

Effects of planting time on the growth and yield of chili (*Capsicum annuum* L.)

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Abstract

Fourteen genotypes of chili (*Capsicum annuum* L.) from diverse sources were evaluated to determine the most suitable genotypes and planting time among the selected genotypes. The genotypes sown at two different times showed distinct differences across all fifteen quantitative measures. November-sown genotypes showed comparatively better results for all the quantitative traits except the days to 1st germination, plant height, number of primary branches, number of secondary branches and number of flowers per plant. Maximum fruit weight per plant was observed in BARI-I (376.02 gm) and Jhilik (377.37 gm), which were sown in October and November, respectively. Among the October-sown genotypes, BARI-I recorded the highest fruit yield (18.80 ton/ha) followed by Jhilik (16.17 ton/ha) and Morich King (13.73 ton/ha), while among the November-sown genotypes, Jhilik (18.87 ton/ha) showed the foremost result, followed by Morich King (13.79 ton/ha), BARI-I (13.67 ton/ha) and Bullet 303 (11.06 ton/ha). The findings demonstrated that the genotypes differed significantly in most traits in both seasons, offering a good opportunity to select appropriate genotypes for each season for commercial purposes.

Keywords: *Capsicum annuum* L., chili genotypes, planting time, yield.

INTRODUCTION

Capsicum spp. (*C. frutescens* and *C. annuum* L.) commonly known as chili, belong to the family Solanaceae and possess a chromosome number of $2n = 2x = 24$, along with an enormous wealth of genetic diversity. Chili fruits are consumed as fresh, dried or processed products; moreover, the green fruit of chili is one of the richest sources of vitamin C and A (Howard, 2000). Due to its color and pungency, it is grown all the year round in the country and used in green and dry stages (Basavaraj, 2008). Chilli is considered as the first spice to have been used by humans and there is archaeological evidence of chili along with other fossil foods, dating back as early as 6000 years ago (Hill *et al.*, 2013).

An important source for new traits is the genetically diverse pool of chili germplasm available in the country, which remains largely unexplored. There is a strong need to collect these germplasms and their proper characterization and classification (Hasan *et al.*, 2014). Chili is grown practically all over Bangladesh in Rabi and Kharif seasons, and the area under cultivation is 259,383 acres. Most of the varieties cultivated in Rabi season and production is about 176,134 metric tons (66,235 ha), but the yield is only 3.68 metric ton per hectare (BBS, 2018). The lack of improved genotypes is the main constraint to

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low yield. Assessment of different desirable traits spread over diverse genotypes is important for rapid advances in the yield improvement of any crop.

In Bangladesh, chili is grown throughout the year in all parts of the country. While winter chili is grown between the months of October to April, and accounts for about 70% of total production. At least 32 local varieties are cultivated in Bangladesh (BBS, 2020). Heavy rainfall is a problem for chili cultivation because chili cannot tolerate heavy rainfall. In the winter, production is hampered due to a lack of irrigation as well as minimal rainfall. Therefore, the purpose of the study is to conduct a comparative analysis of growth, yield and yield attributes among the selected genotypes of chili (*Capsicum annuum* L.) under two different planting times and to determine the most suitable genotype and planting time among the selected genotypes.

MATERIALS AND METHODS

The field experiment was conducted in the experimental field of Botanical Garden of Jahangirnagar University (GPS coordinate: 23°52'28.0"N 90°16'05.6"E) during the year 2024-2025. Fourteen genotypes of chili were collected from different sources and seed markets (Siddique Bazar, Dhaka) in Bangladesh and are presented in Table 1. The seeds of the collected genotypes were soaked in water for 4 hours and sown in prepared tubs (Plate 1). The thirty-seven-days-old healthy seedlings were transplanted to the experimental field.

