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INFLUENCE OF METHOD AND DATE OF PLANTING ON THE PRODUCTION OF LETTUCE

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Abstract

The effect of two planting methods (direct seed sowing and transplanting of seedlings) and seven dates of planting (8 Oct., 2 Nov., 27 Nov., 22 Dec., 16 Jan., 10 Feb. and 5 March) on the production of lettuce was compared. 'Green Wave' a loose leaf Japanese variety was used. The average yield of the direct seeded crops (17.16 t/ha) was found to be almost double than that of the transplanted crops (9.08). The yields (t/ha) from different dates of planting were 13.7 (8 Oct.), 15.04 (2 Nov.), 8.94 (27 Nov.), 14.54 (22 Dec.), 21.45 (16 Jan.) 10.16 (10 Feb.), and 8.02 (5 March). The highest yield of 24.0 t/ha was obtained from direct seedling on 16 January.

Key Words: Method, date, planting, production of lettuce.

Introduction

Lettuce (*Lactuca sativa* L.) is a salad crop belonging to the family Compositae. Although lettuce is the most widely grown salad crop of the world (Rashid, 1999), it is still a minor crop and little known in Bangladesh. Research based information on the production of this crop under local conditions are almost absent. There are reasons to think that lettuce will become popular in the coming years and as such, investigations to standardize the method of its production are required.

The lettuce crop is raised in two methods. In one method which is practiced in North America, seeds are sown directly in the field. In the other method, seedlings are transplanted. It is more commonly used in Europe, especially in crops grown under controlled environment (Ryder, 1998), In Bangladesh, lettuce can be grown only during the *rabi* season. It is very sensitive to the environmental factors. This study was carried out to compare the two methods of production and to know the effect of date of planting on the success of production and the yield and other characters of the crop.

Material and Method

The experiment was conducted at the experimental Farm of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur during the period

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of October 2002 to May 2003. The soil of the experimental site was sandy loan in texture and belonging to the Salna series with a pH of 6.5. Mean monthly maximum and minimum temperature, relative humidity and precipitation that prevailed during the experimental period are presented in Table 1.

Table 1. Monthly mean maximum and minimum temperature, relative humidity and total rainfall (mm) for October 2002 May 2003.

Month	Air temp.		RH		rainfall (mm)
	Max	Min	Max	Min	
October 2002	31.8	20.5	97.4	39.4	62.7
November 2002	28.7	16.7	95.9	41.1	21.7
December 2002	25.5	12.2	90.8	44.3	0
January 2003	17.8	12.9	94.1	42.7	0
February 2003	23.7	15.9	97.3	38.7	7.4
March 2003	27.9	17.4	96.7	40.5	111.4
April 2003	33.2	23.7	97.5	40.8	56.1
May 2003	33.3	27.1	96.6	41.2	247

Lettuce cultivar Green Wave (originated in Japan) was used as the test crop for the experiment. It is of the leafy and spreading type and stated to be heat tolerant. The experiment was laid out in split-plot design with three replications. There were two planting methods viz., direct seed sowing and transplanting and seven planting dates viz., 8 October, 2 November, 27 November, 22 December 16 January, 10 February and 5 March in the experiments. The methods were placed in main plots and planting dates in subplots. Subplot treatments were randomly assigned in each main plot. The total number of subplots was 42. The size of each subplot was 2m×2m. The subplots, the main plots and blocks were separated by a spacing of 0.5, 0.5, and 1.0m, respectively. Plant to plant distance was 20 cm and row to row distance was 40 cm in each subplot. Each plot contained 25 lettuce plants. Manures and fertilizers were applied @ cowdung 10 tons, urea 250 kg, TSP 150 kg, and MP 250 kg per hectare. Fifty percent of cowdung was applied during land preparation. The remaining cowdung, entire quantity of TSP and MP were applied during pit preparation. Urea was applied as top dressing in two equal installments at 30 and 45 days after sowing and 10 and 20 days after transplanting.

The seeds were sown in sub plots as per scheduled dates (25 days interval) with a row spacing of 40 cm and 20 cm within row in pit. First thinning was done after 10 days at 2-leaf stage, keeping 4-5 plants per pit; second thinning was done 8 days after the first thinning at 3-4-leaf stage keeping 2-3 plants per pit and the

third thinning was done 7 days after second thinning keeping one plant per pit at 5-6-leaf stage.

