Mysore J. Agric. Sci., 56 (1) : 130-137 (2022)

Performance of Dolichos Bean (*Lablab purpureus* L.) Genotypes for Growth, Yield and Quality Parameters under Open Field Condition

T. G. Harishkumar[1], Mahabaleshwar Hegde[2], C. Suneetha[3], G. K. Mukund[4], K. S. Jagadish[5] and B. G. Vasanthi[6]

[1-4]Department of Horticulture, [5]Agril. Entomology and [6]AICRPDA, UAS, GKVK, Bengaluru - 560 065

e-Mail : harishhorti55@gmail.com

Abstract

A field trial was conducted at Department of Horticulture, University of Agricultural Sciences, GKVK, Bengaluru for two consecutive years of 2019-20 and 2020-21 with eight genotypes of Dolichos bean (*Lablab purpureus* L.) by adopting randomized complete block design with three replications. The study taken up on growth, yield and quality attributesin different genotypes revealed significant differences registered in all traits studied. Pooled data revealed that the genotype Chintamani local registered the highest plant height (344.50cm), number of branches per plant (15), days to first flowering (73.17 days), pod length (6.27 cm), pod width (2.22 cm), ten pod weight (41.08 g), number of pods per plant (107) among pole types. Pod yield per plant ranged from 159.33 to 389.67 g in different genotypes. However, the highest was observed in Chintamani local (389.67 g) followed by genotypes IC-0623013 (309.67g) and IC-062056 (280.83g). Protein content ranged from 17.57to 26.35 g per 100 g fresh seeds and the highest was recorded in Chintamani local followed by IC-0623013 (25.67 g per 100 g) and IC-0623022 (23.59 g per 100 g). Whereas, Hebbal Avare 4 (HA 4) variety, being a spreading type was earliest in flowering (42 days), pod maturity (green type 60 days), however lowest in protein content (17.57 g per 100 g). Meanwhile pod borer infestation ranged from 4.81 to 17.83 per cent, the least being observed in HA-4 (4.81%). This indicated that HA 4, being a spreading type had the effective plant protection due to spray of chemicals.

Keywords : Dolichos bean, Genoptype, Vegetative growth, Yield, Quality attributes

Dolichos bean (*Lablab purpureus* L.) with chromosome number 2n=22, also known as *lablab bean* or Indian bean, is one of the important indigenous legume vegetables of India. India is one of the primary centre of origin and diversity of this vegetable (Mohan *et al.,* 2009). It is predominantly grown in Karnataka and adjoining districts of Tamil Nadu, Andhra Pradesh and Maharashtra both as an intercrop as well as pure crop. Karnataka alone contributes nearly 90 per cent of both area and production in India (Anonymous, 2018).

It is a drought tolerant indigenous legume vegetable of India grown for multiple uses, the green pods are used as vegetable while ripe and dried seeds are consumed as split pulse. Fresh pods are highly nutritive and contain carbohydrates (6.7 g), protein (3.8 g), fat (0.7 g), minerals (0.9 g), magnesium (34 mg), calcium (210 mg), phosphorus (68 mg), sodium (55.4 mg), iron (1.7 mg), potassium (74.0 mg), sulphur (40.0 mg), vitamin A (312 IU), riboflavin (0.06 mg), vitamin C (9.0 mg), nicotinic acid (0.7 mg) and fiber 1.8 g per 100 g of edible portion (Bose *et al.,* 2000). It has antidiabetic property and is good for natural cure of bladder burns, cardiac problems and diarrhoea. It is also used in treating cholera, vomiting, globe fish poisoning, leucorrhoea, gonorrhea and alcoholic intoxication (Chetia *et al.,* 2000).

In India, the farmers are cultivating more of local cultivars with season specific which leads to overall less productivity in Dolichos bean. University of Agricultural Sciences, Bangalore is pioneer in developing improved Dolichos varieties and hybrids of spreading types suited to agro-ecological conditions for vegetable purpose. Enhancement of its economic value through development of stable

and widely adapted high yielding varieties is expected offer competitive edge to Dolichos bean to enable its popularity and wider cultivation (Ramesh and Byregowda, 2016). However, the farmers still prefer to grow local pole types. An effort was made to evaluate pole types of Dolichos bean through morphological evaluation along with correlation between yield and its contributing characters. The present study was carried with the objective of understanding the performance of pole type Dolichos bean genotypes collected from different sources for growth, yield and quality parameters under open field condition in comparison with hybrid of spreading type developed from UAS, Bangalore.

