The Pharma Innovation Journal 2022; 11(4): 1351-1354

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(4): 1351-1354
© 2022 TPI
www.thepharmajournal.com
Received: 09-01-2022
Accepted: 21-03-2022

Kumar Rathod
M.Sc. Scholar, Department of Vegetable Science, Kittur Rani Channamma College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot, Karnataka, India

Vilas D Gasti
Associate Professor and Head, Department of Vegetable Science, Kittur Rani Channamma College of Horticulture, Arabhavi, Bagalkot, Karnataka, India

Shantappa T
Professor, Department of Seed Science and Technology, ADRE, RHREC, Dharwad, University of Horticultural Sciences, Bagalkot, Karnataka, India

N Thammaiah
Professor, Department of Plant Pathology, University Librarian, University of Horticultural Sciences, Bagalkot, Karnataka, India

Shashikanth Evoor
Assistant Professor, Department of Vegetable Science, College of Horticulture, Bagalkot, Karnataka, India

C S Kamble
Assistant Professor, Department of Vegetable Science, Kittur Rani Channamma College of Horticulture, Arabhavi, Karnataka, India

Corresponding Author:
Kumar Rathod
M.Sc. Scholar, Department of Vegetable Science, Kittur Rani Channamma College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot, Karnataka, India

Genetic variability, heritabilty, genetic advance and genetic advance as per cent over mean in bush type of dolichos bean (*Lablab purpureus* L.) genotypes under RHREC, Dharwad

Kumar Rathod, Vilas D Gasti, Shantappa T, N Thammaiah, Shashikanth Evoor and CS Kamble

Abstract
The investigation on "Genetic variability, character association and divergence studies in bush type of dolichos bean (*Lablab purpureus* L.) germplasm". The analysis of variance proved highly significant (P=0.01 and P=0.05) differences among the genotypes for all the traits studied indicating the higher magnitude of variation in the germplasm. The range, mean, phenotypic variance, genotypic variance, phenotypic coefficient of variation, genotypic coefficient of variation, broad-sense heritability, genetic advance and genetic advance as per cent over mean were calculated. The genotypes showed considerable amount of variability for all the traits. The high estimates of heritability coupled with high genetic advance as per cent over mean were noticed for the traits *viz*., plant height, days to first flowering, days to first picking, number of green pods per cluster, number of clusters per plant, number of green pods per plant, green pod length, average pod weight, green pod yield per plant, green pod yield per plot, protein, shelling per cent, crude fiber, number of seeds per pod and seedling length which indicates dominance of additive components for these traits and hence direct selection would be more effective in improving these traits.

Keywords: Genetic variability, heritability, GCV, PCV, genetic advance and genetic advance as per cent over mean

Introduction
Dolichos bean (*Lablab purpureus* L.) is also known as Indian bean, Indian butter bean, Australian bean, salad bean and hyacinth bean. It is one of the most important leguminous vegetables that originated in India. It is very popular in Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh and North-East India. In South India, the fresh pods are acceptable and liked by all, especially during the winter season. The crop has important value in the agricultural economy of the country and it is a multipurpose crop grown as a pulse, forage and vegetable in the human diet. It is a very nutritious vegetable grown in the cool season throughout the world. It is grown as a vegetable crop for fresh seeds and a pulse for dried seed. The dolichos bean is rich in proteins, minerals, vitamins and fibers.

Green pods of dolichos bean rich in (per 100 g) moisture (86.1%), protein (3.8%), carbohydrate (6.7%), fat (0.7%), mineral matter (0.9%), vitamin-A (312 IU) and also rich in vitamin B and C and dry beans contains copper (148%), calcium (13%), iron (64%), magnesium (71%), manganese (68%), phosphorus (53%), zinc (84%) and potassium (26%) (Aykroyd, 1963) [1].