Table 1. The list of fourteen chili genotypes and their sources

SI No.	Genotypes Code No.	Name of the genotypes	Sources/Seed company
1	G ₁	Suryamukhi	Bankim Proshad Ghosh Seeds Pvt. Ltd.
2	G ₂	Bogura Jhal Morich	Silver Seed Company
3	G ₃	BARI-1	BARI, Gazipur
4	G ₄	BARI-2	BARI, Gazipur
5	G ₅	BARI-4	BARI, Gazipur
6	G ₆	Bullet 1920	Bankim Proshad Ghosh Seeds Pvt. Ltd.
7	G ₇	Jhilik	S.P. Seed Co.
8	G ₈	Local variety Narail	Narail, Jessore
9	G ₉	Bullet	Bankim Proshad Ghosh Seeds Pvt. Ltd.
10	G ₁₀	Morich King	Lal Teer Seed Ltd.
11	G ₁₁	Dudhjal	Narail, Jessore
12	G ₁₂	Kalo Morich	Oriental Seed Company
13	G ₁₃	Bullet 303	IPL seeds
14	G ₁₄	Black Cobra	Bankim Proshad Ghosh Seeds Pvt. Ltd.

*G = Genotype

The genotypes were evaluated through a field experiment conducted in a Randomized Complete Block Design (RCBD) with three replications at the Botanical Garden of Jahangirnagar University during. The size of each plot was 1 m × 1 m at a spacing of 30 cm × 30 cm, accommodating 6 plants per plot (Plate 1). A balanced fertilization program

was maintained for healthy development of the crops in the field. Due to the sandy loam nature of the soil, various types of fertilizers (cowdung-40 kg, urea-1.6 kg, TSP-1kg, MOP-600 gm and Gypsum-200 gm per decimal) were used in the field periodically. Fourteen chili genotypes with two planting time were used as treatments. First sowing date was 2nd October, 2024 and the second sowing date was 19th November, 2024 which were transplanted on 7th November, 2024, and 25th December in the experimental field, respectively.

