Original Research Article

Evaluation of yard long bean genotypes at varied sowing dates in Sylhet region

Abstract

This experiment was conducted in the experimental field of Department of Horticulture, Sylhet Agricultural University (SAU), Bangladesh during 2022. The objective was to evaluate three yard long bean genotypes (BARI yard long bean-1, BARI yard long bean-2 and Kagornatki) in three planting dates (20 March, 20 April and 20 May) under acidic soil conditions of Sylhet. The two factors field experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. Yard long bean planted on 20 March recorded the minimum number of days to flower (40.33), the minimum number of days to first harvest (53.33), the maximum number of pods per plant (31.01), the highest individual pod weight (12.25 g), pod length (45.98 cm), per plant pod yield (389.47 g) as well as per decimal pod yield (97.34 kg). The genotype BARI yard long bean-1 was the earliest in flowering (41.66 days). BARI yard long bean-1 had the highest number of pods (27.81) as well as pod yield (309.85 kg) per plant. Although individual pod weight and pod length of BARI yard long bean-1 and Kagornatki were statistically similar, the per decimal pod yield (76.86 kg) of BARI yard long bean-1 was significantly higher than Kagornatki (56.31 kg). Interaction effect showed that the genotype BARI yard long bean-1 planted on 20 March showed the best performance in terms of pod yield per plant (506.56 g) and per decimal (127.22 kg). Therefore, the genotype BARI yard long bean-1 can be recommended to cultivate at 20 March sowing date under acidic soil condition of Sylhet.

Key words: Yard long bean, acidic soil condition, pod yield, Sylhet region

Introduction

Yard long bean (*Vigna unguiculata* L.) is one of the most important leguminous vegetable crops originated in West Africa but is now cultivated all over the world due to its nutritional and culinary values (Rambabu et al., 2016). It is also known as Chinese long bean, string bean, snake bean, snake pea, snap pea, pea bean, asparagus bean, borboti with chromosome number 2n=2x=22 (Bhagavati et al., 2019). The immature pods of this crop are mainly used as vegetable which contain around 24-27% digestible protein (Ano and Ubochi, 2008). The pods are also rich in vitamins, minerals and fibres (Messina 1999; Singh, 2005). This crop is widely cultivated throughout the tropics as a minor vegetable and is one of the economically important vegetable crops in Bangladesh during summer season when there is scarcity of vegetables (Haque et al., 2020).

Sylhet is a special agro ecological zone in Bangladesh with acidic soils. Research based information on the production of yard long bean crop under this condition is almost absent. Production of yard long bean could be possible in this region during the summer season since this crop is more resistant to heat and drought than typical fields or lima beans (Rubatzly and Yamaguchi, 1997; Khatun et al., 2022). Moreover, this region got huge fallow land could be brought under cultivation. Farmers sometime cultivate this crop without any prior knowledge and ended up with a very low yield although there are opportunities to improve the production.

One of the reasons that could lead to a lower yield is the selection of yard long bean genotypes. Different genotypes are cultivated in our country those differ in yield. Farmers are often used to cultivate different land races or local varieties that are not only low yielding but also susceptible to diseases. Provided superior varieties and or production technologies available could improve the present scenario of this region. So it is essential to identify high yielding varieties adapted to this region to maximize yield.

Another reasons that could lead to a lower yield is sowing date. Since it is a warm season crop, most of the farmer cultivate this as a kharif season crop although cultivation of some local races at the early part of the winter season is not uncommon in Bangladesh. Therefore, to have the longer duration availability of yard long bean staggered sowing can play important role. So the aim of this research work was to evaluate three yard long bean varieties in three planting dates under acidic soil conditions of Sylhet.

Materials and Methods

Three different yard long bean genotypes viz., BARI yard long bean-1, BARI yard long bean-2 and Kagornatki were evaluated during summer season at three different sowing dates of 20 March, 20 April and 20 May 2022 at the experimental field of Horticulture Department, Sylhet Agricultural University, Sylhet. The experimental site was located at North-East corner of the Bangladesh lying between 23º57′ to 25º13′ North latitude and 90º56′to 92º21′ East longitude which falls under the Agro-ecological Zone-20: Eastern Surma-Kusiyara Flood Plain. The soil of the experimental site was grey, sandy loams in texture and belongs to the 'Noncalcareous Grey' soils and the reaction of soils ranges from strongly acidic to neutral (4.7-6.9) (UNDP and FAO, 1988). The experiment was conducted under RCB design with three replications. The land was ploughed with a power tiller followed by removing clods and debris. Basal dose of manure and fertilizers were mixed properly at the time of land preparation. Seeds of three genotypes were sown on raised bed at 60 cm × 30 cm distance between row to row and plant two plant, respectively. After complete germination of the seeds, two plants were allowed to grow in each pit. The crop was fertilized with cowdung, urea, TSP, MoP, gypsum and zinc sulphate @60 kg, 200 g, 600 g, 600 g, 400 and 50 g, respectively. The whole amount of cowdung and other chemical fertilizers except urea and MoP were applied at land preparation. Half of MoP was

applied at land preparation. Urea and rest of MoP were top dressed as two equal installment 30 and 45 days after seed sowing. Irrigation, weeding, mulching and drainage of water were done as and when required. The plants were given bamboo stick vertically to climb up. Data were collected on different yield and yield attributes covering, days to flower, days to harvest, number of pods per plant, individual pod length, per plant as well as per decimal pod yield. Collected data were compiled and statistically analyzed using MSTAT software for interpretation of results.

