Int.J.Curr.Microbiol.App.Sci (2019) *8*(8): 2074-2079

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 8 Number 08 (2019)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2019.808.242

Evaluation of Yield and Yield Attributing Characters in Pole Type of Dolichos Bean (*Lablab purpureus* L.)

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Keywords

Pole type, Dolichos bean, Mean performance and genotypes

Article Info

Accepted:
15 July 2019
Available Online:
10 August 2019

A B S T R A C T

Field experiment was conducted under AICRP on Vegetable Crops, OUAT, Bhubaneswar, during *Rabi* season of 2018-19 to identify the suitable pole type of dolichos bean genotype (s) under the trial. Fourteen pole type dolichos bean genotypes were evaluated for seventeen characters by adopting randomized block design replicated thrice. Significant differences were recorded for all traits studied. 2016/DOLPVAR-6 was the earliest to flower in 34.27 days. 2016/DOLPVAR-5 recorded highest pod length (16.98 cm) and number of seeds pod^{-1} (4.67). Pod width was highest in 2016/DOLPVAR-12 (3.79 cm). Pod weight was maximum in 2016/DOLPVAR-12 (14g). Number of pods plant^{-1} ranged from 30.64 to 119.33, with the maximum in 2016/DOLPVAR-4. Three different pod colors (Green, Butter green and Purple) were recorded. Maximum genotypes had green pods except 2016/DOLPVAR-11 which had purple coloured pods. The genotypes 2016/DOLPVAR-9 (1185.58g), 2016/DOLPVAR-4 (1009g) and 2016/DOLPVAR-12 (905.67g) were found promising for pod yield plant^{-1} than other genotypes. These high yielding genotypes can serve as potentially useful parents in further breeding programme.

Introduction

Dolichos bean (*Lablab purpureus* L.) also known as Indian bean or Lablab bean, belongs to family leguminosae (2n=2x=22) is one of the important vegetable crops of Indian origin. Dolichos bean is a multipurpose crop grown for pulse, vegetable and forage crop for livestock. It is sensitive to photoperiods and both short day and long day types are available. It has high nutritive value and possess immense health benefits. The flavonoid 'Genistein' found in dolichos bean play a role in the prevention of cancer (Kobayashi *et al.*, 2002)[2]. Although dolichos bean has been originated and cultivated in India since long time, the crop remained underexploited due to low productivity, photosensitivity, flowering irregularity, growth habit and the preference of consumers with respect to pod shape, pod size, pod color, pod aroma. Though wide genetic base exists for breeding programme, very little efforts or work have been made for its genetic improvement of yield and quality attributing characters. The evaluation of potentialities of the existing varieties is essential because it is the genetic diversity of the initial parent

material which helps in further crop improvement. Considering all the above mentioned facts, this experiment was conducted to evaluate the yield and yield attributing characters of 14 genotypes of pole type of dolichos bean for commercial cultivation in Odisha.

Materials and Methods

The research work was carried out at All India Co-ordinated Research Project on Vegetable Crops, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha, India during Rabi season of 2018-19. The experimental material comprised of fourteen genotypes collected from different regions (Table 1). The experiment was laid out in Randomized Block Design with three replications. Bold and healthy seeds were sown in different plots of each replication randomly on 25th September, 2018.

All the recommended cultural practices were adopted uniformly to raise good crop stand. Five plants were selected at random from each plot to record observations on seventeen quantitative characters *viz.*, plant height (cm), number of primary branches plant^{-1}, stem thickness (cm), inter nodal length (cm), average leaf area (cm^2), average leaf weight (g), inflorescence length (cm), fresh weight of root (g), days to 1st flowering, days to 50% flowering, pod length (cm), pod width (cm), pod weight (g), number of seeds pod^{-1}, pod yield plant^{-1} (g) and pod yield hectare^{-1} (q).

Results and Discussion

Vegetative growth and flowering parameters

The mean performances of 14 genotypes of pole type of dolichos bean for vegetative parameters are presented in Table 2. Plant height range was observed maximum for 2016/DOLPVAR-9 (632.67cm) and was minimum for 2016/DOLPVAR-1 (274.67cm). Maximum number of primary branches plant^{-1}(2.4) was recorded in 2016/DOLPVAR-1 followed by 2016/DOLPVAR-4 (2.2). Stem thickness was maximum in 2017/BDB-2 (3.93cm) and lowest in Pipili local (3.03cm) with an average of 3.58cm.The data on intermodal length indicated wide variations among tested genotypes ranging from 11.67 cm (2016/DOLPVAR-4) to 18.25cm (2016/DOLPVAR-10) with a mean value of 15.74cm. Average leaf area range was recorded maximum for 2016/DOLPVAR-2 (100.48cm^2) and was minimum for Pipili local (81.17 cm^2). 2016/DOLPVAR-10 showed maximum average leaf weight (2.7g) and 2016/DOLPVAR-1 recorded the lowest average leaf weight of (1.87g).

