Variability among Urdbean (*Vigna Mungo* L. Hepper) for Yield and Yield Components

Chubatemsu Ozukum and Malini Barthakur Sharma

All India Cordinated Research Project on Pigeion Pea
Nagaland University, School of Agricultural Sciences and Rural Dvelopment, Nagaland Centre, Medziphema-797106, Nagaland

Abstract:- **The study of inheritance of various developmental and productive traits through the estimation of different genetic parameters like components of variances, genotypic and phenotypic coefficients of variability, heritability and genetic advance is helpful for framing an effective breeding programme. An experiment was conducted under All India Coordinated Research Project on pigeon pea, Nagaland Centre NU:SASRD to estimate the genetic variability, heritability and genetic advance of 6 traits in 5 Urdbean breeding materials which were conducted under Randomized Block Design with three replications during the Kharif season of 2016-17. A relatively higher estimate of phenotypic coefficient of variation were observed number of pods per plant (89.76) and yield per plot (82.69) which demonstrated the effect of environment upon the traits. Results of the study showed that there were considerable variations among the lines for days to 50% flowering, days to 80% maturity, 100 seed weight and for yield per plot. Broad sense heritability estimate (h_{bs}^2) was 99% for days to 80% maturity, 94.17% for days to 50% flowering and 85% for 100 seed weight. The highest genetic advance as percent of mean was recorded for yield per plot (28.92 %) followed by number of pods per plant (24.47 %). These information showed that there is sufficient genetic variability to justify selection for improvement in the urdbean lines and will be of immense practical uses for plant breeders to choose parent of interest to meet different breeding objectives.**

Keywords**: Urdbean, yield, genetic variability, traits.**

I. INTRODUCTION

Blackgram, *Vigna mungo* (L.) Hepper, popularly known as urdbean or mash, is a grain legume domesticated from *V. mungo var. silvestris* (Lukoki *et al*. 1980). Urdbean occupies an important position due to its high seed protein (25-26%, carbohydrates (60%), fat (1.5%), minerals, aminoacids and vitamins and ability to restore the soil fertility through symbiotic nitrogen fixation (Malik 1994). It is grown in various agro-ecological conditions and cropping systems with diverse agricultural practices (Gupta *et al.* 2001). Among pulses, it is the least researched crop and no international centre of CGIAR system has this crop on its mandate (Anonymous, 1976). Although it has been identified as a potential crop in number of countries, but no systematic research information is available on crop improvement using biometrical techniques except few reports in the recent years (Ghafoor *et al*. 2003) India is the primary centre of origin of Urdbean and about 70% of the world's urdbean production comes from India as the crop is grown in various agroecological conditions and cropping systems with diverse cultural practices (Singh and Satyanarayana 1994). This crop is also popular due to its suitability in various crop rotation practices and well suited in both dry and irrigated conditions. This is one of the most important short duration legume crops utilized in the food, fodder, soil conservation, integrated farming systems, reclaiming of degraded pastures and symbiotic nitrogen fixation. Therefore, the present study was planned to investigate the genetic variability, heritability and genetic advance under the sub tropical climatic conditions of Medziphema, Nagaland to identify the best traits to be used for further genetic improvement of this crop.

II. MATERIAL AND METHODS

The experimental material comprised of 5 breeding materials (details of the genotypes is given in Table 1) of urdbean procured from Indian Institute of Pulse Research (IIPR), Kanpur which were evaluated during Kharif season of 2016-17. The experiment was carried out with three replications under Randomized Block Design at the experimental field of All India Coordinated Research Project on Pigeon Pea, Nagaland University, SASRD, Medziphema. Observations were recorded for 6 quantitative traits *viz*., days to 50 per cent flowering, days to 80% maturity, number of pods per plant, number of seeds per pod, 100 seed weight and seed yield per plot. Data were recorded on randomly selected five plants from each genotype per replication and mean value was used for analysis. The statistical analysis of the data recorded was calculated using the formula given by Allard (1960) and Johnson *et al.* (1955).