In the case of transplanting, seeds were sown in well prepared seedbed as per scheduled dates. Germination of seeds was complete within five days. Twenty five days old seedlings were transplanted in the subplot with spacing of 40 cm × 20 cm. Irrigation along with other intercultural operations were done as and when needed. The crop was harvested at 55 days after sowing and 30 days after transplanting. Ten plants were randomly selected from each plot for collection of data. The recorded data were statistically analyzed and the means were separated by Duncun's Multiple Range Test (DMRT) for interpretation of results.

Results and Discussion

Influence of planting method

Planting method influenced the leaf yield and yield attributes significantly (Table 2). It was observed that plants from direct sowing method showed better performance over transplanting in respect of plant height (19.78 cm), number of leaves (15.34), leaf size (332.59 cm^2), spread (diameter) of plants (23.59 cm), edible plant weight (136.43 g), and leaf yield per hectare (17.16 t/ha). It is obviously due to the uninterrupted growth of the plants which did not suffer transplanting shock. Ryder (1998) reported that the growth of the pruned roots and subsequent growth of the plants become slower in transplanted plants. Results indicate that nearly 100% higher yield was obtained from direct sowing compared with transplanting when harvested at the same time.

Table 2. Effect of planting method on leaf yield contributing characters of lettuce.

Planting method	Plant height (cm)	Leaves/ plant (no.)	Broad leaf area (cm^2)	Spread diameter (cm)	Leaf yield/ plant (g)	Yield (t/ha)
Direct sowing (M_1)	19.78a	15.34a	332.59a	23.59a	136.43a	17.16a
Transplanting (M_2)	16.14b	10.12b	242.59b	19.08b	72.73b	9.08b
F-test	**	**	**	**	**	**
CV(%)	4.08	8.76	5.3	5.36	9.35	8.04

**Significant at 1% level

Influence of planting date

Planting date had significant influence on leaf yield and yield components of lettuce (Table 3). Plants from 16 January planting showed better performance in respect of plant height (20.65 cm), number of leaves per plant (14.60), leaf size (369.79 cm^2), spread diameter (27.10 cm) and edible plant weight (171.84 g),

while the lowest performance was observed in 27 November planting, which was followed by 5 March planting. Price *et al.* (1981) obtained 170 g marketable yield per plant when the crop was grown under controlled environment. The maximum leaf yield (21.45 t/ha) was obtained from 16 January planting and the second highest yield was obtained in 2 November planting (15.04 t/ha), which was statistically identical with 22 December (14.45 t/ha) and 8 October planting (13.70 t/ha). The yield of 27 November planting was lower compared to the yield of 2 November and 22 December planting. The low yield of 27 November was attributed due to very poor performance of lettuce grown from transplanting method. Again transplanting shock, lack of proper care just after transplanting and subsequent foggy weather etc. might be responsible for poor performance of lettuce grown on 27 November. It indicates that the growth of the lettuce plant is markedly influenced by the management practices, environmental factors, namely temperature, sunshine, day length etc. although relative importance of these factors cannot be estimated from the experiment. Burding and Sanchez (1990) also reported that low temperature with 14 hr light conditions are congenial for higher yield of lettuce. The lowest yield (8.02 t/ha) was recorded in 5 March planting, which was statistically similar with 27 November planting (8.94 t/ha). Results revealed that leaf yield decreased, considerably in late planting mainly due to very high temperature (Table 1) and foggy weather at the vegetative stage. So, it can be concluded that very low and high temperature is not favourable for the normal growth of lettuce. Verkerk and Spitters (1973) also reported that the number of leaves, length, and width of largest leaf, total leaf area, and yield are affected by light energy and temperature.

Table 3. Effect of planting time on leaf yield and yield contributing characters of lettuce.

Planting method	Plant height (cm)	Leaves/ plant (no.)	Broad leaf area (cm^2)	Spread diameter (cm)	Leaf yield/ plant (g)	yield (t/ha)
8 Oct. (T_1)	16.37c	14.37a	319.61b	22.82b	109.70b	13.7b
2 Nov. (T_2)	19.80a	14.50a	332.36b	22.15b	120.48b	15.04b
27 Nov. (T_3)	14.40d	8.88d	199.78d	17.03d	71.39cd	8.94cd
22 Dec. (T_4)	20.62a	12.20bc	327.99b	23.78b	113.09b	14.54b
16 Jan. (T_5)	20.65a	14.60a	369.79a	27.10a	171.09b	21.45a
16 Feb. (T_6)	17.72b	13.72ab	284.77c	19.98c	81.34c	10.16c
5 Mar. (T_7)	16.16c	10.83c	178.83d	16.45d	64.21d	8.02d
F-test	**	**	**	**	**	**
CV(%)	4.08	8.76	5.3	5.36	9.35	8.04