Maximum inflorescence length (31.88cm) was recorded in 2017/DOLPVAR-1 among all the other genotypes and lowest of (10.77cm) in 2016/DOLPVAR-9. 2017/BDB-2 showed maximum fresh weight of root of 160.18g followed by 2016/DOLPVAR-8 (133.71g). Similar findings were reported by Bendale *et al.*, (2004) [1] and Verma *et al.*, (2015) [6]. The genotype 2016/DOLPVAR-6 showed earliness and 1st flower appeared 34.27 days after sowing. Whereas, the genotype 2017/BDB-2 had taken maximum time (67.1 days) for appearance of 1st flower. With respect to days to 50% flowering, genotype 2016/DOLPVAR-6 (39.27 days) recorded earliest, followed by 2016/DOLPVAR-9 (46.28 days) and 2016/DOLPVAR-4 (48.26 days) while genotype 2017/BDB-2 (75.05 days) was found to be late in this respect.

Yield and yield attributing parameters

The mean performances of 14 genotypes of pole type of dolichos bean for yield and yield attributing parameters are presented in Table 3 and figure 1.

Table.1 Sources of dolichos bean genotypes (*Lablab purpureus* L.)

Genotypes	Name	Sources (V_1-$V_{11,3}$ seeds received from IIVR)
V1	2016/DOLPVAR-1	AVT-2, AICRP on Vegetable crops, OUAT
V2	2016/DOLPVAR-2	
V3	2016/DOLPVAR-4	
V4	2016/DOLPVAR-5	
V5	2016/DOLPVAR-6	
V6	2016/DOLPVAR-8	
V7	2016/DOLPVAR-9	
V8	2016/DOLPVAR-10	
V9	2016/DOLPVAR-11	
V10	2016/DOLPVAR-12	
V11	2017/DOLPVAR-1	
V12	Pipili Local	Local collection from Pipili
V13	2017/BDB-2	AICRP on Vegetable crops, OUAT
V14	Athgarh Local	Local collection from Athgarh

Table.2 Mean performance for vegetative and flowering parameters in 14 dolichos bean Genotypes

Genotypes	Plant Height (cm)	Number of primary branches	Stem thickness (cm)	Inter-nodal length (cm)	Average leaf Area (cm^2)	Average leaf weight (g)	Inflores-cence length (cm)	Fresh weight of root (g)	Days to first flowering	Days to 50% Flowering
2016/DOLPVAR-1	274.67	2.40	3.51	14.94	91.71	1.87	22.91	97.90	44.53	52.10
2016/DOLPVAR-2	382.20	1.67	3.45	14.88	100.48	2.09	21.18	115.79	53.67	58.28
2016/DOLPVAR-4	603.50	2.20	3.91	11.67	92.68	1.93	20.85	90.74	43.33	48.26
2016/DOLPVAR-5	401.67	2.07	3.67	15.03	84.05	2.07	22.33	83.29	62.60	69.56
2016/DOLPVAR-6	410.27	2.07	3.83	13.11	88.78	2.00	14.55	73.18	34.27	39.27
2016/DOLPVAR-8	392.33	1.53	3.69	17.85	93.65	2.40	16.13	133.71	61.13	65.26
2016/DOLPVAR-9	632.67	2.07	3.59	16.83	90.46	2.10	10.77	73.62	41.15	46.28
2016/DOLPVAR-10	596.67	1.47	3.73	18.25	98.07	2.70	17.37	115.32	64.53	70.26
2016/DOLPVAR-11	527.33	1.47	3.51	16.32	96.63	2.26	16.66	102.54	54.73	62.20
2016/DOLPVAR-12	564.40	2.02	3.47	16.13	84.49	2.13	14.11	96.41	44.70	52.80
2017/DOLPVAR-1	402.00	1.73	3.41	17.11	99.49	2.09	31.88	93.93	51.70	63.20
Pipili Local	380.21	1.67	3.03	14.15	81.17	2.15	17.92	84.91	60.20	69.40
2017/BDB-2	456.97	1.33	3.93	16.50	83.59	2.07	12.61	160.18	67.10	75.05
Athgarh Local	397.18	1.20	3.35	17.59	89.37	1.93	12.71	87.36	53.33	61.59
SE(m)	24.33	0.08	0.11	0.70	5.93	0.18	0.66	4.71	1.95	2.28
CD(0.05)	70.73	0.23	0.32	2.04	17.96	0.54	1.92	13.70	5.66	6.63
CV(%)	9.19	7.74	5.38	7.74	11.29	14.62	6.37	8.11	6.41	6.63