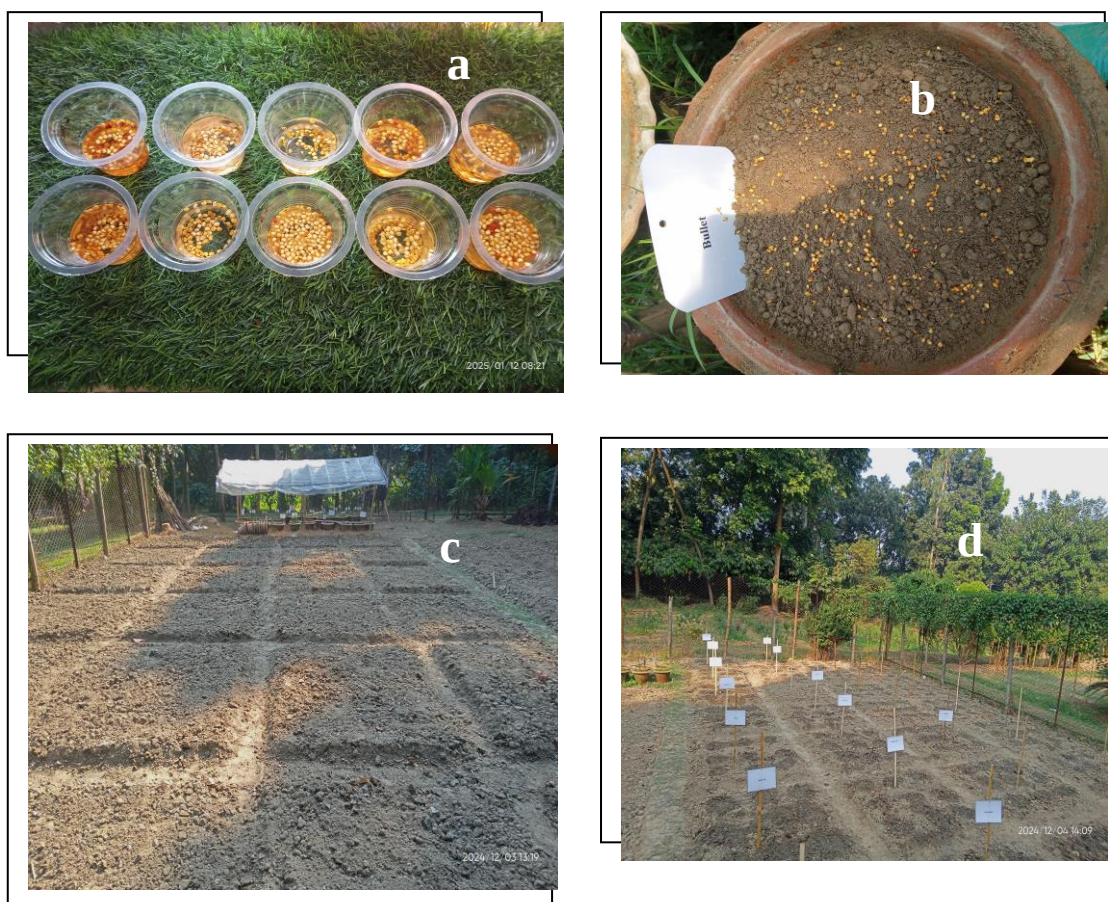


Plate 1 (a-d). Photographs showing the preparation of seed and the experimental field.

a) Seeds were soaked in water for four hours b) Seeds were sown in the tubs c) The experimental field d) Seedlings were transplanted to the experimental plots

Five competitive plants were selected at random from each single plot in each replication and phenotypic data were recorded for fifteen morphological characters viz. days to 1st germination, plant height (cm), primary and secondary branches, initiation of flowering, days to 80% flowering, flowers per plant, fruits per plant, weight per fruit (gm), fruit length (cm), fruit diameter (cm), days to 1st harvesting, days to final harvesting, fruit yield

per plant (gm) and total yield (ton per hectare). The statistical analysis was carried out for each observed character under the study using MS-Excel and IBM SPSS version 23 packages. The analysis of variance as described by Gomez and Gomez (1984) for Randomized Complete Block Design was followed to subject the mean values of each genotype in each replication and all the characters to the analysis. Duncan's Multiple Range Test (DMRT) was performed at 0.01 level to test the differences among the studied genotypes.

RESULTS AND DISCUSSION

The planting dates had a significant influence on the growth parameters, yield contributing attributes and total yields of chili genotypes. Results showed that significant differences in each morpho-physiological character were due to planting dates. The impacts of sowing date on the growth parameters, yield contributing attributes, and yield of fourteen chili genotypes are shown in Table 2.

The lowest days to 1st germination (6 days) was observed in BARI-2, BARI-4, Local variety Narail, Bullet, Morich king, Dudhjal and Bullet 303 in October sowing, whereas BARI-2 and Dudhjal took the minimum days (14 and 15 days respectively) in November sowing. Results showed that significant differences of plant height of the chili genotypes were due to planting date. Plant height of all the genotypes showed better results during October sowing time than during November sowing time. Plant height and yield had a negative correlation which is shown in Tables 3.1 and 3.2. It has been reported that the effect of transplanting time in relation to the change in the environmental temperature will be reflected primarily by the plant height (Islam *et al.*, 2017). In case of tomato, plant height decreased with the late planting from optimum time due to environmental situations (Islam *et al.*, 2017).

Highest number of primary branches was observed in the Local variety Narail in both seasons (7.8 and 7, respectively) whereas the highest number of secondary branches was in Jhilik in both seasons (8.6 and 7.8, respectively). Considering the days to first flowering, Bogura jhal morich took minimum days in both October (51.2 days) and November (46.8 days) plantation. In contrast, Dudhjal took maximum days, 86.4 and 87.4 days respectively in both the planting seasons. The genotype BARI-1 required 71.0 and 68.8 days for 80% flowering in October and November-sowing seasons respectively whereas, Dudhjal and Bullet needed much time (100.6 and 96.8 days) for flowering.

Significant variation was observed in days to 1st and days to final harvesting during the both planting seasons studied (Table 2). BARI-1 (60.8 days), Morich king (61.4) and Jhilik (61.6 days) took the minimum days to first harvesting in October planting period, while Bogura jhal morich (56 days) and BARI-1 (58 days) showed the best result in the November planting period. The highest, 94 days were required for 1st harvesting for Dudhjal in both the studied periods. Among the fourteen genotypes, six of them viz., Bullet 1920, Jhilik, Bullet, Kalo morich and Bullet 303, showed better results for final harvesting in the October planting period (Table 2), while other genotypes showed best

results in November. The genotype Jhilik had the best performance for the number of pickings (5 and 6 respectively) in both seasons followed by Morich king (5). The highest number of flowers was observed in Jhilik in both the seasons (137.2 and 150.06, respectively) while the lowest number was in Dudhjal (19.2) during October and BARI-2 (22.7) during November (Table 2).

