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Influence of Planting Methods on Growth, Yield and Storage of Onion (*Allium cepa* L.) var. Bhima Shakti

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ABSTRACT

Background: Successful crop production in any crop depends on the good agronomic practices. Being a commercial crop, onion needs good attention during the crop growth stages, most of the times, in onion cultivation farmers follow broadcasting method which leads to the wastage of seeds, seedling mortality and poor germination and it will affect the total yield and productivity.

Methods: To identify the best planting method an investigation on performance of seed drill versus transplanted onion was conducted at University of Agricultural Sciences, Main Agriculture Research Station, Dharwad.

Result: Results indicated that, T_3- (Transplanting) performed superior for all the vegetative and yield parameters studied. Plant height 55.57 cm, leaf number (7.86, 8.29 and 8.08 in pooled), Leaf width (1.03 cm, 0.99 cm pooled 1.01 cm). Total yield: (21.97 t/ha, 22.05 t/ha and 22.01 t/ha), marketable yield (20.74 t/ha, 20.95 t/ha and 20.85 t/ha), bulb weight (64.00 g, 53.00 g and 53.90 g in pooled analysis). From this, it can be concluded that transplanting of onion was better compared to other methods.

Key words: Non pelleted, Pelleted, Seed drill, Transplanted.

INTRODUCTION

Onion is one of the key vegetable crops for export, it generates over 4000 crores in foreign exchange each year. It has been grown all over the world for more than 5000 years.

The onion, (*Allium cepa* L.) is a monocotyledonous vegetable crop with chromosome number 2n=2X=16. It belongs to the family Alliaceace and order Asparagales. No kitchen in India is without onions, which implies that every Indian family uses onions every day in some capacity. As a result, onions are known as the ″Queen of the Kitchen″and go by several other names in local dialects, including Pyaz, Ullagaddi, Eerulli and Neerulli. Chinese gardens, Egyptian pyramids, interior walls of their paintings and the Bible all include evidence of onions (Kanwar *et al*., 2013).

Onion is one of the most important economical vegetable crops of India. Every year India is exporting Rs. 4000-5000 crore worth onions to different countries. But shortage of onion supply is one major problem because of the following reasons like unpredictable weather, poor quality seed supply, lack of improved varieties, poor storage facilities and lack of agronomic practices. Among these, agronomic practices play a major role because success of any crop production mainly depends on the good agricultural practices or good agronomic practices adopted in that particular crop. In India, the major onion producing states includes Maharashtra having an area of 507.96 thousand hectare with production of 8854.09 thousand MT (Million tons) and productivity of 17.43 MT/ ha and in Karnataka it is being grown in an area of 195.28 thousand hectare with production 2986.59 thousand MT and productivity of 15.29 MT/ha (Jeevitha *et al.,* 2017; Ketema, 2013; Ketema, 2018). To increase the productivity one can concentrate on implementing the new strategies which helps from the site of production itself. In this regard, an experiment was conducted to know the performance of seed drill/ direct sown onion with and without pelleting versus transplanting.

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MATERIALS AND METHODS

The seed material was collected from Directorate of Onion and Garlic Research Rajagurunagar. The experiment was laid out in a randomized complete block design using three treatments which are replicated seven times by selecting a variety 'Bhima Shakti' for two consecutive years. The data was recorded on various growth and yield parameters and

analysis was carried out using statistical method suggested (Panse and Sukhatme, 1961).

The details of the materials used and methods followed for recording the observations were discussed as follows:

Treatment details

1. T_1 - Direct sowing and pelleting.
2. T_2- Direct sowing: Non pelleted (NP).
3. T_3- Transplanting (T).

The details of the observations recorded are as follows.

Vegetative parameters

Plant height (cm)

Plant height was recorded from 5 randomly selected tagged plants in all the replications from ground level to the tip of the longest leaf. Average was calculated and expressed in centimeter at 75 days after planting.

Number of leaves per plant (numbers)

The photosynthetically active leaves were identified from five randomly selected plants at 75 days after planting from all the replications and the average was calculated and expressed in numbers.

