

## Effect of Planting Time and Seedling Raising Methods on Growth and Yield of Capsicum

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### Abstract

The experiment stands to find out the suitable time of planting and also the method of seedling raising of capsicum (BARI Mistimorich-1) during the period from October 2010 to April 2011. Experiments consisted four sowing times [1<sup>st</sup> October (P<sub>1</sub>); 15<sup>th</sup> October (P<sub>2</sub>); 1<sup>st</sup> November (P<sub>3</sub>) and 15<sup>th</sup> November (P<sub>4</sub>), 2010] and two seedling raising methods [double transplanting method (S<sub>1</sub>) and direct sowing (S<sub>2</sub>)] i.e., 8 treatment combinations. It was found that seeds sowing at 15<sup>th</sup> October was found better in respect of yield (321.69 g/plant, 5.67 kg/plot and 15.78 t/ha). Compared to others and direct sowing method was found better yield (264.87 g/plant, 3.79 kg/plot and 12.25 t/ha) than double transplanting method. The combined effect of October 15<sup>th</sup> planting and direct sowing method performed better in respect of yield (307.45 g/plant, 4.56 kg/plant and 19.37 t/ha) of BARI Mistimorich-1.

**Keywords:** *Capsicum annuum*; Sowing Dates; Direct Sowing; Growth; Yield

### Introduction

Capsicum (*Capsicum annuum* L.) belonging to Solanaceae family is a popular vegetable. Though it has a good economic importance but growers are not able to produce good quality capsicum with high productivity [1] in Bangladesh. Planting time has a significance effect on light intensity; photoperiod, day and night temperature thus may affect the flower initiation, fruiting, yield and quality of the crops. Early sowing provided higher yield than late sowing as a consequence of longer growing period [2,3] with vigorous growth (Kirby, 1993). Early crop set up i.e., early planting is one of the important factors for elevated production [4]. On the other hand the protein content and yield was also found to be maximum in wheat grain while it sown in proper time [5]. Sowing method is an important factor for crop vigourity and ultimate yield [6]. So, it is important to find out the proper planting time and seedling raising method for not only in agro-technical factors but also in economic approach. The present study was carried out to clarify the effect of most favorable planting time and the proper seedling emergent method for growth and yield of capsicum in Bangladesh.

### Materials and Methods

**Location and period:** A Two factorial experiment was conducted from October 2010 to April 2011 at Vegetable Research Farm, Olericulture division, HRC, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur, Bangladesh.

**Genetic material:** BARI Mistimorich -1 was used as a genetic material of the experiment.

**Experimental Design:** Randomized Complete Block Design (RCBD) was followed for the experimental design.

**Treatments of the experiment:** The treatments included four sowing times and two seedling raising methods (i.e., 8 treatment combinations) with three replications. The seeds were sown in four different dates 1<sup>st</sup> October (P<sub>1</sub>); 15<sup>th</sup> October (P<sub>2</sub>); 1<sup>st</sup> November (P<sub>3</sub>) and

15<sup>th</sup> November ( $P_4$ ), 2010 while two seedlings raising method double transplanting method ( $S_1$ ) and direct sowing ( $S_2$ ) were used in this experiment.

**Seedling transplantation:** Thirty days old seedlings were transplanted in the main field in each of the sowings. 10g seeds were needed for sowing per planting date.

**Fertilization, irrigation and other intercultural operation:** The crop was fertilized with cowdung (10 t/ha), Urea (217 kg/ha), TSP (333 kg/ha), MP (200 kg/ha), Gypsum (111 kg/ha) and ZnO (5 kg/ha). Half of cowdung was applied during final land preparation. The remaining half of Cowdung, entire quantity of TSP, ZnO, Gypsum and one third each of urea and MP were applied during pit preparation. The rest of Urea and MP were applied in two equal splits, 25 and 50 days after transplanting in the main field. Irrigation along with other intercultural operations was done as and when needed.

**Data collection and analysis:** Data were collected in different parameters from randomly selected five plants in each plot. Collected data were statistically analyzed by MSTAT-C computer package program and mean differences were determined by Duncan's Multiple Range Test (DMRT) at both 1% and 5% level of significance [7].

