



Effect of Age of Seedling on Bolting and Yield of Rabi Onion Cv. NHRDF Red-3

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Onion is one of the most important bulb crops of the Nalanda district. The trial is conducted to reduce the bolting percentage and improve the yield by transplanting onion seedlings at the proper age. Farmers are usually transplanting 75 to 80 days old seedlings in the Nalanda district. In this trial, farmers transplanted 60 days and 55 days old seedlings for consecutive two the financial year 2018-2019 and 2019-2020. The best result was obtained in the case of transplanting 55-day-old seedlings. The maximum bulb weight was 58.86 gm, the minimum bolting percentage was 1.98%, maximum yield 324.63 q/ha with the highest B:C ratio of 02.08 was recorded in the Year 2018-2019 in the case of 55 days of seedlings. A similar result was obtained in the year 2019-2020 as the highest bulb weight was 61.01 gm, the least bolting percentage was 1.98%, maximum yield was 325.25q/ha with the highest B:C ratio of 2.10 as compared to transplanting of 60 days old seedlings and farmers practice. In the case of farmers' practice, the average bulb weight was 57.45gm with a bolting percentage of 6.74%, the yield is 297.28 q/ha with B: C ratio of 1.77 in Years 2018-19, and 57.66 gm of bulb weight, 6.53% of bolting, 296.56 q/ha of yield with B: C ratio of 1.76.

Keywords: Onion; bolting; percentage; yield; seedling age; transplanting.

1. INTRODUCTION

India is the second largest producer of onion in the world. It is one of the most important bulbs

and spice crops with the botanical name of *Allium cepa* L. and belongs to the family Alliaceae. It is a herbaceous, monocotyledonous, and cross-pollinated crop that belongs to genus

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Allium [1]. It has a production of 2311.14 thousand metric tonnes in the year 2018-2019 and 2379.66 thousand metric tonnes in the Year 2019-2020 (Source: Horticulture Statistics Division, Department of Agriculture, cooperation and farmers welfare, GOI, New Delhi). The quality of Indian onions is appreciable for their pungency and their availability around the year. It has hollow, narrow leaves and the base portion of it enlarges to form a bulb. It requires 80 to 150 days to harvest. It is a temperate crop but can grow in diverse climatic conditions such as tropical, subtropical, and temperate climates [2]. The most suitable climate is mild weather without extremes of cold and hot. The optimum temperature required for vegetative growth is 13 to 24 degree celsius and for bulb development around 16 to 25 degree Celsius [2]. It can be grown in all types of soil but the best soil for its cultivation is friable loam and alluvial soils with good drainage, moisture-holding capacity, and sufficient organic matter. It can be grown well in heavy soil with proper field preparation such as the application of FYM or organic manure in sufficient quantity. The optimum pH range for its cultivation is 6 to 7.5 [2]. Onion is cultivated from transplants, seeds, and sets for use as green onions as well as dry onions [3]. It gives pungent order while crushing [4].

Nursery raising in onion and its management is one of the very important operations for getting quality bulbs and higher yield. For transplanting of the one-hectare area about 0.05-hectare area is used for a nursery bed. The raised beds are prepared for good growth of the seedling. Half tons of well-decomposed FYM should be added to the soil before preparing the bed. The raised bed of 12-15 cm height with 1 to 1.2-meter width is prepared. The length of the bed can be increased or decreased as per requirement. The distance between two beds should be maintained properly for the removal of excess water and to do different intercultural operations easily. For controlling the weeds in the nursery spraying 0.2% pendimethalin as a pre-emergence herbicide. The seed rate is 5 to 7 kg for one hectare. Before sowing of seed, it must be treated with fungicide or Trichoderma for control damping off disease, and raising healthy seedlings.