Material and Methods

The experiment was conducted at Department of Horticulture, Gandhi Krishi Vignana Kendra, University of Agricultural Sciences, Bangalore during 2019-20 and 2020-21. The trials of seven genotypes of pole type Dolichos bean collected from different geographical regions *viz.,* IC-0623010 from Bellavi (Tumkur), IC-0623013 from Biligiri Rangana Hills (Chamarajnagar), IC-0623022 from Tuljapur, Osmanabad (Maharashtra), IC-0623037, IC-0623056 and IC-0623064 from UAS, Dharwad, Chintamani Local from Chintamani (Chikkaballapur). A hybrid HA 4 from UAS, Bangalore a spreading type was also included as check for comparison. The experiment was conducted in Randomized block design with three replications with a spacing of 60 x 45 cm. The crop was staked and supported and also recommended package of practices was followed to raise the crop.

Five plants were randomly selected and labeled in each line and data were recorded on various characters *viz.,* Plant height, Number of branches per plant, Number days to first flowering, Number of days to first harvesting, Number of pods per plant, Number of pods per cluster, Pod length, Pod width, Ten pod weight, Pod yield per plant, Pod yield per plot, Pod yield per ha, Number of seeds per pod, Protein content and pod borer incidence*,* where periodically observed and data were recorded. The mean value from five plants of each line for each trait in three replications was computed. The observations recorded for each parameter were also depicted in tables and figures. The replicated mean data was subjected to statistical analysis for interpretation.

Results and Discussion

Analyzed mean data and its range for the eight genotypes with respect to different characters revealed significant differences. A pooled mean analysis of two year's data revealed that IC-0632064 exhibited highest plant height of 100.33 cm at initial stage of 30 days of growth whereas, Chintamani Local registered significantly the highest plant height 256.50 cm and 344.50 cm at 60 and 90 days of growth, respectively (Table 1). Number of branches per plant was the highest in Chintamani Local (15.67) with mean value ranging from 11.50 to 15.67 in different genotypes (Table 2). Days to first flowering ranged from 42 to 75 days with HA 4 variety being earliest in flowering (42 days) followed by Chintamani Local (73 days) showed in Table 2. whereas, days to 50 per cent flowering ranged from 55 to 100 days with earliest observed in HA 4 (55 days) followed by IC-0623010 (87 days). The genotype IC-0623056 (93 days) took more number of days as depicted in Table 3, respectively. Similar results reported by Vaijayanthi *et al.* (2016)*,* Mohan *et al.* (2009), Chattopadhyay and Dutta (2010) and Mahesh *et al*. (2019).

The number of days for first green pod harvest in different pole type genotypes ranged from 98.00 to 102.83 days with Chintamani Local being early (98 days). Pod maturity in HA 4 was early (60 days) being a spreading type. Pod length ranged from 5.12 to 6.27 cm and Chintamani Local had significantly the highest pod length (6.27 cm) followed by IC-062056 (5.82 cm). The lowest pod length was observed in IC-062064 (5.02cm). Pod-width ranged from 1.70 to 2.15 cm with the highest being recorded in IC-062013.The lowest mean pod width was noticed in HA 4 (1.70 cm). Ten pod weight ranged from 29.50 to 41.08 g and the highest was in Chintamani Local (41.08 g). Number of pods per plant ranged from 50.05 to 107.67 with highest being in

TABLE 1

Plant height (cm) at 30, 60 and 90 days after sowing (DAS) in Dolichos bean genotypes under open field condition