A wide range of genetic variability is available in the dolichos bean providing good scope for improvement in yield and associated characters of dolichos bean through selection. Performance of the germplasm varies with region, season and other growing conditions. As a result, a prominent cultivar performing well in one region may fail to perform well in another region of varying climatic conditions. The criterion for selection of suitable high yielding cultivar for the region leads to the requirements of collection and evaluation of available dolichos bean germplasm. Ultimately, the yield and production of good quality pod depends upon the selection of suitable germplasm for a particular location.

The plant is variable due to extensive breeding in cultivation, but in general, they are annual or short-lived perennial vines. Bush type of dolichos bean (*Dolichos lablab var. lignosus*) which does not require specific short-day conditions (Photo insensitive) for flowering and pod set.

It is mainly grown as a highly compensatory off-season crop during the summer and rainy season for its tender pods (Pan *et al*., 2004) [9].

A pole type requires a high maintenance like provide supporting to the plants at the certain level, whereas bush type is less maintenance and high yielding compared to the pole types hence they are preferred over pole types.

Planning and implementation of a breeding program for the improvement of the various quantitative and qualitative attributes depend, to a great extent, upon the magnitude of genetic variability existing in the population. Hence, studies on genetic variability with the help of suitable biometrical tools such as coefficient of variability, heritability and genetic advance become indispensable in breeding programs for tangible results of the desired value. The selection cannot be effective in a population without variability.

Material and Methods

The present investigation was carried out at Regional Horticultural Research and Extension Centre, Kumbapur farm, Dharwad, KRCCH, Arabhavi and University of Horticultural Sciences, Bagalkot, Karnataka during the *rabi* season 2020-21. Two genotypes collected from NBPGR, New Delhi, 20 genotypes from CHES, Godra, two genotypes from UAS, Bengaluru and two genotypes from University of Agricultural and Horticultural Sciences, Shivamogga have been taken for investigation.

The experiment was laid out in a randomized complete block design (RCBD) with three replications. The treatments in each replication were allotted randomly by using random number table. Dolichos bean seeds were sown by dibbling at 45 cm × 30 cm spacing. The crop was raised by following the recommended package of practices of University of Horticultural Sciences, Bagalkot (Plate 1).

Observations were recorded on five randomly selected plants in each replication for different traits *viz*., plant height at 60 DAS and 90 DAS, number of branches per plant at 60 DAS and 90 DAS, days to first flowering, days to 50 per cent flowering, days to first picking, days to last picking, number of green pods per cluster, number of clusters per plant, number of green pods per plant, green pod width, green pod length, average pod weight, green pod yield per plant, green pod yield per plot, number of seeds per pod, hundred seed weight, germination per cent, seedling length, seedling vigour index, shelling per cent, protein and crude fibre.

Analysis of variance was performed by following the standard procedure given by Panse and Sukhatme (1967) [10]. Genotypic and phenotypic coefficients of variation were estimated according to Burton and Devane (1953) [2] based on estimate of genotypic and phenotypic variance. The broad sense heritability (h^2) was estimated by following the procedure suggested by Weber and Moorthy (1952) [15]. The genetic advance and genetic advance as per cent over mean for each character was predicted by the formula given by Johnson *et al.,* (1955) [6].

Results and Discussion

Analysis of variance showed significant differences among the genotypes for all the characters studied at one and five per cent level of significance. The mean sum of squares for 18 yield and yield attributing characters in 27 genotypes of dolichos bean were presented in Table 1.

Components of variation exhibited by the genotypes for all the characters indicated wide range of variability present in the genotypes. A wide range of variability existing for various the quantitative traits has also been reported in dolichos bean by Verma *et al*., (2015) [14], Chaudhari *et al*., (2016), Ram *et al.,* (2016) [12], Goudar *et al*., (2017) [5] and Noorjahan *et al*., (2019) [8]. In general, phenotypic coefficients of variation were higher than genotypic coefficients of variation indicating that the genotypic influence is lessened under the influence of the given environment (Table 2).

