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Original Research Article

Mean Performance and Correlation Coefficient Analysis for Seed Yield and Related Traits in Blackgram Parents and Crosses

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A B S T R A C T

Blackgram [*Vigna mungo*] also called 'urdbean' belongs to the family *Fabaceae* is an excellent source of easily digestible proteins with low flatulence which complements the staple rice diet in Asia. A field experiment with 21 genotypes as well as crosses of blackgram was conducted at Breeding Farm, SHUATS Allahabad during *Kharif*-2017 to study the *per se* performance and correlation coefficient analysis for grain yield and its component traits. Genotypes were evaluated in Randomized Block Design with a single check UTTARA. Mean performance for earliness revealed that Genotype PGRU 99022, GC-9120 and GU-1were significantly earlier over the check. In the case of seed yield per plant, genotypesIPU7-3xPGRU 99022, AZAD-1xIPU 96-1, IPU 86-7xIPU 96-1, and AZAD-1xPGRU-99022 exhibited significant mean performance with check UTTARA. Few of the traits such as the number of primary branches per plant, pod length, and seeds per pod all the genotypes showed at par performance. Therefore, these genotypes can be utilized for urdbean improvement program. The correlation of seed yield per plant was positive and significant at the genotypic level with primary branches per plant, pods per plant, and Harvest Index, and significantly negative correlations were found for days to 50 % flowering and seed index. Therefore, selection based on these component traits would result in an improvement in the seed yield of urdbean.

Keywords

Correlation, Urdbean, Per se performance, Seed yield

Introduction

Urdbean [*Vigna mungo*], is an ancient pulse crop widely cultivated in India. It can be grown in various crop rotation practices (Singh *et al.*, 2015) because of its short duration nature, wider adaptability, low water requirement, and photo insensitiveness can be utilized in low rainfall areas or god rainfall areas. Urdbean is a short day, warm-season crop, grown mainly in tropical and sub-tropical regions. It is drought tolerant and can grow under harsh climate and medium to low rainfall situation. It is tolerant to moisture

stress and heat as well. It can grow under low input conditions. It can be grown on several types of soils such as black cotton, red lateritic, gravelly, and sandy soils. Well-drained fertile sandy loam soil with a pH between 6.2- 7.2 is the best for urdbean cultivation. Waterlogged and saline soils are not suitable for urdbean cultivation (Sharma 2016).Correlation coefficient analysis is a statistical technique that helps to measures the degree and association between two or more variables. Estimates of the correlation coefficient are useful in identifying the component traits, which can be used for yield or other agronomically important traits improvement of urdbean. Earlier numerous studies have been reported in legumes recently such as Chauhan *et al.,* (2007), Konda *et al.,* (2008), Kumar *et al.,* (2003), Natarajan and Rathinasamy (1999) in urdbean,Kumar *et al.,* (2018), Kumar *et al.,* (2020) in mungbean, Sahoo *et al.,* (2018) and Sahoo *et al.,* (2019) in moth bean. Therefore, the present study was conducted to assess *per se* performance and correlation to identify component traits for developing high yielding varieties or crosses of urdbean.

Materials and Methods

The present investigation was carried out during *Kharif*-2017 at the experimental farm, Sam Higgin bottom University of Agriculture, Technology and Sciences, Allahabad. The experimental material consisted of 21 genotypes including 10 crosses were evaluated in randomized block design with three replications accommodating 3-meter long two rows per replication at 30 cm spacing (Table 1).

Observations were recorded for twelve characters *viz.,* days to 50% flowering (DF), days to maturity (DM), plant height (PH), primary branches per plant (PBP), number of clusters per plant (CPP), pods per plant (PPP), pod length (PL), seeds per pod (SPP), biological yield per plant (BYP), Seed Index (SI), Harvest Index (HI) and seed yield per plant (SYP). Phenotypic and genotypic correlation coefficient estimated by Johnson *et al.,* (1955). Softwares used for analysis were OPSTAT and Microsoft Excel 2007.

Results and Discussion

Mean performance

The mean performance of 21genotypes of urdbean was mentioned in Table 2. Based on the mean performance of urdbean genotypes, under this environmental condition, the high mean value is the sign for all the traits except seeds per pod.

After analyzing the mean performance of these genotypes, it was found that zero genotypes for days to 50 % flowering, 3 for days to maturity, 12 plant height, zero for the number of primary branches per plant, 5 for clusters per plant, 3 for pods per plant, zero for pod length, zero for seeds per pod, 2 for the biological per plant, 6 for harvest index, 18 for harvest index and four genotypes showed significant mean performance over check UTTARA in a desirable direction, respectively.