In a column, the figure(s) having same letter(s) do not differ significantly by DMRT

**Significant at 1% level

Interaction effects of planting method and planting date

Interaction of planting method and planting date exerted significant influence on leaf yield and yield components of lettuce (Table 4). Plant height ranged from 22.77 to 11.00 cm. The maximum height was attained by the plants in M_1T_2 and the minimum height was attained by the plants in M_2T_3. The highest number of leaves was found in M_1T_2 (18.27), which was statistically identical with M_1T_1 (18.20), M_1T_5 (17.07) M_1T_6 (15.55) and statistically different from the rest of the treatments. The plants produced the lowest number of leaves (5.89) per plant in treatment M_2T_3. The highest leaf area was observed in M_1T_5 (408.41 cm^2), which was followed by M_1T_2 (392.53 cm^2), M_1T_1 (388.03 cm^2), and M_1T_4 (302.70 cm^2) and the lowest was found in M_2T_3 (129.62 cm^2), which was identical with M_2T_7 (163.73 cm^2). The highest plant diameter was obtained from M_1T_5 (28.00 cm), which was followed by M_1T_1 (26.48 cm) and M_1T_4 (26.06 cm). The lowest plant diameter was found in M_2T_3 (12.10 cm).

Table 4. Interaction effect of planting method and time on leaf yield and yield contributing characters of lettuce.

Treatments	Plant height (cm)	Leaves/ plant (no.)	Leaf area (cm^2)	Spread diameter (cm)	Leaf yield/ plant (g)	Yield (t/ha)
M_1T_1	18.47bc	18.20a	388.03a	26.48ab	153.74b	19.20b
M_1T_2	22.77a	18.27a	392.53a	24.37bc	163.27b	20.39b
M_1T_3	17.8bcd	11.87c	269.93c	21.97cde	125.05c	15.65c
M_1T_4	22.47a	14.73b	372.57a	26.06ab	155.99b	20.32b
M_1T_5	21.83a	17.07ab	408.41a	28.00a	192.32a	24.00a
M_1T_6	18.89b	15.55ab	302.70bc	22.23cd	95.68d	11.95d
M_1T_7	16.22d	11.66c	193.92e	16.00h	68.92e	8.61e
M_2T_1	14.27e	10.53c	251.19d	19.l7efg	65.66e	8.20e
M_2T_2	16.83cd	10.73c	272.l8cd	19.93def	77.69de	9.68d
M_2T_3	11.00f	5.89d	129.62f	12.10i	17.73f	2.23f
M_2T_4	18.77b	9.67c	263.40cd	21.50de	70.19e	8.77e
M_2T_5	19.47b	12.13c	331.16b	26.20ab	151.35b	18.90b
M_2T_6	16.56d	11.89c	266.83cd	17.73fgh	66.98e	8.37e
M_2T_7	16.11d	10.00C	163.73ef	16.89gh	59.49e	7.43e
F-test	**	**	**	**	**	**
CV(%)	4.08	876	5.3	5.36	9.35	8.04

In a column, the figure(s) having same letter(s) do not differ significantly by DMRT

** Significant at 1 %level

The highest leaf yield per plant was obtained from M_1T_5 (192.32 g) and lowest was found in M_2T_3 (17.73 g). The highest leaf yield per ha in M_1T_5 (24.0 t), which was statistically different from all other interaction effects. The second highest yield was recorded in M_2T_3 (20.39 t/ha), which was followed by M_1T_4 (20.30 t/ha), M_1T_1 (19.20 t/ha), and M_2T_5 (18.30 t/ha). Direct sown plants performed better due to normal growth of the tap root and prevailing favourable environmental conditions during vegetative growth and development stage. The lowest leaf yield was observed in M_2T_3 (2.23 t/ha). The lowest leaf yield from transplanted plants in 27 November planting is probably due to the presence of low temperature and continuous foggy weather during the establishment of lettuce seedlings. It was revealed that the directly sown plants in all planting dates performed better in respect of leaf yield and all yield contributing characters.

The results led to conclude that the lettuce cultivar (Green Wave) may be sown during October to January for acceptable yields. Later planting will reduce the yield unless the variety is highly heat tolerant.

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