



Variations in Growth and Yield of Indigenous Hyacinth Bean (*Lablab purpureus* (L.) Sweet) Genotypes

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Abstract

Variations in growth and yield of three hyacinth bean genotypes collected from Sitakundu of Chittagong, were investigated at the Agricultural Research Station (ARS) of Bangladesh Agricultural Research Institute (BARI), Pahartali, Chittagong during November 2011 to March 2012, where BARI Seem-4 was used as standard control. The minimum number of days for pod formation (54 days) was recorded in BARI Seem-4, while the maximum was in DLP 002 (62 days). The highest number of pods (324) per plant was obtained from DLP 001 followed by DLP 003 (212.33) and the lowest (148.33) was obtained from BARI Seem-4. The maximum weight (12.61 g) of single pod was observed in DLP 003, which is close to that of DLP 002 (12.23 g). The minimum weight of single pod (7.08g) was however observed in DLP 001. Weight of 100-green seed (117.17 g) was maximum in DLP 002, while that of DLP 001 was the minimum (85.90 g). The maximum green seed (61.86 %) was found in DLP 003 and the minimum was in DLP 001 (47.89 %). DLP 003 produced the highest pod yield (26.77 t/ha) which was followed by DLP 001 (22.94 t/ha), while BARI Seem-4 produced the lowest (17.43 t/ha), which is close to that of DLP 002 (19.57 t/ha).

Keywords: Growth and yield, indigenous hyacinth bean, germplasm

1. Introduction

Hyacinth bean (*Lablab purpureus* (L.) Sweet) is one of the most important winter vegetables in Bangladesh (Rashid, 1999). It is very nutritious as the green pods contain a good amount of protein in addition to fibre, vitamins and minerals (Gopalan *et al.*, 1982). Lablab bean is a self polinated crop belonging to the family Leguminosae, and sub-family Papiolionaceae. It originated in India from where it was spreaded to other parts of the world (Chowdhury *et al.*, 1989b). Different varieties of bean are popular for their different qualities. Some varieties are

grown for seeds, while others are preferred as green vegetables. Being a developing country, malnutrition is a common feature of the people of Bangladesh. Of the two major sources of protein, viz., animal and plant protein, animal protein is very scarce in this country, where leguminous crops can play an important role to meet up the deficiency. Moreover, pulses and bean seed contain 20-30% protein on a dry weight basis, which is nearly three times that of cereals (Mia, 1989).

In Bangladesh, various types of hyacinth bean are grown in different parts of the country with

various popular local names, such as Suri, Bata, Puti and Noldog etc. Significant variations in growth and yield parameters are also found among the genotypes (Mollah *et al.*, 1995). The farmers of Sitakundu area of Chittagong popularly cultivate different types of hyacinth bean in large areas (Moniruzzaman *et al.*, 2010). Bangladesh Agricultural Research Institute (BARI) has released six high yielding hyacinth bean varieties. However, the growth and yield attributes of the popular local genotypes of Sitakundu have not been studied in comparison with those of HYV. Therefore, the present investigation was undertaken to study the growth and yield variations of three local popular hyacinth bean genotypes in relation to those of a BARI developed popular variety BARI Seem-4.

2. Materials and Methods

The experiment was conducted at the Agricultural Research Station of Bangladesh Agricultural Research Institute (BARI), Pahartali, Chittagong during Rabi season (October to February) of 2011- 2012. Growth and yield of three promising hyacinth bean genotypes: DLP 001, DLP 002 and DLP 003 with BARI Seem - 4 as check were investigated in a RCB design with three replications. Seeds were sown in black perforated polybags (5 cm x 6 cm) on 24 October, 2011. Twenty days old seedlings were transplanted in the main field. The unit plot size was 12.0 m X 1.0 m maintaining 1.0 m X 1.0 m plant spacing. Manures and fertilizers were applied @ 10000-23-30-75 kg/ha of cowdung, N, P and K, respectively (Rashid, 1999). N, P and K were applied in the form of urea, TSP and MoP, respectively. Half of the cowdung was applied during final land preparation. The rest amount of the cowdung, entire quantity of TSP, half of the urea and half of the MoP were applied in the pit (size 30 x 30x 30 cm) 10 days before transplanting of the seedling. The rest of the urea and MoP was applied as top dressing in two equal instalments, at 15 and 30 days after transplanting.

