71.00 d-h	56.33 a-f	1.833 e-h	5.27 d-g	9.79 c-f
F	43.33 a-e	72.33 b-g	58.33 a	2.733 e-h	5.62 b-e	7.45 f-j
1122-1	38.33 d-g	69.67 g-j	57.33 a-d	1.633 fgh	4.26 f-i	8.65 d-g
V40/14	23.40 fgh	67.00 j	56.00 def	1.475 gh	7.01 a	14.8 ab
A	47.07 abc	75.00 a	56.67 b-e	3.233 a	5.19 a-i	4.33 k
K	39.93 c-f	67.67 ij	56.00 def	1.850 d-h	5.73 a-d	12.05 bc
V22/2	49.33 a	72.33 a-g	56.67 b-e	1.900 c-h	4.64 c-i	9.66 c-f
L	42.07 a-e	73.67 a-d	56.33 c-f	1.733 fgh	4.57 c-i	11.14 cd
I*1	43.87 a-d	71.67 c-g	55.00 f	2.433 b-h	5.71 a-e	7.32 f-j
I*2	39.53 c-f	70.67 e-h	56.33 c-f	2.166 b-h	4.18 ghi	8.55 d-h
121-25	48.67 ab	73.00 a-f	55.67 ef	2.016 b-h	4.37 e-i	8.05 e-i
V39/15	30.47 gh	70.33 f-i	56.33 c-f	1.633 fgh	6.01 abc i	10.62 cde
LSD	8.27	2.708	1.476	0.934	1.35	2.89

Table II ***Correlation matrix of different plant characters of mungbean genotypes sown under the Agro-climatic conditions of Peshawar***

	Days to flowering	Days to maturity	Pods per plant	Seeds per pod	100-seed weight	Dry weight per plot	Seed yield per plant	Harvest index	Yield per ha
Plant height	0.014	0.389**	-0.031	0.325**	-0.360**	0.353**	-0.262	-0.373**	-0.214
Days to flowering	-	0.108	0.014	-0.137	-0.081	0.103	-0.165	-0.1	0.019
Days to maturity	-	-	-0.101	0.215	-0.359**	0.369**	-0.192	-0.421**	0-.216
Pods per plant	-	-	-	0.184	0.271*	0.174	0.507**	0.149	0.286*
Seeds per pod	-	-	-	-	-0.242*	0.277*	0.031	-0.222*	-0.258*
100-seed weight	-	-	-	-	-	-0.215	0.12	0.271*	0.179
Dry weight per plot	-	-	-	-	-	-	-0.111	-0.479**	-0.057
Seed yield per plant	-	-	-	-	-	-	-	0.261*	0.353**
Harvest index	-	-	-	-	-	-	-	-	0.461**

** Highly significant differences

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