Leaf width (cm)

It was measured from the five randomly selected plants and average was calculated and expressed in cm.

Yield parameters

Marketable yield (t/ha)

All the plants present in a single plot were harvested according to the treatment and replication; bulbs which are rotted, sprouted and split were separated. Consumer acceptable quality bulbs alone were retained and weighed using electronic balance and average was calculated and the same was converted to per ha.

Total yield (t/ha)

Total yield includes all the bulbs (good, rotted, sprouted and split) from single plot from each replication and weighed same thing was followed for all the replications and the average was calculated and expressed in kg and the estimated yield per hectare was calculated using this data and expressed in /hectare.

Bulb weight (g)

Bulb weight was done from five randomly selected bulbs using electronic balance and average was calculated and expressed in grams.

Storability

Observation was recorded after harvesting and curing at 30 and 60 days 90 days.

Total loss in weight

The whole quantity of bulbs is weighed without cleaning and the weight was recorded by subtracting with initial weight (5 kg). Loss in weight was measured on monthly basis upto three months from all the replications average was calculated and expressed in percentage.

B: C ratio

Net returns (Rs./ha) =

$$\text{Benefit: Cost ratio} = \frac{\text{Net returns (Rs./ha)}}{\text{Cost of cultivation (Rs./ha)}}$$

RESULTS AND DISCUSSION

Growth parameters: Plant height number of leaves and leaf width at 75 days after transplanting

Plant height was noticed in T_3 (Transplanting) 55.57 cm and it was lowest in 40.19 cm T_1 (Pelleted) and it was same in pooled data T_3 (Transplanting) 55.50 cm and lowest in T_1 (Pelleted) 39.51 cm (Table 1). Maximum number of leaves were noticed in T_3 (Transplanting) 8.08 and it was lowest in 7.55 cm (T_1) (Table 1). The highest leaf width was noticed in T_3 (Transplanting) *i.e.* 1.03, 0.99 and 1.01 cm and T_1 (Pelleting) showed least values for leaf width in both the years and in pooled data (0.69, 0.71 and 0.70 cm) (Table 1).

Yield parameters total yield and marketable yield

The highest total yield was obtained in T_3 (Transplanting) in both the years (21.97 t/ha, 22.05 t/ha and 22.01 t/ha) and in pooled data. It was lowest in T_1 (Pelleting) *i.e.* 17.74 t/ha, 17.46 t/ha and in pooled data 17.60 t/ha. Marketable yield was significant in treatment T_3 (Transplanting) (20.74 t/ha, 20.95 t/ha and 20.85 t/ha and it was lowest in T_1 (Pelleting) *i.e.,*15.26 t/ha, 16.16 t/ha and 15.71 t/ha (Table 2). Bulb weight: Bulb weight was significant highest in T_3 *i.e.*, Transplanting (64.00, 53.00 and 58.50 g in pooled analysis) lowest bulb weight was observed in both the years in T_1 *i.e.*, in pelletting (50.40, 46.60 and 48.90) (Table 3). Storage and cost ratio Total weight loss: Significant effect was noticed in different treatments for total weight loss, it was lowest in T_3 (Transplanting) in both the years (11.86, 11.43 and 11.65 per cent). Highest loss was observed in the T_1 (Pelleting) *i.e.*, 22.60, 20.43 and 21.52 per cent) (Table 4). B:C ratio: (T_3)Transplanted onion was highest the years 1.44 and 1.71 and pooled it was 1.58 economical compared to other treatments (Table 3).

In both years, a significant difference was seen in the growth and yield parameters for transplanted and pelleted onions. Compared to direct seeding, transplanted onions may have better light penetration and nutrient uptake, which activates the photosynthetic activity and results in increased yield. This may account for the increase in growth parameters and yield parameters. Similar results were obtained by Bhatt *et al.* (1994). An increase in growth and yield parameters may be attributed to improved nutrient, air, water, photoperiod availability, optimum plant utilization and favorable climatic conditions which, in comparison to other planting dates, enables each plant to make better use

Table 1: Effect planting methods on growth parameters of onion var. Bhima Shakti.