Genotypes	Plant height 30 DAS (cm)			Plant height 60 DAS (cm)			Plant height 90 DAS (cm)		
	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean
IC-0623010	80.00	70.67	75.33	191.67	256.67	224.17	268.67	260.00	264.33
IC-0623013	87.00	82.67	84.83	142.00	181.67	161.83	251.33	251.67	251.50
IC-0623022	56.33	84.00	70.17	228.00	230.67	229.33	308.00	281.00	294.50
IC-0623037	83.67	43.33	63.50	198.33	238.67	218.50	288.67	277.33	283.00
IC-062056	68.33	86.33	77.33	233.67	195.33	214.50	314.33	292.33	303.33
IC-062064	99.33	101.33	100.33	193.00	262.00	227.50	309.00	298.00	303.50
Chintamani Local	135.67	59.33	97.50	236.67	276.33	256.50	381.00	308.00	344.50
HA 4	73.67	63.00	68.33	98.67	103.67	101.17	113.00	103.33	108.17
Mean	85.50	73.83	79.67	190.25	218.13	204.19	279.25	258.96	269.11
S.Em±	8.53	4.28	6.41	2.77	3.42	3.10	5.65	11.31	8.48
C.D at 5%	24.91	12.49	18.70	8.07	9.99	9.03	16.49	33.01	24.75

TABLE 2

Number of branches per plant at 90 DAS and number of days for first in Dolichos bean genotypes under open field condition

Genotypes	Number of branches per plant			Days to first flowering		
	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean
IC-0623010	12.67	13.00	12.83	73.67	74.33	74.00
IC-0623013	13.33	13.33	13.33	73.00	75.33	74.17
IC-0623022	14.67	14.67	14.67	76.00	74.00	75.00
IC-0623037	14.33	14.33	14.33	74.67	75.33	75.00
IC-062056	13.33	13.00	13.17	72.33	77.00	74.67
IC-062064	14.00	13.67	13.83	73.33	76.00	74.67
Chintamani Local	14.00	16.00	15.67	72.00	74.33	73.17
HA 4	12.00	10.00	11.50	42.00	42.00	42.00
Mean	13.75	13.58	13.67	69.63	71.04	70.34
S.Em±	0.71	0.68	0.70	1.04	1.35	1.20
C.D at 5%	2.08	1.98	2.03	3.04	3.95	3.5

TABLE 3

Number of days for 50% flowering and number of days for first green pod harvest of Dolichos bean genotypes under open field condition

Genotypes	Days to 50% flowering			Days first green pod harvest		
	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean
IC-0623010	88.00	86.00	87.00	101.00	100.00	100.50
IC-0623013	92.33	88.00	90.17	102.00	97.00	99.50
IC-0623022	89.00	86.00	87.5	103.00	100.00	101.50
IC-0623037	91.00	90.00	90.5	104.00	95.33	99.67
IC-062056	93.00	93.67	93.33	102.00	100.33	101.17
IC-062064	92.33	91.00	91.67	105.33	100.33	102.83
Chintamani Local	96.33	95.33	95.83	100.00	96.00	98.00
HA 4	54.33	56.00	55.17	58.67	62.33	60.50
Mean	87.04	85.75	86.4	97	93.2	95.1
S.Em±	1.02	0.64	0.83	1.58	2.21	1.90
C.D at 5%	2.99	1.88	2.44	4.62	6.64	5.63

TABLE 4

Pod length (cm) and pod width (cm) in Dolichos bean genotypes under open field condition

Genotypes	Pod length(cm)			Pod width (cm)		
	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean
IC-0623010	5.5	5.37	5.43	2.1	1.43	1.77
IC-0623013	5.8	5.73	5.77	2.13	2.17	2.15
IC-0623022	5.27	4.9	5.08	2.1	1.6	1.85
IC-0623037	5.37	5.5	5.43	1.93	1.67	1.8
IC-062056	5.83	5.8	5.82	1.87	2.0	1.93
IC-062064	5.0	5.03	5.02	1.6	1.83	1.72
Chintamani Local	6.30	6.23	6.27	2.30	2.13	2.22
HA 4	5.23	5.00	5.12	1.40	2.00	1.70
Mean	5.54	5.45	5.50	1.93	1.85	1.89
S.Em±	0.10	0.05	0.08	0.06	0.08	0.07
C.D at 5%	0.28	0.14	0.21	0.16	0.25	0.21

The Mysore Journal of Agricultural Sciences

TABLE 5

Number of pods per plant and weight of 10 pod in Dolichos bean genotypes under open field condition

