

# SELECTION STRATEGY FOR PRODUCTIVE PLANT TYPE IN DOLICHOS BEAN (*DOLICHOS LABLAB* L.) FOR CHHATTISGARH PLAINS

Kanhaiya Lal Patel, Nandan Mehta and G.L. Sharma

Department of Horticulture, Indira Gandhi Krishi Viswavidyalaya, Raipur (Chhattisgarh) – 492 006

E-mail-mehta.igkv@gmail.com, [hehapatel@gmail.com](mailto:hehapatel@gmail.com)

**Abstracts :** In Chhattisgarh, a field experiment was carried out at Department of Horticulture, where sixty three genotypes of Dolichos bean (*Dolichos lablab* L.) were evaluated for green pod yield and its contributing characters. The genetic variability analysis revealed that wide range of variability was observed for all the characters viz. leaf length, leaf width, inflorescence length, number of flower per inflorescence, number of pod per inflorescence, pod length, pod width, number of pod plant, hundred seed weight and pod yield. It was also revealed that relative magnitude of phenotypic coefficient of variation was higher than the genotypic coefficient of variation under the study, higher heritability estimates coupled with high genetic advance as percent of mean were observed for hundred seed weight (98.11%) followed by pod length (97.29%), pod width (96.20%) number of flower per inflorescence (94.53%), length of inflorescence (94.24%) and number of pods per inflorescence (78.05%). Correlation revealed that number of pod per plant highly significant and positive association with pod width, pod length and marketable green pods yield per plant at phenotypic and genotypic level.

**Keywords :** Dolichos bean, Vegetable, Cultivation, Sem

## INTRODUCTION

Dolichos bean or Sem (*Dolichos lablab* L.) is an important vegetable crop throughout India and especially in Chhattisgarh due to its local acceptability by the people. Formerly Dolichos bean cultivated for its soft and edible pods and latter the bean is cultivated for dry seeds as pulse. The green pods are eaten after cooking and has very good nutritive value. According to Venkatachalam *et al.* (2002) on dry weight basis, it contains 30% protein. Out of which albumin, globulin, prolamin and glutelin respectively accounted for approximately 20%, 48%, 1% and 31% of the total proteins. Vavilov (1939) had considered India as the primary centers of origin of Dolichos bean and wild forms are found in many parts of the country. Chhattisgarh has a wide range of genetic variability in Dolichos bean with variable plants type (determinate / indeterminate) pod characteristics for shape (small, medium, long etc.), and colour (dark green, light green, maroon, red etc.). The knowledge of genetic variability association and their direct and indirect effect of green pod yield and its component are of economic worth in formulating and executing the breeding programme. Consider these points a study was undertaken at Department of Horticulture, I.G.K.V., Raipur (C.G.). Hence this study aimed to know about relationship among green pod yield and its component characters, on which selection can be used for genetic improvement in the green pod yield and promote Dolichos bean cultivation in Chhattisgarh plains.

## MATERIAL AND METHOD

The experimental material comprised of sixty three diverse genotypes of Dolichos bean which were collected from All India Coordinate Research Project on Vegetable Crops, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) and local landraces

of Chhattisgarh were used for the present study. The trials were evaluated during *Kharif* and *Rabi* season of 2009-10 at the Department of Horticulture, Horticulture Farm, I.G.K.V., Raipur (C.G.). The soil of the experimental field was sandy loam in texture which is locally known as "*Matasi*" and it is neutral in reaction with the pH 7.5. The experiment was conducted in a Randomized Block Design with four replications.

The date of sowing of sixty three genotypes was 9<sup>th</sup> July 2009. Each entry was sown in 3.6 m x 3.0 m plot area with a spacing of 60cm x 30cm in between row and within row respectively. All the standard agronomical practices and plant protection measures were followed timely to raise a crop successfully. Five plants were selected randomly for recording different yield related traits (Table-1). However green pod yield and days to first picking were recorded on plot basis. After recording data Genetic Coefficient of Variation GCV and Phenotypic Coefficient of Variation PCV were calculated as per the formula suggest by Comstock and Robinson (1952). Heritability in Board sense and expected genetic advance were calculated as per formula given by Jonson *et al.* (1955). The genotypic and phenotypic correlation coefficients were partitioned into direct and indirect effects by path analysis as suggested by Dewey and Lu (1959).

## RESULT AND DISCUSSION

Analysis of variance (Table-1) revealed that wide range of variability was observed for all the characters viz. leaf length, leaf width, inflorescence length, number of flower per inflorescence, number of pod per inflorescence, pod length, pod width, number of pod per plant, hundred seed weight and pod yield.

It was also revealed that (Table-2) relative magnitude of Phenotypic Coefficient of Variation (PCV) was

higher than the Genotypic Coefficient of Variation (GCV). The highest value of Genotypic coefficient of variation (GCV) was recorded for pod width (30.68%) followed by pod length (26.07%), number of pods per inflorescence (23.08%), length of inflorescence (23.07%), hundred seed weight (21.76%) and number of pod per plant (20.99%). Whereas, rest of the traits exhibited moderate genotypic coefficient of variation. Under the study, higher heritability estimates coupled with high genetic advance as percent of mean were observed for pod length followed by pod width, length of inflorescence, hundred seed weight, number of flower per inflorescence and number of pods per inflorescence. This findings are corroborated the observations of Joshi (1971) and Baswana *et al.* (1980).

