J. Sylhet Agril. Univ. 4(1):71-74, 2017 ISSN: 2308-1597

SCREENING OF COUNTRY BEAN GENOTYPES FOR GREEN POD AND SEED PRODUCTION IN SYLHET REGION

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(Available online at: www.jsau.com.bd)

Abstract

An experiment was conducted during November 2013 to March 2014 at the experimental field of Sylhet Agricultural University (SAU), Sylhet to observe the differences in relation to seed colour, cotyledon colour, seed shape, flower colour, petiole and inflorescence length, pod shape and size, yield performances etc. among the five lablab bean genotypes viz., SB003, BP003, SB008, SB010 and IPSA Sheem-2. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The genotypes SB003 and SB008 had reddish brown seed coat colour while it was reddish for BP003 and black for SB010 and BARI Sheem-1. Among the genotypes 100 dry seed weight was ranged from 30.00 g (BARI Sheem-1) to 41.30 g (SB003). Variation in pod and seed yield potentiality was also found among five lablab bean genotypes. The genotype SB008 produced the maximum number of pods plant^{-1} (263.3) followed by BP003 (256.3) but plant^{-1} pod yield was maximum for the genotype BP003 (1.78 kg) followed by SB008 (1.68 kg). This variation was due to the individual pod weight. The highest pod yield was recorded in the genotype BP003 (11.86 t ha^{-1}) while it was the lowest in the genotype SB003 (9.0 t ha^{-1}). For seed production potentiality, the genotype SB008 produced highest amount of seed plant^{-1} (242.97 g) since it produced the maximum number of dry pods plant^{-1} (141.18).

Keywords: Lablab bean, genotypes, pod and seed yield.

Introduction

Country bean, botanically known as *Lablab purpureas* (L.) sweet is a major winter vegetable in Bangladesh. According to Rao (1977) it is native to India. Its cultivation and use is so widespread that it would almost be impossible to find a homestead in rural areas which is lacking a bush of country bean in winter (Rashid, 1999). It is a nutritious vegetable. Its green pod provide good amount of protein in addition to vitamins and minerals (Gopalan *et al.*, 1982; Aykreyd, 1963). In Bangladesh green pods are used as vegetable and recently dry seeds are getting popularity as pulse. Recently, Department of Horticulture of Sylhet Agricultural University has developed some advance lines of country bean but their morphological features, green pod and seed production potentials were not assessed properly under Sylhet condition. So, proper information regarding morphological characteristics, pod and seed production behavior are very much important for researchers and growers. Farmers of this region are also not well concerned about the importance and cultivation procedure of country bean as well as the production of quality seed. So, there is an ample scope to increase country bean for pod and seed production in Sylhet region. The present experiment was, therefore, undertaken to assess the pod and seed production potentiality among the collected country bean genotypes.

Materials and Methods

The experiment was conducted at the Horticulture research field of Sylhet Agricultural University, Sylhet during the November 2013 to March 2014. In this study five lablab bean genotypes were used to estimate pod and seed yield. The seeds of these genotypes were collected from the Department of Horticulture, Sylhet Agricultural University,

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Sylhet. The land was prepared by removing weeds, stubbles, crop residues and triming ails. Hence the land was acidic in nature, lime (Dolomite) was applied in the field @ 4 kg decimal^{-1}. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The unit plot size was 1.5 m × 6.0 m accommodating single row bed^{-1} and six pits bed^{-1}. Plants were spaced at 1.0 m in a bed and 2.0 m between two adjacent beds. Distances of 50 cm in the form of drain between the block and between the beds within a block were maintained. Pits of 50 cm × 50 cm × 50 cm were prepared two weeks before transplanting of seedlings. The soil of the pits and basal dose of fertilizers mixed well and prepared in such a way that the pit tops remained at least 10 cm above the ground level to facilitate drainage. For planting two seeds of each of the five genotypes were sown in polybags containing well prepared mixture of sandy loam soil and well decomposed cowdung at 50 : 50 ratio on 10 November 2013 and 10 days old seedlings were transplanted in the pit and out of two seedlings, one was thinned out two weeks after transplanting. The land was fertilized with cowdung, urea, TSP and MoP @ 10 ton, 50 kg, 150 kg and 150 kg ha^{-1}, respectively (Rashid 1999). Full dose of cowdung, TSP and half of the MoP were applied during pit preparation one week before transplanting. The remaining MoP and urea were applied in three equal installments as top dressing at 15, 30 and 45 days after transplanting. Weeding, staking, irrigation and other intercultural operations were done as required. Data were recorded from all experimental plants on different morphological parameters, yield and yield attributes. Some of the parameters were analyzed using simple statistical measures while others were analyzed using MSTAT software for analysis of variance.