Genotypes	Number of Pods/plant			Weight of 10 pods (g)		
	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean
IC-0623010	70.73	71.57	71.15	30.00	29.00	29.5
IC-0623013	91.57	88.40	89.98	33.00	33.33	33.17
IC-0623022	88.27	87.4	87.83	35.17	35.00	35.08
IC-0623037	72.93	75.33	74.13	36.00	32.33	34.17
IC-062056	78.55	77.57	78.06	35.00	35.33	35.17
IC-062064	71.93	75.69	73.81	34.00	35.33	34.67
Chintamani Local	110.6	104.73	107.67	41.00	41.17	41.08
HA 4	50.33	49.77	50.05	34.00	33.50	33.75
Mean	79.36	78.81	79.09	34.77	34.38	34.58
S.Em±	1.1	8.99	5.05	0.66	1.27	0.97
C.D at 5%	3.22	26.23	14.73	1.94	3.7	2.82

TABLE 6

Green pod yield /plant(g), green pod yield /plot (kg) and green pod yield /ha (t) of Dolichos bean genotypes under open field condition

Genotypes	Green pod yield / plant(g)			Green pod yield /plot (kg)			Green pod yield /ha (t)		
	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean	2019-20	2020-21	Pooled Mean
IC-0623010	214.33	211.00	212.67	29.61	28.82	29.21	7.99	7.64	7.81
IC-0623013	307.33	312.00	309.67	41.57	42.98	42.27	11.20	11.44	11.32
IC-0623022	259.67	257.00	258.33	36.34	35.75	36.04	10.34	9.32	9.83
IC-0623037	230.67	227.00	228.83	33.57	31.44	32.51	8.70	8.40	8.55
IC-062056	278.33	283.33	280.83	38.20	38.56	38.38	10.22	10.51	10.37
IC-062064	224.00	218.00	221.00	31.64	29.99	30.82	8.29	8.04	8.17
Chintamani Local	387.67	391.67	389.67	53.53	54.06	53.80	14.21	13.56	13.89
HA 4	160.33	158.33	159.33	21.94	22.07	22.00	5.78	5.83	5.81
Mean	257.79	257.29	257.54	35.80	35.46	35.63	9.59	9.34	9.47
S.Em±	1.75	1.32	1.54	0.74	0.27	0.51	0.28	0.31	0.30
C.D at 5%	5.11	3.86	4.49	2.16	0.80	1.48	0.82	0.90	0.86

TABLE 7

Number of seeds per pod and 100 seeds weight (g) in Dolichos bean genotypes under open field condition

Treatment	Genotypes	Number of seeds per pod			Protein (g/100g)		
		2019-20	2020-21	Pooled average	2019-20	2020-21	Pooled average
T1	IC-0623010	4.33	4.33	4.33	22.59	18.47	20.53
T2	IC-0623013	4.33	3.67	4.00	25.57	25.77	25.67
T3	IC-0623022	4.67	4.67	4.67	24.47	22.71	23.59
T4	IC-0623037	4.33	4.67	4.50	22.20	17.95	20.08
T5	IC-062056	4.33	3.67	4.00	19.97	18.79	19.38
T6	IC-062064	4.33	4.33	4.33	18.27	22.82	20.55
T7	Chintamani Local	4.67	4.33	4.50	30.81	21.89	26.35
T8	HA-4	4.00	4.33	4.17	17.21	17.92	17.57
	Mean	4.38	4.25	4.32	22.63	20.79	21.71
	S.Em±	0.33	0.36	0.35	1.21	1.08	1.15
	C.D at 5%	0.97	1.06	1.02	3.54	3.15	3.35

Chintamani Local (107). The lowest number of pods per plant (50) was observed in HA 4 as presented in Table 4 and 5. These results are close in conformity with results reported by Reddy *et al.* (2019), Vaijayanthi *et al.* (2016) and Mishra *et al.* (2019).

The results indicated the existence of wide variability for each of the traits studied. The genotype Chintamani Local registered, among seven pole types, significantly higher green pod yield per plant (389.67 g), green pod yield per plot (53.80 kg) and green pod yield ha^{-1} (13.89 t/ha). It was followed by the other pole types IC-0623013 (309.67g) and IC-062056 (280.83g). Whereas, the lowest pod yield per plant was observed in HA 4 variety (159.33g) which is a determinate type. Among the genotypes studied (IC-0623010, IC-0623013, IC-0623022, IC-0623037, IC-0623056, IC-0623064 and Chintamani Local registered more than 200 g pod yield per plant (Table 6 and Fig. 1). The more yield in Chintamani Local,

