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Effect of Seasons and Spacing's on Seed Production of Rose Onion Variety Arka Bindu

Vijayalakshmi, R.[1], H. Amarananjundeswara[1*], R. Veeregowda[3], M. Anjanappa[2], V. Lavanya[1] and Sandhya G. C.[1]

[1]Horticulture Research and Extension Station, Hassan

[2]College of Horticulture, Bengaluru, UHS, Bagalkot

[3]ICAR- Indian Institute of Horticultural Research, Hessaraghatta Lake post, Bengaluru-89

*Corresponding Author E-mail: amar.horti@gmail.com

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ABSTRACT

A field experiment was conducted at College of Horticulture, Bengaluru during July, 2014 to April, 2015. The study was conducted to investigate the effect of seasons and spacings on seed production of rose onion variety Arka Bindu. Two seasons (Kharif and Rabi) and four spacings (40cm x 30cm, 30cm x 20cm, 30cm x 15cm, 30cm x 10cm) were considered in the experiment. The number of scapes, length and thickness of the scape, umbel length and width, seed weight per umbel, seed weight per plant, total seed weight per plot and total seed weight per hectare were measured to assess the onion seed production with quality. The maximum number of scapes (5.29), length and thickness of flower stalk (72.67 cm and 7.60 cm) and umbel length and width (5.97 and 5.52 cm) were obtained from Rabi season crop with wider plant spacing of 40cm x 30cm. The results revealed that the highest seed yield of 917.60 kg was obtained with the spacing of 30cm x 15cm in Rabi season. Hence, Rabi season with the spacing of 30cm x 15cm is found better for onion seed production in Eastern Dry Zone of Karnataka.

Key words: *Season, Spacing, Kharif and Rabi.*

INTRODUCTION

Rose onion (*Allium cepa* Linn.) is an important biannual bulbous crop belonging to the family Alliaceae. This crop is mainly grown for local consumption and export purposes. It is an indispensible item in every kitchen as vegetable and spice cum condiment used to flavour many of the food stuffs. Therefore, onion is popularly referred as 'Queen of the Kitchen'. In addition to these, onion is used as salad and pickle. In recent onion is being employed by processing industry to a greater extent for preparing dehydrated onion products like powder and flakes. Moreover, timely availability of good quality seed is one of the limiting factor which affecting the production and productivity of the crop. Therefore, the present study was conducted to investigate the effects of bulb spacing and growing season on seed production of rose onion variety Arka Bindu.

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In Karnataka, onion is produced throughout the year and cultivated in an area of 159.60 million hectare with the production of 2395.60 million tonnes and productivity of 154 tonnes per hectare[2]. In India, the total production of onion is 16,813 metric tonnes obtained in an area of 1051.50 million ha. Arka Bindu is an improved variety with on par traits as that of Bengaluru rose onion. The bulbs are deep pink in colour, small size (2.5-3.5 cm) of flattish globe shape. The bulbs are free from pre-mature bolting and splits. They have high pungency with a TSS of $14\text{-}16^0$ brix. The average yield potential is 25 tonnes per hectare and suitable for export purpose.

Rose onion has been widely growing in the Bengaluru rural and surrounding districts such as Chickballapura, Kolar, Tumkur and Ramanagara districts of Karnataka from past three to four decades. The performance of the variety is found good in these regions. However, optimum spacing and ideal season play a major role in determining the seed production with good productivity. But meager work has been done on the spacing's and seasonal effects on seed yield and qualities of rose onion on commercial scale. Therefore, considering the importance and demand for onion seeds in major onion growing areas, investigations were carried out with the main objective of standardization of season and spacing for enhancement of seed yield and qualities in rose onion variety Arka Bindu.

MATERIALS AND METHODS

The experiment was carried out in the field of Vegetable Science Block, College of Horticulture, UHS campus, GKVK, Bangalore, Karnataka. The research farm is situated between 13.05° latitude and 77° east longitude at an altitude of 924 m above mean sea level.

