Int.J.Curr.Microbiol.App.Sci (2017) *6*(8): 3228-3232

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 8 (2017) pp. 3228-3232**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.608.385

Study on Genetic Variability, Heritability and Genetic Advance in Dolichos Bean (*Lablab purpureus* L.) Genotypes

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Keywords

Dolichos bean, Genetic variability, Heritability and Genetic advance.

Article Info

Accepted:
26 June 2017
Available Online:
10 August 2017

A B S T R A C T

The present investigation was carried out to study the genetic variability, heritability and genetic advance for 17 traits in dolichos bean. The experimental material comprised of 38 genotypes of dolichos bean (*Lablab purpureus* L.*)*. The highest value of genotypic coefficient of variation (GCV) was recorded for inflorescence length (28.10%). The highest value of phenotypic coefficient of variation (PCV) was recorded for inflorescence length (28.16%). The highest heritability estimate was observed for days to 50% flowering (99.95%). The highest genetic advance as percent of mean observed for inflorescence length (57.76). Hence selection will be effective for these traits.

Introduction

It is known as poor's man bean (Ismunandji and Arsyad, 1990). It is commonly called as Hyacinth bean, bonavist bean, Indian bean, field bean, Egyptian bean, lablab bean, Avare in Kannada. It belongs to the family *Fabaceae*, sub family *Faboideae*, tribe *phaseoleae* and sub tribe *phaseolineae*. It is one of the most ancient crops known for its food and fodder value. Dolichos bean has chromosome number 2n=2x=22. Dolichos bean (*Lablab purpureus* L.) is an important leguminous vegetable crop grown throughout the country and distributed in Madhya Pradesh, Maharastra, Andhra Pradesh, Tamil Nadu and North Eastern states. India is world's largest producer of vegetables next to China with an annual production around 166.60 (million MT) from 9.57 (mha) of land with the productivity of 17.3 MT/ha (National Horticulture Mission, 2016).

It is sensitive to photoperiods and both short day and long day types are available and recently someday neutral types are also reported. Field bean is a drought tolerant crop and it is an excellent crop to be grown in dry lands with limited rainfall. It cannot stand water logging condition. The characters for which variability is present should be highly heritable for the success of crop improvement programme as progress due to selection depends on heritability, selection intensity and genetic advance of the character. Heritability and genetic advance estimates for

different targeted traits help the breeder to apply appropriate breeding methodology in the crop improvement programme.

Materials and Methods

The experiment was carried out at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad U.P. The experiment was conducted in Randomized Block Design having thirty eight genotypes collected from different part of Chhattisgarh in three replications. The allocation of treatments of the individual plots using random number in each replications with spacing 1.5× 1 m row to row and plant to plant respectively. Five plants from each replication were taken for recording observation on 17 characters *viz.* days to first flowering, days to 50% flowering, inflorescence length, number of flowers per inflorescence, number of pods per inflorescence, days to first green pod harvest, days to last pod harvest, number of green pod pickings, pod length, pod width, pod weight, number of seeds per pod, vine length, 100 seed weight, green pod yield per plant, green pod yield per plot, green pod yield per hectare.

Results and Discussion

A clear understanding of the extent of variability prevailing for each trait in germplasm is essential for the improvement of character through selection. In hybridization programme, selection of genetically diverse parent is important to get wide range of recombinants. The analysis of variance (ANOVA) revealed significant differences between genotypes indicating presence of sufficient amount of variability in all the characters studied. These results are similar with the findings of Chattopadyay and Dutta (2010), Upadhyay and Mehta (2010), Islam *et al.*, (2011), Magalingam *et al.*, (2013), Verma *et al.*, (2014), Singh *et al.*, (2015) and Kujur *et al.*, (2017).