Table 1: Analysis of variance for 18 yield and yield attributing characters in twenty seven genotypes of dolichos bean

Sl. No.	Source of variation /character	Replication	Treatments (Genotypes)	Error	S.Em ±	C.D at 5%	C.D at 1%
	Degrees of freedom	2	26	52			
01	Plant height at 60 DAS	2.60	300.26 **	5.24	1.32	3.74	4.47
02	Plant height at 90 DAS	81.57	224.79*	86.90	5.38	15.27	18.12
03	Number of branches per plant at 60 DAS	0.82	0.36*	0.228	0.27	0.50	0.72
04	Number of branches per plant at 90 DAS	0.54	0.68**	0.24	0.28	0.81	0.95
05	Days to first flowering	8.04	44.23**	4.50	1.22	3.47	4.21
05	Days to 50 per cent flowering	159.26	21.00**	11.93	1.99	5.65	7.23
06	Days to first picking	51.35	35.28**	403.31	1.60	4.56	5.22
07	Days to last picking	7.81	26.98**	5.62	1.37	3.88	4.60
08	Number of green pods per cluster	0.26	1.46*	1.02	0.58	1.63	2.54
09	Number of clusters per plant	8.25	5.90*	4.48	0.52	1.48	2.20
10	Number of green pods per plant	120.08	737.56*	364.56	2.93	8.34	12.92
11	Green pod length	0.25	0.12*	0.09	0.18	0.45	0.77
12	Green pod width	1.33	8.01*	2.99	0.99	2.83	3.32
13	Average pod weight	4.52	368.19**	12.21	0.51	0.46	0.81
14	Green pod yield per plant	176.73	917.96**	283.04	9.71	27.56	32.48
15	Green pod yield per plot	0.04	0.08*	0.05	0.14	0.37	0.48
16	Protein	0.41	0.10*	0.07	0.16	0.52	0.62
17	Shelling percentage	1.07	9.38**	6.63	1.49	4.52	5.51
18	Crude fibre	0.29	0.04*	0.10	0.18	0.50	0.61

**Significant at 1 per cent

*Significant at 5 per cent

DAS: Days after sowing

Table 2: Mean, range and genetic parameters for growth, flowering, yield and quality parameters in dolichos bean genotypes

Characters	Mean ±S.Em	Range		GV	PV	GCV (%)	PCV (%)	h^2 (%)	GA	GAM (%)
		Min	Max							
Plant height at 60 DAS	61.88±1.32	51.70	78.07	83.34	112.57	14.75	17.15	74.03	16.18	26.14
Plant height at 90 DAS	82.02±5.38	64.68	97.68	98.96	104.88	12.19	12.48	94.35	9.90	12.34
Number of branches per plant at 60 DAS	5.02±0.27	3.64	5.48	0.16	0.21	7.97	9.13	76.19	0.72	15.16
Number of branches per plant at 90 DAS	6.20±0.28	4.52	6.76	0.43	0.61	10.57	12.60	70.49	1.13	19.38
Days to first flowering	61.22±1.22	50.33	65.12	70.24	79.75	13.69	14.59	88.07	16.21	26.48
Days to 50 per cent flowering	79.70±1.99	72.00	84.01	61.02	65.95	9.80	10.19	92.52	15.48	19.42
Days to first picking	93.79±1.60	84.02	98.33	102.17	104.95	10.78	10.92	97.35	20.55	21.91
Days to last picking	124.59±1.36	117.66	129.33	112.12	117.74	8.50	8.71	95.22	21.28	17.08
Number of green pods per cluster	9.82±0.58	8.70	10.70	3.14	3.76	18.04	19.75	83.51	3.33	33.91
Number of clusters per plant	7.68±1.22	5.77	9.52	4.47	5.95	27.53	31.76	75.12	3.78	49.22
Number of green pods per plant	75.49±11.02	58.36	89.27	313.44	322.54	23.45	23.79	97.17	35.95	47.62
Green pod length	5.21±0.18	4.87	5.53	0.51	0.57	13.71	14.49	89.47	1.39	26.68
Green pod width	17.08±0.99	14.67	21.13	0.03	0.05	1.01	1.31	60.00	0.28	1.64
Average pod weight	2.87±2.01	2.63	3.43	1.18	1.30	37.85	47.11	90.67	2.13	74.22
Green pod yield per plant	265.57±9.71	145.76	234.30	958.64	998.67	11.90	18.52	95.99	62.49	23.53
Green pod yield per plot	3.49±0.14	2.18	2.81	0.21	0.24	14.04	19.67	87.50	0.88	25.21
100 seed weight	36.16±0.17	32.93	40.67	6.84	7.68	7.23	7.67	89.06	5.08	14.05
No. of seeds per pod	4.09±0.52	3.87	4.47	3.61	4.84	46.45	53.79	74.58	3.38	82.64
Germination (%)	88.52±0.09	85.74	92.52	1.75	2.40	1.54	1.98	72.92	2.94	3.33
Seedling length	38.16±0.57	30.78	43.41	21.67	26.53	12.20	13.50	81.68	8.67	22.72
Seedling vigour index	2910±0.79	2512	3342	2191	2707	1.60	1.79	80.95	86.76	2.98
Protein	1.90±0.16	1.50	2.23	0.28	0.33	27.85	30.23	84.84	1.00	52.63
Shelling percentage	53.89±1.48	50.68	58.65	71.36	77.54	15.66	16.32	92.02	16.69	30.94
Crude fibre	1.97±0.18	1.74	2.16	0.25	0.28	25.38	26.86	89.28	0.97	49.24