Two factors (Seasons and spacings) with five replications were adopted in the experiment where, the field was laid out in Factorial Randomized Complete Block Design. Plant spacing comprised of S_1-40cm x 30cm, S_2-30cm x 20cm, S_3-30cm ×15cm, and S_4- 30cm ×10cm were adopted in *Rabi* and *Kharif* seasons. The size of a unit plot was 3.0m x 2.5m. Bulbs were planted on 15th July, 2014 and 15th November, 2014 by setting upright depth of 2.5cm in soil. Replacement of healthy bulbs were done within a week of planting by removing rotten bulbs. The recommended quantity of Farm Yard Manure at 25 t/ha was incorporated into soil before sowing.

The major nutrients *viz*., nitrogen, phosphorus and potassium were (125:75:125 kg NPK/ha) applied at the time of sowing, except nitrogen was applied as split doses to the soil in the form of Urea, Single super phosphate and Muriate of potash as per the package of practices of UHS, Bagalkot. The RDF was worked out per metre square as 50: 80: 200 g of fertilizers. The parameters such as length of flowering stalk (cm) was measured from ground level to the tip of the flowering stalk before harvest and the average value was recorded. The number of flowering stalk and umbels per plant, number of seeds per fruit, weight of seeds (g) per umbel were recorded from five randomly selected plants after completion of flowering. One thousand seeds were counted from each plot and were weighed with electronic balance in gram (g) up to two decimal units. The seed yield per hectare was measured by converting the respective seed yield per plot and was expressed in kilogram (kg) per hectare. The observations were recorded from five randomly selected plants of each treatment and replication. The data comprising the calculated average values of each observation of treatment and replication wise were subjected to computerized statistical analysis using a method suggested by Sundaraj *et al*[6]., (1972) for Factorial - Randomized Complete Block Design. The test of significance (F-test), standard error and critical difference (CD) values were worked out at the probability level of 0.05.

RESULTS AND DISCUSSION

Effect of seasons, spacings and their interactions on umbel characteristics of rose onion variety Arka Bindu.

Significant differences of number of flowering stalks, length, thickness of flower stalk, umbel length and umbel width were observed in different seasons (Table 1). The study revealed that the number of flowering stalks per plant, length, thickness of flower stalk, umbel length and umbel width were significantly high (4.50, 67.94 cm , 6.79 mm, 5.64 cm, and 4.83 cm respectively) in *Rabi* season. Whereas, minimum was recorded (3.78, 60.10 cm, 6.48 mm, 5.07 cm, and 4.00 cm respectively) in *Kharif* season (Table 1). The superiority of *Rabi* season over *Kharif* season is due to the favourable temperature and relative humidity in *Rabi* season. These results are in conformity with El-Helaly and Karam[4] in onion.

The results revealed that the wider spacing of 40cm x 30cm was recorded the significant differences with respect to number of flowering stalks (4.88) and the length of flowering stalk (68.49 cm) increased with the increase in plant spacing. This might be due to the widest plant spacing produced more green leaf and surplus food which could promoted the number and length of flowering stalk. These results are similar to Asaduzzaman *et al*[3]., in onion. Similarly thickness of flower stalk was measured maximum of 7.13mm, this may be due to wider plant spacing produced more green leaf and adequate nutrients might promoted the thickening of flowering stalk. Besides, umbel length (5.75cm) and umbel width (5.25cm) were registered maximum. The length and width of umbel increased with the increase in plant spacing. This could be due to the widest plant spacing produced more green leaf and surplus food which might promoted the length and width of umbel. These results are similar to that of Asaduzzaman *et al*[3]., noticed in onion. The minimum was noticed in closer spacing of 30cm x 10cm with respect to scapes (3.62), length of flower stalk (58.79 cm), thickness of flower stalk (6.29mm), umbel length (5.02cm), and umbel width (3.85cm).

The interaction combination of *Rabi* season with spacing of 40 cm x 30 cm performed better in production of maximum number of scapes (5.29), length of flower stalk (72.67cm), thickness of flower stalk (7.60 mm), umbel width (5.97 cm) and umbel length (5.52cm). It was due to combined effect of favourable weather factors prevailed during the *Rabi* season and less competition for nutrients, water and sunlight at wider spacing.

