PERFORMANCE OF VARIETIES ON THE YIELD AND QUALITY OF ONION (*Allium cepa* L.) THROUGH SET TO BULB METHOD

I suggest revising the English.

Abstract

The experiment was laid out at Spices Research Sub-Centre (SRSC), Bangladesh Agricultural Research Institute (BARI), Faridpur, Bangladesh during the winter season of 2021-2022. The study was conducted to explore potentialities of new developed varieties such as BARI Piaz-4, BARI Piaz-6, LalTeer King and BARI Piaz-1 (as check) for getting higher yield and quality of onion in set to bulb method. The trial was carried out in randomized complete block design with three replications. The finding depicted that the varieties responded significantly on the parameters studied except days to maturity of bulb and disease rating. The variety BARI Piaz-4 and LalTeer King showed the best performance on the basis of incidence of bolting, split bulb, diameter of bulb, individual bulb weight and yield of onion. On the other hand, BARI Piaz-1 had the highest dry matter content and total soluble solid content against other varieties. Finally, new developed varieties such as BARI Piaz-4 and LalTeer King would be used for getting higher yield of early green onions in set to bulb method.

Key Words: Onion, Varieties, Performance, Yielda and Quality

- Keywords must not be in the title.

Introduction

The government of Bangladesh imports around 10 lakh metric tons onions per year expending foreign money for meeting the demand of the country (Khan *et al*., 2022). To meet the annual demand farmers of Bangladesh grow their onion following three methods: a) transplanting of seedlings, b) direct seeding in line or broadcast and set (bulb to bulb) method. Around 60-65% and 5-10% of total annual onion are produced using transplanting of seedlings and direct seeding, respectively while the rest by onion set (Rahim *et al*., 1992). Around 25-30% of total annual onion is produced by using sets. Hence in Bangladesh, bulbs produced from set method meet up a remarkable portion of annual demand. In many countries, onions are largely planted as sets (Khokhar *et al*., 2002). The bulbs produced in this method are entirely fresh (green onion) and these bulbs are immediately consumed before harvesting winter onions but not for store purpose. These crops come into the market quite early in the season and meets market demand for several months. However, early harvesting compensates by high price received for the crops. The sets are produced in previous season by seeding thickly and those sets are planted in September to October. The green bulbs are harvested in December to January. Growing onions through sets is a traditional method. Once a time farmers of Bangladesh were dependent on only

one variety like BARI Piaz-1 for production of early onion crop in set method. Now-a-days, they have many alternative varieties to grow early crops. Besides BARI Piaz-1 Spices Research Centre (SRC), BARI, Bogura has released more two improved winter onion varieties viz. BARI Piaz-4 and BARI Piaz-6. LalTeer Seed Limited, Dhaka, Bangladesh also has released an improve variety namely LalTeer King which is grown by farmers. In the country, so far no research work was done comparing aforesaid varieties in set method.

The present experiment was, therefore, undertaken to explore potentialities of new released improved varieties under set to bulb method for getting higher yield and quality of onion.

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Materials and Methods

The present research work was laid out at the experimental field of SRSC, BARI, Faridpur during winter season of 2021-2022. The study was set up to explore potentialities of new developed varieties such as BARI Piaz-4, BARI Piaz-6, LalTeer King and BARI Piaz-1 (as check) for getting higher yield and quality of onion in set to bulb method. The experiment was carried out in randomized complete block design with three replications. The onion sets from each variety were planted in the trial plot maintaining 15 cm x 10 cm spacing. The size of sets was 4 ± 0.5 to 6 ± 0.50 g (Khan *et al*., 2021). The unit plot size was 5.00 m x 4.00 m. The experimental field was fertilized with 3 tones well-decomposed cowdung, 120 kg N, 50 kg P, 85 kg K and 40 kg S per hectare. Nitrogen, phosphate, potash and sulphur were supplied in the form of urea, TSP, MP and gypsum, respectively. The entire quantity of cowdung, P, K, S and one third of N were applied as basal dose during land preparation. The remaining N was used as top dress in two equal splits at 20 and 30 days after set planting. The fungicide iprodione/mancozeb @ 3 g/1 litre of water was sprayed at fortnightly interval commencing from one month after set planting. All other recommended management practices were followed for variety. The data recorded were: plant height (cm), number of leaves per plant (no.), percent bolting (%), days to maturity of bulb, equatorial diameter of bulb (cm), individual bulb weight (g), percent split bulbs (%), dry matter content of bulbs (%), total soluble solid content (°brix), disease rating (0-5 scale), bulbs weight per plot (kg/ha) then calculated as fresh yield per hectare (t). Ten plants were randomly selected from each plot for recoding data and averaging it. After counting the percent of bolting, the flower stalks were broken down. Bulbs were harvested at maturity when the pseudostem of non-bolted plants becomes flaccid and unable to support the leaf blades (Brewster, 1990). Days to maturity were recorded considering days between planting of sets and harvesting of bulbs. The percent dry matter content of bulbs was calculated by dry weight basis as per procedure of Walle *et al*. (2018). The total soluble solids (TSS) content of bulbs were recorded by hand refractometer (ATAGO, Master-53M, Japan) with a range of 0-53 °brix. The stemphylium leaf blight/purple blotch severity of onion was scored by following 0-5 scale, as described by Sharma (1986). The recorded data were analyzed statistically as suggested by Gomez and Gomez (1984) and the means were compared by least significant difference.

