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# Assessment of genetic variability and correlation in mungbean (*Vigna radiate* (L.) Wilczek)

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**Abstract**
In sixteen genotype of mungbean phenotypic coefficient of variation (PCV) was higher than that of genotypic coefficient of variation (GCV) for all the characters under study. The highest estimates of heritability coupled with higher genetic advance were obtained for the characters number of pods per plant, pod weight per plant, number of cluster per plant, number of primary branches and yield per plant. It shows that genotypic variance for their characters are probably due to high additive genetic effect. Therefore, the selection based on phenotypic performance of these characters would be useful for achieving desired results. Plant height, number of primary branches, number of cluster per plant, number of pod per cluster, number of pod per plant, Pod length (cm), and 100 seed weight were positively and significantly correlated to yield per plant at both genotypic and phenotypic level.

**Keywords:** Mungbean, genetic variability, heritability, correlation

## Introduction
Greengram (*Vigna radiata*) belongs to the family Leguminaceae. It is a small, herbaceous annual plant growing to a height of 30 to 120 cm with a slight tendency of twining in the upper branches. The central stem is more or less erect while side branches are semi erect. The leaves are 5-10 cm long, trifoliate with long petioles. Both the stem and leaves are covered with short hair, generally shorter than those in blackgram. The pods are linear, green, rounded and slender with short pubescence. The seed are small and nearly globular. The colour of seed is usually green, but yellow brown seeds also occur. The colour of cotyledons is yellow. The crop is fully self-fertile and self pollinated.

For improvement of grain yield of mungbean, it is essential to have knowledge on variability of different characters. The variability of a biological population is an outcome of genetic constitution of individuals making up that population in relation to prevailing environment. A survey of genetic variability with the help of suitable parameters such as genotypic coefficient of variation, heritability and genetic advance are absolutely necessary to start an efficient breeding program. Yield is the end product of interaction of many correlated characters and selection for yield would be effective when based on the characters, which are highly heritable and positively correlated with focus on improvement of grain yield of mungbean.

## Material and method
The experimental material comprising of 16 mungbean genotype (Kopergaon, PKV-AKM-4, AKM-8802, PKV Green gold, BM-2003-2, BM-2002-1, AKM-10-12, Vaibhav, Uttkarsha, BM-4, AKM-12-17, AKM-12-07, BM-2011-3, BPMR-145, AKM-10-10, Phule M-504-20-27). Experiment was conducted at the field of Agricultural Botany Dr. P.D.K.V, Akola, Maharashtra State during the Kharif 2015. A Randomized Block Design (RBD) with three replication was used in the experiment. Data were recorded five randomly selected plant randomly selected plant in each row for the characters viz. Days to 50% flowering, days to maturity, plant height (cm), number of primary branches/plant, number of cluster / plant, number of pod / cluster, number of pod / plant, number of seed / pod, pod length (cm), pod weight/plant (g), 100 seed weight (g), shelling percentage (%) and seed yield / plant (g). The mean value were used for estimation of genotypic and phenotypic coefficient of variation, heritability in broad sense and genetic advance as percentage of mean according to Johnson *et al*., (1955) [1] and Correlation according to Srivastava and Singh, (2012) [6].

## Result and discussion
The estimate of genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV), heritability and genetic advance (GA) for 13 different character are presented in table 1.

Phenotypic coefficient of variation (PCV) was higher than the genotypic coefficient of variation (GCV) for all character suggesting the presence of environmental influence to some extent of the expression of these characters. The highest genotypic coefficient of variation (GCV) was found for plant height followed by shelling percentage, number of pod per plant, number of cluster per plant, number of primary branches and seed yield per plant, indicating highest degree of genetic variability for these character. Similar result found by Rahim *et al.* (2010) [4].

Johnson *et al*. (1955) [1] had suggested that GCV together with heritability would give best picture of amount to be expected from selection. Number of pod per plant, plant height, shelling percentage, number of cluster per plant, seed yield per plant and number of pod percluster exhibited high estimated of GCV, PCV, heritability and genetic advance (table-1). These traits can be used for selection as they respond well because of their high genetic variability. The highest magnitude of heritability coupled with genetic advance was observed for pod weight per plant fallowed by plant height, shelling percentage, number of pod per plant, number of cluster per plant, number of primary branches, number of pod per cluster and seed yield per plant. These character show that genotypic variance for their character due to additive genetic effect. Therefore selection based on phenotypic performance of these character would be useful achieving desirable result. The lowest magnitudes of heritability couple with genetic advance were reported days to maturity and days to 50% flowering. Similar result found by Tabasum *et al.* (2010) [8] reported same for plant height, pods per plant and seed yield per plant.