Results and Discussion

Effect of sowing dates

Significant variations were observed among the sowing dates in respect to pod yield and yield attributes of yard long bean except the parameter, pod width (Table 1). Early flowering was noticed in March sowing (40.33 days), while delay flowering was noticed in May sowing (45.66 days). The maximum number of days to first harvest was required for May sowing (56.44 days), which was statistically similar with the April sowing (56.00 days). But the lowest number of days required to first harvest was recorded in March sowing (53.33 days). The highest number of pods/plant, individual pod weight and pod length were harvested from the March sowing (31.01, 12.25 g and 45.98 cm, respectively). Contrary, the lowest number of pods/plant, individual pod weight and pod length were harvested from the May sowing (13.11, 6.96 g and 35.9 cm, respectively). Considering the yield parameters, the highest per plant as well as per decimal yield were recorded in case of the March sowing (389.47 g and 97.34 kg, respectively). The highest number of pods per plant and highest individual pod weight contributed to the maximum yield (97.34 kg/decimal) of March sowing. But the lowest per plant yield and per decimal yield were produced in case of the May sowing (93.15 g and 23.08 kg respectively). Yard long bean is considered as relatively low pod yield productivity from May sowing, because of its sensitivity to unfavorable environmental conditions, such as high temperature, dry weather, and even cloudy sky or heavy rain through the growing periods previously reported by Sarutayophat et al., 2007. On the other hand, March sowing has given the better performance due to having congenial environmental conditions throughout the growing period, receiving and optimum utilizing the natural resources for completing both vegetative and reproductive phages.

Table 1. Effect of sowing dates on pod yield and yield attributes of yard long bean at varied sowing dates

Sowing dates	Days to flower	Days to harvest	No. pods/plant	Ind. Pod wt (g)	Pod yield /plant (g)	Pod length (cm)	Pod width (cm)	Pod yield (kg)/ decimal)
T1	40.33c	53.33b	31.01a	12.25a	389.47a	45.98a	0.84	97.34a
T2	42.88b	56.00a	21.08b	10.01b	211.81b	40.28b	0.68	52.46b
T3	45.66a	56.44a	13.11c	6.96c	93.15c	35.90c	0.69	23.08c
F-test	**	**	**	**	**	**	NS	**
CV%	3.77	3.48	19.08	11.87	20.61	6.38	20.17	21.49

NS indicates non-significant, ** indicates significant at 1% level of probability, T1= March sowing, T2= April sowing and T3= May sowing

Effect of genotypes

Effect of yard long bean genotypes on pod yield and yield attributes was presented in Table 2. Significant variations were observed among the genotypes in respect to all parameters except days to harvest and pod width. Days to flower was significantly lower in the genotype BARI yard long bean-1 (41.66 days) than BARI yard long bean-2 (42.77 days) and Kagornatki (44.44 days). The maximum number of pods/plant was produced by the genotype BARI yard long bean-1 (27.81). But the minimum number of pods/plant was produced by the genotype Kagornatki (17.05) which was statistically similar with BARI yard long bean-1 (20.33). The highest individual pod weight was identified in the genotype Kagornatki (11.43g) which was par with the genotype BARI yard long bean-1(10.45g) but the lowest individual pod weight was identified in the genotype BARI yard long bean-2 (7.26 g). Per plant pod yield was maximum in the genotype BARI yard long bean-1 (309.85 g) followed by the genotypes Kagornatki (226.52 g) and BARI yard long bean-2 (158.07 g). The longest pods were produced by the genotype BARI yard long bean-1 (46.74 cm) which was statistically similar with Kagornatki (46.73 cm). Contrary, the shortest pods were produced by the genotype BARI yard long bean-2 (28.69 cm). Nooprom and Santipracha (2015) found pod length ranged from 49.88 cm to 50.63 cm when working with seven different cultivars of yard long bean. The maximum per decimal yield was harvested from the genotype BARI yard long bean-1 (76.86 kg). On the other hand the minimum per decimal yield was harvested from the genotype BARI yard long bean-2 (39.72 kg) that was statistically closer to the genotype Kagornatki (56.31 kg). The results revealed that the pod yield of yard long bean was influenced by the genotypes. Similar results were also previously reported by Neupane et al. (2008). Among the three genotypes, BARI yard long bean-1 exerted the best performance may be due to their genetic makeup. Nahid (2018) also found the highest yield (14.5 t/ha) of the genotype BARI yard long bean-1 when working with the nutrient management and auxin application on yard long bean. Haque et al. (2020) investigated thirty six genotypes of yard long bean and found that the variability among these genotypes had the potential to be used in future plant breeding program as well as for commercial production. After thorough

investigation of the quality of yard long bean, Quamruzzaman et al. (2022) recommend the five yard-long bean cultivars viz. VS-21, VS-32, VS-49, BARI Barboti-1 and BARI Barboti-2 for production and consumption within Bangladesh to improve human health and nutrition and to contribute to the prevention of key health complications including diabetes, obesity and some cancers.