TABLE 8

Genotypes against Pod borer incidence (%) in open field under condition

Genotypes	Pod borer incidence (%)
IC-0623010	11.22
IC-0623013	17.81
IC-0623022	16.48
IC-0623037	10.2
IC-062056	9.21
IC-062064	17.83
Chintamani Local	8.34
HA 4	4.81

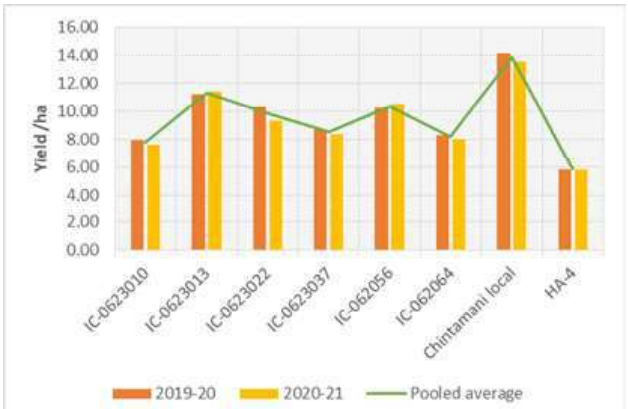

Fig. 1. Green pod yield per ha (t) under open field condition

when analysed to the pole types of Dolichos beans could be attributed to longer duration of vine growth (152 days), number of branches per plant (15.67), pod length (6.27 cm), ten pod weight (41.08 g) and number of pods per plant (107) etc. The variety HA-4 being an early variety with determinate growth type, the green pod yield recorded though high in early stages of plant growth. The overall yield was much lower as total fruiting period was less (99 days) as similar findings reported by Indhumathi *et al*. (2020), Vaijayanthi *et al.* (2016), Mishra *et al.* (2019) and Mahesh *et al*. (2019).

The studies on quality parameters revealed that protein content ranged from 17.57 to 26.35g per 100 g and the highest was recorded in Chintamani Local followed by IC-0623013 (25.67 g / 100 g) and IC-0623022 (23.59 g / 100 g). Mean while the lowest protein content was observed in genotype HA 4 (17.57 g / 100 g). Considering variation observed in protein content in pods the selected germplasm may be used as parental source for the development of superior Dolichos bean varieties. Number of seeds per pod ranged from 4.17 to 4.67 which on par with all the genotypes. presented in Table 7. These findings are in agreement with the results of Shete and Deshmukh (2019) and Preetham *et al*. (2020) who stated that difference in yield among Dolichos genotypes may be attributed mainly to the difference in their plant height, number of branches per plant, pod length, number of pods per plant, pod weight and number of seeds per pod along with growing environment. This was very evident among two seasons of study.

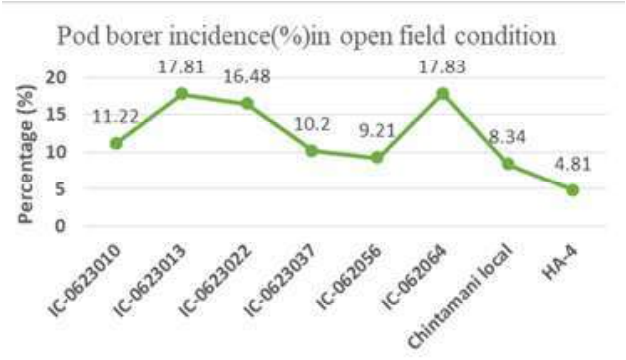

Fig. 2 : Pod borer incidence (%) under open field condition

Pod borer infestation (%) ranged from 4.81 to 17.83 with the highest being in IC-062064 (17.83%) followed by IC-062013 (17.81 %). Whereas, the least pod borer incidence observed in HA 4 variety (4.81%). Among pole types, Chintamani Local had the lesser incidence of pod borer (8.34 %). However, the intensity of pod borer varied among themselves (Table 8 and Fig. 2). These findings are close conformity with results obtained by Indhumathi *et al*. (2020) and Ravinaik *et al.* (2012). Less infested genotypes may be useful in crop improvement programme with the high yielding characters intact (Ramesh and Byregowda, 2016).