For the traits number of primary branches per plant, pod length and seeds per pod all the genotypes showed at par performance. According to the mean performance of the studied genotypes, it is observed that few of them can be selected for their better performance, such as PGRU 99022, GC-9120, and GU-1for the lowest days to maturity, GC-9120xPGRU 99022, and IPU-86-7 for biological yield per plant,IPU7-3xPGRU 99022, AZAD-1xIPU 96-1, IPU 86-7xIPU 96-1and AZAD-1xPGRU-99022 for seed yield per plant over the check UTTARA.

Table.1 List of the genotypes used for the present study

S. No.	Name of Genotypes
1	GC-9120xPGRU 99022
2	SHEKAR-3xIC 106194
3	IPU7-3xPGRU 99022
4	GC 9120xIC 106194
5	GU-1xIC 106194
6	SHEKAR-1xIPU 96-1
7	AZAD-1xIPU 96-1
8	IPU 86-7xIPU 96-1
9	IPU 7-3xIC 106194
10	AZAD-1xPGRU-99022
11	IPU 96-1
12	PGRU 99022
13	AZAD-1
14	IPU 7-3
15	SHEKAR-3
16	IPU-86-7
17	GC-9120
18	IC-106194
19	SHEKAR-1
20	GU-1
21	UTTARA (C)

Table.2 Mean performances of twenty-one genotypes for twelve characters

GENOTYPES	DF	DM	PH	PBP	CPP	PPP	PL	SPP	BYP	HI	SI	SYP
GC-9120xPGRU 99022	40	66	47.3	2.93	11.60	31.66	3.80	5.33	22.42	19.95	3.42	4.47
SHEKAR-3xIC 106194	39	65	46.0	2.73	9.86	28.00	3.74	5.66	17.79	26.58	3.62	4.72
IPU7-3xPGRU 99022	38	68	43.5	2.93	8.93	31.40	3.75	5.66	20.50	24.30	3.45	4.96
GC 9120xIC 106194	40	63	46.7	2.66	9.76	26.13	3.71	6.00	16.73	27.27	3.54	4.54
GU-1xIC 106194	38	67	45.9	2.86	9.06	26.53	3.59	4.66	17.23	27.20	3.54	4.67
SHEKAR-1xIPU 96-1	39	63	44.3	2.40	10.93	30.13	3.87	5.66	19.85	23.33	3.12	4.61
AZAD-1xIPU 96-1	37	62	45.4	2.73	10.73	27.33	3.56	5.00	18.52	27.57	3.51	5.08
IPU 86-7xIPU 96-1	37	64	45.1	2.93	9.60	20.93	3.83	5.66	19.51	25.46	3.45	4.95
IPU 7-3xIC 106194	37	67	45.6	2.86	9.26	24.66	3.90	6.00	18.15	24.70	3.39	4.47
AZAD-1xPGRU-99022	37	66	44.4	2.80	9.93	26.86	3.78	5.66	19.96	24.67	3.28	4.92
IPU 96-1	40	67	46.3	2.93	7.93	24.46	3.74	5.00	17.80	23.39	3.66	4.16
PGRU 99022	41	62	42.3	2.60	8.40	22.40	3.74	5.33	17.35	25.04	3.63	4.34
AZAD-1	40	63	47.3	2.53	8.06	25.40	3.91	6.00	18.42	22.63	3.53	4.16
IPU 7-3	40	68	44.6	2.66	8.13	24.40	3.72	5.00	21.82	19.17	3.53	4.18
SHEKAR-3	41	63	43.7	2.60	8.80	26.60	3.90	5.00	20.81	21.94	3.57	4.55
IPU-86-7	40	64	46.1	2.40	10.73	26.46	3.82	5.66	22.62	18.88	3.51	4.27
GC-9120	39	62	43.4	2.86	8.83	25.73	3.85	5.33	17.67	26.50	3.24	4.68
IC-106194	36	66	45.5	2.80	11.26	26.20	3.56	5.33	18.61	22.43	3.47	4.17
SHEKAR-1	41	66	44.7	2.53	8.20	26.53	3.70	4.66	17.30	26.85	3.55	4.64
GU-1	41	62	43.7	2.66	11.00	28.10	3.75	5.66	17.35	24.02	3.63	4.17
UTTARA (CHECK)	37	65	47.3	2.93	9.06	27.33	3.84	6.00	20.47	23.72	3.26	4.83
Mean	**39**	**65**	**45.2**	**2.73**	**9.53**	**26.53**	**3.76**	**5.44**	**19.09**	**24.08**	**3.47**	**4.55**
C.V. (%)	2.86	2.6	2.35	4.13	5.83	6.17	2.97	11.07	5.26	6.17	2.38	1.55
S.E.	0.64	0.97	0.61	0.06	0.32	0.94	0.06	0.34	0.58	0.85	0.04	0.04
C.D. (5%)	1.83	2.78	1.75	0.18	0.91	2.70	0.18	NS	1.65	2.45	0.13	0.11

