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Short Communication

Selection of protein rich genotypes in urdbean [*Vigna mungo* (L.) Hepper]

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Urdbean, [*Vigna mungo* (L.) Hepper] is cultivated mainly as a source of dietary protein for its high protein content of about 25% in seeds [1]. Protein content and total protein yield, therefore, deserve emphasis in any breeding strategy in this crop. Stupendous breeding efforts have been made for augmentation of yield ceiling in this crop. Available literature, however, evidences for limited attempts on selection of genotypes with higher protein content and protein yield. Besides, it is imperative to discern out the agronomic characters associated with those two protein attributes to use them as selection criteria for screening of genotypes with higher protein content and yield. Such studies in mungbean have revealed availability of some local land races (LLR) with higher protein content and yield, and also better performance with regard to the agronomic characters related to the protein attributes [2]. The present investigation, therefore, aimed at evaluation of genetic variation in an accession collected from diverse sources with regard to protein content, protein yield and seed yield, and also on identification of agronomic characters with significant association with protein content and yield.

The experimental materials for the present investigation comprised 14 improved varieties from diverse sources, and six LLRs collected from different regions of Orissa (Table 1). These 20 genotypes were field grown under rainfed situation in a plot laid out in randomized complete block design, replicated thrice during the *kharif* season of 1999 at the farm of the Dryland Agricultural Research Project at Phulbani district of Orissa. The genotypes were seeded in seven-row subplots of 2.5m length with a row-to-row spacing of 30cm and a plant to plant spacing of 10cm. Cultural practices were followed as recommended. Observations were recorded on 10 competitive plants in each replication for 12 agronomic characters (Table 2). Estimation of protein content, protein yield and categorization of genotypes were done following essentially as in mungbean [2].

Analysis of variance revealed highly significant differences among the test genotypes with regard to all the 12 quantitative traits including protein content, protein yield and seed yield (data not shown). The protein content in the test genotypes varied from 21.8 to 28.4% with a coefficient of variation (CV) of 7.12% and an average of 23.89% (Table 1) that equaled to the mean seed protein content in its closely related species mungbean [2]. The LLRs had protein content ranging from 21.8 to 26.3% with an average of 24.13% comparable to that of the improved varieties. The categorization of the genotypes on the basis of values for mean (μ) and standard deviation (σ) showed that three LLRs including *Malabiri*, *Boudha* local and *G. Udaygiri* local and only one improved variety LBGI7 were above the ($\mu + \sigma$) of the population (20%). Three genotypes (15%) including two LLRS (*Laghubiri* and *Bhawanipatna* local) and one improved variety LBG402 were below ($\mu - \sigma$). The remaining 13 genotypes (65%) including one LLR, *Cuttack* local were within the range of ($\mu \pm \sigma$) which is fairly close to the expected proportion of 68% in a normally distributed population. This indicated quantitative nature of inheritance of protein content.

Protein yield/ha ranged from 1. 12 to 3.12q with an average of 1. 89q and CV of 27.51%. The LLRs had protein yield ranging from 1.33 to 2.63q with an average of 1.77q. The classification of the genotypes for this trait on the basis of μ and σ indicated that the population for this trait is also following normal distribution with three (15%) genotypes above ($\mu + \sigma$) including LBGI7, *Malabiri* and Sarala, four genotypes below ($\mu - \sigma$) including KU300, T9, AKU7 and *Bhawanipatna* local, and the remaining 13 genotypes (65%) within ($\mu \pm \sigma$).

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Table 1. Performance of 20 urdbean genotypes with regard to protein content, seed yield and protein yield

Sl. No.	Genotypes1	Protein content (%)	Seed yield (q/ha)	Protein yield (q/ha)
1	LBG17	28.4	11.00	3.12
2	*Malabiri* local	26.3	10.00	2.63
3	*Boudha* local	25.8	7.17	1.85
4	*G. Udayagiri* local	25.8	6.34	1.64
5	TMU1	25.1	8.50	2.13
6	Sarala	24.7	11.34	2.80
7	KU300	24.4	4.59	1.12
8	OBG19	23.8	9.17	2.18
9	LBG623	23.4	7.25	1.70
10	Pant U-30	23.4	9.00	2.11
11	TU94-2	23.3	7.42	1.73
12	B-3-8-8	23.3	7.50	1.75
13	*Cuttack* local	23.2	6.17	1.43
14	T9	23.1	5.42	1.25
15	AKU7	23.1	5.89	1.36
16	LBG645	22.7	9.00	2.04
17	Pant U-19	22.4	9.50	2.13
18	*Laghubiri* local	21.9	7.92	1.73
19	LBG402	21.9	8.25	1.81
20	*Bhawanipatna* local	21.8	6.09	1.33
	Mean (μ)	23.89	7.88	1.89
	S.D. (σ)	1.70	1.83	0.52
	C.V. (%)	7.12	23.22	27.51

[1]Genotypes in italicized font are local land races

One improved variety LBG17 and one LLR *Malabiri* had high protein content as well as protein yield. Two LLRS, *Boudha* local and *G. Udaygiri* local, had high protein content but moderate protein yield. An improved variety Sarala had moderate protein content but high protein yield. These five genotypes excelling in higher protein content and/or protein yield, therefore, can be recommended for cultivation as high protein source and also as parent materials for improvement in these two protein attributes.

In order to augment the protein content and yield, an understanding of the relationship of different component traits with that of protein content and protein yield is essential to formulate efficient selection strategies. Sandhu *et al.* [3] reported negative association of protein content with seed yield, clusters/plant, pods/plant, pod length and seeds/pod. In the present study, protein content did not show any significant association with other quantitative traits (Table 2). Protein yield showed significant positive association with seed yield, protein content, 100-seed weight and pods/plant whereas it showed significant negative association with branches/plant. Therefore, to augment protein yield emphasis should be given for selection of genotypes having higher seed yield, higher protein content, bold seeds and profuse pods but fewer primary branches.

References

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3. **Sandhu T. S., Bhullar B. S., Cheema H. S. and Brar J. S.** 1978. Grain protein, yield and its components in urdbean. Indian J. Genet. **38**: 410-415.

Table 2. Simple correlation coefficient values *inter se* 12 agronomic characters in urdbean

Characters	2	3	4	5	6	7	8	9	10	11	12
Days to 50% flowering	0.920**	0.850**	−0.070	0.726**	−0.016	−0.030	0.226	−0.551*	−0.410	−0.180	−0.377
Days to maturity		0.897**	−0.102	0.771**	0.059	0.054	0.276	−0.555*	−0.326	−0.023	−0.264
Plant height (cm)			−0.220	0.859**	0.107	0.054	0.174	−0.414	−0.203	0.147	−0.110
Primary branches #/plabnt				−0.256	−0.492*	−0.154	−0.012	−0.233	−0.594**	0.002	−0.538*
Pod clusters #/plant					0.383	−0.046	0.298	−0.385	−0.029	0.086	0.016
Pod #/plant						−0.369	0.017	−0.308	0.498*	0.147	0.480*
Pod length (cm)							0.219	0.549*	0.311	0.115	0.301
Seed #/pod								0.038	−0.005	−0.176	−0.057
100-seed weight (g)									0.562**	0.238	0.544*
Seed yield (q/ha)										0.351	0.961**
Protein content (%)											0.591**
Protein yield (q/ha)											

*,**Significant at 5% (0.4438) and 1% (0.5614) level, respectively