Two bushy (branched) twigs of bamboo, each 1.75 m in height were vertically inserted keeping the lower parts into the soil for each plant, so that the vines could climb on the twigs. Intercultural operations such as irrigation, weeding, mulching and plant protection measures were done as per recommendation of BARI (Mandal *et al.*, 2011). The data were taken from randomly selected 5 plants. All data on growth and yield attributes were recorded. Data on flower bud emergence, pod formation, number of pods per plant, number of green seeds per pod, pod size, weight of single pod, weight of pods per plant, 100-green-seed weight, insect and disease infestation, green seed yield, pod yield were estimated. Organoleptic evaluation was also done by a panel of 10 members setting the criteria as poor, good, very good and excellent. Data were analyzed statistically and the means were separated by Least Significant Difference (LSD) following MSTATC software.

3. Results and Discussion

The data on different characters are presented in Tables 1 and 2. The check variety BARI Seem-4 took minimum 38 days for flower bud emergence, while the maximum days were needed for DLP 003 (44 days). Mohammad (2003) found that 50 days were needed for flower bud emergence in his study. Purselove (1977) reported that some of the hyacinth bean varieties produced flowers at about 6 weeks after sowing. The minimum days for pod formation (54 days) were obtained from BARI Seem-4 and the maximum was obtained from DLP 002 (62 days). The check variety BARI Seem-4 required minimum days (78 days) for 1st harvest, while the maximum days for 1st pod harvest (86 days) was for DLP 002. Moniruzzaman *et al.* (2010) reported that time required for 1st harvesting ranged from 62 to 134 days after planting among the three genotypes. Harvesting duration varied from 30-35 days. Maximum harvesting duration (35 days) was observed in BARI Seem-4, while the minimum in DLP 001 (30 days).

Table 1. Days to flowering and harvest and yield attributes of hyacinth bean genotypes

Genotypes	Days to flower bud emergence	Flower colour	Days to pod formation	Days to 1 st pod harvest	Days to last pod harvest	Harvesting duration (days)	Number of pods/plant	Number of seeds /pod	Pod length (cm)	Pod diameter (cm)
BARI Seem-4	38	White	54	78	113	35	148.33	5.33	12.92	1.34
DLP 001	42	Purple	58	84	114	30	324.00	4.33	7.79	1.94
DLP 002	41	White	62	86	119	33	160.00	4.33	12.57	1.63
DLP 003	44	White	56	84	115	31	212.33	4.67	13.42	1.78
CV (%)	4.59	-	4.92	4.33	3.50	8.54	1.38	10.71	1.34	3.79
Level of significance	*	-	*	NS	NS	NS	**	NS	**	**
LSD _{0.05}	3.78	-	5.65	-	-	-	5.83	-	0.30	0.12

*Means significant at 5% level of probability, **Means significant at 1% level of probability and NS= Non significant

Table 2. Yield and yield contributing characters and organoleptic quality of hyacinth bean genotypes

Genotypes	Individual pod weight (g)	Weight of pods/plant (kg)	Weight of seeds/pod (g)	Weight of seeds/plant (kg)	100-fresh-green-seed weight (g)	Fresh green seed (%)	Insect and disease infestation (%)	Organoleptic quality	Green seed yield (t/ha)	Pod yield (t/ha)
BARI Seem-4	11.75	1.74	4.77	0.71	90.13	59.37	10.00	Excellent	7.1	17.4
DLP 001	7.08	2.29	3.69	1.20	85.90	47.89	5.00	Good	12	22.9
DLP 002	12.23	1.96	5.01	0.80	117.17	59.03	8.33	Very good	8	19.6
DLP 003	12.61	2.68	4.81	1.02	104.22	61.86	15.00	Good	10.2	26.8
CV (%)	1.19	3.81	1.24	2.45	11.80	1.74	3.01	-	5.83	1.02
Level of significance	**	**	**	**	*	**	**	-	**	**
LSD _{0.05}	0.26	0.16	0.10	0.06	23.43	1.98	0.57	-	1.08	0.44

*Means significant at 5% level of probability and **Means significant at 1% level of probability

The number of pods per plant ranged from 148 to 324 among the genotypes. Highest number of pods per plant (324) was obtained from DLP 001 followed by DLP 003 (212) and the lowest number of fruits was in BARI Seem-4 (148). Pods per plant ranged from 180-320 among nine country bean genotypes as recorded by Halim and Ahmed (1992).