I suggest that the methodology be more detailed.

Results and Discussion

The results depicted that the parameters studied under the experiment were significantly affected by varieties except disease rating and days to maturity (Table 1).

Table 1. Effect of varieties on the growth, yield and quality of onion bulb in set to bulb method at SRSC, BARI, Faridpur during 2021-2022

Seed rate	Plant height (cm)	Number of leaves /plant	Days to maturity	Bolting (%)	Splitting (%)	Bulb diameter (cm)
V_1:BARI Piaz-1	48.64	7.86	82.83	40.08	72.16	3.32
V_2:BARI Piaz-4	51.94	8.51	84.12	31.58	50.21	4.03
V_3:BARI Piaz-6	47.67	8.00	81.69	28.39	69.04	3.53
V_4:LalTeer king	50.51	9.34	84.01	30.45	45.60	3.92
CV (%)	5.15	4.65	11.24	5.82	5.00	9.22
LSD (0.05)	4.012	0.783	-	3.795	5.920	0.682
Level of sig.	*	*	NS	**	**	*

Footnote: ** Significant at 1% level of probability, * Significant at 5% level of probability and NS-Not significant

Contd. Table 1.

Variety	Disease rating (0-5 scale)	Individual bulb weight (g)	Dry matter of bulb (%)	TSS (°brix)	Bulb yield (t/ha)
V_1:BARI Piaz-1	2.56	20.42	19.18	18.15	17.64
V_2:BARI Piaz-4	2.32	27.03	15.18	14.33	23.55
V_3:BARI Piaz-6	2.29	20.79	15.31	14.03	19.05
V_4:LalTeer king	2.08	24.60	14.13	14.97	21.54
CV (%)	13.45	5.00	9.54	3.37	6.69
LSD (0.05)	-	2.310	3.041	1.034	2.701
Level of sig.	NS	**	*	**	**

Footnote: ** Significant at 1% level of probability, * Significant at 5% level of probability and NS-Not significant

Plant height

The variety BARI Piaz-4 exhibited the tallest plant height (51.94cm) insignificantly followed by LalTeer King (50.51cm). The shortest plant height (47.67cm) was recorded in BARI Piaz-6 which was significantly differed with BARI Piaz-4. The variation in plant height might be due to genetic causes. The present result corroborates the findings of Walle *et al*. (2018) and Sirajo and Namo (2019).

Number of leaves per plant

The maximum number of leaves per plant was counted in LalTeer King (9.34) significantly followed by BARI Piaz-4 (8.51cm). The variety BARI Piaz-1 had the minimum numver of leaves (7.86). The variation in pungency of onion among the genotypes/varieties might be due to their genetic potential. The similar finding in onion was also reported by Ratan *et al*. (2017). On the contrary, Sirajo and Namo (2019) stated that differences in mean number of leaves per plant among the genotypes were not significant.

Days to maturity

Though days to maturity of bulb were not responded by variety but BARI Piaz-6 matured earlier (81.69days) than those of other varieties. Delayed maturity was noted in BARI Piaz-4 (84.12days) which was at par with LalTeer King (84.01days). The apparent cause of the insignificant variation among varieties might have been due to their genetic potential. The earlier reports of Walle *et al*. (2018) and Arya *et al*. (2017) showed significant differences among the variety in days to maturity.