**Table 1:** Estimation of rang, mean, coefficient of variation (GCV and PCV). Heritability, Genetic advance for different characters of mungbean.

| Sr. No | Character | Range | Mean | GCV% | PCV% | $h^2$% | GA |
|---|---|---|---|---|---|---|---|
| 1 | Days to 50% flowering | 32-37 | 35.38 | 3.15 | 4.58 | 47 | 4.45 |
| 2 | Days to maturity | 63-66 | 65.10 | 2.85 | 5.64 | 25 | 2.95 |
| 3 | Plant height (cm) | 24-41.33 | 32.42 | 22.18 | 24.14 | 74 | 41.96 |
| 4 | Number of primary branches/plant | 3.33-6.66 | 4.42 | 18.24 | 20.85 | 76 | 32.86 |
| 5 | Number of cluster/plant | 3-7 | 4.81 | 19.62 | 22.10 | 78 | 35.86 |
| 6 | Number of pods/cluster | 3.33-4 | 3.79 | 14.08 | 14.49 | 94 | 28.19 |
| 7 | Number of pod/plant | 12-28 | 18.94 | 21.62 | 22.94 | 88 | 41.98 |
| 8 | Number of seed /pod | 9.33-13.33 | 11.52 | 10.54 | 13.14 | 64 | 17.41 |
| 9 | Pod length (cm) | 6.85-12.20 | 9.22 | 10.31 | 10.84 | 90 | 20.19 |
| 10 | Pod weight/plant (g) | 9.4-25.43 | 14.86 | 8.01 | 25.67 | 91 | 50.47 |
| 11 | 100 seed weight (g) | 3.1-4.80 | 4 | 10.080 | 11.33 | 79 | 18.48 |
| 12 | Shelling percentage (%) | 37.24-82.01 | 59.28 | 21.75 | 23.54 | 85 | 41.39 |
| 13 | Seed yield/ plant (g) | 7.10-10.77 | 8.85 | 12.05 | 13.62 | 78 | 21.94 |

**Character association**

**Correlation coefficient analysis**

Correlation help to find out the degree of association between yield and yield contributing traits. Correlation coefficient analysis among seed yield and its contributing character are shown in table 2.seed yield per plant was highly significant positive correlation with plant height, number of primary branches, number of cluster per plant, no of pod per cluster, number of pod per plant, pod length, pod weight and 100 seed weight. Days to 50% flowering showed highly significant and positive association with days to maturity. Days to maturity had highly significant and positive association with pod weight per plant. Plant height shelling percentage had highly negative significant correlation with days to maturity. Plant height highly significant and positive association with number of primary branches per plant, number of cluster per plant, number of pod per cluster and number of pod per plant. Similar results were found by Rohman *et al* (2003) [5] for number of pods per plant.

Number of primary branches highly significant and positive association with number of cluster per plant, number of pod per cluster, number of pods per plant, number of seed per pod, pod weight, 100 seed weight and seed yield per plant. number cluster per plant exhibited highly significant and positively correlated with seed yield per plant, number of pod per cluster, number of pod per plant, pod length and pod weight while number of seed per pod, 100 seed weight and shelling percentage non-significant correlation. Similar results were found by Katiyar *et al*. (2015) [2] and Tabasum *et al*. (2010) [8]. Number of pods per cluster found highly significant and positively correlated with seed yield per plant, number of pod per plant, 100 seed weight and shelling percentage.

Number of pods per plant exhibited highly significant and positive association with seed yield per plant and shelling percentage while number of seed per pod exhibited negatively significant with number of pods per plant. Number of seeds per pod exhibited highly significant and positive association with pod weight and 100 seed weight. Similar results were found by Pan *et al* (2014) [3]. Pod length had highly significant and positively association with pod weight per plant and seed yield per plant while shelling percentage highly significant and negatively correlated with pod length. Pod weight per plant exhibited highly significant and positive association with seed yield per plant, while highly significant but negative association with shelling percentage. 100 seed weight highly significant and positively associated with seed yield per plant. Shelling percentage had non-significant correlation with yield per plant.

