

Evaluation of Country Bean Germplasm Collected from Patuakhali Region



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Abstract:

The experiment was conducted at Regional Horticulture Research Station, Lebukhali, Patuakhali and were evaluated the genotypic performance like yield and yield traits of seventeen (17) country bean genotypes collected from Patuakhali region. In this area, country bean yield is very low, that why we need to identify high yielding country bean genotypes in Patuakhali region. The experiment was laid out in an augmented block design. Seventeen country bean lines viz., LPPK001 to LPPK017 and four check variety viz., BARI Sheem-1, 6, 7 and IPSA Sheem-2 were used for this trial. A lot of variability was observed such as plant height, pod length, pod breadth, pod weight, No. of pod plant⁻¹, yield plant⁻¹, 100 seed weight and yield. The pod length ranged from 20.4-7.62 cm, pod breadth range from 4.83-1.41 cm and pod weight ranged from 13.28-5.08g. The longest pod (20.4 cm), maximum pod breadth (4.83cm) and the premier pod weight (13.28 gm) were found in BARI Sheem 6, LPPK012 and LPPK002 respectively. The highest yield (18.73 t/ha) obtained from the line *LPPK016* and minimum in the line *LPPK 003* (5.43 t/ha). Among the 17 tested lines and 4 checks; 15 were green in colour, and *IPSA Sheem 2* was light green, *LPPK011* was purple green and LPPK001 and LPPK014 were creamy- white in colour. The wide variations in phenotypic level among the genotypes LPPK001, LPPK005, LPPK015, LPPK016, and BARI Sheem 7 can be potentially used for more production in Patuakhali region, ultimately it will increase the farmers' incomes level.

Keywords: Patuakhali, Production, Evaluation, Hyacinth Bean and Data Analysis

1.0. Introduction

Hyacinth bean (*Lablab purpureus* L.), also known as country bean, lablab bean or Indian bean, is one of the important legume vegetables of Bangladesh and grown throughout the country. Its cultivation and use are wide in winter season and it is almost impossible to find a homestead in rural Bangladesh without a vine of hyacinth bean [1]. It is known for edible young pods, dried seeds, leaves and flowers and it also produces green manure [2]. The crop has also been used as garden plant in USA for generations due to its beautiful dark green purple veined foliage with large spikes clustered with deep violet and white pea like blossoms. The beans are naturally rich in carbohydrates, proteins, fat and fibers as well as minerals including calcium, phosphorus and iron [3]. Among the legumes, hyacinth bean constitutes an important source of therapeutic agents used in the modern as well as traditional systems of medicine [4]. There are various types of hyacinth bean grown in different part of Bangladesh with various popular local name such as suri, puti, beta, noldog etc. Significant physico-morphological variation was found among the lines grown in Bangladesh [5]. This variation is a useful material to plant breeders for crop improvement. Characterization and evaluation will provide a rapid, reliable and efficient means of information for proper utilization of germplasm. This is also helpful to select suitable parental line for further improvement programme [6]. Information regarding the performances of the hyacinth bean cultivars is scanty under Patuakhali condition. Therefore, the present study was undertaken to evaluate the performance of hyacinth bean genotypes collected from this region and to get desirable lines for cultivation as well as for breeding purpose.

2.0. Materials and methods

The experiment was conducted during rabi season of 2017-18 at Regional Horticulture Research Station, Lebukhali, Patuakhali to evaluate the performances of seventeen (17) hyacinth bean lines in Patuakhali region. Seventeen lines viz., LPPK001 to LPPK017 and four check variety viz., BARI Sheem-1, BARI Sheem-6, BARI Sheem-7 and IPSA Sheem-2 were used for this trial. The experiment was laid out in augmented block design. Four plants were cultivated in each plot maintaining 2 m x 1.5m spacing. Two seeds of each line were sown in polyethylene bag for seedling production on 11 September, 2017 and one seedling was removed from the polyethylene bag to keep healthy one after seed germination. Seedlings of 14 days old were transplanted in the pit on 24 September, 2017. The land was fertilized with Cowdung-10 t/ha, N₂₈, P₄₀ and K₇₅ and S₂₀ kg/ha respectively. Half quantity of cowdung was applied during final land preparation. The remaining half quantity of cow dung, entire amount of P and half of N and K were applied during pit preparation. The remaining N and K were applied as topdressing at 30 days after transplanting. The plants were allowed to grow on trellis. Five weeding were done at 25, 40, 60, 80 and 100 DAP. The crop was protected from the attack of pests; mainly aphids and pod borer by regular spraying of Chita @ 2 ml/L. Data on plant height at 60 days (cm), primary branches per plant, days to 1st harvest, number of pods per plant, single pod weight, 100-seed weight, pod yield per plant (kg), pod yield (t/ha) were recorded. Data were analyzed statistically using 'R' version 3.4.4 software.