Treatment	Plant height (cm)			Number of leaves (No s)			Leaf width (cm)		
	75 DAT 2017-18	75 DAT 2018-19	Pooled	75 DAT 2017-18	75 DAT 2018-19	Pooled	75 DAT 2017-18	75 DAT 2018-19	Pooled
T_1- Pelleted	38.83	40.19	39.51	6.24	7.00	6.62	0.69	0.71	0.70
T_2- Non pelleted	50.04	51.04	50.54	7.10	8.00	7.55	0.80	0.94	0.87
T_3- Transplanted	55.43	55.57	55.50	7.86	8.29	8.08	1.03	0.99	1.01
S. Em.±	1.18	1.60	0.31	0.32	0.27	0.12	0.05	0.02	0.05
C.D. at (5%)	3.62	4.94	1.91	1.00	0.84	0.73	0.17	0.06	0.28

cm- Centimeter; No s- Numbers.

Table 2: Influence of different planting methods on yield of onion var. Bhima Shakti.

Treatment	Total yield (t/ha)			Marketable yield (t/ha)		
	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1- Pelleted	17.74	17.46	17.60	15.26	16.16	15.71
T_2- Non pelleted	19.00	18.37	18.69	16.55	17.69	17.12
T_3- Transplanted	21.97	22.05	22.01	20.74	20.95	20.85
S. Em.±	0.51	0.43	0.18	0.55	0.39	0.24
C.D. at (5%)	1.56	1.33	1.08	1.70	1.20	1.47

t-tones; ha-hectare.

Table 3: Effect of seed drill vs transplanted onion on bulb weight and B: C ratio of onion.

Treatment	Bulb weight (g)			B:C ratio		
	2017-18	2018-19	Pooled	2017-18	2018-19	Pooled
T_1 - Pelleted	50.40	46.60	48.50	0.76	1.33	1.05
T_2- Non pelleted	59.00	48.80	53.90	0.88	1.41	1.15
T_3- Transplanted	64.00	53.00	58.50	1.44	1.71	1.58
S. Em.±	2.34	1.25	1.97	0.01	0.01	0.02
C.D. at (5%)	7.62	4.09	3.01	0.04	0.03	0.06

g-grams.

Table 4: Storage of onion as influenced by different planting methods.

Treatment	Total weight loss %		
	2017-18	2018-19	Pooled
T_1- Pelleted	22.60	20.43	21.52
T_2- Non pelleted	18.13	15.14	16.64
T_3- Transplanted	11.86	11.43	11.65
S. Em.±	0.75	0.29	0.65
C.D. at (5%)	2.32	0.89	3.98

%-percentage.

of the climate. Similar findings had been reported by Khan *et al*. (2003) and Jilani *et al*. (2010).

The experiment was carried out during *rabi* and it is general fact that during *rabi* season the loss of onion in storage is less than kharif. Therefore, it is possible that the least total weight loss was caused by proper curing and the fact that transplanted onions store better than direct-sown onions, as well as by the genetics of the variety chosen for the experiment. The similar pattern has also been reported by Ahmed *et al*. (2017), Priya *et al*. (2014), Kimani *et al*. (1993) and Nandpuri *et al*. (1990). Cost economics: Two years study on Effect of seed drill vs transplanted onion revealed that B: C ratio of transplanted onion was highest (1.44 1.71) respectively this might be due to the increased growth and yield parameters in transplanted onion resulted in higher yield compared to direct sown treatment hence B:C ratio was also highest in the transplanted onion. Similar findings were noticed by Bhasker *et al*. (2018).

CONCLUSION

Although labor-intensive, transplanting onions on raised beds was shown to be the most effective method of cultivating onions since transplanted onion was established successfully than direct-seeded onions. Therefore, growing onions by transplanting is preferred over direct sowing since it helps in saving seeds and enhances yield.

Conflict of interest

Authors don't have any conflict of interest.

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