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TRUE SEED PRODUCTION OF BIG ONION FROM DRYSETS

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ABSTRACT

One of the main constraints in big onion production is the non-availability of quality seed at the proper time. In an attempt to produce true seeds a preliminary study was undertaken at the Agricultural Research Station, Thirunelvely. In this study, drysets of big onion variety "Ramphur red" were planted during the first week of every month from March 1989 to February 1990. Higher seed yields were recorded in November (401.2 Kg/ha) and December (817.0 Kg/ha) plantings. Fairly good seed yields were also recorded in October (141.4 Kg/ha) planting. The results show that true seed production is possible by planting drysets during the months of November and December in the Jaffna peninsula. It is also evident that drysets could be used for true seed production of big onion in this area.

KEYWORDS: Big onion, Drysets, True seed.

INTRODUCTION

Big onion (*Allium cepa* L.) is an important condiment used daily in the Sri Lankan diet. National requirement of big onion for consumption is about 124,600 mt per year. But the national average production is about 29,550 mt per year (Census and Statistics, 2002) and therefore, big onion is imported annually. The main constraint for increasing the big onion production in the country is the unavailability of quality seed at the appropriate time. The seed material usually brought from India for cultivation is not certified. Therefore, true seed production in Sri Lanka is essential to overcome this problem.

In Sri Lanka, big onion is mostly cultivated in the dry zone and the extent was about 2730 ha, in the year 2002 (Census and Statistics, 2002). In the Jaffna district, the popular big onion variety "Ramphur red" is mainly cultivated in the Arali, Chempiyanpattu and Amban areas annually during the *yala* season (May - August) under irrigation. Because of the poor quality of the true seed material, farmers face lot of cultivation constraints.

In true seed production the 'seed to seed' method usually produces good seed yields as 'bulb to seed' method, but there are difficulties in practicing this method. Even though mother bulbs are widely used for onion seed production, drysets can also be used. There are certain advantages in

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using drysets for onion seed production. They keep better in storage for 6-8 months without any deterioration in a small area.

The objective of this study was to assess the feasibility of producing big onion true seeds locally using drysets.

MATERIALS AND METHODS

A preliminary study on true seed production from drysets of big onion variety "Ramphur red" was undertaken at the Agricultural Research Station, Thirunelvely during March 1989 - February 1990 period. The weather conditions prevailed during the experimental period where the experiment was conducted is given in table 1. The soil is characterized as red latosols in the experimental site (De Alwis and Panabokke, 1973).

Table 1. Mean monthly weather data recorded during the experimental period (March 1989 to February 1990).

Planting month	Temperature (^{0}C) Maximum	Minimum	Relative Humidity (%) 8.30 am	3.30pm	Rainfall (mm)
March 89	32.3	23.3	71	53	-
April 89	33.4	27.1	80	65	33.0
May 89	32.2	25.6	88	78	46.0
June 89	30.8	27.0	87	77	-
July 89	31.2	26.6	80	69	80.4
August 89	31.5	27.0	77	64	3.0
September 89	31.0	26.9	82	71	95.3
October 89	30.4	26.1	80	74	182.5
November 89	29.4	24.2	86	78	394.0
December 89	28.6	22.5	81	71	86.7
January 90	28.9	20.3	80	63	15.4
February 90	30.5	20.1	77	63	-

Source: Agricultural Research Station, Thirunelvely

Dryset production

Drysets used in this experiment were produced by sowing true seeds at the rate of 60-80 kg/ha. These seeds were broadcasted in 3m x 90 cm x 15 cm raised nurseries. Two to three hand weedings were done. Fertilizers were applied at the rate of 15g. urea, 30g. P_2O_5 and 15g. K_2O per plot as basal dressing. At 3 weeks after planting 15g. urea and 10g. K_2O per plot was applied as top dressing. At 6 weeks after planting 15g. urea and 10g. K_2O per plot was applied as top dressing. Six weeks after sowing, irrigation interval was increased. When the bulblets were about 1 cm in diameter, irrigation was stopped. About 8-10 weeks after sowing, plant top was flattened with a stick

to facilitate drying. Drysets were harvested when the vegetative parts had dried completely and stored in wooden slats in a well-ventilated room for 6 - 8 weeks to break dormancy. These drysets were planted after 6 - 8 weeks of the dormancy period to produce the true seeds. The drysets used were 1 - 2 cm in diameter.

True seed production

The drysets produced in the above method were planted during the first week of every month from March 1989 to February 1990 in observational plots. At each planting, drysets were planted in a plot area of 12.96 m^2. One hundred and forty four (144) drysets were planted at a spacing of 15 cm x 15 cm in a plot area of 3.24 m^2. Four such plots were planted every month.

Table 2. The weight of drysets planted every month.

Planting month	Weight of drysets (g)	Planting month	Weight of drysets (g)
March 89	456	September 89	420
April 89	442	October 89	624
May 89	528	November 89	557
June 89	470	December 89	635
July 89	315	January 90	422
August 89	509	February 90	392

Mean weight = 480.83 Standard deviation = 94.3

Drysets were planted in sunken beds. Irrigation was done once in 3-4 days. Two to three hand weedings were done. Fertilizers were applied according to the recommendation of the Sri Lanka Department of Agriculture (50kg/ha. urea, 100 kg/ha. P_2O_5 and 50 kg/ha. K_2O as basal dressing and 50kg/ha. Urea, 25kg/ha. K_2O as top-dressing at 3 weeks after planting (WAP) and 50kg/ha. urea as top dressing at 6 WAP). The weights of drysets planted every month are given in the table 2.