3.0. Results and Discussions

Performance of seventeen hyacinth bean lines with check variety on yield and yield contributing characters are presented in Table 1. The adjusted treatment effects were significant for all of the traits. However, the adjusted block effects were non-significant for all traits except pod yield per plant and yield (t/ha) indicating homogeneity of evaluation blocks. Among the lines, highest plant height was observed in LPPK012 (395.25 cm) which was identical to LPPK015 (364 cm) and LPPK005 (327.75 cm). On the other hand, lowest plant height was observed in LPPK002 (205.25 cm) which was statistically similar to LPPK011 (217.75 cm) and IPSA Sheem 2 (237 cm). Among the lines, plant showed significance height differences due to its genetical characters. Maximum number of branches was noticed in LPPK 015 (9.13) which was statistically similar to LPPK007 (8.56) and LPPK002 (8.26) where as minimum number of branches was noticed in LPPK005 (3.56). Days to first harvest were earlier in BARI Sheem7 (68.8 days) followed by BARI Sheem 1 (98.6days). On the contrary, days to first harvest were delayed in LPPK005 (140.35 Days) and LPPK009 (140.85 days). Days to first harvest is very important for the farmers due to its market value. The longest pod (20.4 cm) was found in BARI Sheem 6 followed by LPPK014 (15.67 cm), LPPK001 (15.14 cm) and LPPK012 (15.07 cm) and the line LPPK007 produced the shortest pod (7.62 cm) which was statistically similar to LPPK004 (8.74 cm), LPPK008 (8.47 cm) and IPSA Sheem 2 (8.4cm) respectively. Maximum pod breadth was observed in LPPK012 (4.83 cm) followed by

LPPK002 (4.21 cm) and LPPK010 (3.96 cm) whereas minimum pod breadth was noticed in LPPK004 (1.41 cm) which was identical to LPPK008 (1.51 cm) and LPPK016 (1.58 cm) respectively. Variation in pod length was similar to Islam (2010) who reported variation on it from 3.96 cm to 18.20 cm. Rashid (1999) reported that the length and width of hyacinth bean generally ranges 8-15cm and 2.5-5.0cm, respectively. Heaviest fruit was obtained from LPPK013 (14.13 g) which was identical to LPPK012 (13.83 g) and LPPK002 (13.28 g) whereas, lowest single fruit weight was recorded from LPPK004 (5.085 g) which was identical to LPPK008 (5.38 g), IPSA Sheem 2 (5.58g), LPPK016 (5.63 g), LPPK017 (5.83 g) and LPPK005 (5.88 g). This might be inherent characteristics of the genotype. Maximum numbers of pods per plant were harvested from LPPK016 (1418.65) which were identical to LPPK005 (1249.9) and minimum numbers of pods per plant were harvested from LPPK003 (277.83) which were identical to LPPK002 (381.08), LPPK006 (445.9) and LPPK 010 (445.77). Our result was higher than Halim and Ahmed (1992) finding, in case of number of pods per plant and also ranged 180 to 330 among nine hyacinth bean lines. The variation in number of pods/plant might be due to differences in number of inflorescences/plant, pods/raceme, flower dropping tendency of the genotypes [11]. Maximum pod weight per plant (7.89 kg) obtained from the line LPPK016 followed by BARI Sheem7 (7.87 kg), LPPK015 (7.73 kg), LPPK001 (7.42 kg) and LPPK011 (7.21 kg) and minimum in the line LPPK 003 (2.29 kg). The highest hundred seed weight (50.3 g) was found from the line LPPK0011 and the lowest thousand seed weight (23.8 g) was obtained from the line LPPK008. BARI (2001) reported that the average weight of 100 seed was 41.99 g and ranged from 24.8 to 54.0g [12], which extended slightly from the report of Rashid (1999) who reported that hundred seeds weight of country bean lies between 25-50g.