Bolting

The variety in bolting was significantly differed with each other. The maximum incidence of bolting was occurred in BARI Piaz-1 (40.08%) followed by followed by BARI Piaz-4 (31.58%). The least incidence of bolting was computed in BARI Piaz-6 (28.39%). The difference in maturity of bulbs could be due to genetic character among varieties. Abu-Rayyan and Abu-Irmaileh (2004) reported that onion required cool weather during inflorescence initiation and seed stalk development. All varieties studied were grown in a same environment. So, this difference in bolting percent could be due to hereditary causes of varieties. The result is in consent with the finding of Lancaster *et al*. (1995).

Splitting of bulb

The highest percent of split bulbs was observed in BARI Piaz-1 (71.16%) insignificantly followed by BARI Piaz-6 (69.04%). However, the lowest percent split bulb (45.60%) was registered in LalTeer King. It is hypothesized that the variation in split bulb among varieties might be attributed to their genetic factor. The result is in accordance with the earlier report of Arya *et al*. (2017).

Diameter of bulb

The greatest size of bulb was obtained from BARI Piaz-4 (4.03cm) which was non-significantly followed by LalTeer King (3.92cm). The BARI Piaz-1 demonstrated the smallest size of bulb (3.32cm). The variation in multiplier bulb was mainly attributed to the genetic effect of varieties. The similar claims were also made by Arya *et al*. (2017) and Walle et al. (2018).

Incidence of disease

Though the incidence of disease was not affected by varieties, BARI Piaz-1 was the most susceptible (2.56) to diseases. While, LalTeer King had the least susceptible (2.08). Insignificant

difference might also happen due to genetic differences among the varieties screened. The present result is on the contrary to the finding of Ruth (2017) who found significant difference among the varieties in incidence of diseases.

Individual bulb weight

The difference among the varieties in bulb weight was markedly influence with each other. The BARI Piaz-4 yielded the heaviest bulb (27.03g) followed by LalTeer King (24.60g). The BARI Piaz-1 produced the lightest bulb (20.42g). The apparent cause of the variation in bulb weight among the varieties might have been due to their genetic potential. The similar results have also been reported by Sirajo and Namo (2019).

Dry matter content of bulb

The BARI Piaz-1 gave the highest dry matter content of bulb (19.18%) significantly followed by BARI Piaz-6 (15.31%). The lowest dry matter content (14.13%) was noted from LalTeer King (14.13%). The difference in dry matter bulb could be attributed due to genetic potential of the varieties. The result concurs with that of Arya *et al*. (2017) who reported that varieties significantly influenced the percent dry matter of bulbs.

Total soluble solid content of bulb

The BARI Piaz-1 exhibited the maximum reading for total soluble solid (TSS) content (18.15°brix) significantly followed by LalTeer King (14.97°brix). The TSS content among BARI Piaz-4 (14.33°brix), BARI Piaz-6 (14.03°brix) and LalTeer King were mutually insignificant. Similarly, the fluctuation in TSS content among the varieties might happen due to similar causes as found for the dry matter content. The result agrees with the finding of Arya *et al*. (2017).

Yield

The BARI Piaz-4 gave rise to the highest yield (23.55t/ha) which was insignificantly followed by LalTeer King (21.54t/ha). Nevertheless, the lowest yield was recorded in BARI Piaz-1 (17.64t/ha). The variation between BARI Piaz-6 (19.05t/ha) & BARI Piaz-1 and LalTeer King & BARI Piaz-6 were not statistically significant. The variation in yield might have due to their differences in bulb weight along with their inherited wealth. The similar result was also provided by Walle *et al*. (2018), Dwivedi *et al*. (2012) and Lancaster *et al*. (1995). Besides, the reason for lower yield from BARI Piaz-1 might be due to producing higher bolting in BARI Piaz-1. Khan and Shanmugashundaram (2013) stated that bolting reduced the bulb weight of onion.

Autors should explore the results further.

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Conclusion

The finding of the current study concluded as follows:

•New varieties such as BARI Piaz-4 and LalTeer King exhibited the better performance on the basis of yield, incidence of bolting and splitting bulb as compared to BARI Piaz-1. Hence these new varieties would be used to obtain higher yield of early green onions in set to bulb method.

•However, BARI Piaz-1 had the highest dry matter and TSS content against other varieties.

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