Onion is very good for health. It is a rich source of vitamins, and minerals and has different medicinal values. Its bulbs are widely used in vegetables, raw consumption, used as spices for culinary purposes, etc. Since ancient times it was widely used to treat health ailments like mouth

sores, heart diseases, and headaches. It is also called nutrient dense which means it is high in vitamins and minerals and low in calories. It is rich in vitamin C. It helps in iron absorption, tissue repair, and immune health. It is also a strong antioxidant. It protects our cells from free radicals. It is a good source of potassium, vitamins B9 and B6. It plays a major role in metabolism, nerve function, etc.

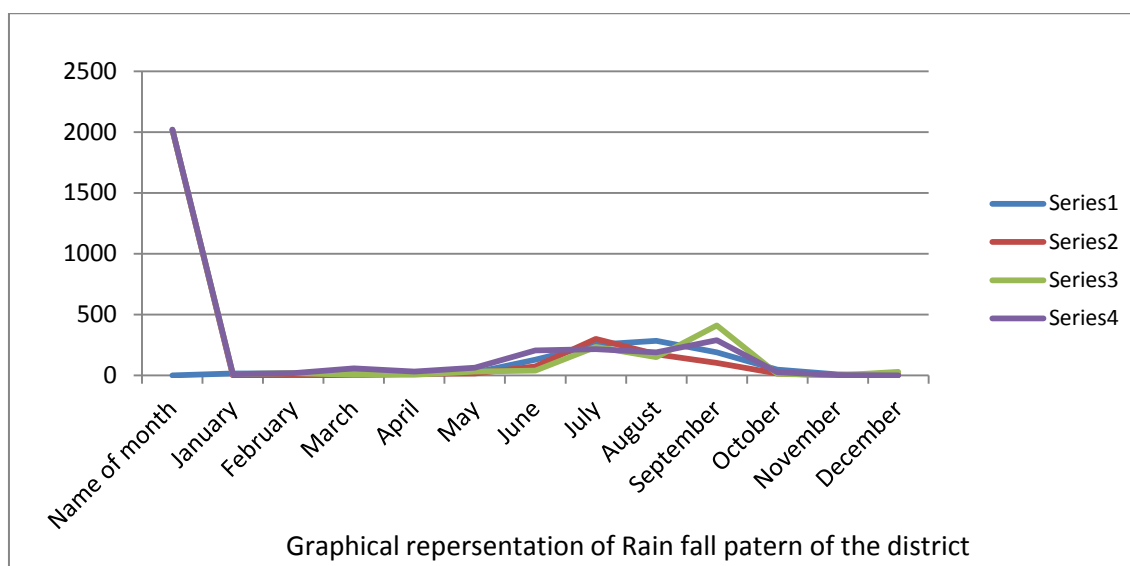
2. MATERIALS AND METHODS

This On-farm trial is conducted in different villages in Nalanda district. It is one of the most important districts of Bihar. This district is known as the land of knowledge. The latitude of the district is 25.122265 and the longitude is 85.456177. It is situated in the Magadh region of southern Bihar [5]. This district has a total geographical of 2355 square kilometers [6]. Out of this cultivable land occupies 181130 ha. Most of the land in the district is the fertile land of the Indo-Gangetic plane. The major soil type of the district is sandy loam to clay loam. The soil testing of experimental plots was done in the soil testing lab at Krishi Vigyan Kendra, Harnaut, Nalanda. We got the initial value as pH varies in the range of 7.25 to 7.37, EC from 0.026 to 0.033dS/m, organic from 0.565 to 0.596 Available nitrogen from 242.6 to 248.5 kg/ha, Available P₂O₅ from 27.25 to 32.32 kg/ha and Available K₂O from 150.5 to 158.5 kg/ha. This trial is conducted on ten farmers' fields during the year 2018-2019 and 2019-2020. The raised nursery beds are prepared on sandy loam soil with the addition of vermicompost. The surface of the bed should be well-leveled and smooth. The size of the bed is 3 meters in length, 0.6 meters in width, and 10 to 15 cm in height from the field surface. The distance between the two seed beds was 80 cm for carrying out different operations like weeding, spraying, irrigation; etc. The experiment is conducted in Randomised block design. The number of treatments was three including farmers' practice. The farmers are transplanting seventy-five days old seedlings. In other treatments, we used transplanting of sixty days and fifty-five days old seedlings. We got the best findings in transplanting fifty-five old seedlings as mentioned in table number two and three. We got the data on rainfall for the years 2018, 2019 and 2020. We found that there is a deficit in rainfall in the year 2018 and 2019 with 697.2 mm and 931.3 mm. There is excess rainfall in the year 2020 with 1100 mm. The optimum level of rainfall in the district is 977.9 mm (Source: DAO Office, Bihar Sharif, Nalanda).