This higher/plant yield was attributed due to higher number of pods/plant. The highest yield obtained from the line LPPK016 (18.73 t/ha) and BARI Sheem7 (18.69 t/ha) closely followed by LPPK015 (18.35 t/ha), LPPK001 (17.62 t/ha) and LPPK011 (17.12 t/ha) and the lowest yield obtained in the line LPPK 003 (5.43 t/ha).

Lines found promising for five of the characters are shown in Table 2. LPPK001, LPPK002, LPPK012, LPPK014 and BARI Sheem 6 for pod-length; LPPK002, LPPK010, LPPK0012 for pod-breadth; LPPK 002, LPPK010, LPPK012 and LPPK 013 for high pod weight; LPPK 001, LPPK005, LPPK011, LPPK 015, LPPK016 and BARI Sheem 7 for high pod-number and LPPK001, LPPK005, LPPK0011, LPPK015, LPPK016 and BARI Sheem 7 for high pod-yield.

In our germplasm, different size and color of pods were found. Size and color of pods are important traits in deciding the marketability of a crop. All the genotypes evaluated had acceptable green pod color. Details for pod-colour are presented in Table 3. Variations were recorded for pod colour with four types, namely, green, light-green, purple-green, and creamy-white 15 were green in colour viz., BARI Sheem 1, BARI Sheem 6, BARI Sheem 7, LPPK002, LPPK003, LPPK004, LPPK005, LPPK006, LPPK007, LPPK008, LPPK009, LPPK010, LPPK0012, LPPK0013, LPPK015, LPPK016 and LPPK017 and IPSA Sheem 2 was light green, LPPK011 was purple green and LPPK001 and LPPK014 were creamy-white in colour. Variation in pod-colour was observed in dolichos germplasm collected by AVRDC in Bangladesh. Islam (2010) also reported 52.3% were green color pod in his study [7-10].

The results indicated existence of wide variability for pod yield, pod length, pod breadth, pod weight, number of pods per plant and pod colour. High-yielding germplasm lines and lines with different pod-types can be utilized further in breeding programmes. Lines with colour variation can be used as phenotypic markers in genetic and hybridization studies.

Table 1: Yield and yield attributes of 17 country bean genotypes with check variety BARI Sheem-1, BARI Sheem-6, BARI Sheem-7 and IPSA Sheem 2 during 2017-18