Effect of seasons, spacings and their interactions on seed characteristics of rose onion variety Arka Bindu.

A significant variation was obtained with respect to seed yield of rose onion due to seasons (Table 2). The characters like seed weight per umbel (g), the seed weight per plant (g), total seed weight per plot (kg), total seed weight per hectare (kg) registered a significant positive response in *Rabi* season with yield of 2.82 (g), 13.07 (g), 0.612 (kg), 816.62 (kg) respectively (Fig.1).

However, spacing at 40cm x 30cm (S_1) documented maximum seed weight per umbel (2.92 g). Whereas, it was lowest in treatment with spacing of 30cm x 10cm (S_4) (2.16 g). This increasing trend of weight of seeds per umbel might be due to luxuriant growth of plant with good availability of nutrients at wider spacing as compared to closer spacing. These results are similar with the findings of Mengistu and Yamoah[5] in Carrot. While, the seed weight per plant was also noticed maximum in wider spacing of 40cm x 30cm (S_1) with yield of 13.69 g. This might be due to increase in the weight of umbel in wider spacing and number of umbels also found increased in wider spacing. Hence, the seed weight per plant was higher in the wider spacing. These results are in accordance with Anjum and Amjad[1] in coriander. Whereas, spacing at 30cm x 15cm (S_3) registered highest total seed yield per plot (0.604kg). But minimum seed yield per plot was noticed in spacing at 40cm x 30cm (S_1) (0.438kg).This might contributed due to optimum plant population than other wider spacings. The spacing at 30cm x 15cm (S_3) resulted in highest total seed yield per hectare (805.33 kg), while minimum was noticed in spacing of 40cm x 30cm (S_1) (586.69kg) (Fig.2). This was due to increase in the plant density and this intern might increased the

total seed yield per hectare. These results are confirmed by Mengistu and Yamoah[5] in carrot seed production experiment.

Among different interactions effect, maximum seed weight per umbel was observed in treatment combination of *Rabi* season with spacing of 40cm x 30cm (3.14 g). It might be due to conducive effect of season and spacing for seed production. The maximum seed weight per plant was observed in interaction of *Rabi* season with spacing of 40cm x 30cm (14.90 g). Whereas, maximum seed weight per plot and total seed weight per hectare were observed in combination of *Rabi* season with spacing of 30cm x 15cm (0.688kg) and (917.60 kg), respectively (Fig. 1 & 2). While, it was lowest (488.32 kg) in *Kharif* season with spacing of 40cm x 30cm regarding total seed weight per hectare. The high yield was due to the favourable effect of season and optimum spacing.

Table 1: Effect of seasons, spacings and their interactions on umbel characteristics of rose onion variety Arka Bindu

Treatments	Scapes/ Flowering stalks (No./ plant)	Length of flower stalks (cm)	Thickness of flower stalk (mm)	Umbel length(cm)	Umbel width (cm)
Seasons					
K- *Kharif*	3.78	60.10	6.48	5.07	4.00
R- *Rabi*	4.56	67.94	6.79	5.64	4.83
S.Em±	**0.13**	**0.53**	**0.07**	**0.07**	**0.05**
CD at 5%	**0.37**	**1.52**	**0.21**	**0.19**	**0.16**
Spacings					
S_1- 40 x 30cm	4.88	68.49	7.13	5.75	5.25
S_2- 30 x 20cm	4.32	65.71	6.60	5.31	4.32
S_3- 30 x 15cm	3.86	63.11	6.50	5.34	4.26
S_4- 30 x 10cm	3.62	58.79	6.29	5.02	3.85
S.Em±	**0.18**	**0.75**	**0.10**	**0.94**	**0.08**
CD at 5%	**0.53**	**2.14**	**0.29**	**0.27**	**0.22**
Interactions (Seasons x Spacings)					
K x S_1	4.47	64.31	6.64	5.52	4.97
K x S_2	4.21	62.12	6.50	5.17	4.01
K x S_3	3.32	59.73	6.47	4.9	3.68
K x S_4	3.12	54.26	6.29	4.63	3.35
R x S_1	5.29	72.67	7.60	5.97	5.52
R x S_2	4.44	69.30	6.71	5.45	4.62
R x S_3	4.39	66.50	6.54	5.74	4.83
R x S_4	4.12	63.31	6.29	5.41	4.34
S.Em±	**0.26**	**1.06**	**0.15**	**0.13**	**0.11**
CD at 5%	**NS**	**3.03**	**0.42**	**0.38**	**0.31**