Purple blotch disease caused by *Alternaria porri* was a constraint owing to the high RH at the experimental site (table 1). It was controlled by spraying Mancozeb. Five to six sporadic spraying controlled the disease efficiently.

The seeds were harvested when 10% of umbels opened. They were harvested about 5-5 1/2 months after planting. The umbels were cut with 10-15 cm of stem attached and sun dried for 2-3 days. Then they were thrashed by hand, winnowed and cleaned. By this weed seeds, light seeds and chaff were removed. The seeds were packed in polythene bags. The viability of the seeds produced was tested.

RESULTS AND DISCUSSION

The percentage sprouting of the drysets ranged from 85% to 99% with the highest values recorded during December, January and February plantings. The bulb yield from plants that did not bolt was recorded. The big onion bulb yields were highest in January, February and March plantings. The ratio of seed onion (drysets) to bulb yield was also high in these months. The bulb yield was fairly high in May and June plantings as well. The results are presented in the table 3.

Table 3. The growth and yield parameters recorded in monthly plantings of "Ramphur red" drysets at the Agricultural Research Station, Thirunelvely.

Planting month	Sprou-ting (%)	Bulb yield (t/ha)	Ratio of seed onion to bulb yield	No. of plants flowered (%)	True seed yield (g/plot)	True seed yield (Kg/ha)
Mar. 89	96	12.4	1:10.9	29.2	35.5	109.6
April 89	85	3.5	1:3.2	0.7	0.8	2.5
May 89	94	8.38	1:6.3	16.0	18.0	55.6
June 89	89	8.28	1:7	18.1	20.5	63.3
July 89	94	7.17	1:9.1	1.4	1.5	4.6
Aug. 89	86	3.81	1:3	5.6	5.0	15.4
Sept. 89	92	4.75	1:4.5	4.2	3.5	10.8
Oct. 89	94	7.28	1:4.7	33.3	45.8	141.4
Nov. 89	92	8.15	1:5.8	53.5	130.0	401.2
Dec. 89	99	1.8	1:1.1	88.2	265.0	817.9
Jan. 90	98	10.88	1:10.3	25.7	28.5	87.96
Feb.90	98	8.98	1:9.1	7.6	8.0	24.7

Bolting

The plants started to flower about 80-85 days after planting and continued for about 2-3 weeks. In general, 2-3 scapes (flower stalks) per plant were produced. The flowered plants were allowed to set seeds. The percentage bolting in each monthly planting varied from 0.7 - 88.2%. In December planting, 88.2% of the plants flowered and in November planting 53.5% of the plants flowered. This is due to the low night temperatures prevailed during the months of December, January and February (table 1). Bolting is induced almost entirely by cool temperatures, provided the bulbs have grown to a sufficient size. It is not influenced by the photoperiod. In hot tropical countries, only easy bolting cultivars, requiring relatively little low temperature exposure can produce seeds (Jones and Mann, 1963; Purseglove, 1985). Bolting at high temperatures has been reported in other countries also. Beekom (1952) reported that small sets (1.0 cm - 1.5 cm) bolted 7.9%,

medium sets (1.6 cm - 2.0 cm) bolted 45.9% and large sets (2.1 cm - 2.5 cm) bolted 71.3% when stored at 25.5-28^{0}C for 3 1/2 months.

Storing bulbs at low temperatures (preferably at 10-15^{0}C) known as vernalization induces bolting. The best seed producing areas are those that have low atmospheric humidity with periods of low temperatures (Purseglove, 1985).

During the flowering period, clear, bright days are necessary to ensure insect activity for pollination. The bees specially honey bees and flies are the pollinators (Hwang-HaeJun *et.al*., 1998). Keeping the bee boxes near the field will increase the seed yield (Lorenzon *et al*., 1993). Hot dry weather is necessary during the harvesting, curing and thrashing of the seed.

True seed yield

The December planting gave the highest seed yield of 817.9 kg/ha. November planting gave the 2nd highest seed yield of 410.2 kg/ha. These yields can be considered as good yields as potential seed yield varies from 500 - 1000 kg/ha in other countries (Patil *et al.,* 1990; Sidhu *et al.,* 1996; Ghimire *et al.*, 1998). The germination percentage was more that 90-95% in all the seed material collected.

El-wheel and Ghobashi, (1999) reported that seed yield in big onion mother bulbs was influenced by planting dates in Oman where planting in early November gave high yields. Farghali, (1995) reported that planting dates affected seed yield in Egypt. 1st November planting resulted in the highest seed yield and 1000 seed weight. Rizk, *et al.,* (1996) also reported about the planting date affecting the flowering and seed yield of onion in Egypt. They found that early November planting (during the first 10 days) of mother bulbs resulted in high seed yields. Similarly, Kuruppuarachchi *et al,* (1994) also reported that the big onion variety "Kalpitiya selection" flowers and produces viable seeds satisfactorily under local dry zone conditions without vernalization of mother bulbs when planted in December.

Vernalization of the drysets may increase the seed yield. But this will increase the cost of seed production and therefore may not be economical. In other countries growth regulators are being used to increase the seed production (Bhople, *et al.,* 1999; Bhardwaj, *et al.,* 1995). This has not been tried here so far.

CONCLUSIONS

This study shows that big onion true seeds can be produced using drysets without vernalization under local dry zone conditions. Also, yields are

attractive for commercial true seed production, when drysets are planted during the November and December months in the Jaffna peninsula.

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