The present study on performance of eight genotypes including one released variety of dolichos revealed wide variability for pod yield, pod maturity, pod length, ten pod weight, number of pods per plant and other growth, quality and yield attributing characters. Among these, Chintamani Local showed better performance as a pole type in all the parameters followed by IC-0623013 and IC-062056. As for as quality parameter concerned, Chintamani Local showed higher protein content. However, Chintamani Local appeared to be the less susceptible to the pod borer incidence in pole type indicating the necessity of better plant protection measures for effective control. This indicated its adoptability to the present agro-ecological conditions of this transitional belt of Karnataka with high yielding characters among pole types.

References

Anonymous, 2018, Indian Horticulture database, *www.nhb.org.in*

Bose, T. K., Kabir, J., Das, P. and Joy, P. P., 2000, Tropical Horticulture, Naya Prakash, Calcutta India, **2** : 167.

Chattopadhyay, A. and Dutta S., 2010, Characterization and identification of selection indices of pole type Dolichos bean. *Vegetable crops Res*., **73** : 33 - 45.

Chetia, A., Borua, I. and Sarkar, C., 2000, Nutritional and ant nutritional factors of few improved varieties of field bean (*Lablab purpureus* L*). Research on crops*, **1** (1) : 40 - 44.

INDHUMATHI, K., SHANMUGAM, P. S. AND AYYADURAI, P. A., 2020, Assessment of high yielding varieties of Dolichos bean (*Lablab purpurius var. typicus*) in Dharmapuri district, Tamilnadu, India. *Plant Archives*., **20** (2) : 3762 - 3765.

MAHESH, R. O., SHASHIKANTH EVOOR, BASAVARAJ, GASTI, V. D., CHETHAN KUMAR, S. AND CHANDRAKANT KAMBLE, 2019, *Per se* performance of Dolichos bean (*Lablab purpureus* L.) genotypes for pod yield and quality traits. *Journal of Pharmacognosy and Phyto chemistry,* **8** (4) : 1729 - 1732.

MISHRA, M., SAHU, G. S., MOHANTY, A., TRIPATHY, P., PRADHAN, B. 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 (**8) : 2074 - 2079.

MOHAN, N., AGHORA, T. S. AND DEVARAJU, 2009, Evaluation of Dolichos (*Lablab purpureus* L.) germplasm for pod yield and pod related traits. *J. Hort. Sci*., **4** (1) : 50 - 53.

PREETHAM R., SUCHITRA, V. AND ASHWINI, D., 2020, Evaluation of Dolichos genotypes (*Dolichos lablab* L.) to qualitative and quantitative traits in Northern Telangana Zone. *Journal of Pharmacognosy and Phytochemistry,* **9** (5) : 2717 - 2720.

RAMESH, S. AND BYREGOWDA, M., 2016, Dolichos bean (*Lablab purpureus* L. *Sweet, var. lignosus*) genetics and breeding - present status and future prospects. *Mysore J. Agric. Sci.,* **50** (3) : 481 - 500.

RAVINAIK, K., HANCHINAMANI, C. N., PATIL, M. G. AND IMAMSAHEB, S. J., 2015, Evaluation of Dolichos genotypes (*Dolichos lablab* L.) under north eastern dry zone of Karnataka. Asian *J. Hort.,* **10** (1) : 49 - 52.

RAVINAIK, K., HANCHINMANI, C. N., PAUL, M. G., ASHOK HUGAR, GOUD, I. S., HOSAMANI, A. C. AND NAIK, K. R., 2012, Performance of Dolichos bean genotypes (*Dolichos lablab* L.). *Environment and Ecology*., **30** (1) : 148 - 152.

REDDY, K. J., PRABHAKAR B, N., SAIDAIAH, P. AND PANDRAVADA, S. R., 2019, Mean performance of genotypes for protein and fiber content in Dolichos bean (*Dolichos lablab* L. *var. typicus* Prain) Germplasm, *Int. J. Curr. Microbiol. App. Sci.,* **8** (3) : 150 - 154.

VAIJAYANTHI, P. V., RAMESH, S., GOWDA, M. B., RAO, A. M., RAMAPPA, H. K. AND CHINNAMADE GOWDA, 2016, Identification of selected germplasm accessions for specific / wide adaptation coupled with high pod productivity in Dolichos bean (*Lablab purpureus* L. Sweet). *Mysore J. Agric Sci.,* **50** (2) : 376 - 380.

(*Received :* August 2021 *Accepted :* January 2022)