## Results

### Effect of planting time

**Plant height, duration and number of fruits:** Plant heights gradually increased when recorded at two different harvesting stages. Plants of October 1<sup>st</sup> sowing to 15<sup>th</sup> October sowing attained the maximum heights which were 29.54 cm and 40.56 cm at 1<sup>st</sup> and last harvest respectively. Lowest heights obtained from the plants sown at 15<sup>th</sup> November sowing (Table 1). Plants from 1<sup>st</sup> October sowing date produced the maximum number of fruits (6.13/plant and 121.54/plot) while minimum from  $P_3$  (4.13/plant) and  $P_4$  (68.85/plot) (Table 1). Plants from  $P_4$  (November 15<sup>th</sup>) flowered later (106.88 days) compared to the other sowings but no such inclination was followed in case of days to first harvest due to the main effect of planting time i.e., 130.09 days required for first harvest on same planting date whereas plants from  $P_1$  flowered earlier (99.79 days) but 1<sup>st</sup> harvest was in later (149.45 days) (Table 1).

Treatments	Plant height (cm)				Days to 50% flowering	Number of fruits/plant	Number of fruits/plot	Days to 1 <sup>st</sup> harvest				
	1 <sup>st</sup> harvest		final harvest									
$P_1$	29.54	a	40.56	a	99.79	c	6.13	a	121.54	a	149.45	a
$P_2$	28.65	ab	39.78	ab	104.28	b	4.99	b	103.76	b	145.89	b
$P_3$	27.09	b	39.05	b	106.12	ab	4.13	c	79.37	c	147.65	ab
$P_4$	25.78	c	38.45	b	106.88	a	5.76	b	68.85	d	130.09	c
Level of Sig.	**		**		**	**	**	**	**	**	**	**

**Table 1:** Effect of planting time on plant height, 50% flowering, number of fruits/plant, number of fruits/plot and days to 1<sup>st</sup> harvest of BARI Mistimorich-1.

Here; sowing on 1<sup>st</sup> October ( $P_1$ ); 15<sup>th</sup> October ( $P_2$ ); 1<sup>st</sup> November ( $P_3$ ) & 15<sup>th</sup> November ( $P_4$ ), 2010

\*\*significant at 1% level of probability

**Fruit weight, length, breadth and yield:** The effect of planting time was found to be significant at 1% level of probability regarding individual fruit weight, yield/plant and yield/plot as well as yield /ha. Fruit length, fruit breadth and yield/plot were significant at 5% level. In case of planting time it was found that 15<sup>th</sup> October ( $P_2$ ) planting produced fruits with higher individual fruit weight (49.31 g) followed by 1<sup>st</sup> October ( $P_1$ ) sowing (45.75 g) (Table 2).  $P_1$  and  $P_2$  were found to be statistically identical in case of fruit length and breadth. Maximum yield was found from  $P_2$  (321.69 g/plant, 5.67 kg/plant and 15.8 t/ha) while minimum from  $P_4$  (185.30 g/plant, 3.12 kg/plot and 9.70 t/ha) (Table 2).

Treatments	Individual fruit						Yield					
	weight (g)		length (cm)		breadth (cm)		g/plant		kg/plot		t/ha	
P <sub>1</sub>	45.75	b	5.87	a	6.16	a	276.64	bc	4.21	a	14.2	ab
P <sub>2</sub>	49.31	a	5.49	a	6.18	a	321.69	a	5.67	a	15.8	a
P <sub>3</sub>	43.29	c	5.46	ab	5.89	c	254.20	d	3.87	b	12.4	c
P <sub>4</sub>	43.10	c	5.30	b	5.65	b	185.30	de	3.12	bc	9.70	d
Level of sig.	**		**		*		*		*		**	

**Table 2:** Effect of planting time on fruit weight, length, breadth and yield of BARI Mistimorich-1.

Here; sowing on 1<sup>st</sup> October (P<sub>1</sub>); 15<sup>th</sup> October (P<sub>2</sub>); 1<sup>st</sup> November (P<sub>3</sub>) & 15<sup>th</sup> November (P<sub>4</sub>), 2010

\*\*significant at 1% level of probability and \*significant at 5% level of probability

### Effect of seedling raising method

**Plant height, duration and number of fruits:** The effect of seedling raising was found to be significant on plant height at 1<sup>st</sup> and last harvesting stages. It was found that the direct sowing produced the plants with higher heights both two stages of harvesting compared to double transplanting method which were 28.53 cm and 43.67 cm respectively (Table 3). 50% flowering was earlier in double transplanting method (107.87 days) than direct sowing method (110.21 days) (Table 3). Flowering occurred earlier in plants from double transplanting method but number of fruits was maximum (6.12/plant and 90.83/plant) under direct sowing method (Table 3). First harvest was earlier at direct sowing method (137.90 days) (Table 3).

