GENETIC VARIABILITY AND ITS ASSOCIATION WITH YIELD AND ITS TRAITS IN *VIGNA RADIATA* L. WILCZEK

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ABSTRACT

To Understand Its Genetic Variability, Heritability, Genetic Advance And Character Association With Seed Yield/Plant And Its Component Traits, It Was Decided To Study 50 Advance Lines Including Three Varieties Of Vigna Radiata. Seed Yield Per Plant Showed Maximum Variability Followed By Pods/Plant, Plant Height, Branches/Plant And 100-Seed Weight. For All The Traits, Their Heritability Estimates Were High, Except Days To Flower And Pod Length. High Expected Genetic Advance Coupled With High Heritability Estimates Were Observed In Seed Yield Per Plant, Pods Per Plant, and Plant Height, And All These Traits Were Least Influenced By Environmental Variation. Significant And Positive Association Were Found In Seed Yield Per Plant And Pods Per Plant, Plant Height, Harvest Index And Grains Per Pod

KEYWORDS: *Genetic Variability, Heritability & Index, and Grains Per Pod*

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INTRODUCTION

Vigna radiata L. Wilczek is one of the most important pulse crops of Asia and is also known as green gram. In India, food legumes, commonly known as pulses, are major sources of dietary protein (24-27%), which is around 2-2.5 times higher than that of cereals. Its productivity is low which can be improved with the help of genetic variability. In order to improve the characteristic of our study, it is necessary to estimate the heritable variances. This association study will be helpful for upgrading the seed yield. This investigation was undertaken to forecast a suitable plant type for selection so that the seed yield can be improved keeping in view the interrelation between traits and heritability.

MATERIALS AND METHODS

Genotypes of 50 advance varieties along with three checked varieties viz. KM 2241, IPM 02-3 and K 851 were assessed in three duplications during kharif 2016 and summer 2017 at C.S. Azad University of Agriculture and Technology, Kanpur. Each genotype planted in six rows in a plot of 4-meter length with an spacing of 25 cm in between and 10 cm within each row. The observations were recorded for ten quantitative traits viz. days to 50 per cent flowering, days to maturity, plant height (cm), number of branches/plant, number of pods/plant, pod length (cm), number of grains/pod, harvest index, 100-seed weight and seed yield/plant (Table 1) Genotypic and phenotypic coefficients of variation was also estimated as Burton (1952). According to Hanson *et al.* (1956), heritability and genetic advance were calculated, and correlation coefficients were calculated as per

formula suggested by Robinson *et al.* (1951).

RESULTS AND DISCUSSIONS

From the study (Table 1), there were revealing differences among the genotypes of all traits. Genetic parameters of variation, heritability and expected genetic advance as a percentage over mean for seed yield and related traits are given in Table 2 & Figure 1. The genotypic and phenotypic coefficient variation ranged from 3.51 to 15.93 and 4.13 to 21.89, respectively. The maximum phenotypic and genotypic coefficients of variability were observed for seed yield/plant (22%) followed by the number of cluster per plant (21.50%), branches per plant (17.84%), number of seeds per pod (17.04%) and number of pods per plant (15.79%). The least variability to the tune of 3.9% was recorded for days to flower and maturity. Similar findings have also been reported by Singh (1985); Saini *et al.* (1994); Rao (1994); Tyagi *et al.* (1997), Kumar *et al.* (1998), Khedar *et al.* (2006), Kumar *et al.* (2010), Babu *et al.* (2012), Farhan (2013), Nand *et al.* (2013) and Prasanna *et al.* (2013).

Table 1: General Mean, Range of Variance and S.E. for Various Characters in Mungbean

S. N.	Characters	Range of Mean		Grand Mean	S.E. Difference
		Min.	Max.		
1.	Days to 50% flowering	26.50	38.00	31.94	0.93
2.	Days to maturity	61.00	70.50	65.37	1.67
3.	Plant height	27.85	43.20	36.13	0.83
4.	No .of branches per plant	2.00	4.000	2.93	0.63
5.	No. of clusters per plant	3.50	85.00	6.45	0.59
6.	No. of pods per plant	13.50	27.00	19.99	1.31
7.	Pod length	6.25	8.15	6.99	0.43
8.	No. of seeds per pod	5.50	9.50	7.56	0.68
9.	100-seed weight	2.75	4.29	3.52	0.09
10.	Grain yield per plant	3.25	7.92	4.84	0.72

Table 2: The Estimates of Genetic Parameters of Variability for Seed Yield and its Components in Mungbean

S.N.	Characters	Coefficient of Variability		Heritability (%)	Genetic Advance	Genetic Advance in Percent of Mean
		GCV	PCV			
1.	Days to 50% flowering	7.59	8.65	77.00	4.38	13.71
2.	Days to maturity	3.51	4.13	72.38	4.02	6.15
3.	Plant height	10.61	11.22	89.36	7.46	20.65
4.	No .of branches per plant	13.66	17.84	38.93	0.51	17.56
5.	No. of clusters per plant	15.62	21.53	54.71	1.56	24.27

Table 2: Contd.,						
6.	No. of pods per plant	14.09	15.79	78.59	5.14	25.73
7.	Pod length	7.55	8.56	77.74	0.95	13.71
8.	No. of seeds per pod	11.55	17.04	45.93	1.21	16.12
9.	100-seed weight	10.82	10.96	76.61	0.77	21.98
10.	Grain yield per plant	15.93	21.89	79.35	41.36	28.16

Figure 1: Estimates of Variability

Among all the traits, high heritability estimates to the level of 79.35% were found, except the number of branches/plant which was only 38.93% (Table 2). Seed/plant yield as well as high heritability for economic traits was the requirement for selection due to their heritability and can give the anticipated gain in selection. The genetic advance in per cent of the mean was the highest for seed yield/plant (28.16%), followed by pods/plant (25.73%) and 100-seed weight (21.98%), whereas it was lowest for days to maturity (6.15%). Similar findings were reported by Singh *et al.* (1978); Rao (1994), Singh (1999), Khedar *et al.* (2006), Kumar *et al.* (2010), Babu *et al.* (2012), Farhan (2013), Nand *et al.* (2013) and Prasanna *et al.* (2013). High heritability and highly expected genetic advance observed for seed yield/plant, pods/plant and 100-seed weight revealed that these characters were least influenced by environmental factors. Thus, selection for these traits would be quite effective in enhancing grain yield/plant and also simultaneously with its related attributes.

Figure 2 indicates the correlation coefficients of seed yield/plant with other traits. Significant and positive correlation was observed by seed yield/plant and 100-seed weight, number of seeds/pod, number of pods/plant and plant height; 100-seed weight with number of pods/plant and number of branches/plant; number of seeds/pod with pod length, number of clusters/plant and number of pods/plant; number of pods/plant with number of clusters/plant and number of branch/plant; plant height with days to maturity had positive and significant association.

Figure 2: Correlation Coefficients

CONCLUSIONS

Seed yield/plant is the product of seeds per plant and 100-seed weight, but seeds per plant depend on pods/plant, seeds/pod, plant height, branching and pod length. During selection, it is necessary to emphasize the previously mentioned characteristics to improve productivity. These traits were highly heritable and interrelated. The proportion of seed yield and total biomass is referred to as harvest index, Another criteria for selection is the physiological genotype efficiency.

For further breeding programmes aimed at achieving high yield and stable varieties, the advance lines viz. KM 2268, KM 2272, KM 2290, SML 667, IP 04-7, LGG 407 and KM 2293 were found to be superior.

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