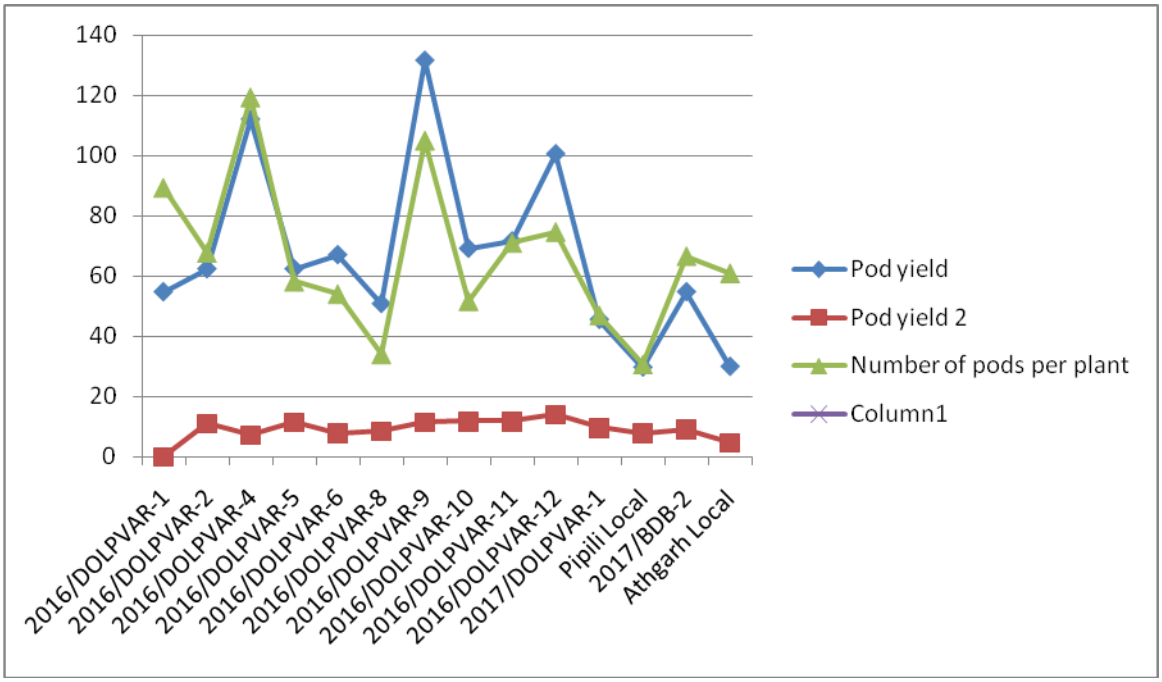
Table.3 Mean performance for yield and yield attributing parameters in 14 dolichos bean genotypes

Genotypes	Pod length (cm)	Pod width (cm)	Pod weight (g)	Number of pods per plant	Number of seeds per pod	Pod yield per plant(g)	Pod yield per hectare(q)
2016/DOLPVAR-1	13.12	2.14	8.13	89.33	4.25	492.21	54.69
2016/DOLPVAR-2	15.34	2.82	10.97	67.67	4.26	561.06	62.34
2016/DOLPVAR-4	6.54	2.61	7.30	119.33	3.45	1009.00	112.12
2016/DOLPVAR-5	16.98	2.19	11.63	58.17	4.67	561.06	62.34
2016/DOLPVAR-6	12.50	2.63	7.83	54.00	4.00	603.27	67.03
2016/DOLPVAR-8	13.20	2.44	8.60	34.00	4.00	456.66	50.74
2016/DOLPVAR-9	15.61	2.45	11.50	105.00	4.37	1185.58	131.73
2016/DOLPVAR-10	13.80	2.58	11.67	51.67	4.50	622.17	69.13
2016/DOLPVAR-11	12.45	3.49	11.80	71.00	4.08	639.54	71.60
2016/DOLPVAR-12	11.41	3.79	14.00	74.67	4.23	905.67	100.63
2017/DOLPVAR-1	12.37	2.31	9.67	46.97	4.01	409.33	45.48
Pipili Local	10.07	2.05	7.83	30.64	2.98	266.42	29.60
2017/BDB-2	13.13	2.46	9.08	66.61	4.07	492.47	54.71
Athgarh Local	7.10	2.18	4.68	60.94	2.92	268.80	29.86
SE(m)	0.48	0.09	0.53	5.55	0.14	59.60	6.66
CD(0.05)	1.39	0.27	1.55	16.14	0.40	173.25	19.36
CV(%)	6.68	6.22	9.61	14.64	5.99	17.06	17.14