Table 2. Effect of seasons, spacing and their interactions on seed yield of rose onion variety Arka Bindu

Treatments	Seed weight (g/umbel)	Seed weight (g/plant)	Total seed weight (kg/plot)	Total seed weight (kg/ha)
Seasons				
K- *Kharif*	2.33	10.6	0.45	595.54
R- *Rabi*	2.82	13.07	0.61	816.62
S.Em±	**0.04**	**0.15**	**2.91**	**4.19**
CD at 5%	**0.12**	**0.43**	**8.30**	**11.97**
Spacings				
S_1- 40cm x 30cm	2.92	13.69	0.44	586.69
S_2- 30cm x 20cm	2.67	12.06	0.52	687.76
S_3- 30cm x 15cm	2.56	11.78	0.60	805.33
S_4- 30cm x 10cm	2.16	9.83	0.56	744.55
S.Em±	**0.06**	**0.22**	**4.11**	**5.92**
CD at 5%	**0.17**	**0.62**	**11.74**	**16.92**
Interactions (Seasons x Spacings)				
K x S_1	2.70	12.46	0.36	488.32
K x S_2	2.26	10.89	0.42	560.12
K x S_3	2.33	9.99	0.52	692.98
K x S_4	2.04	9.05	0.48	640.75
R x S_1	3.14	14.90	0.51	685.06
R x S_2	3.09	13.23	0.61	815.40
R x S_3	2.78	13.55	0.69	917.60
R x S_4	2.27	10.59	0.64	848.35
S.Em±	**0.01**	**0.31**	**5.81**	**8.39**
CD at 5%	**0.24**	**0.87**	**16.60**	**23.93**