Table.3 Phenotypic upper (r_p) and Genotypic lower (r_g) correlation coefficients for twelve characters in urdbean

Characters	DM	PH	PBP	CPP	PPP	PL	SPP	BYP	HI	SI	SYP
DF	-0.249*	-0.135	-0.464**	-0.198*	0.041	0.175	-0.143	-0.022	-0.216*	0.361**	-0.458**
	-0.411**	-0.302**	-0.668**	-0.282**	-0.044	0.226*	-0.419**	-0.149	-0.209*	0.568**	-0.606**
DM		0.174	0.255**	-0.118	0.087	-0.142	-0.119	0.098	-0.101	0.007	-0.033
		0.368**	0.595**	-0.207*	0.178	-0.282**	-0.298**	0.301**	-0.274**	0.046	-0.040
PH			0.105	0.130	0.129	0.047	0.208*	0.182*	-0.210*	0.001	-0.117
			0.236*	0.172	0.095	-0.081	0.368**	0.081	-0.098	0.040	-0.103
PBP				-0.024	0.023	-0.026	0.006	-0.024	0.166	-0.061	0.288**
				-0.081	-0.031	-0.285**	-0.009	-0.071	0.264**	-0.102	0.379**
CPP					0.457**	-0.123	0.123	0.231*	-0.142	-0.218*	0.078
					0.510**	-0.293**	0.417**	0.268**	-0.159*	-0.301**	0.085
PPP						-0.081	0.008	0.314**	-0.163	-0.239*	0.184*
						0.009	0.167	0.318**	-0.119	-0.341**	0.221*
PL							0.361**	0.254**	-0.285**	-0.231*	-0.092
							0.949**	0.382**	-0.374**	-0.508**	-0.058
SPP								0.007	-0.049	-0.226*	-0.025
								0.194*	-0.124	-0.593**	0.090
BYP									-0.833**	0.236*	0.0009
									-0.788**	-0.335**	0.036
HI										0.003	0.541**
										0.035	0.582**
SI											-0.372**
											-0.432**

*, ** significant at 5% and 1 % of the level of significance

The correlation coefficient (Table 3)

The correlation of seed yield per plant was positive and significant at the genotypic level with the number of primary branches per plant, pods per plant, and harvest index. This character needs due consideration during any selection method. Similar results were reported by Natarajan and Rathinasamy (1999), Kumar *et al.,* (2003), Chauhan *et al.,* (2007), Konda *et al.,* (2008), Khanpara *et al.,* (2012), Gadakh *et al.,* (2013), Bisht *et al.,* (2014), Katiyar *et al.,* (2015), Bhutia *et al.,* (2016) and Choudhary *et al.,* (2016). The correlation of biological yield per plant was positive and significant at the genotypic level with days to maturity, clusters per plant, pods per plant, and pod length. Similar findings also agree with previous findings Gadakh *et al.,* (2013), Bisht *et al.,* (2014), Kumar *et al.,* (2018) in mungbean. The trait Days to 50% flowering showed negative and significant correlation with days to maturity, the number of primary branches per plant, clusters per plant, seeds per plant, seed yield per plant, and harvest index.

In conclusion, the information from mean performance and correlation analysis in urdbean will be helping in finding out the structural yield components that can be appropriately incorporated into an improved plant type. Being grown under marginal conditions, it requires a change in the plant type for wider adaptability. Hence, the present study reveals that days to 50 % flowering, number of primary branches per plant, pods per plant, and harvest index are important agronomic traits as they have directly contributed towards seed yield per plant. Therefore, selection based on these component traits would result in an improvement in seed yield of urdbean.

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Conflicts of Interest

The authors declare no conflict of interest.

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