Table.1 Source of Genotypes of Dolichos Bean

S.No.	Genotypes	No. of genotypes	Source of Genotypes
1.	CG 1, CG 2,CG 5,CG 6	4	Lundra Surguja CG
2.	CG 7,CG 8,CG 9.	3	Ambikapur Surguja CG
3.	CG 3,CG 4.	2	Bilha, Bilashpur, CG
4.	CG 10,CG 11,CG 12,CG 13,CG 14,CG 15,CG 16.	7	Udaipur Surguja CG
5	CG. 17,CG 18.	2	Udagi Surajpur CG
6	CG 19, CG 28,	2	Lailunga Raigarh, CG
7	CG 20, CG 21, CG 22,	3	Ramanujnagar Surajpur CG
8	CG 23.	1	Bhaiyathan Surajpur CG
9	CG 24,CG 25,CG 26,CG 27.	4	Pathalgaon Jashpur CG
10	CG 29, CG 30,CG 31,CG 32,CG 33,CG 34,CG 35,CG 36	8	Reewagahan, Rajnandgaon CG
11	VRSEM-186	1	IIVR Varanasi,U.P.
12	PUSA SEM-2	1	IARI, Delhi

Table.2 Genetic parameter of yield and its attributing traits of dolichos bean

S.N.	Characters	Range		Mean	Coefficient of variance			h^2 (%)	Genetic advance	Genetic advance as a % of mean
		Min.	Max.		GCV	PCV	ECV			
1	Days of First Flowering	93.41	46.20	116.67	15.89	15.89	0.44	99.93	30.56	32.72
2	Days of 50% Flowering	97.01	49.80	120.47	15.31	15.31	0.37	99.95	30.58	31.52
3	Inflorescence Length (cm.)	19.14	7.08	28.40	28.10	28.16	1.85	99.92	11.06	57.76
4	Flowers/Inflorescence	13.52	9.87	20.00	19.18	19.60	4.07	95.68	5.22	38.64
5	Pod Formations/Inflorescence	6.92	4.33	10.93	20.72	21.33	5.07	94.36	2.87	41.47
6	Days to First green Pod harvest	109.00	60.67	133.67	13.74	13.78	0.96	99.51	30.78	28.24
7	Days of Last Green Pod harvest	194.53	175.67	206.33	4.61	4.65	0.68	97.88	18.26	9.39
8	Number of Green Pod Picking	6.08	5.00	7.67	7.43	11.64	8.97	40.70	0.59	9.76
9	Pod Length (cm.)	9.42	3.85	13.02	22.14	22.44	3.69	97.27	4.24	44.98
10	Pod Width(cm)	1.96	1.37	4.22	26.46	26.99	5.31	96.12	1.05	53.44
11	Pod Weight (g)	7.24	2.47	11.36	25.09	26.16	7.41	91.96	3.59	49.56
12	Number of Seeds/ Pod	5.12	3.11	6.31	12.05	14.13	7.38	72.71	1.08	21.16
13	Vine Length (m)	5.81	4.47	8.35	14.90	15.88	5.49	88.02	1.67	28.79
14	Seed Index (g)	32.26	20.57	51.33	27.09	27.25	2.91	98.86	17.90	55.49
15	Green Pod Yield Per Plant (kg)	1.71	0.93	2.24	17.80	18.82	6.14	89.37	0.59	34.66
16	Green Pod Yield Per Plot (kg)	10.28	5.56	13.42	17.80	18.82	6.14	89.37	3.56	34.66
17	Pod Yield (q/ha)	114.20	61.77	149.11	17.79	18.83	6.14	89.34	39.57	34.65

The highest value of genotypic coefficient of variation (GCV) was recorded for inflorescence length (28.10%), followed by 100 seed weight (27.09%), pod width (26.46%), pod weight (25.09%), pod length (22.14%), number of pods per inflorescence (20.72%), number of flower per inflorescence (19.18%), green pod yield per plant (17.80%), green pod yield per plot (17.80%), green pod yield per hectare (17.79%), days to first flowering (15.89%), days to 50% flowering (15.31%), vine length (14.90%), days to first green pod harvest (13.74%), no. of seeds per pods (12.05 %), number of green pod picking (7.43%), and lowest genotypic coefficient of variation was recorded for days to last pod harvest (4.61 %). The Similar results were noticed by Kujur *et al.*, (2017) for all characters, Sharma *et al.*, (2014) for days to first flowering, days to 50% flowering, pod formation per inflorescence, pod length (cm), Varma *et al.*, (2014) for days to first flowering, days to 50% flowering, pod formation per inflorescence, days to 1st pod harvesting, pod length (cm) and pod width (cm), days to last pod harvesting.