The number of fruits per plant varied significantly, ranging from 10.6 to 125.2 (October) and 14.2 to 125.8 (November). The genotype BARI-1 produced the maximum number of fruits per plant (125.2) in October, followed by Jhilik (107.8). On the contrary, Jhilik produced the highest number of fruits per plant (125.8) during the November season. The lowest fruit set (10.6) was observed in Dudhjal during October and Suryamukhi (14.2) during November (Table 2), indicating that the performance of the trait depends on the sowing and planting time of the studied genotypes. Chilli was significantly different from one cultivar to another in the number of fruits (Obidiebube *et al.*, 2012). The difference in yield of cultivars has been attributed to their genetic make-up (Odeleye and Odeleye, 2001; Akinfosoye *et al.*, 1997).

Highly significant variation was observed in the fruit weight per plant across all genotypes (Table 2). The highest green fruit weight was obtained from BARI-1 (376.02 gm), followed by Jhilik (323.23 gm), sown in October. Whereas the highest weight in the November season was recorded in Jhilik (377.38 gm), followed by Morich king (275.71 gm). On the contrary, the lowest fruit weight was observed in Dudhjal (17.60 gm) during the first sowing time (Table 2) and Suryamukhi (25.63 gm) followed by Dudhjal (45.67 gm) during the second sowing time (Table 2). During both seasons, Dudhjal showed poor results in fruit weight. Manju and Sreelathakumary (2002) reported the yield of 51.31-1649.72 gm per plant in India. This variation may be due to differences in genotypes and growing seasons.

Table 2. Effects of planting time on the growth parameters and yield of fourteen chili genotypes