The correlation coefficient at phenotypic and genotypic levels for green pod yield and developmental characters are presented in (Table-3). Characters like pod length and pod width showed significant and positive correlation with green pod yield per plant (kg) at phenotypic and genotypic levels. However number of flowers per inflorescence was negative and significantly correlated with green pod yield per plant (kg) at phenotypic and genotypic levels. Also number of flower per inflorescence was positive and significantly associated with number of pods per inflorescence and number of pods per plant. Among the pair of component traits *viz.* leaf length, leaf breadth, number of flowers per inflorescence, number of pods per inflorescence and hundred seed weight was observed 6+significant and positive correlation at both level. While length of

inflorescence and number of pods per plant not showed significant correlation at both level. The above results were supported by Baswana *et al.* (1980) and Golani *et al.* (2007) and Bendale *et al.* (2008).

Path analysis provides an effective means of partitioning direct and indirect causes of association while permitting a critical examination of the specific forces to produce a given correlation and measure the relative importance of each casual factor. The path coefficient at genotypic level (Table-4) revealed that number of pod per plan (0.547) showed highest positive direct effect on green pod yield, followed by hundred seed weight (0.461), number of pods per inflorescence(0.178), pod length (0.176) and leaf breadth (0.103).Whereas number of flower per inflorescence(-0.107), pod width (-0.076) and leaf length(-0.017) showed negative indirect effect on green pod yield. The above results were supported by Baswana *et al.* (1980) and Bendale *et al.* (2008).

#### ACKNOWLEDGEMENT

I thankful to project coordinator All India Coordinated Research Project on Vegetable Crops, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), Dr. Nandan Mehta for giving permission, Inspiring guideline and extending all the necessary facilities during the course of study. Thanks are also due to Dr. D.A. Sarnaik, Head of the Horticulture division Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh and Shri G.L.Sharma, Scientist Horticulture, for their Support and valuable suggestion.

**Table 1:** Analysis of variance for green pod yield in sixty three Dolichos bean genotypes

S. No.	Character (df)	Mean sum of square			CD P=0.05
		Replication (3)	Genotypes (62)	Error (186)	
		01	Leaf length (cm)	2.41	4.89**
02	Leaf breadth (cm)	1.61	5.43**	0.56	01.04
03	Inflorescence length (cm)	4.69**	76.26**	1.50	01.71
04	No. of flower per inflorescence	7.46**	77.30**	1.10	01.97
05	No. of pod per inflorescence	3.62*	11.75**	0.77	1.22
06	Pod length (cm)	0.46	23.88**	0.16	0.56
07	Pod width (cm)	0.14	1.22	0.01	0.15
08	Number of pod per plant	27.22**	201.12**	9.51	4.30
09	Hundred seed weight (g)	7.86**	283.66**	1.35	1.62
10	Green pod yield per plant (kg)	0.0015	0.0066	0.00021	0.02

\*: Significant at 5%, \*\*: significant at 1%

**Table 2:** Genetic variability and its components of green pod yield in Dolichos bean genotypes

S. No.	Characters	MEA N	RANGE		GCV (%)	PCV (%)	h <sup>2</sup> (bs) (%)	Genetic advance as % of mean
			Min.	Max.				
01.	Leaf length (cm)	11.95	9.37	14.45	8.62	11.05	60.77	13.72
02.	Leaf breadth (cm)	11.15	8.35	13.51	9.89	11.96	68.33	16.86
03.	Length of inflorescence (cm)	18.73	8.90	27.03	23.07	23.98	92.54	45.70
04.	Number of flowers per inflorescence	22.36	10.50	29.00	19.51	20.07	94.53	39.08
05.	Number of pods per inflorescence	7.18	4.50	11.75	23.08	26.11	78.05	41.92
06.	Pod length (cm)	9.33	4.12	15.30	26.07	26.43	97.29	52.94
07.	Pod width (cm)	1.79	1.10	3.76	30.68	31.27	96.2	62.01
08.	No. of pods per plant	32.86	21.00	49.77	20.99	22.98	23.40	39.42
09.	Hundred seed weight (g)	38.59	22.58	52.61	21.27	21.97	98.11	44.41
10.	Green pod yield / plant (kg)	0.200	0.134	0.279	19.27	20.52	88.22	40.00