Results and Discussion

Seed and seedlings characteristics of the lablab bean genotypes are presented in the Table 1. Before sowing it was found that, 100 seed weight was ranged from 30.00 g to 41.30 g. Islam (2008) also observed similar result of 44 genotypes. Only two types of seed shape were found among the genotypes. These were oval for SB003 and SB008, round for BP003, SB010 and BARI Sheem-1. Islam *et al*. (2002) reported similar seed shape. Black, reddish and reddish brown seed colour was recorded among the five genotypes which was also reported by different researchers (Islam, 2008; Islam *et al.*, 2002). Two types of colour *i.e*. green and white was observed among the five genotypes by visual observation in case of cotyledon and hypocotyl colour (Islam, 2008). Among the genotypes the tallest seedling (76.03 cm) at transplanting was recorded in the genotype SB003 while it was the shortest in BP003 (47.87 cm). Similar trend also recorded for primary leaf size. Almost all the genotypes had the similar number of leaves seedling^{-1} ranged from 5.77 to 7.33.

Table 1. Seed and seedlings characteristics of lablab bean genotypes

Genotype	100 dry seed weight (g)	Shape	Seed colour	Cotyledon colour	Hypocotyl colour	Seedling height (cm)	Primary leaf length (cm)	Primary leaf breadth (cm)	No of leaves seedling^{-1}
SB003	41.30	Oval	Reddish brown	Light green	Light green	76.03	7.40	7.93	6.67
BP003	36.50	Round	Reddish	Light green	Light green	47.87	5.18	6.05	6.67
SB008	38.67	Oval	Reddish brown	Creamy white	Creamy white	70.40	6.83	6.80	6.33
SB010	39.83	Round	Black	Light green	Creamy white	59.23	7.33	7.70	7.33
BARI Sheem-1	30.00	Round	Black	Light green	Light green	48.00	6.20	6.60	5.77
Mean	37.26	-	-	-	-	60.31	6.59	7.02	6.55
Range	30.00-41.30	-	-	-	-	47.87-76.03	5.18-7.40	6.05-7.93	5.77-7.33
St dev	4.42	-	-	-	-	4.42	12.81	0.78	0.57

Vegetative, inflorescence and pod characteristics of lablab bean genotype presented in the Table 2. Terminal leaflet length and breadth was ranged from 9.63 to 13.10 cm and 9.10 to 13.44 cm, respectively while both was maximum in the genotype SB010 (13.10 and 13.44 cm, respectively). Khan (2000) also reported difference in leaflet size of different yard long bean genotypes. The highest petiole length was measured from SB010 (11.72 cm) while it was the lowest for SB003 (7.47 cm). Two types of flower colour were observed among the genotypes where it was

purple in SB010 and BARI Sheem-1 and white in all other genotypes. Islam (2008) observed three types of flower colour among 44 genotypes. Mean inflorescence length for the five genotypes was 42.63 cm while it was maximum in BARI Sheem-1 (45.30 cm) and minimum in SB010 (36.33 cm). In case of pod characteristics two types of pod colour (light green and deep green) were found among the genotypes and the pod curvature was recorded straight in SB008 and BARI Sheem-1 and slightly curved for others while pod beak shape was thick in BP003 and SB010 short for all other genotypes.

Table 2. Vegetative, inflorescence and pod characteristics of lablab bean genotype

Genotype	Terminal leaflet length (cm)	Terminal leaflet breadth (cm)	Petiole length (cm)	Flower colour	Inflorescence length (cm)	Pod colour	Pod curveture	Pod beak shape
SB003	10.33	9.10	7.47	White	44.83	Deep green	Slightly curved	Short beak
BP003	9.63	9.50	7.87	White	41.50	Deep green	Slightly curved	Thick beak
SB008	12.50	10.93	9.75	White	45.17	Light green	Straight	Short beak
SB010	13.10	13.44	11.72	Purple	36.33	Light green	Slightly curved	Thick beak
BARI Sheem-1	12.32	11.18	11.60	Purple	45.30	Light green	Straight	Short beak
Mean	11.57	10.83	9.68	-	42.63	-	-	-
Range	9.63-13.10	9.10-13.44	7.47-11.72	-	36.33-45.30	-	-	-
St dev	1.51	1.71	2.00	-	3.85	-	-	-