Genotypes	Planting time	Days to 1 st germination	Plant Height (cm)	Number of Primary Branches	Number of Secondary Branches	Days to 1 st Flowering	Days to 80% Flowering	Days to 1 st Harvesting	Days to Final Harvesting
G ₁	October	8.0±0.00	108.30±6.45b	6.20±0.73bcde	7.80±0.73ab	67.6±0.24f	89.2±0.58de	73.6±0.24c	148.0±0.00
	November	24.00±0.00	95.61±5.05bc	6.00±0.63cde	7.20±0.73ab	59.00±1.45cd	83.00±2.61c	66.00±0.00e	152.00±0.00
G ₂	October	10.0±0.00	80.80±10.32a	4.0±0.55ab	7.2±0.73ab	51.2±0.37a	76.6±0.24b	62.8±0.49b	152.0±0.00
	November	18.00±0.00	75.90±9.36ab	3.80±0.49abc	6.80±0.49ab	46.80±0.58a	72.60±2.06a	56.00±0.00a	156.00±0.00
G ₃	October	8.00±0.00	81.20±8.88a	4.80±0.97abcd	5.80±0.20a	55.00±0.32b	71.00±0.32a	60.80±0.20a	146.00±0.00
	November	19.00±0.00	65.52±6.12a	4.20±0.80abc	6.00±0.32a	52.80±0.73b	68.80±1.36a	58.00±0.00b	163.00±0.00
G ₄	October	6.00±0.00	147.80±6.58d	2.20±0.37a	6.00±0.55a	70.00±0.32g	90.60±0.24f	81.60±0.24g	147.00±0.00
	November	14.00±0.00	115.04±6.29cdef	2.80±0.37a	5.80±0.49a	68.40±1.21f	86.00±1.05cd	77.00±0.00h	158.00±0.00
G ₅	October	6.00±0.00	103.60±9.36ab	4.40±1.12abcd	7.20±0.73ab	52.00±0.32a	89.40±0.24e	81.40±0.24fg	146.00±0.00
	November	18.00±0.00	103.68±9.20cd	4.80±0.97abcde	6.80±0.49ab	52.40±0.68b	87.60±1.08cd	68.00±0.00f	162.00±0.00
G ₆	October	7.00±0.00	133.40±3.36cd	4.40±1.47abcd	7.00±0.77ab	74.00±0.32i	88.20±0.37cd	82.60±0.24h	151.00±0.00
	November	19.00±0.00	125.90±3.13def	3.60±0.98ab	6.60±0.24ab	76.40±0.68g	96.80±0.49f	83.00±0.84j	143.00±0.00
G ₇	October	8.00±0.00	119.80±11.40bc	6.40±0.60bcde	8.60±0.68b	51.80±0.49a	76.60±0.24b	61.60±0.24a	157.00±0.00
	November	19.00±0.00	113.12±10.60cde	5.80±0.73bcde	7.80±0.73b	54.20±0.73b	77.00±0.45b	60.40±0.40c	154.00±0.00
G ₈	October	6.00±0.00	136.20±5.60cd	7.80±0.92e	6.40±0.24ab	71.00±0.32h	94.00±0.45i	88.80±0.37j	160.00±0.00
	November	19.00±0.00	133.90±6.62efg	7.00±0.89e	6.20±0.20ab	67.60±1.29ef	93.40±0.68ef	76.40±0.24h	164.00±0.00
G ₉	October	6.00±0.00	139.60±9.53cd	3.80±0.49ab	7.60±1.08ab	67.60±0.24f	90.60±0.68f	87.80±0.49i	146.00±0.00
	November	18.00±0.00	137.70±9.04efg	3.40±0.40a	6.20±0.73ab	68.40±0.51f	87.00±1.30cd	79.40±0.68i	144.00±0.00
G ₁₀	October	6.00±0.00	135.50±7.78def	4.40±0.75abcd	7.60±1.12ab	58.60±0.24d	87.20±0.37c	61.40±0.24a	157.00±0.00
	November	19.00±0.00	134.00±8.17efg	4.40±0.40abcd	7.00±0.32ab	58.00±0.32cd	83.40±1.75c	62.80±0.73d	160.00±0.00
G ₁₁	October	6.00±0.00	141.40±7.70cd	7.20±1.46cde	6.20±0.37a	86.40±0.24j	100.60±0.51i	94.00±0.32k	156.00±0.00
	November	15.00±0.00	139.60±7.67fg	5.80±0.80bcde	6.00±0.32a	87.40±0.51h	96.80±2.50f	94.00±0.00k	163.00±0.00
G ₁₂	October	11.00±0.00	139.20±10.67cd	7.40±0.75de	7.80±0.37ab	65.40±0.40e	92.80±0.37g	77.60±0.24e	147.00±0.00
	November	17.00±0.00	135.84±11.45efg	6.60±0.75de	6.60±0.51ab	65.80±0.37e	89.40±1.12de	74.00±0.00g	144.00±0.00
G ₁₃	October	6.00±0.00	106.00±4.11b	6.80±0.92bcde	6.20±0.20a	56.40±0.24c	92.80±0.37g	74.60±0.24d	146.00±0.00
	November	19.00±0.00	103.30±3.09cd	5.00±0.32abcde	6.40±0.24ab	57.20±0.37c	85.80±1.39cd	73.60±0.68g	143.00±0.00
G ₁₄	October	8.00±0.00	158.60±4.76d	4.20±0.92abc	7.40±0.93ab	59.00±0.32d	92.00±0.32g	80.60±0.24f	146.00±0.00
	November	19.00±0.00	152.60±7.81g	5.00±0.45abcde	7.00±0.77ab	60.00±0.55d	85.80±0.97cd	76.60±0.24h	147.00±0.00

Data represent the mean of three observations. Means followed by the same letter(s) within the same column did not differ significantly from each other at the 1% level according to DMRT.

Here, G₁= Suryamukhi, G₂= Bogura Jhal Morich, G₃= BARI-1, G₄= BARI-2, G₅= BARI-4, G₆= Bullet 1920, G₇= Jhilik, G₈= Local variety Narail, G₉= Bullet, G₁₀= Morich King, G₁₁= Dudhjal, G₁₂= Kalo Morich, G₁₃= Bullet 303, G₁₄= Black Cobra

Table 2. Effects of planting time on the growth parameters and yield of fourteen chili genotypes (continued.)