**Table 3:** Phenotypic and Genotypic Correlation of green pod yield and its components characters in Dolichos bean

Characters Number & Name		Character number									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Leaf length (cm)	P	0.322*	0.347**	-0.091	-0.031	0.087	-0.061	0.178	-0.014	0.217	0.308*
	G	0.433	0.428	-0.089	-0.030	0.085	-0.063	0.272	-0.015	0.232	0.343
(2) Leaf breadth (cm)	P		0.459**	-0.098	-0.068	-0.271	-0.088	0.184	0.276*	0.188	0.186
	G		0.715	-0.138	-0.103	-0.402	-0.056	0.293	0.358	0.241	0.209
(3) Length of inflorescence (cm)	P			-0.070	-0.079	-0.315	-0.060	0.084	0.140	0.125	0.128
	G			-0.078	-0.095	-0.387	-0.059	0.109	0.178	0.128	0.199
(4) Number of flowers per inflorescence	P				0.679**	0.349**	0.333*	0.053	-0.088	-0.310*	0.080
	G				0.730	0.425	0.365	0.054	-0.089	-0.332	0.088
(5) Number of pods per inflorescence	P					0.375**	0.297*	0.013	-0.167	-0.179	0.060
	G					0.430	0.340	0.038	-0.174	-0.187	0.066
(6) Number of pods per plant	P						0.049	0.040	-0.187	-0.106	0.009
	G						0.096	0.045	-0.218	-0.119	-0.011
(7) Pod length (cm)	P							0.350**	-0.061	0.332**	0.309*
	G							0.564	-0.131	0.599	0.501
(8) Pod width (cm)	P								0.055	0.355**	0.464**
	G								0.056	0.378	0.474
(9) Marketable green pod yield per plant (kg)	P									-0.048	-0.011
	G									-0.052	-0.014
(10) Hundred seed weight (g)	P										0.415**
	G										0.447

\*: Significant at 5%, \*\*: Significant at 1%, P=Phenotypic; G=Genotypic

**Table 4:** Direct and indirect effect of green pod yield and its components at phenotypic level in Dolichos bean

Characters	Leaf length (cm)	Leaf breadth (cm)	Inflorescence length (cm)	Number of flowers per Inflorescence	Number of pods per Inflorescence	Pod length (cm)	Pod width (cm)	Number of pods / plant	Hundred seed weight (g)	Yield per plant (kg)
Leaf length (cm)	<b><u>-0.017</u></b>	-0.012	0.003	0.002	0.007	-0.006	-0.004	0.001	-0.006	0.213
Leaf breadth (cm)	0.074	<b><u>0.103</u></b>	-0.008	-0.008	-0.040	0.018	0.013	-0.006	0.034	0.202
Inflorescence length (cm)	-0.006	-0.003	<b><u>0.047</u></b>	0.047	0.020	-0.004	-0.015	0.017	-0.008	0.088
Number of flowers per Inflorescence	0.014	0.008	-0.107	<b><u>-0.107</u></b>	-0.045	0.009	0.035	-0.039	0.019	0.089
Number of pods / Inflorescence	-0.071	-0.069	0.076	0.075	<b><u>0.178</u></b>	-0.039	-0.021	0.017	-0.048	-0.013
Pod length (cm)	0.063	0.031	-0.016	-0.015	-0.038	<b><u>0.176</u></b>	0.009	-0.016	0.084	0.371
Pod width (cm)	-0.018	-0.009	0.025	0.025	0.009	-0.004	<b><u>-0.076</u></b>	-0.002	0.001	-0.052
Number of pods per plant	-0.025	-0.027	0.169	0.168	0.044	-0.041	0.012	<b><u>0.547</u></b>	-0.174	0.226
Hundred seed weight (g)	0.201	0.180	-0.100	-0.099	-0.148	0.261	-0.006	-0.206	<b><u>0.461</u></b>	0.449

Residual value: **0.0839**,

Diagonal and bold underline figures shows direct effect on pod yield

## REFERENCES

- Baswana, K.S., Pandita, M.L., Partap, P.S. and Dhankhar, B.S. (1980). Genetic divergence for yield and its components in Indian bean (*Dolichos lablab* var. *lignosus* L.). *Haryana J. Hort. Sci.*, **9** (3/4):, 184-187.
- Bendale, V.W., Ghangurde, M.j., Bhawe, S.G. and Sawant, S.S. (2008). Correlation and path analysis in lablab bean (*Lablab purpureus* L. Sweet). *Orissa j. Hort.*, **36**(1):49-52.
- Comstock, R.E. and Robinson, H.F. (1952). Genetic parameters, their estimation and Significance. Proc. VI Intl. Grassland.
- Dewey, D.R. and Lu, K.H. (1959). A correlation and path coefficient analysis components of crested wheat grass seed production. *Agron J.* **51**(6): 515-518.
- Golani, I.J., Mehta, D.R., Naliyandhara, Patel, R.K. and Kanzariya, M.V. (2007). Genetic variability, correlation and path analysis for green pod yield and its characters in Hyacinth bean. *Orissa j. Hort.* **35**(1):71-75.
- Johanson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Estimates of genetic and environmental variability of soybean. *Agron. J.*, **47**: 314-318.
- Joshi, S.N. (1971) Studies on genetic variability for yield and its components in Indian beans *Dolichos lablab* var. *lignosus*. *Madras Agric. J.*, **58**:367-371.
- Vavilov, N.I. (1939). *Chromosome Atlas of cultivated plants*. George Allen Unwin Ltd., London.
- Venkatachalam, M., Kshirsagar, H.H. Tiwari, R. and Sathe, S.K. (2002). *Annual meeting and food expo* Anaheim, California. Session 30c, food chemistry: proteins.