

EFFECT OF TIME OF SOWING AND PLANT SPACING ON BROCCOLI PRODUCTION

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ABSTRACT

A field experiment was conducted at Agricultural Research Station, BARI, Thakurgaon during rabi season, 2009/10 to find out the optimum time of sowing and plant spacing on broccoli production. Three sowing time viz. (i) 1 October, (ii) 15 October and (iii) 30 October and three plant spacing viz. (i) 60 x 40cm, (ii) 60 x 50cm and (iii) 60 x 60cm were included in the study. Yield and yield contributing characters were significantly influenced by the treatments. 1 October sowing produced the highest yield (21.39 t/ha) and 30 October sowing produced the lowest yield (13.6t/ha) of broccoli. On the other hand, closer spacing (60 x 40cm) produced the highest yield (18.8t/ha) which was statistically similar to 60 x 50cm (17.6t/ha) and lowest yield (16t/ha) was obtained from 60 x 60 cm spacing. 1 October sowing and 60 x 40cm plant spacing combination produced the highest yield (22.5t/ha) which was statistically similar to 1 October sowing and 60 x 50cm plant spacing (21.9t/ha) and the lowest yield (12.8t/ha) was produced from 30 October sowing and 60 x 60cm plant spacing combination.

Key words: Broccoli Production, Planting Time and Spacing, Cruciferaea

INTRODUCTION

Broccoli (*Brassica oleracea var italica*) (Cruciferae) is a biannual and herbaceous winter vegetable crop in Bangladesh. Broccoli, originated from west Europe (Prasad and Kumar 1999) has now been distributed in both the sub tropical and tropical areas like Bangladesh. The crop is considered as a commercial crop in India (Nonnecke 1989). Broccoli is planted in the winter season in Bangladesh. Flower heads develop relative to ambient temperatures (15-20°C), and in the heat of summer, broccoli heads matured and produced flowers (Lorenz and Maynard 1988). The temperature in Bangladesh remains fairly high up to mid October and gradually goes down in mid December. This cool period extends up to mid February. The temperature increase sharply thereafter. It is therefore important to study the effect of planting time for achieving optimum growth and yield of broccoli (Das *et al.* 2000). Higher plant population reduced head size, lower average marketable head weight and delay maturity (Khan *et al.* 1991). Its cultivation in Bangladesh has not extended due to the lack of awareness regarding its nutritive value and appropriate method of planting including planting time and spacing. Therefore, the present study was undertaken to identify the best sowing time and plant spacing.

MATERIALS AND METHODS

The research was carried out at Agricultural Research Station, Thakurgaon during rabi season 2009/10 as a factorial experiment, laid out in RCB design with 3 replications (Table 1). The unit plot size was 10m x 1.2m. The amounts of fertilized applied (kg/ha) as follows: Urea, 260; TSP, 150; MoP, 100; Gypsum, 80; Zn, 1.5; Boron, 2. Total amount of cow dung, TSP, gypsum, zinc sulphate and boric acid were applied in the plot during final land preparation. Urea and MoP were applied in three equal installments at 15, 30 and 45d after planting. Irrigations were done when necessary. Three weeding was also done after planting.

Ten plants were selected randomly for data collection. Immature and developed broccoli heads from each treatment were harvested at 7-10d interval throughout the harvesting season. The number of leaves per plant, days to first harvest, head size, single head weight, Main head yield, lateral head yield and total yield were recorded. The collected data were analyzed statistically and the means were separated by LSD.

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Table 1: Treatments tested

Factor A	Factor B
Time of sowing	Plant spacing
1 October	60 x 40 cm
15 October	60 x 50 cm
30 October	60 x 60 cm

RESULTS AND DISCUSSION

Effect of time of sowing on broccoli production

Yield and yield contributing characters of broccoli were significantly influenced by the time of sowing (Table 2). Minimum days required to first harvest of broccoli head was recorded in 30 October sowing while 1 October sowing required maximum period of 90.4d. Maximum length and diameter of broccoli head were obtained from 1 October sowing. On the other hand, 15 October sowing produced the longest broccoli head and 30 October sowing produced minimum head diameter. The highest single head weight was recorded from 1 October sowing and the lowest single head weight was recorded from 30 October sowing. Being a thermo sensitive plant, the early planted plant received comparatively low temperature during vegetative growth which produced bigger sized head. The main head yield and lateral head yield of broccoli were significantly influenced among the three sowing time. 1 October sowing produced the highest main head yield and lateral head yield and 30 October sowing produced the lowest main head yield and lateral head yield. The report of Lawande *et al.* (1988) and Tewary *et al.* (1987) are the agreement with the present findings.