Genotypes	Planting time	Number of pickings	Number of Flowers Per Plant	Number of Fruits Per plant	Fruit Weight Per Plant (gm)	Weight Per Fruit (gm)	Fruit Length (cm)	Fruit Diameter (cm)
G ₁	October	3.0±0.00	37.80±15.66a	23.4±0.40ab	42.67±0.48a	2.20±0.17ab	5.06±0.09c	0.7±0.08cd
	November	2.00±0.00	26.60±9.96a	14.20±2.56a	25.63±4.64a	2.32±0.20abc	5.10±0.05c	0.64±0.07bc
G ₂	October	4.00±0.00	89.60±10.07bcd	43.60±0.24ab	83.58±0.13abc	1.92±0.20ab	6.50±0.31d	0.46±0.02ab
	November	5.00±0.00	79.20±10.07cde	35.00±0.89ab	66.30±1.69ab	1.93±0.18abc	6.48±0.27d	0.48±0.04ab
G ₃	October	4.00±0.00	127.00±13.84de	125.20±0.86e	376.02±2.58e	4.24±0.47de	7.78±0.61e	0.96±0.07ef
	November	5.00±0.00	105.87±13.84ef	91.00±5.99de	273.31±18.00f	4.27±0.45efg	7.96±0.32e	0.94±0.07ef
G ₄	October	4.00±0.00	27.00±5.47a	20.80±4.31a	42.86±8.87a	2.24±0.24ab	6.82±0.08d	0.56±0.07abc
	November	4.00±0.00	39.00±6.9a	22.73±5.47ab	80.37±14.34ab	2.25±0.24abc	6.78±0.17d	0.56±0.07abc
G ₅	October	4.00±0.00	106.00±16.57cde	83.20±8.52cd	148.58±bc	2.47±0.31abc	6.38±0.22d	0.58±0.07abc
	November	4.00±0.00	120.67±16.50fg	106.80±4.07ef	190.72±7.26de	2.48±0.31bcd	6.46±0.18d	0.64±0.02bc
G ₆	October	2.00±0.00	35.80±7.17a	27.60±5.90ab	74.72±15.96abc	3.95±0.35de	4.46±0.21bc	1.28±0.04g
	November	2.00±0.00	70.73±7.17bcd	55.20±2.44b	149.44±6.60cd	4.14±0.27efg	4.44±0.20bc	1.26±0.05g
G ₇	October	5.00±0.00	137.20±29.55e	107.80±20.64de	323.38±61.93de	4.21±0.13de	8.40±0.20e	0.82±0.06de
	November	6.00±0.00	150.07±29.5g	125.80±12.19f	377.37±36.57g	4.35±0.10fg	8.38±0.23e	0.84±0.04de
G ₈	October	3.00±0.00	35.60±6.52a	20.40±1.50a	54.23±4.00a	3.33±0.43cd	5.10±0.11c	1.16±0.08fg
	November	5.00±0.00	74.80±6.52cde	59.20±1.98bc	157.36±5.28cde	3.33±0.44de	5.06±0.22c	1.22±0.06g
G ₉	October	2.00±0.00	53.00±8.01ab	33.40±3.91ab	102.50±11.99abc	3.35±0.45cd	5.02±0.11c	1.02±0.05ef
	November	3.00±0.00	54.87±8.01abc	36.40±1.57ab	111.70±4.81bc	3.38±0.42def	5.06±0.15c	1.08±0.05fg
G ₁₀	October	5.00±0.00	102.80±29.29cde	95.80±27.56de	274.56±78.98d	4.79±0.39e	10.54±0.21f	0.68±0.04bcd
	November	5.00±0.00	98.93±29.29def	96.20±23.96de	275.71±68.67f	4.84±0.42g	10.83±0.38f	0.70±0.03cd
G ₁₁	October	2.00±0.00	19.20±0.86a	10.60±0.93a	17.60±2.25a	1.410.11a	3.54±0.20a	0.40±0.05a
	November	4.00±0.00	44.73±0.86abc	34.60±5.11ab	45.67±6.75ab	1.43±0.13a	3.62±0.21a	0.44±0.05a
G ₁₂	October	3.00±0.00	36.00±6.58a	24.00±4.97ab	37.47±7.76a	1.78±0.16ab	5.14±0.13c	0.56±0.02abc
	November	3.00±0.00	66.47±6.58bcd	47.20±2.89b	73.70±4.51ab	1.80±0.17ab	4.98±0.23c	0.58±0.02abc
G ₁₃	October	4.00±0.00	64.00±10.57abc	55.40±11.72bc	153.20±32.40c	4.39±0.55de	4.88±0.17c	1.00±0.14ef
	November	3.00±0.00	92.00±10.57def	80.00±3.54cd	221.23±9.78ef	4.44±0.54g	4.7±0.22c	1.00±0.11ef
G ₁₄	October	2.00±0.00	48.60±13.09ab	24.80±3.25ab	59.48±7.79ab	2.84±0.30bc	3.92±0.25ab	1.00±0.11ef
	November	3.00±0.00	36.60±13.09ab	19.80±1.59a	47.49±3.82ab	2.86±0.29cd	3.89±0.28ab	1.02±0.10ef