The highest value of phenotypic coefficient of variation (PCV) was recorded for inflorescence length (28.16%), followed by 100 seed weight (27.25%), pod width (26.99%), pod weight (256.16%), pod length (22.44%), number of pods per inflorescence (21.33%), number of flower per inflorescence (19.60%), green pod yield per hectare (18.83%), green pod yield per plant (18.82%), green pod yield per plot (18.82%), days to first flowering (15.89%), vine length (15.88%), days to 50% flowering (15.31%), no. of seeds per pods (14.13%),days to first green pod harvest (13.78%), number of green pod picking (11.64%), and lowest phenotypic coefficient of variation was recorded for days to last pod harvest (4.65 %). The Similar results were noticed by Kujur *et al.*, (2017) for all characters, Sharma *et al.*, (2014) for days to first flowering, days to 50% flowering, pod formation per inflorescence, pod length (cm) and pod width (cm), Varma *et al.*, (2014) for days to first flowering, days to 50% flowering, pod formation per inflorescence, days to 1st pod harvesting, pod length (cm) and pod width (cm), days to last pod harvesting, Sharma *et al.*, (2014) days to first flowering, days to 50% flowering, pod length and days to 1st pod harvesting, green pod yield/plant.

Highest heritability estimate was observed for days to 50% flowering (99.95%) followed by days to first flowering (99.93%), inflorescence length (99.92%), days to first green pod harvest (99.51%), 100 seed weight (98.86%), days to last green pod harvest (97.88%), pod length (97.29%), pod width (96.12%), flower per inflorescence (95.68%), number of pod formation per inflorescence (94.36%), pod weight (91.96%), pod yield per plant (89.37%), pod yield per plot (89.37%), pod yield per ha. (89.34%), plant vine length (88.02%), number of seeds per pod (72.71%). While minimum heritability was observed in number of pod picking (40.70%). The Similar results were noticed by Kujur *et al.*, (2017) for all characters, Varma *et al.*, (2014) for days to first flowering, days to 50% flowering, pod formation per inflorescence, days to 1st pod harvesting, pod length (cm) and pod width (cm), days to last pod harvesting.

On the other hand highest genetic advance as percent of mean observed for inflorescence length (57.76), followed by 100 seed weight (55.49), pod width (53.44), pod weight (49.56), pod length (44.98), number of pods per inflorescence (41.47), number of flower per inflorescence (38.64), green pod yield per plant (34.66), green pod yield per plot (34.66), pod yield per ha. (34.65), days to first flowering (32.72), days to 50 % flowering (31.52), vine length (28.79), days to first

green pod harvest (28.24), seed/pod (21.16) and number of green pod picking (9.76). The lowest genetic advance as percent of mean was observed for days to last green pod harvest (9.39). The Similar results were noticed by Kujur *et al.,* (2017) for all characters, Varma *et al.,* (2014) for days to 50 % flowering, number of pods per inflorescence, pod length (cm), 100 seed weight, Sharma *et al.,* (2014) for seed/pods, Magalingam *et al.,* (2014) for pod length (cm) and pod width (cm), pod weight (g).

Acknowledgement

Authors are sincerely Thankful to Dr. Vijay Bahadur Associate Prof., Department of Horticulture Naini agricultural institute SHUATS Allahabad (U.P). and Thanks to my friends Praveen Choyal, Ramesh, Shatis Xaxa, Mithlesh Gupta.

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How to cite this article:

Radhelal Dewangan, Vijay Bahadur, Praveen Choyal, Ramesh, Shatis Xaxa, Vipul Pratap Singh, Shubham Sachan and Anita Kerketta. 2017. Study on Genetic Variability, Heritability and Genetic Advance in Dolichos Bean (*Lablab purpureus* L.) Genotypes. *Int.J.Curr.Microbiol.App.Sci.* 6(8): 3228-3232. doi: https://doi.org/10.20546/ijcmas.2017.608.385