Plant 1: General view of the experimental plot

Among the different characters studied, high GCV and PCV were observed for number of clusters per plant, number of green pods per plant, average pod weight, protein, crude fibre and number of seeds per pod. It indicates the presence of a higher magnitude of variability for these characters, which would be helpful for further selection. Moderate GCV and PCV were observed for plant height at 60 DAS, plant height at 90 DAS, number of branches per plant at 60 DAS, days to first flowering, days to first picking, number of green pods per cluster, green pod length, green pod yield per plant, green pod yield per plot, shelling per cent and seedling length. This indicates equal importance of additive and non-additive gene action in these traits. Low GCV and PCV were noticed in number of branches per plant at 90 DAS, green pod width, 100 seed weight, germination per cent, seedling vigour index which indicates the presence of a narrow genetic base for these traits (Table 2). Hence variability has to be created in these traits can be done by either through introduction or by hybridization between divergent parents (Table 2). These results are in conformity with the findings of Siddika *et al.* (2012) [13], Chaitanya *et al.,* (2014) [3], Verma *et al.,* (2015) [14] and Noorjahan *et al.* (2019) [8].

Close relationship between GCV and PCV was found in all the characters and PCV values were slightly greater than GCV indicating a very little influence of environment for their expression (Table 2). This is in confirmation with the results reported by Chaitanya *et al.*, (2014) [3], Goudar *et al.*, (2017) [5], Verma *et al.,* (2015) [14] and Noorjahan *et al.*, (2019) [8].

Only the extent of variability present in genotypes for different characters is indicated by coefficient of variation but for the prediction of response to selection heritability estimates are useful. Since heritability is a important factor for expressing the phenotypic variability value as a tool to breeding value. Hence Heritability is a fundamental important factor in practicability of selection.

The high broad sense of heritability (> 60%) was shown by plant height at 60 DAS, plant height at 90 DAS, number of branches per plant at 60 DAS, number of branches per plant at 90 DAS, days to first flowering, days to 50 per cent flowering, days to first picking, days to last picking, number of green pods per cluster, number of clusters per plant, number of green pods per plant, green pod length, average pod weight, green pod yield per plant, green pod yield per plot, protein, shelling per cent, crude fibre, 100 seed weight, number of seeds per pod, seedling length, germination per cent and seedling vigour index (Table 2).