Table.4 Leaf and pod characteristics

Varieties	LEAF CHARACTERISTICS			POD CHARACTERISTICS	
	Leaf Shape	Leaf Colour	Petiole colour	Shape & Size	Colour
2016/DOLPVAR-1	Ovate	Light Green	Purple	Round, Long	Green with purple edge
2016/DOLPVAR-2	Ovate	Green	Green	Round, Long	Green
2016/DOLPVAR-4	Ovate	Light Green	Purple	Flat, Short	Green with purple edge
2016/DOLPVAR-5	Ovate	Light Green	Light Green	Round, Long	Butter Green
2016/DOLPVAR-6	Ovate	Green	Light Green	Flat, Long	Green
2016/DOLPVAR-8	Ovate	Green	Purple	Flat, Long	Green with purple edge
2016/DOLPVAR-9	Ovate	Green	Green	Flat, Long	Green
2016/DOLPVAR-10	Ovate	Green	Light Green	Round, Long	Green
2016/DOLPVAR-11	Ovate	Light Green	Purple	Flat, Medium	Purple
2016/DOLPVAR-12	Ovate	Light Green	Purple	Flat, Medium	Butter Green with purple edge
2017/DOLPVAR-1	Ovate	Green	Light Green	Round, Long	Green
Pipili Local	Ovate	Green	Green	Round, Long	Green
2017/BDB-2	Ovate	Green	Light Green	Round, Long	Green
Athgarh Local	Ovate	Green	Light Green	Flat, Short	Green

Fig.1 Mean performance for yield and yield attributing parameters in 14 dolichos bean genotypes



Pod length was found to be maximum for 2016/DOLPVAR-5 (16.98 cm) whereas it was minimum for 2016/DOLPVAR-4 (6.54cm). Data recorded on pod width showed maximum for 2016/DOLPVAR-12 (3.79 cm) while that of lowest in Pipili local (2.05 cm).

Maximum pod weight of 14 g was recorded in 2016/DOLPVAR-12 and lowest pod weight was recorded in Athgarh local (4.68 g).

Highest number of pods plant^{-1}was observed in 2016/DOLPVAR-4 (119.33) and that of lowest in Pipili local (30.64). The range for number of seeds pod^{-1} was varied from 2.92 (Athgarh local) to 4.67 (2016/DOLPVAR-5) with a mean value of 3.98. The genotype, 2016/DOLPVAR-9 recorded maximum pod yield (plant^{-1} and ha^{-1}) i.e. 1185.58g and 131.73 q followed by 2016/DOLPVAR-4 (1009g and 112.12 q) and 2016/DOLPVAR-12 (905.67g and 100.63q). On the other hand genotype Pipili local gave minimum pod yield (plant^{-1} and ha^{-1}) of 266.42g and 29.6q. These findings are in conformity with the reports of Mohan *et al.,* (2009) [3], Parmar *et al.,* (2013) [4] and Sharma *et al.,* (2014) [5].

Leaf and pod characteristics

Morphological characters like leaf shape, leaf colour, petiole colour, pod shape, pod size, pod colours of all genotypes are given in Table 4. All the fourteen genotypes were found to be ovate in leaf shape.

Out of the 14 genotypes, 5 genotypes had leaves of light green in colour and rest had green coloured leaves. 5 genotypes had purple coloured petiole, 6 genotypes had light green petioles and 3 genotypes had green petioles. Out of 14 genotypes, pod shape was round in 7 genotypes and flat in 7 genotypes and pod size was long in 10 genotypes, medium and short in 2 genotypes each. Three different pod colours (Green, Butter green and Purple) were recorded. Maximum genotypes had green pods except 2016/DOLPVAR-11 which had purple coloured pods.

It may be concluded from the present investigation that genotype, 2016/ DOLPVAR-9, 2016/DOLPVAR-4 and 2016/DOLPVAR-12 showed significantly higher pod yield per plant. Therefore these genotypes can be used in breeding programme as high yielding genotype after having multi-locational yield trial in Odisha and may be recommended for their commercial utilization. These genotypes can also be used as donor parent for improvement in pod and yield trait in further dolichos bean improvement programmes.

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How to cite this article:

Mishra, M., G.S. Sahu, A. Mohanty, P. Tripathy, B. Pradhan and Mallikarjun, K. 2019. Evaluation of Yield and Yield Attributing Characters in Pole Type of Dolichos Bean (*Lablab purpureus* L.). *Int.J.Curr.Microbiol.App.Sci.* 8(08): 2074-2079.
doi: https://doi.org/10.20546/ijcmas.2019.808.242