Significant variations were observed on pod yield and yield attributes of five lablab bean genotypes are presented in Table 3. Days to first flowering among the different genotypes were varied from 46.00 (SB003) to 51.33 (BARI Sheem-1). Purseglove (1977) reported that some of the hyacinth bean varieties can produce flower at about 6 weeks after sowing. Days to first harvest was the minimum for SB008 (85.00) and maximum in BARI Sheem-1 (96.00). The genotype SB003 produced the longest (12.11 cm) pod while it was shortest in SB010 (8.77 cm). Pod breadth of the genotypes ranged from 2.19 to 2.94 cm while it was maximum in BARI Sheem-1 and minimum in BP003. Pengelly and Maass (2001) reported pod length ranged from 2.5 to 14.0 cm and breadth 1.6 to 3.2 cm among 249 genotypes studied in Australia. Similar variation in respect of pod length was also reported by Sultana (2001). Number of seeds pod^{-1} was ranged from 4.13 to 5.00. Among them the highest number of seed was found in BARI Sheem-1 (5.00). The result is an agreement with the findings of Khan (2003). The highest pod yield plant^{-1} was recorded in the genotype BP003 (1.78 kg). The pod yield was lowest (1.35 kg plant^{-1}) in SB003 due to lowest number of pods plant^{-1} (176.7). Similar trend also found in case of pod yield ha^{-1} as well as of the pod yield plant^{-1} which was highest in BP003 (11.86 ton) and lowest for SB003 (9.00 ton). Mollah *et al.* (1995) observed yield variation of 9.4 - 21.4 t ha^{-1} among nine lablab bean genotypes grown under Chittagong condition during winter season.

Table 3. Pod yield and yield attributes of lablab bean genotypes

Genotype	Days to first flower	Days to first harvest	Pod length (cm)	Pod breadth (cm)	No. of seeds pod^{-1}	No. of pods plant^{-1}	Individual pod weight (g)	Pod yield (kg plant^{-1})	Pod yield (t ha^{-1})
SB003	46.00	87.33b	12.11a	2.38bc	4.53	176.7c	7.64a	1.35c	9.00c
BP003	49.00	87.67b	9.40bc	2.94a	4.13	256.3a	6.98ab	1.78a	11.86a
SB008	46.67	85.00b	11.49a	2.23bc	4.73	263.3a	6.43bc	1.68ab	11.2ab
SB010	49.67	89.33b	8.77c	2.53b	4.90	255.7a	5.58c	1.43bc	9.50bc
BARI Sheem-1	51.33	96.00a	10.20b	2.19c	5.00	221.7b	6.45bc	1.43bc	9.50bc
F-test	ns	**	**	**	Ns	**	*	*	*
CV%	6.05	2.54	3.46	24.71	9.75	1.25	9.30	8.88	8.88

Effect of five lablab bean genotypes on seed yield and yield attributes is presented in Table 4. Significant variations were observed among the genotypes in respect to seed yield and yield attributes except 100 dry seed weight. The highest seed yield plant^{-1} was recorded in SB008 (242.97 g) due to the maximum number of dry pod plant^{-1} (141.18). The seed yield plant^{-1} was the lowest (124.42 g) in the genotype SB003. The highest seed yield ha^{-1} was obtained in SB008 (1.62 t) and was significantly differed from other genotypes. The lowest seed yield (0.83 t ha^{-1}) was obtained in SB003. Pod borer infestation (%) was highest in the genotype SB003 which was 2.11% and the lowest was 0.56% in the genotype SB010.

Table 4. Seed yield and yield attributes of lablab bean genotypes

Genotype	No. of dry pods plant^{-1}	No. of seeds pod^{-1}	Dry seed yield (g plant^{-1})	Seed yield (t ha^{-1})	100 dry seed weight (g)	Pod borer infestation (%)
SB003	88.21e	4.00bc	124.42d	0.83d	39.00	2.11a
BP003	106.06d	3.93c	152.34c	1.02c	36.20	1.16b
SB008	141.18a	4.27ab	242.97a	1.62a	38.50	1.05b
SB010	124.00c	4.57a	218.93b	1.40b	40.00	0.56c
BARI Sheem-1	131.27b	3.90c	165.99c	1.00c	31.00	1.21b
F-test	**	**	**	**	NA	**
CV%	1.63	2.63	3.01	3.27	-	4.93

Acknowledgement

We cordially acknowledge The Krishi Gobeshona Foundation Authority for financial support to conduct this research work under KGF BKGET 1st Call project.

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