The high estimates of heritability coupled with high genetic advance as per cent over mean were noticed for the traits such as plant height at 60 DAS, days to first flowering, days to first picking, number of green pods per cluster, number of clusters per plant, number of green pods per plant, green pod length, average pod weight, green pod yield per plant, green pod yield per plot, protein, shelling per cent, crude fiber, number of seeds per pod and seedling length, which indicates that these characters are under the influence of additive gene action similar results were also obtained by Magalingum *et al.* (2013), Chaitanya *et al.*, (2014) [3], Verma *et al.*, (2015) [14],

Choudhary *et al.* (2016), Peer *et al.* (2018) [11] and Noorjahan *et al.*, (2019) [8].

In conclusion the significant differences were observed among the genotypes for all the characters studied at one and five per cent level of significance. Components of variation exhibited by the genotypes for all the characters indicated wide range of variability present in the genotypes.

High to moderate GCV and PCV were observed by the most of the characters studied and most of the characters exhibited high heritability coupled with high genetic advance as per cent of mean which indicates that these characters are under the influence of additive gene action.

References

1. Aykroyd WR. ICMR Special reporter series. 1963;2:15.
2. Burton GW, Devane EM. Estimating heritability from replicated clonal material. Agron J. 1953;45:478-81.
3. Chaitanya V, Reddy RVSK, Kumar PA. Variability, heritability and genetic advance in indigenous dolichos bean (*Dolichos lablab* L. *var typicus*) genotypes. Plant Archives. 2014;14(1):503-506.
4. Chaudhary J, Kushwah SS, Singh OP, Naruka IS. Studies on genetic variability and character association in Indian bean (*Lablab purpureus* (L.) sweet). Leg. Res. - An Int. J 2016;39(3):336-342.
5. Goudar R, Srinivasa V, Lakshmana D. Genetic variability and genetic divergence in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub) under hill zone of Karnataka, India. Leg. ReS., 2017;40(2):237-240.
6. Johnson HW, Robinson HF, Comstock RS. Estimation of genetic and environmental variability in soybean. Agron J. 1955;41:314-318.
7. Magalingam V, Yassin M, Kumar SR. Genetic variability and character association in dolichos bean. SAARC J Agri. 2013;11(2):161-165.
8. Noorjahan AM, Deshmukh JD, Bagade AB, Kalpande HV, Reddy V. Path analysis studies in dolichos bean (*Lablab purpureus* L.). J. Pharmacogn. Phytochem. 2019;8(2):41-42.
9. Pan RS, Singh AK, Rai M, Krishnaprasad, Kumar S. Genetic variation and character association in photo insensitive dolichos bean *(Lablab purpureus* L. Sweet). Veg. Sci. 2004;31(1):22-25.
10. Panse VG, Sukhatme PV. Statistical methods for agricultural workers, 2nd edition ICAR, New Delhi. 1967, 324.
11. Peer SS, Reddy PSS, Sadarunnisa S, Reddy DS, Pandravada SR. Genetic variability and heritability for yield and yield attributes in field bean (*Lablab purpureus* L.) genotypes. Int. J Curr. Microbiol. App. Sci. 2018;7(3):2131-2137.
12. Ram BKC, Joshi BK, Dahal SP. Diversity analysis and psycho-morphological characteristics of indigenous germplasm of lablab bean. J Nepal. Agri. Res. Counc. 2016;2(15-21):2392-4535.
13. Siddika SS, Bhuiyan MKA, Momotaz R, Bari GMM, Rahman MH. Cultural characteristics, virulence and in-vitro chemical control of *Fusarium oxysporum f. sp. phaseoli* of bush bean (*Phaseolus vulgaris* L.). The Agriculturists, 2014;12(1):103-110.
14. Verma A, Jyothi U, Rao D. Variability and character association studies in dolichos bean (*Lablab purpureus* L.). Indian J Agri. Res. 2015;49(1):46-52.
15. Weber CR, Moorthy HR. Heritable and non-heritable relationship and variability of oil content and agronomic characters in the F_2 generation of soybean crosses. Agron. J. 1952;44:202-209.