Data represent the mean of three observations. Means followed by the same letter(s) within the same column did not differ significantly from each other at the 1% level according to DMRT. Here, G₁= Suryamukhi, G₂= Bogura Jhal Morich, G₃= BARI-1, G₄= BARI-2, G₅= BARI-4, G₆= Bullet 1920, G₇= Jhilik, G₈= Local variety Narail, G₉= Bullet, G₁₀= Morich King, G₁₁= Dudhjal, G₁₂= Kalo Morich, G₁₃= Bullet 303, G₁₄= Black Cobra

The other traits such as weight per fruit, fruit length and fruit diameter, exhibited a significant variation among all the genotypes (Table 2). The highest weight per fruit was found in Morich king in both seasons (4.79 gm and 4.84 gm, respectively), followed by Bullet 303 (4.39 gm and 4.44 gm). Meanwhile, the lowest weight per fruit was observed during the October and November planting season in Dudhjal (1.41 gm and 1.43 gm respectively), followed by Kalo morich (1.78 gm and 1.80 gm, respectively) (Table 2).

Fruit length, diameter and yield showed significant differences among the genotypes in both the studied periods (Table 2, Figure 1 and Plate 2). The genotype Morich king showed the best result in fruit length during both the periods (10.83 cm and 10.54 cm, respectively). The second highest result was observed in Jhilik (9.38 cm and 8.40 cm, respectively). On the other hand, the lowest length was obtained from Dudhjal (3.62 cm and 3.54 cm) during the October and November planting seasons, respectively. The highest fruit diameter was observed in Bullet 1920 during both the period (1.28 cm and 1.26 cm, respectively) while the lowest value was in Dudhjal during both seasons (0.40 cm and 0.44 cm, respectively). Fruit length and diameter had a strong correlation with the fruit weight per plant (Tables 3.1 and 3.2) in both seasons.

Moreover, yield had a strong and significant correlation with fruit weight per plant (Table 3.1 and 3.2). The yield and the fruit weight per plant showed strong correlation during both the periods. Large varietal variations in yields were also reported by Rajput *et al.*, 1991. The results obtained in this study are in close agreement with those of Uddin *et al.*, 2015, who recorded highly significant variability among different chili genotypes in Bangladesh.

Table 3.1. Correlation among the growth parameters of *Capsicum annuum* L. in October sowing period.