The maximum number of green seeds per pod (5.33) was observed in BARI Seem-4, where as the minimum was in DLP 001 and DLP 002 (4.33). The longest pods (13.42 cm) were produced by DLP 003, while the shortest pod was given by DLP 001 (7.79 cm). Pengelly and Maass (2001) reported that pod length ranged from 2.5 to 14.0 cm among 249 genotypes. The highest pod diameter (1.94 cm) was observed in DLP 001 and the lowest pod diameter (1.34 cm) was observed in BARI Seem 4 (Table 1). Pengelly and Maass (2001) found variations in pod width, which ranged from 1.6 to 3.2 cm among 249 genotypes with an average pod width of 2.1 cm.

The maximum weight of single pod (12.61 g) was observed in DLP 003, while the minimum weight of single pod (7.08 g) was in DLP 001 (Table 2). Mohammad (2003) recorded that individual pod weight varied from 1.47 g to 12.30 g among 44 genotypes.

The maximum weight of pod per plant (2.68 kg) was observed in DLP 003, while the minimum weight (1.74 kg) was observed in BARI Seem-4. Pods weight per plant ranged from 1.62 to 2.81 kg among nine country bean lines as recorded by Halim and Ahmed (1992).

100-green-seed weight was maximum (117.17 g) in DLP 002, while that was minimum (85.90 g) in DLP 001. The maximum weight of green fresh pod without seed in relation to seed was the maximum (61.86 %) in DLP 003, while that was minimum in DLP 001 (47.89 %).

The highest green seed yield (12.00 t/ha) was found in DLP 001 and the lowest was found in BARI Seem 4 (8.00 t/ha).

DLP 003 produced the highest pod yield (26.80 t/ha) followed by DLP 001 (22.90 t/ha), while BARI Seem-4 produced the lowest pod yield (17.40 t/ha). Moniruzzaman et al. (2010) found that pod yield varied from 7.01 to 32.24 t/ha which is consistent with the present study.

Insect and disease infestation was the highest in DLP 003 (15%) and the lowest in DLP 001 (5%). Organoleptic quality performed excellent in BARI Seem-4, very good in DLP 002 and good in DLP 001 and DLP 003.

4. Conclusions

All the three collected genotypes showed better performance especially in respect of pods yield as well as green seed weight per plant against BARI sheem-4. Insect and disease infestation was also lower in DLP 001 and DLP 002 as compared to BARI sheem-4 with acceptable organoleptic quality.

References

- Chowdhury, A. R., M. Ali, M. A. Quadir and A. H. Talukder. 1989b. Floral biology of hyacinth bean [*Lablab purpuria* L. (Sweet)]. *Thai Journal of Agricultural Science*, 22: 56-67.
- Gopalan C. V., B. Y. Ramasastry and S. C. Balasubramaniam. 1982. Nutritive value of Indian food. National Institute of Nutrition. ICMR, Hyderabad. 75 p.
- Halim, G. M. A. and S. Ahmed. 1992. Study of the morphogenetic divergence in country bean. *Bangladesh Horticulture*, 20 (2): 103-107.
- Mandal, M. R. I., M.S. Islam, M. A. J. Bhuyan, M. M. Rahman and M. H. H. Rahman

- (Eds.). 2011. Krishi Projukti Hatboi (in bengali). 1st part. 5th edn., Bangladesh Agricultural Research Institute. Gazipur, 1701. Bangladesh. 428 pp.
- Moniruzzaman, M., J. Hasan, N. U. Ahmed, Z. A. Firoz and A. K. M. Quamruzzaman. 2010. Effect of date of planting and spacing on the yield attributes and yield of different varieties of country bean [*Lablab purpuria* L. (Sweet)]. *Bangladesh Journal of Agricultural Research*, 35 (4): 573-584.
- Mia, M. W. 1989. Genetic analysis of country bean [*Lablab purpuria* L (Sweet)]. *M. Sc. Thesis*. Department of Genetic and Plant Breeding, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- Mollah, M. S.; S. R. Saha and M. S. Islam. 1995. Effect of method of support on the yield performance of some advanced lines of hyacinth bean. *Bangladesh Journal of Crop Science*, 6(1&2): 37-40.
- Pengelly, B. C. and B. L. Maass. 2001. *Lablab purpuria* (L) Sweet-diversity, potential use and determination of a core collection of this multi-purpose tropical legume. *Genetic Resources and Crop Evolution*. 48: 261-272.
- Purseglove, J. W. 1977. Tropical Crops. Dicotyledons. Longman, London. 273-276 pp.
- Rashid, M. M. 1999. Shabji Biggan (in bengali). Rashid Publishing House, 94, Old DOHS, Dhaka-1206. 307-409 pp.