Table 2.Effect of genotypes on pod yield and yield attributes of yard long bean

Genotypes	Days to flower	Days to harvest	No. pods/plant	Ind. Pod wt (g)	Pod yield /plant (g)	Pod length (cm)	Pod width (cm)	Pod yield (kg/ decimal)
V1	41.66b	54.66	27.81a	10.54a	309.85a	46.74a	0.76	76.86a
V2	42.77ab	55.44	20.33b	7.26b	158.07c	28.69b	0.70	39.72b
V3	44.44a	55.66	17.05b	11.43a	226.52b	46.73a	0.76	56.31b
F-test	**	NS	**	**	**	**	NS	**
CV%	3.77	3.48	19.08	11.87	20.61	6.38	20.17	21.49

NS indicates non-significant, ** indicates significant at 1% level of probability, V1= BARI yard long bean-1, V2= BARI yard long bean-2 and V3= Kagornatki

Interaction effect

Most of the parameters significantly affect the pod yield and yield attributes of yard long bean due to interaction between sowing dates and genotypes except days to flower, days to harvest, number of pods/plant and pod width (Table 3). The highest individual pod weight was produced by the genotype Kagornatki when sown in March (15.49 g). But the lowest individual pod weight was produced by the genotype BARI yard long bean-2 planted during May (5.30 g). The longest pods were identified in the genotype Kagornatki from March sowing (55.26 cm) which was statistically similar with the genotype BARI yard long bean-1 from March sowing (53.40 cm). But the smallest pods were found in the genotype BARI yard long bean-2 from May sowing (27.16 cm) which was par with the genotype BARI yard long bean-2 from March sowing (29.27 cm) and April sowing (29.63 cm). The maximum pod yield/plant and per decimal yield was harvested from the genotype BARI yard long bean-1 when sowed in March (506.56 g and 127.22 kg, respectively). On the other hand the minimum pod yield/plant and per decimal yield was harvested from the genotype BARI yard long bean-2 from the May sowing (60.0 g and 15.06 kg, respectively) which was statistically closer with the genotypes Kagornatki from May sowing (73.10 g and 18.36 kg, respectively) and BARI yard long bean-1 from May sowing (146.36 g and 35.83 kg, respectively).

Table 3. Interaction effect due to sowing dates and genotypes of yard long bean for pod yield and yield attributes

Sowing dates	Days to flower	Days to harvest	No. pods/plant	Ind. Pod wt (g)	Pod yield /plant (g)	Pod length (cm)	Pod width (cm)	Pod yield (kg/ decimal)
T1V1	38.66	52.00	40.36	12.63b	506.56a	53.40ab	0.83	127.22a
T1V2	40.66	53.33	28.00	8.63c	244.73cd	29.27e	0.83	59.83cd
T1V3	41.66	54.66	24.66	15.49a	417.11b	55.26a	0.88	104.99b
T2V1	42.00	55.66	24.41	11.23b	276.61c	43.80cd	0.71	67.53c
T2V2	42.33	55.33	21.68	7.80c	169.47de	29.63e	0.56	44.28de
T2V3	44.33	57.00	17.16	10.96b	189.35de	47.43bc	0.79	45.58de
T3V1	44.33	56.33	18.66	7.76c	146.36ef	43.03cd	0.74	35.83ef
T3V2	45.33	57.66	11.33	5.30d	60.00f	27.16e	0.72	15.06f
T3V3	47.33	55.33	9.33	7.84c	73.10f	37.50d	0.63	18.36f
F-test	Ns	NS	NS	*	*	**	NS	*
CV%	3.77	3.48	19.08	11.87	20.61	6.38	20.17	21.49

NS indicates non-significant, ** indicates significant at 1% level of probability, * indicates significant at 5% level of probability, T1= March sowing, T2= April sowing and T3= May sowing; V1= BARI yard long bean-1, V2= BARI yard long bean-2 and V3= Kagornatki

Conclusion

It could be concluded from the current experiment that performance of yard long bean declined gradually in each successive delay of sowing date. Among the three varieties used in this experiment, the BARI yard long bean-1 is the best adapted to acidic soil condition of Sylhet and out yielded the other two varieties Therefore, the genotype BARI yard long bean-1 could be taken under consideration for March sowing in Sylhet.

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