Effect of spacing on broccoli production

Most of the parameters were not significant for plant spacing. Only single head weight, min head weight and total yield were significantly affected by the treatment (Table 3). The maximum single head weight was measured from

Table 2. Effect of time of sowing on yield of broccoli

Time of sowing	No. of Days leaves to first harvest	Length of head (cm)	Diameter of head (cm)	Single head wt. (g)	Main head yield (t/ha)	Lateral head yield (t/ha)	
1 Oct.	19.8	90.4	22.6	22.9	638	16.7	4.7
15 Oct.	20.0	83.1	15.8	18.8	478	15.0	2.5
30 Oct.	19.4	80.2	16.7	16.2	347	12.2	1.3
CV(%)	6.5	3.7	8.2	8.2	14	12.0	9.8
LSD _(0.05)	-	21.4	4.5	4.5	240	6.2	3.2

Table 3. Effect of spacing on yield of broccoli

Time of sowing	No. of Days leaves to first harvest	Length of head (cm)	Diameter of head (cm)	Single head wt. (g)	Main head yield (t/ha)	Lateral head yield (t/ha)	
60x40cm	19.4	85.7	18.8	18.6	441	16.3	2.5
60x50cm	19.7	84.6	18.0	19.3	479	14.7	2.0
60x60cm	20.1	83.5	18.2	20.0	543	12.8	3.0
CV(%)	-	-	-	-	14.0	12.0	-
LSD _(0.05)	-	-	-	-	75.9	6.1	-

60cm x 60cm and the minimum single head weight was measured from 30cm x 30cm. Food accumulation was maximum in the plant which was grown at wider spacing. As a result the head was large sized and weight became maximum. The present results are partially similar with results obtained by Griffith and Carling (1991). However, the main head yield of broccoli was significantly different from one treatment to another. 60cm x 40cm plant spacing produced the highest main head yield and 60cm x 60cm plant spacing produced the lowest main head yield. Similar results had got by Pornsuriya *et al.* (1997). Main head yield and total yield of broccoli followed the same trend in response to plant spacing. Increasing the plant number per plot decreased the head size but increased the yield (Nassar *et al.* 1972)

Combined effect of time of sowing and plant spacing on broccoli production

Treatment combination of time of sowing and plant spacing had significant effect on yield and yield contributing characters of broccoli production (Table 4). Combination of 30 Octo-

Table 4. Combined effect of time of sowing and spacing on broccoli production

Treatment combination (cm)	No. of Days leaves to first harvest	Length of head (cm)	Diameter of head (cm)	Single head wt. (g)	Main head yield (t/ha)	Lateral head yield (t/ha)	
1 60x40	19.0	91.7	23.7	26.7	607	18.3	4.1
Oct60x50	20.0	90.4	22.3	23.0	644	17.3	4.5
60x60	20.3	89.3	21.7	23.0	663	14.3	5.3
15 60x40	20.0	83.7	16.3	18.0	410	16.9	2.4
Oct60x50	19.7	83.0	15.3	18.7	546	15.1	2.3
60x60	20.3	79.6	15.7	19.7	580	12.6	2.8
30 60x40	19.3	81.6	16.3	15.0	307	13.4	1.1
Oct60x50	19.3	80.3	17.3	16.3	346	11.7	1.4
60x60	19.7	78.7	17.3	17.3	387	11.4	1.3
CV (%)	-	3.75	8.2	8.19	14.0	12.0	9.8
LSD _(0.05)	-	11.49	2.8	2.97	128.6	3.31	1.6

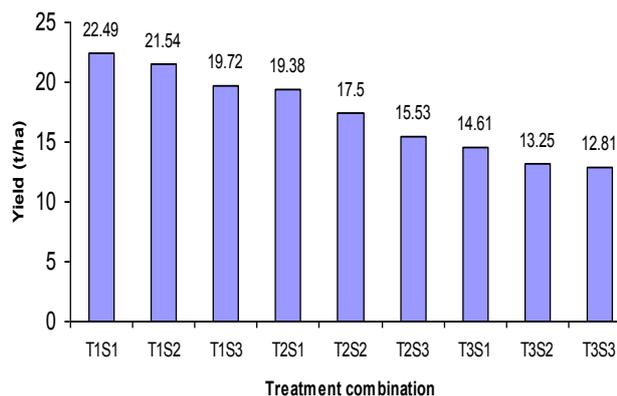


Fig.1. Combined effect of time of sowing and plant spacing on yield of broccoli

ber sowing and 60cm x 60cm plant spacing required the minimum days to first harvest of broccoli and 1 October sowing and 60cm x 40cm plant spacing required the maximum days to first harvest. Size of broccoli head also significantly different from combination to combination. Maximum length and diameter of broccoli head was measured from the treatment combination of 1 October sowing and 60cm x 40cm plant spacing. Main head yield, lateral head yield and total yield were also significant. The highest main head yield was obtained from the treatment combination of 1 October sowing and 60cm x 40cm plant spacing. The lowest main head yield was recorded from the combination of 30 October sowing and 60cm x 60cm plant spacing.

CONCLUSION

Results of the present study revealed that 1 October to 15 October seed sowing is the optimum time for broccoli production. Before 1 October, seed sowing was not possible because of rainfall in Bangladesh. Besides, 60cm x 40cm and 60cm x 50cm plant spacing increased statistically similar yield of broccoli. Further studies are needed to optimize the specific time and plant spacing for the highest yield of broccoli.

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