**Table 2:** Genotypic (G) and phenotypic (P) correlation among the 13 character in mungbean

| Characters | | Days to 50% flowering | Days to maturity | Height at flowering | No. of primary branches per plant | No. of cluster per plant | No. of pod per cluster | No. of plant per plant | No. of seed per pod | Pod length (cm) | Pod weight per plant (g) | 100 Seed weight (g) | Shelling percentage | Seed yield per plant (g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Days to 50% flowering | G | 1 | 0.707** | -0.226 | -0.227 | -0.042 | -0.005 | -0.219 | 0.046 | 0.182 | -0.030 | -0.168 | -0.278* | -0.140 |
| | P | 1 | 0.318 * | -0.136 | -0.079 | 0.021 | -0.037 | -0.229 | 0.083 | 0.098 | -0.035 | 0.003 | -0.143 | 0.010 |
| Days to maturity | G | | 1 | -0.383** | 0.084 | 0.1910 | 0.080 | 0.119 | 0.190 | 0.200 | 0.421** | -0.432** | -0.548** | 0.0324 |
| | P | | 1 | -0.126 | 0.051 | 0.040 | 0.018 | -0.023 | 0.007 | 0.084 | 0.135 | -0.209 | -0.237 | 0.0816 |
| Plant height | G | | | 1 | 0.882** | 0.726** | 0.780** | 0.513** | 0.286* | 0.258* | 0.438** | 0.507** | 0.099 | 0.824** |
| | P | | | 1 | 0.676 ** | 0.566 ** | 0.703 ** | 0.434 ** | 0.1934 | 0.229 | 0.342** | 0.424 ** | 0.047 | 0.695** |
| No. of primary branches | G | | | | 1 | 0.825** | 0.703** | 0.685** | 0.325 ** | 0.235* | 0.405** | 0.332** | 0.108 | 0.815** |
| | P | | | | | 0.685** | 0.559** | 0.538** | 0.258* | 0.189 | 0.363** | 0.305* | 0.143 | 0.696 ** |
| No. of cluster per plant | G | | | | | 1 | 0.687** | 0.816** | 0.067 | 0.469** | 0.442** | -0.019 | 0.154 | 0.882** |
| | P | | | | | 1 | 0.574** | 0.690** | 0.047 | 0.377** | 0.380** | 0.077 | 0.122 | 0.752** |
| No. of pod per cluster | G | | | | | | 1 | 0.696** | 0.266* | 0.134 | 0.157 | 0.382** | 0.380** | 0.843** |
| | P | | | | | | 1 | 0.622 ** | 0.1639 | 0.1347 | 0.145 | 0.331** | 0.335** | 0.731** |
| No. of pod per plant | G | | | | | | | 1 | -0.327* | 0.243 | -0.021 | 0.031 | 0.447** | 0.755** |
| | P | | | | | | | 1 | -0.218 | 0.210 | -0.003 | 0.055 | 0.399** | 0.617** |
| No. of seed per pod | G | | | | | | | | 1 | 0.115 | 0.376** | 0.471** | -0.091 | 0.242 |
| | P | | | | | | | | 1 | 0.048 | 0.264* | 0.335 ** | -0.071 | 0.152 |
| pod length (cm) | G | | | | | | | | | 1 | 0.605** | 0.169 | -0.430** | 0.497** |
| | P | | | | | | | | | 1 | 0.549** | 0.138 | -0.381** | 0.433** |
| Pod weight (g) | G | | | | | | | | | | 1 | 0.257* | -0.721** | 0.575** |
| | P | | | | | | | | | | 1 | 0.219 | -0.600** | 0.509** |
| 100 Seed weight (g) | G | | | | | | | | | | | 1 | 0.079 | 0.453** |
| | P | | | | | | | | | | | 1 | 0.107 | 0.466** |
| Shelling percentage | G | | | | | | | | | | | | 1 | 0.048 |
| | P | | | | | | | | | | | | 1 | 0.024 |
| Seed yield per plant | G | | | | | | | | | | | | | 1 |
| | P | | | | | | | | | | | | | 1 |

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