Line/Variety	Plant Height (cm) at 60 days	No. of primary branches	Days to first harvest	Pod length (cm)	Pod breadth (cm)	Pod weight (gm)	No. of pods/plant	Yield/plant (kg)	100-seed weight	Yield (t/ha)
LPPK 001	295.25 b-d	5.26 b-d	113.6 b-d	15.34 b	2.11 hi	6.78 hi	1097.83 bc	7.42 ab	40.05 b	17.62 ab
LPPK002	205.25 f	8.26 a	117.6 b-d	15.25 bc	4.21 b	13.28 a	381.08 ij	5.27 c-e	32.05 d	12.51 c-e
LPPK003	295.25 b-d	3.26 g	127.6 a-c	12.74 d	3.31 cd	8.48 de	277.83 j	2.29 h	32.05 d	5.43 h
LPPK004	265.25 c-f	5.26 b-d	131.6 ab	8.74 h-k	1.41 j	5.08 k	914.58 cd	4.50 ef	28.05 e	10.68 ef
LPPK005	327.75 a-c	3.56 g	140.35 a	9.37 g-j	2.41 f-h	5.88 i-k	1249.9 ab	7.31 ab	31.8 d	17.36 ab
LPPK006	277.75 c-e	4.56 d-f	129.35 a-c	13.37 cd	3.51 c	9.98 c	445.9 ij	4.36 e-g	27.8 e	10.35 e-g
LPPK007	272.75 c-f	8.56 a	131.35 ab	12.17 de	3.31 cd	7.98 ef	776.9 d-f	6.15 b-d	27.8 e	14.60 b-d
LPPK008	287.75 c-e	4.56 d-f	106.35 de	8.47 i-k	1.51 j	5.385 k	955.65 cd	5.15 de	23.8 f	12.23 de
LPPK009	302.75 b-d	5.885 bc	140.85 a	7.62 k	2.46 fg	7.36 f-h	819.27 de	6.30 a-d	36.3 c	14.96 a-d
LPPK010	277.75 c-e	5.885 bc	126.85 a-c	13.32 cd	3.96 b	11.66 b	445.77 ij	5.57 c-e	32.3 d	13.22 c-e
LPPK011	217.75 ef	3.885 fg	131.85 ab	10.22 f-h	2.16 hi	6.56 h-j	1062.02 bc	7.21 ab	50.3 a	17.12 ab
LPPK012	395.25 a	4.16 fg	112.35 c-e	15.07 b	4.83 a	13.83 a	512.83 hi	6.79 a-c	32.3 d	16.12 a-c
LPPK013	295.25 b-d	6.16 b	119.35 b-d	13.17 cd	3.23 cd	14.13 a	501.33 hi	6.79 a-c	32.3 d	16.12 a-c
LPPK014	280.25 c-e	4.16 fg	109.35 de	15.67 b	2.25 gh	9.43 cd	736.08 d-g	6.76 a-c	36.3 c	16.05 a-c
LPPK015	364 ab	9.135 a	131.85 ab	11.09 ef	2.28 gh	6.93 gh	1131.4 bc	7.73 ab	41.55 b	18.35 ab
LPPK016	239 d-f	6.135 b	128.85 a-c	9.49 g-j	1.55 j	5.63 jk	1418.65 a	7.89 a	39.55 b	18.73 a
LPPK017	264 c-f	5.135 c-e	129.85 a-c	9.89 f-i	2.88 e	5.83 i-k	549.65 g-i	3.28 f-h	31.55 d	7.79 f-h
BARI Sheem 1	293 cd	4.44 ef	98.6 e	11.5 e	2.58 f	9.58 c	713.5 e-g	6.89 ab	28.2 e	16.36 b
BARI Sheem 6	264 d-f	6.08 b	110.2 de	20.4 a	2i	6.82 h	866.3 d	5.92 cd	35.8 c	14.06 cd
BARI Sheem 7	282 c-e	6.16 b	68.8 f	10.32 fg	3.22 d	7.46 fg	1056.45 c	7.87 a	28.4 e	18.69 a
IPSA Sheem 2	237 ef	4.36 f	106.8 de	8.46 jk	2.24 gh	5.58 k	616.6 f-h	3.22 gh	31.8 d	7.64 gh
L.S.	Treatment adjusted	**	*	**	**	**	**	**	**	**
	Block adjusted	**	NS	NS	NS	NS	NS	NS	NS	NS

Table 2: Grouping of hyacinth bean germplasm for yield and pod related traits

Traits	Lines /Variety	No. of lines
Pod length (> 15 cm)	BARI Sheem 6, LPPK001, LPPK002, LPPK012, LPPK014	5
Pod breadth (> 3.5 cm)	LPPK002, LPPK010 and LPPK0012	3
Pod weight (> 10g)	LPPK 002, LPPK010, LPPK012 and LPPK 013	4
Number of pod per plant (> 1000)	LPPK 001, LPPK005, LPPK011, LPPK 015, LPPK016 and BARI Sheem 7	6
Pod yield per plant (> 7 kg)	LPPK001, LPPK005, LPPK0011, LPPK015, LPPK016 and BARI Sheem 7	6

Table 3: Grouping of hyacinth bean germplasm on the basis of pod colour

Pod colour	Germplasm	No. of Lines
Green	BARI Sheem 1, BARI Sheem 6, BARI Sheem 7, LPPK002, LPPK003, LPPK004, LPPK005, LPPK006, LPPK007, LPPK008, LPPK009, LPPK010, LPPK011, LPPK012, LPPK013, LPPK015, LPPK016 and LPPK017	15
Light green	IPSA Sheem 2	1
Purple green	LPPK011	1
Creamy-white	LPPK001 and LPPK014	2

4.0. Conclusions

The study revealed that for considering higher yield of five lines, LPPK001, LPPK005, LPPK0011, LPPK015, LPPK016 were found promising. Besides, LPPK002, LPPK010 and LPPK0012 were for wider breadth and LPPK001 and LPPK014 were for creamy –white pod colour was also selected. It is the first year study, so the trial will be repeated with more lines for conclusive result.

5.0. References

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