EFFECT OF TIME AND METHOD OF PLANTING ON THE GROWTH AND YIELD OF ONION

Rummanara[1], M. S. H. Choudhary, M. G. Rabbani and M. A. Rahman
Department of Horticulture
Bangladesh Agricultural University
Mymensingh, Bangladesh

ABSTRACT

Seeds of onion cv. Taherpuri were sown in the main field and simultaneuously in the seedbed (to be transplanted later on) on 31 Oct., 15 and 30 Nov. and 15 Dec., 1992. Time of planting significantly influenced plant height, number and fresh weight of leaves/plant, size and weight of individual bulbs, dry matter content of bulbs and the yield. The diameter, weight and dry matter content (%) of bulb and yield declined with delayed planting. Onion planted on 31 Oct. produced the highest bulb yield (19.9 t/ha) while that planted on 15 Dec. had lowest yield (7.4 t/ha); however, the yield was significantly affected by other planting dates. In general, direct sowing resulted in higher yield (15.4 t/ha) than the transplanted ones (12.2 t/ha). Considering the interaction effect of time and method of planting, 31 Oct. directly seeded onion on 31 Oct. gave maximum yield of bulb (20.4 t/ha).

Additional Key Words: *Allium cepa*, vegetable, bulb, sowing, cultivar.

INTRODUCTION

Bulb formation of onion is mainly controlled by daylength and temperature. It is promoted by long days, although cultivars differ greatly in daylength requirements (Magrender and Allard, 1937). With a favourable daylength, temperatures of 20 to 25° C favour bulb setting (Shanmugavelu, 1989). Time of planting is, thus, an important agronomic variable for yield and quality of onion bulbs (Hutton and Wilson, 1986; Mondal *et al.*, 1986; Khokhar *et al.*, 1990). Onion, in Bangledesh, is planted with the onset of winter. Early planting is sometimes limited by late rain in Sept.-Oct. Moreover, late recedence of flood water in some years also causes delay of planting in the low-lying areas of the country.

Usually seedlings are transplanted in the field but in some areas, seeds also sown in the field. Direct sowing may be more useful on commercial planting to avoid the laborious and time consuming task of transplanting. But the available information regarding planting date and method of planting for onion bulb production are yet to be established. Hence, this experiment was conducted to find out the appropriate time of planting for onion bulb production by comparing direct sowing vs. transplanting.

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1 Present address: Floriculture Division, HRC, BARI, Joydebpur, Gazipur, Bangladesh.

MATERIALS AND METHODS

At the Horticulture Farm of Bangladesh Agricultural University, Mymensingh the two factorial experiment (four planting dates, viz., 31 Oct., 15, 30 Nov., 15 Dec.) and two planting methods viz., direct sowing (DS) and transplanting (TP) was laidout in a randomized complete block design with three replications during 1992-93 growing season. The size of unit plots was 1.5 m x 1.5 m. Sprouted seeds of local onion cv. Taherpuri were sown on four dates as per treatments directly in the main field and simultaneously in the seedbed for raising seedlings. These seedlings in the main field were gradually thinned to a spacing of 15 cm x 10 cm. Seedlings of 45 days-old raised in the seed bed plots at the same spacing (15 cm x 10 cm). The crop received 10 tons of well decomposed cowdung, 175 kg urea, 125 kg triple superphosphate (TSP) and 150 kg muriate of potash (MP) per hectare as recommended by Rashid (1983). The whole amount of cowdung and TSP was applied during the final land preparation. Urea and MP were top dressed in two equal instalments, first 30 days after and the second 50 days after transplanting. In direct sowing, the same quantity of urea and MP was applied first 75 days after and second 95 days after planting. Proper care of the crop was taken as and when necessary. Bolting was discouraged by pinching off the flower stalks whenever they appeared during the growing period of the crop. Crops were harvested in early Apr. 1993 at maturity when leaves start drying and collapsing the neck of the bulbs.

RESULTS AND DISCUSSION

The yield contributing characters and yield of onion were significantly influenced by time of planting (Table 1). Planting time influenced the plant height, which was highest (56.76 cm) on 31 Oct. but it declined in later planting. The number of leaves and their fresh weight also declined similarly as the planting date was delayed. However, the leaf number was recorded maximum (13.4) from 15 Nov. planting. But, the weight of fresh leaves was maximum on 31 Oct.

Table 1. Main effects of time and method of planting on the growth and yield of onion.