Treatments	Plant height (cm)				Days to 50%		No. of		No. of		Days to 1 <sup>st</sup>	
	1 <sup>st</sup> harvest		final harvest		flowering		fruits/plant		fruits/plot		harvest	
S <sub>1</sub>	27.25	b	42.32	b	107.87	b	5.46	ab	80.18	b	141.39	a
S <sub>2</sub>	28.53	a	43.67	a	110.21	a	6.12	a	90.83	a	137.90	b
Level of sig.	**		**		**		**		**		**	

**Table 3:** Effect of seedling raising method on plant height, 50% flowering, number of fruits/plant, number of fruits/plot and days to 1<sup>st</sup> harvest of BARI Mistimorich-1.

Here; Double transplanting method (S<sub>1</sub>), Direct sowing (S<sub>2</sub>)

\*\*significant at 1% level of probability

**Fruit weight, length, breadth and yield:** The effect of seedling raising method was found to be significant at 1% level of probability regarding individual fruit weight, fruit length, fruit breadth and at 5% level regarding yield/plant, yield/plot and yield/plot as well as yield/ha. It was found that S<sub>2</sub> produced fruits with higher individual fruit weight (44.69g) with maximum individual fruit breadth (6.80 cm) while S<sub>1</sub> produced longest fruit (5.80 cm). Maximum yield was found from S<sub>2</sub> (264.87 g/plant, 3.79 kg/plot and 12.25 t/ha) while minimum from S<sub>1</sub> (254.62 g/plant, 3.75 kg/plot and 11.87 t/ha) (Table 4).

Treatments	Individual fruit						Yield					
	weight (g)		length (cm)		breadth (cm)		g/plant		kg/plot		t/ha	
S <sub>1</sub>	43.08	b	5.80	a	5.60	b	254.62	ab	3.75	ab	11.87	b
S <sub>2</sub>	44.69	a	5.69	b	6.80	a	264.87	a	3.79	a	12.25	a
Level of sig.	**		**		**		*		*		*	

**Table 4:** Effect of seedling raising method on fruit weight, length, breadth and yield of BARI Mistimorich-1.

Here; Double transplanting method (S<sub>1</sub>), Direct sowing (S<sub>2</sub>)

\*\*significant at 1% level of probability and \*significant at 5% level of probability

**Combined effect of planting time and seedling raising method**

**Plant height, duration and number of fruits:** The combined effect of planting time and method of seedling raising indicated that at 1<sup>st</sup> harvest was statistically insignificant along with at final harvest. The Combined effect of 50% flowering was significant at 5% probability level. The combined effect was found to be significant on number of fruits/plant, number of fruits/plot and days to first harvest at 1% level of probability. It was also found that seeds sowing at 1<sup>st</sup> October using direct sowing method (P<sub>1</sub>S<sub>2</sub>) produced the maximum number of fruits (7.95/plant and 152.07/plot) (Table 5). Earlier flowering was noticed at P<sub>1</sub>S<sub>1</sub> (93.65 days) while 1<sup>st</sup> harvest from P<sub>4</sub>S<sub>2</sub> (146.00 days) (Table 5).

Treatment	Plant height (cm)		Days to 50% flowering		No. of fruits/plant		No. of fruits/plot		Days to 1 <sup>st</sup> harvest	
	1 <sup>st</sup> harvest	Final harvest								
P <sub>1</sub> S <sub>1</sub>	26.79	44.37	93.65	f	7.91	a	122.98	b	167.00	a
P <sub>2</sub> S <sub>1</sub>	27.01	45.16	101.03	f	7.95	a	152.07	a	155.87	b
P <sub>3</sub> S <sub>1</sub>	24.24	42.22	106.33	de	6.37	ab	76.77	de	149.90	c
P <sub>4</sub> S <sub>1</sub>	24.79	43.76	104.52	de	5.77	b	98.48	c	148.07	cd
P <sub>1</sub> S <sub>2</sub>	23.27	34.09	107.50	d	5.09	c	70.12	ef	153.65	b
P <sub>2</sub> S <sub>2</sub>	23.98	35.32	112.02	cd	5.62	b	79.34	de	142.67	c
P <sub>3</sub> S <sub>2</sub>	24.56	33.54	114.00	abc	4.76	cd	56.87	f	146.28	d
P <sub>4</sub> S <sub>2</sub>	25.03	37.14	113.05	abc	5.01	c	71.18	e	146.00	d
Level of Sig.	NS	NS	*		**		**		**	
CV (%)	6.34	7.13	4.18		6.48		7.23		5.39	

**Table 5:** Combined effect of planting time and seedling raising method on plant height, 50% flowering, number of fruits/plant, number of fruits/plot and days to 1<sup>st</sup> harvest of BARI Mistimorich-1.

