

Effect of Plant Spacing on Big Onion (*Allium Cepa* L.) Yield in Yala Season

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Introduction

Big onion (*Allium cepa* L.) is an essential condiment in Sri Lankan diet so it is cultivated in Sri Lanka. It mainly grows in Matale, Anuradhapura, Polonnaruwa, Kurunegala districts and Mahaweli H zone. Pusa red, Rampure, Agri found light red, Kalpitiya selection, N53 and Nasic red are the recommended varieties for Sri Lankan conditions considering the factors such as high yield, seed setting ability, storage adaptability, pungency and color etc. Local production of big onion, which is approximately 61,037 MT per year, is not sufficient to meet the annual demand of big onion approximately in between 200,000 - 220,000 MT per year (Department of Census and Statistics, 2011). The major constraint to improve the productivity of big onion in Sri Lanka is the unavailability of good quality seeds of recommended varieties in adequate quantities (Mettananda, 2006). In addition, the poor quality of imported seeds from India is another constraint to enhance the big onion production. Poor quality seeds are characterized by poor germination and poor bulb formation ability and poor quality seeds will result the bulbs which show high thick neck percentage and low yield (Edirimanna, 2003). Minimizing the land area devoted for big onion seed production is a challenge and one way to overcome this challenge is to explore the possibilities of increase in plant density by decreasing plant spacing without affecting seed yield. The objective of the present study was to study the effect of reduction in plant spacing on big onion seed yield of variety Agri found light red which is popularly cultivated in Sri Lanka.

Methodology

This experiment was conducted at the big onion cultivation site of CIC Agri Businesses at Palwehera, Dambulla from May 2013 to September 2013. Two plant spacings; 17.78 cm×17.78 cm and 15.24 cm×15.24 cm were used in the experiment which was laid out in a Completely Randomized Block Design (CRBD) with 10 replicates. Agri found light red variety was used to assess the final seed yield of onion.

Planting beds were prepared in size 1 m × 3 m. Vernalized medium sized (50-70g/bulb) mother bulbs were selected and treated with Chlorpyrifos 400g/L EC (20ml/10L of water) and Thiram (80% (w/w) WP) (15g/10L of water). Treated bulbs were planted randomly in planting beds according to the design. Watering was done daily. Oxyfluorfen 240g/L EC (11 ml/10 L of water) was applied in 5 days after planting to control weeds and one or two hand weeding was followed to effectively control the weeds. Recommended concentrations and volumes of fertilizers and other chemicals were applied depending on the growth stages of onion. Hand pollination was done 50 days after planting and it was continued for about 21 days. Matured umbels were harvested in 85-95 days after planting and harvesting was continued for about 30 days. The umbels were air dried for about 15 days. Air dried umbels were sundried and processed to separate seeds from seed heads. Cleaned seeds were dried to reduce the moisture to 8% and weighed.

Yield components of big onion plants were assessed during the study period. Number of umbels per 1m², number of florets per umbel, percentage of fertile florets per umbel, number of seeds per fertile floret, 1000 seed weight and total plot yield were measured as yield components.

Collected data of yield components were statistically analyzed using Analysis of variance (ANOVA) in MINITAB 15 software.

Results and Discussion

A summary of the results obtained in this study is shown in table 1 with their significance levels. Table 1 reveals that, at the significance level of 5%, there are no significant differences in percentage of fertile florets per umbel, number of seeds per fertile floret and 1000 seed weight when reducing the plant spacing from 17.78 cm × 17.78 cm to 15.24 cm×15.24 cm. But when considering the number of umbels per 1m² and number of florets per umbel, increased plant density significantly increased (p<0.03) the number of umbels per unit land area but significantly decreased (p<0.025) the number of florets per umbel. However, the gain in seed yield due to increase in number of umbels per unit land area was higher than the loss in seed yield due to decrease in number of florets per umbel as increase in plant density due to decreased plant spacing did not significantly reduce the final seed yield of onion.

Table 1. Measurements of yield components of treatments and p values

Treatments	Number of umbels per 1m ²	Number of florets per umbel	% of fertile florets per umbel	Number of seeds per fertile floret	Weight (g) of 1000 seeds	Total plot yield (g)
Planting spacing 17.78 cm×17.78 cm	100.40	297.20	53.31	4.65	4.59	392.43
Planting spacing 15.24 cm×15.24 cm	128.40	243.08	52.95	4.66	4.56	402.28
p value	0.025	0.030	0.938	0.976	0.789	0.621

Conclusions

The results of this research reveal that reduction of plant space from 17.78 cm × 17.78 cm to 15.24 cm×15.24 cm significantly increased the number of umbels per unit land area but decreased the number of florets per umbel without significantly changing percentage of fertile florets, number of seeds per fertile floret and 1000 seed weight. But no significant difference on final seed yield of big onion was found between the plots with high and low plant spacing indicating that land area for a given target production of big onion seeds can be saved through reduction in plant spacing from 17.78 cm × 17.78 cm to 15.24 cm×15.24 cm or eventual increase in plant density.

References

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