Table 1. Average rainfall data of FY-2018, 2019 and 2020

Sr. No.	Name of month	Normal rainfall (mm)	2018	2019	2020
1	January	14.5	0	8.98	10.72
2	February	13.6	1.96	16.65	17.46
3	March	8.7	0	3.09	56.30
4	April	8.7	12.99	3.66	31.39
5	May	22.6	14.29	30.03	62.16
6	June	127.7	73.50	38.54	205.37
7	July	252.8	299.32	232.54	215.11
8	August	282.7	173.36	149.92	189.03
9	September	188.6	102.2	409.32	287.36
10	October	47.4	14.6	11.2	24.32
11	November	8	0	0	0.91
12	December	2.6	4.98	27.37	0
Total		977.9	697.2	931.3	1100

Source: DAO Office Bihar Sharif, Nalanda

**Fig. 1. Graphical representation of Rainfall pattern of the district**

3. RESULTS AND DISCUSSION

The maximum plant height is 64.72 cm, neck thickness is 1.47cm, Bulb weight 58.86 gm and yield 324.63 q/ha with a minimum bolting percentage of 1.98 is recorded in case of transplanting of 55 days old seedlings instead of 60 and 75 days old seedlings transplanted by farmers in the financial year 2018-2019. In the financial year 2019-2020 we got similar findings a maximum plant height of 63.85 cm, neck thickness of 1.43 cm, bulb weight of 61.01 gm, and yield of 325.55q/ha with a minimum bolting percentage of 1.98% is recorded in the case of transplanting of 55 days old seedlings. A similar result was also recorded by [7] in the case of

transplanting of 8 weeks old seedlings. Similar findings were also reported by Bahadur and Singh [8-9]. As per the findings of [10] the maximum bulb yield was recorded in the case of transplanting eight weeks old seedlings. [11-12] also reported that the eight-week-old age seedlings mature at an early stage as compared to other seedlings. A similar result was also reported by [13]. The maximum plant height of 59.30 cm was recorded by [10] in the case of transplanting eight-week-old seedlings. [12] Also reported maximum plant height in eight-week-old seedlings. A similar result was also recorded by [14]. Findings of [15] recorded the maximum height and bulb yield in the case of eight weeks of transplanted seedlings.

Table 2. Effect of age of seedlings on bolting and yield of Onion Cv. NHRDF Red-3 FY-2018-2019

Treatments	Plant height (cm)	Neck thickness (cm)	Bulb weight (gm)	Affected bolting plant percentage	Yield (q/ha)
Farmers practice	61.09	1.01	57.45	6.74	297.28
Transplanting of 75 days old seedlings					
Transplanting of 60 days old seedlings	62.93	1.13	58.71	5.52	306.47
Transplanting of 55 days old seedlings	64.72	1.47	58.86	1.98	324.63
S.Em.+	0.65	0.026	0.260	0.037	0.933
C.D.@5%	1.365	0.055	0.546	0.079	1.961