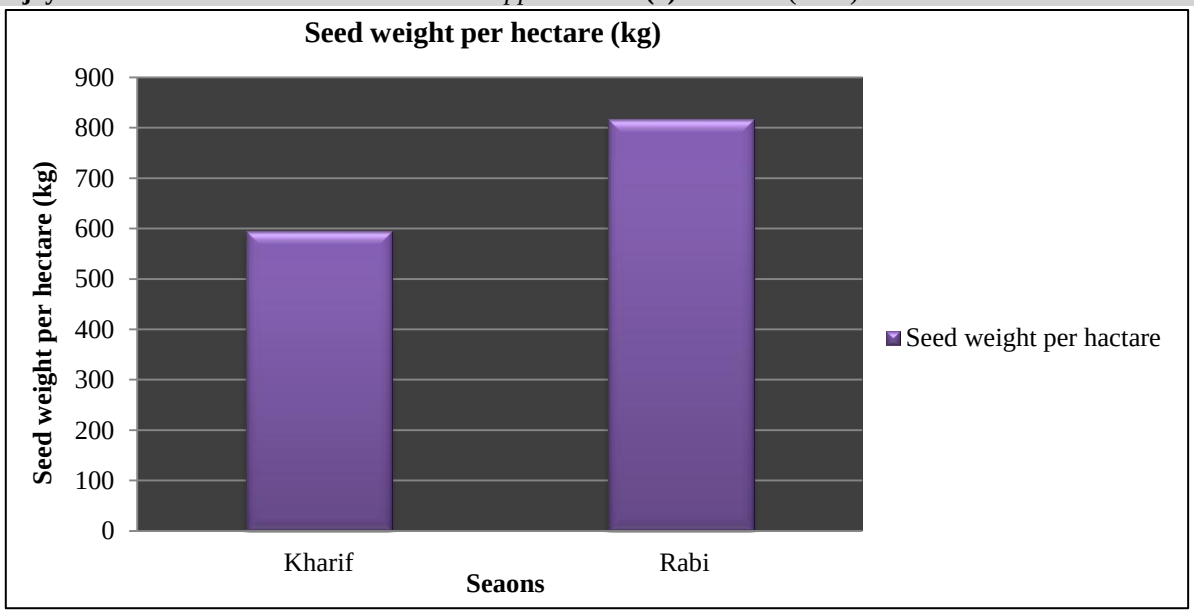

Fig. 1: Seed weight per hectare as influenced by seasons on seed production of rose onion variety Arka Bindu

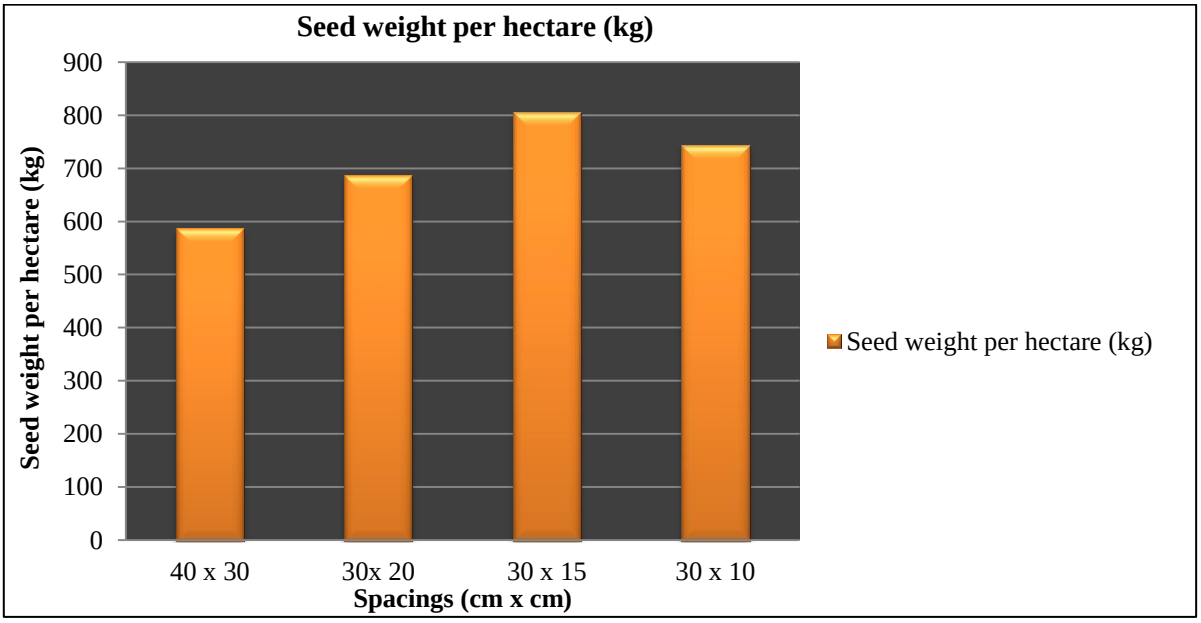

Fig. 2: Seed weight per hectare as influenced by spacings on seed production of rose onion variety Arka Bindu

CONCLUSION

The study concluded that the seed yield of rose onion variety Arka Bindu was significantly affected by the interactions effect of season and plant spacing. The yield attributes and quality of onion seeds were found to be gradually increased under *Rabi* season crop. The spacing also greatly influenced the yield and quality of onion seeds. Therefore the total seed yield per plot and seed weight per hectare were found significantly higher in *Rabi* season with spacing of 30cm x 15cm (0.688 kg and 917.60 kg, respectively) with highest benefit cost ratio for commercial seed production of rose onion variety Arka Bindu.

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