III. RESULTS AND DISCUSSION

The analysis of variance for yield and yield attributing traits were analyzed and presented in Table 2. The analysis of variance exhibited significant differences among the genotypes for all the traits studied except number of pods per plant and number of seeds per pod indicating presence of genetic variability among the genotypes. In general, phenotypic coefficients of variation were higher than corresponding genotypic coefficients of variation for all the traits which demonstrated the effect of environment upon the traits (Table 3). A relatively higher estimate of phenotypic

coefficient of variation (PCV of more than 20%) were observed for number of pods per plant (89.76) and yield per plot (82.69). This is in accordance with the findings of Malik *et al.* (2008) for grain yield and Konda *et al.* (2009) for plant height. The highest genotypic coefficient of variability was observed for number of pods per plant (75.64) and yield per plot (73.87) which indicates the presence of exploitable genetic variability for these traits. Moderate phenotypic and genotypic coefficient of variation (10 to 19%) was observed for days to 50% flowering (18.18 and 18.73) and days to 80% maturity (14.45 and 14.53) which revealed that there is considerable scope for improving this trait in desirable direction through a selection programme. Low PCV and GCV were observed for number of seeds per pod (12.45 and 15.07) and 100 seed weight (12.39 and 13.41). This is in corroboration with the findings of Khjudpran and Tantasawat (2011) in mungbean.

Heritability and genetic advance as percent of mean were determined to get a clear picture of the scope for improvement in various characters through selection. The results of the present investigation showed that, the heritability (h_{bs}) values were recorded quite high (>50%) (Table 3). The highest estimates of heritability was observed for days to 80% maturity (99.00 %) followed by days to 50% flowering (94.17), 100 seed weight (85.29%) and number of pods per plant (89.76 %). In general all traits had higher heritable variation, hence it can be assumed that phenotypes of all these traits are mainly determined by their genotypes. The lowest estimates of heritability was observed for number of seeds per pod (68.23 %) indicating that the major part of the variability was due to genotypic causes. The expected genetic advance as percent of mean was also calculated and the results (Table 3) revealed that the highest (> 20%) genetic advance as percent of mean was recorded for yield per plot (28.92 %) followed by number of pods per plant (24.47 %). The results revealed that, all these traits are controlled by additive gene action as reported by other workers (Johnson *et al.* 1955 and Panse 1957). Similar results were also reported by Gowda *et al.* (1997) in blackgram, Kumar *et al.* (2004) in greengram and Younis *et al.* (2008) in lentil who reported high heritability coupled with high genetic advance for most of the quantitative characters. Presence of higher genetic advance as % of mean for yield per plot and number of pods per plant indicated that it is governed by additive genes action and selection would be more effective in such cases as earlier reported in chickpea by Sewak *et al* (2012). While moderate (>10 %) estimates of genetic advance coupled with high heritability was recorded for the character days to 50% flowering (14.29%), while high heritability coupled with low genetic advance was recorded for 100 seed weight and number of seeds per pod.

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Table 1: Details of the Urdbean entries

Sl No.	Code
1.	Urd 1
2.	Urd 2
3.	Urd 3
4.	Urd 4
5.	Urd 5

Table 2. Mean squares of yield and yield attributing traits in urdbean

Source of variation	Days to 50% flowering	Days to 80% maturity	Number of pods/plant	Number of seeds/pod	100 seed weight	Yield per plot
Replication	11.67	1.40	36.36	0.01	0.00	5335.71
Genotype	52.17*	106.27*	225.69	0.59	0.17*	25622.46*
Error	3.17	1.07	81.08	0.24	0.03	5974.68
Se m (±)	1.03	0.60	5.20	0.28	0.10	44.63
C.D. (at 5%)	3.35	1.94	16.95	0.92	0.31	145.54
C.V. (%)	4.52	1.45	48.32	8.50	5.14	37.15

Table 3. Mean and variability parameters for six characters in urdbean during kharif 2016

Sl no.	Character	Grand Mean	MS Error	Genotypic variance	Phenotypic variance	GCV	PCV	Heritability (h_{bs}^2)%	GA (% of mean)
1	Days to 50% flowering	39.33	3.17	51.11	54.28	18.18	18.73	94.17	14.29
2	Days to 80% maturity	71.20	1.07	105.91	106.98	14.45	14.53	99.00	21.09
3	Number of pods/plant	18.63	81.08	198.67	279.75	75.64	89.76	71.02	24.47
4	Number of seeds/pod	5.74	0.24	0.51	0.75	12.45	15.07	68.23	1.22
5	100 seed weight	3.23	0.03	0.16	0.19	12.39	13.41	85.29	0.76
6	Yield per plot	208.09	5974.68	23630.90	29605.58	73.87	82.69	79.82	28.92