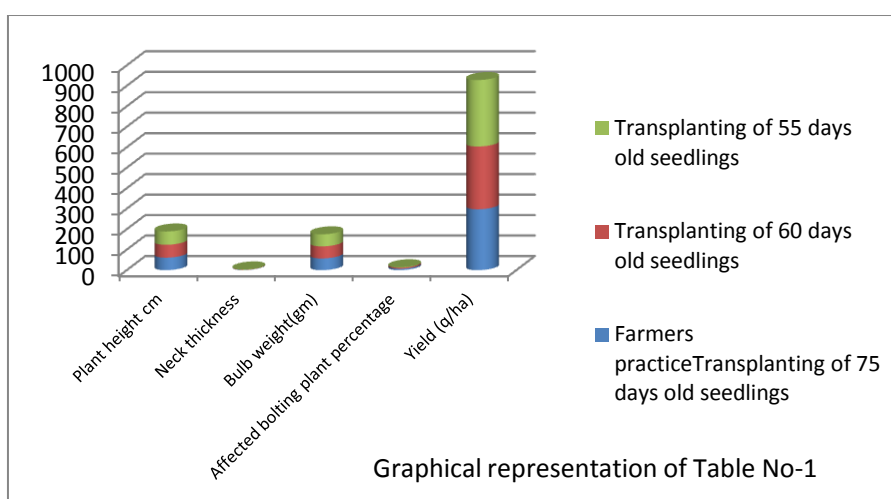


Fig. 2. Graphical representation of Table No-1

Table 3. Effect of age of seedlings on bolting and yield of Onion Cv. NHRDF Red-3 FY-2019-2020

Treatments	Plant height (cm)	Neck thickness (cm)	Bulb weight (gm)	Affected bolting plant percentage	Yield (q/ha)
Farmers practice	61.73	1.02	57.66	6.53	296.56
Transplanting of 75 days old seedlings					
Transplanting of 60 days old seedlings	62.93	1.13	59.99	5.27	307.38
Transplanting of 55 days old seedlings	63.85	1.43	61.01	1.98	325.55
S.Em.+	0.65	0.025	0.338	0.096	1.010
C.D.@5%	1.365	0.053	0.711	0.202	2.122

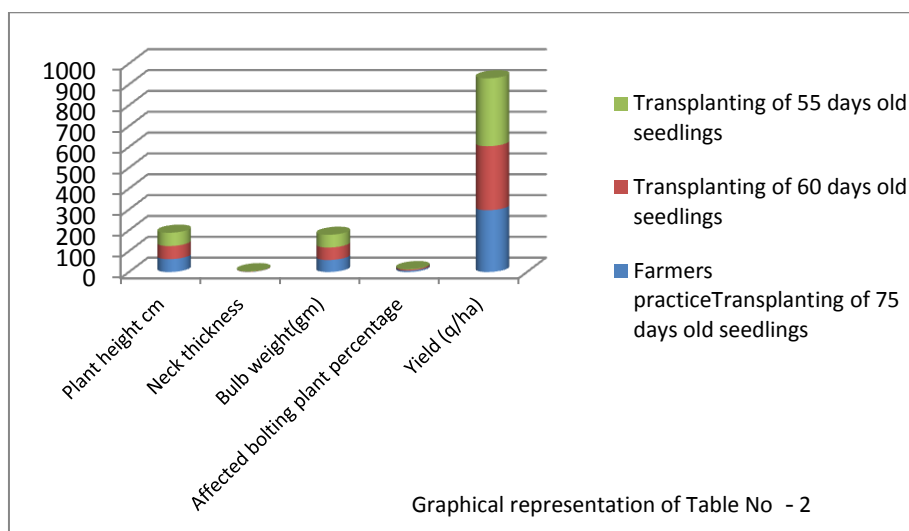


Fig. 3. Graphical representation of Table No-2

4. CONCLUSION

Based on the findings of this trial, we can conclude that the transplanting of 55 days old seedlings is best for getting quality onion bulbs with optimum yield as compared to transplanting of 60 days and 75 days old seedlings.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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