Treatments	Plant height (cm)	Number of leaves /plant	Fresh wt. of leaves /plant (g)	Bulb length	Bulb diam. (cm)	Neck diam.of bulb (cm)	Avg. wt of bulb (g)	Dry matter of bulb (%)	Bulb yield kg/plot*	Bulb yield t/ha
Planting time										
31 Oct.	56.8	11.8	8.5	4.5	5.8	2.2	56.6	16.4	4.5	19.9
15 Nov.	52.4	13.4	3.3	3.3	5.4	2.1	45.2	14.1	3.7	15.6
30 Nov.	44.5	11.6	1.9	3.3	4.7	1.8	27.3	14.2	2.8	12.3
15 Dec.	36.4	8.5	1.1	3.7	3.6	1.4	18.6	12.7	1.7	7.4
LSD (0.05)	3.1	1.0	2.2	0.3	0.5	0.1	10.8	1.5	0.7	3.4
Planting method										
DS	49.5	12.9	3.4	3.6	5.3	2.0	42.2	15.3	3.5	15.4
TP	45.6	9.8	3.9	3.9	4.5	1.8	31.6	13.4	2.8	12.2
LSD (0.05)	2.2	0.7	NS	0.2	0.3	0.1	7.7	1.1	0.5	2.4

* Size of the unit plot was 1.5 m x 1.5 m. NS means not significant

The size of bulbs was also influenced by planting dates. Plants from 31 Oct. planting resulted the highest (4.5 cm) bulb length and the least was from (3.3 cm). Bulb diameter and the neck diameter at harvest were declined as there was a delay in planting (Table 1). Thus, the crop of 31 Oct. planting produced bulbs of 4.5 cm length x 5.8 cm diameter.

Accordingly, the weight of the individual bulbs was the highest (56.9 g) from the 31 Oct. planting and the lowest (18.6 g) in the 15 Dec. planting. Dry matter of bulbs was the highest (16.4) from 31 Oct. planting and lowest (12.7) from 15 Dec. planting, but there was no significantly difference in dry matter content of bulbs between 15 Nov. and 30 Nov. plantings.

The yield of bulbs per plot and per hectare was influenced by planting dates. Onions from 31 Oct. yielded highest bulb yield (19.9 t/ha) while yields from the 15 Dec. planting was the lowest (7.4 t/ha). But Nov. plantings did not differ in bulb yield significantly. There was more vegetative growth because of prevailing higher temperature and long day during early stage of the plants, and relatively longer growing period; these might have contributed in the production of larger and heavier bulbs in early planting. These results are also supported by the findings of Maeso (1980), Lisbao *et al.* (1985), Hutton and Wilson (1986), Tomar *et al.* (1988), Khokhar *et al.* (1990) and Richwine (1990), who reported a gradual reduction in yield of onion bulbs as planting was delayed.

Method of planting also had significant influence on the growth and yield of onion bulbs (Table 1). Direct sowing resulted taller plants with more leaves over the transplanting method (Table 1), except the weight of leaves per plant.

Table 2. Combined effect of time and method of planting on the growth and yield of onion.

Treatment	Plant height (cm)	Leaves/ plant	Fresh wt. of leaves/ plant (g)	Bulb length (cm)	Bulb diam. (cm)	Neck diam. of bulb (cm)	Avg. wt. of bulb (%)	Dry matter of bulb (g)	Bulb yield	
									kg/plot* bulb	t/ha
31 Oct. planting										
DS	56.2	11.8	7.8	4.3	5.7	2.3	54.5	17.2	4.4	19.4
TP	52.4	13.4	3.3	3.3	5.4	2.1	45.2	14.1	3.7	15.6
15 Nov. planting										
DS	44.5	11.6	1.9	3.3	4.7	1.8	27.3	14.2	2.8	12.3
TP	0.1	3.7	3.6	1.4	18.6	12.7	1.7	7.4		
LSD (0.05)	3.1	1.0	2.2	0.3	0.5	0.1	10.8	1.5	0.7	3.4
Planting method										
DS	49.5	12.9	3.4	3.6	5.3	2.0	42.2	15.3	3.5	15.4
TP	45.6	9.8	3.9	3.9	4.5	1.8	31.6	13.4	2.8	12.2
LSD (0.05)	2.2	0.7	NS	0.2	0.3	0.1	7.7	1.1	0.5	2.4

* Size of the unit plot was 1.5 m x 1.5 m. NS means not significant.

As regards to the size of the bulbs, plants raised by direct seeding resulted bulbs with a higher diameter along with the neck diameter. The length of bulbs was not influenced by planting methods. The dry matter content in the bulb was higher in case of plants raised from direct seeding (15.3%) as compared to the plants grown by transplanting method (13.4%). Direct sowing 15.4 t/ha produced significantly higher yield of bulbs over transplanting (12.2 t/ha). The higher yield of onion in case of direct sowing might be associated with the taller plants and increased leaf number per plant, increased length and diameter of bulbs and bulb weight. The positive influence of direct sowing on these parameters might be related to undisturbed plants in the field as compared to transplanted seedlings, which need to resumption of growth after transplanting.

There was significant interaction between planting dates and methods on plant height, leaf number, neck diameter of bulbs and bulb diameter. But no significant interaction effect of planting time and method regarding bulb weight, leaf weight, dry matter of bulbs and bulb yield were noticed under the experimental conditions (Table 2). Although the transplanted crop, in general showed significant lower yields than the direct sowing method, the difference was significant only on 30 Nov. planting (Table 2). Moreover, the transplanted crops were adversely affected with delay in planting. But, direct sowing reduced yield signficantly beyond 30 Nov. planting. Further investigation with different varieties at different agro-ecological zones of the country is needed for conclusive results. However, it is suggested that 4th week of Oct. is the optimum time for raising onion seedlings that are to be transplanted later on. At present direct sowing in the main field might be useful as the yield was not reduced significantly up to Nov. in Mymensingh region.

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