Here; sowing on 1<sup>st</sup> October (P<sub>1</sub>); 15<sup>th</sup> October (P<sub>2</sub>); 1<sup>st</sup> November (P<sub>3</sub>) & 15<sup>th</sup> November (P<sub>4</sub>), 2010 and Double transplanting method (S<sub>1</sub>), Direct sowing (S<sub>2</sub>)

**Fruit weight, length, breadth and yield:** The combined effect of insignificant regarding at individual fruit weight but fruit length, breath, yield/plant as well as yield/ha was found to be significant at 1% level of probability whereas yield/plot was found to be significant at 5% level of probability. It was found that P<sub>1</sub>S<sub>2</sub> produced fruits with higher individual fruit weight (46.39 g). P<sub>2</sub>S<sub>1</sub> produced longest fruit (6.22 cm) maximum individual fruit breadth (6.55 cm). Maximum yield was found from P<sub>2</sub>S<sub>2</sub> (307.45 g/plant, 4.56 kg/plant and 19.37 t/ha) (Table 6).

Treatment	Individual fruit					Yield					
	weight (g)	length (cm)		breadth (cm)		g/plant		kg/plot		t/ha	
P <sub>1</sub> S <sub>1</sub>	36.23	6.01	ab	6.11	ab	259.63	c	3.39	d	14.08	c
P <sub>2</sub> S <sub>1</sub>	37.00	6.22	a	6.55	a	253.56	cd	3.56	bc	15.55	bc
P <sub>3</sub> S <sub>1</sub>	42.06	5.85	b	6.36	ab	297.42	bc	4.17	b	15.54	bc
P <sub>4</sub> S <sub>1</sub>	39.34	5.49	c	6.7	a	234.76	d	4.29	ab	15.70	b
P <sub>1</sub> S <sub>2</sub>	46.39	5.47	c	5.67	bcd	299.76	b	3.59	bc	18.39	a
P <sub>2</sub> S <sub>2</sub>	44.67	5.61	bc	5.69	bc	307.45	a	4.56	a	19.37	a
P <sub>3</sub> S <sub>2</sub>	35.18	5.77	bc	5.27	de	189.20	de	2.43	c	10.32	de
P <sub>4</sub> S <sub>2</sub>	41.18	5.84	b	5.81	b	145.76	e	2.47	c	10.39	d
Level of Sig.	NS	**		**		**		*		**	
CV (%)	7.1	4.67		4.03		4.83		3.93		4.4	

**Table 6:** Combined effect of planting time and seedling raising method on fruit weight, length, breadth and yield of BARI Mistimorich-1. Here; sowing on 1<sup>st</sup> October (P<sub>1</sub>); 15<sup>th</sup> October (P<sub>2</sub>); 1<sup>st</sup> November (P<sub>3</sub>) & 15<sup>th</sup> November (P<sub>4</sub>), 2010 and Double transplanting method (S<sub>1</sub>), Direct sowing (S<sub>2</sub>)

## Discussion

From the current study it was found that early planting of capsicum performed better than the late planting in terms of growth and yield. On the other hand, direct seed sowing showed better growth and yield than the double transplanting method. Though both methods were suggested for capsicum cultivation [8] but direct sowing was better than double transplanting in Bangladesh. It was emphasized to use appropriate spacing and plant arrangements for better capsicum production [9]. Fertility rate also depends on proper planting time [10] thus ultimately affect the yield. Earlier sowing caused better fruit development due to longer growing period and vice versa [10]. This study also showed that planting on too early reduced growth and yield of capsicum and this may be due to that the plant did not get suitable growing conditions at their early growth and development stage also in flowering and fruiting stage.

## Conclusion

The effect of planting time and method were found significant in individually and combinedly to the parameters individual fruit weight, fruit length, fruit breadth, and yield. Though the fruit size in respect of length and breadth was statistically significant but the values were very close and carry insignificant contribution from the practical point of view. From the study it can be concluded that planting should be done at 15<sup>th</sup> October following direct seed sowing would be the best practice for higher yield of capsicum (BARI Mistimorich-1).

## Conflict of Interest

No.

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