	D50E	PH	PB	SB	DFF	D80F	1 st Har.	FH	NoP	NFIP	NFrP	FWP	WPF	FL	FD	Yield
D50E	1															
PH	-.220	1														
PB	.102	.024	1													
SB	.198	-.024	-.107	1												
DFF	-.305*	.477**	.157	-.146	1											
D80%F	-.395**	.578**	.207	-.065	.686**	1										
1 st Har.	-.423**	.488**	.099	-.150	.757**	.833**	1									
FH	-.169	.123	.272*	.063	.235	.038	-.036	1								
NoP	.025	-.391**	-.063	.057	-.681**	-.562**	-.769**	.198	1							
NFIPP	.086	-.438**	-.153	.298*	-.640**	-.602**	-.615**	.060	.584**	1						
NFrPP	-.011	-.460**	-.142	.182	-.612**	-.634**	-.654**	.031	.641**	.912**	1					
FWP	-.037	-.404**	-.112	.152	-.545**	-.647**	-.660**	.087	.604**	.867**	.977**	1				
WPF	-.286*	-.128	-.024	.095	-.323**	-.329**	-.385**	.133	.344**	.430**	.518**	.598**	1			
FL	-.022	-.223	-.207	.160	-.537**	-.593**	-.744**	.262*	.840**	.600**	.675**	.672**	.397**	1		
FD	-.224	.072	.001	-.021	.010	-.053	.096	-.014	-.257*	.009	.061	.152	.475**	-.167	1	
Yield	-.037	-.404**	-.112	.152	-.545**	-.647**	-.660**	.087	.604**	.867**	.977**	1.000**	.598**	.672**	.152	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Here, D50E= Days to 50% emergence, PH= Plant height (cm), PB= Number of primary branches, SB= Number of secondary branches, DFF= Days to first flowering, D80%F= Days to 80% flowering, 1st Har. = Days to 1st harvesting, FH= Days to final harvesting, NoP= Number of pickings, NFIPP= Number of flowers per plant, NFrPP= Number of fruits per plant (gm), FWP= Fruit weight per plant (gm), WPF= Weight per fruit, FL= Fruit length (cm), FD= Fruit diameter (cm), Yield= Total yield (ton/ha).

Table 3.2. Correlation among the growth parameters of *Capsicum annuum* L. in November sowing period.

	D50E	PH	PB	SB	DFF	D80%F	1 st Har	FH	NoP	NFIPP	NFrPP	FWPP	WPF	FL	FD	Yield
D50E	1															
PH	-.220	1														
PB	.205	.159	1													
SB	.266*	-.033	.037	1												
DFF	-.416**	.546**	.041	-.197	1											
D80%F	-.236*	.585**	.176	-.118	.757**	1										
1 st Har	-.434**	.592**	.042	-.234	.913**	.828**	1									
FH	-.197	-.229	.082	-.089	-.078	-.181	-.209	1								
NoP	-.255*	-.215	.051	.052	-.366**	-.464**	-.494**	.689**	1							
NFIPP	.109	-.308**	-.076	.316**	-.434**	-.348**	-.482**	.196	.541**	1						
NFrPP	.005	-.260*	.054	.147	-.352**	-.259*	-.400**	.263*	.542**	.881**	1					
FWP	.110	-.253*	.027	.152	-.353**	-.338**	-.438**	.180	.553**	.885**	.950**	1				
WPF	.294*	-.135	-.118	.186	-.241*	-.175	-.273*	-.109	.185	.501**	.537**	.684**	1			
FL	.050	-.282*	-.175	.198	-.510**	-.544**	-.683**	.412**	.648**	.573**	.604**	.643**	.438**	1		
FD	.293*	.123	.001	-.056	.086	.170	.132	-.320**	-.172	.126	.139	.281*	.506**	-.187	1	
Yield	.110	-.253*	.027	.152	-.353**	-.338**	-.438**	.180	.553**	.855**	.950**	1.000**	.684**	.643**	.281*	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Here, D50E= Days to 50% emergence, PH= Plant height (cm), PB= Number of primary branches, SB= Number of secondary branches, DFF= Days to first flowering, D80%F= Days to 80% flowering, 1st Har. = Days to 1st harvesting, FH= Days to final harvesting, NoP= Number of pickings, NFIPP= Number of flowers per plant, NFrPP= Number of fruits per plant (gm), FWP= Fruit weight per plant (gm), WPF= Weight per fruit, FL= Fruit length (cm), FD= Fruit diameter (cm), Yield= Total yield (ton/ha).

Effect of different sowing dates on yield of chili is presented in Figure 1. The highest chili yield (18.87 ton/ha) was obtained from Jhilik during November sowing followed by October sowing BARI-1 (18.80 ton/ha). Kisha (1977) found that early transplanted onions produced significantly higher yields than onions transplanted later.

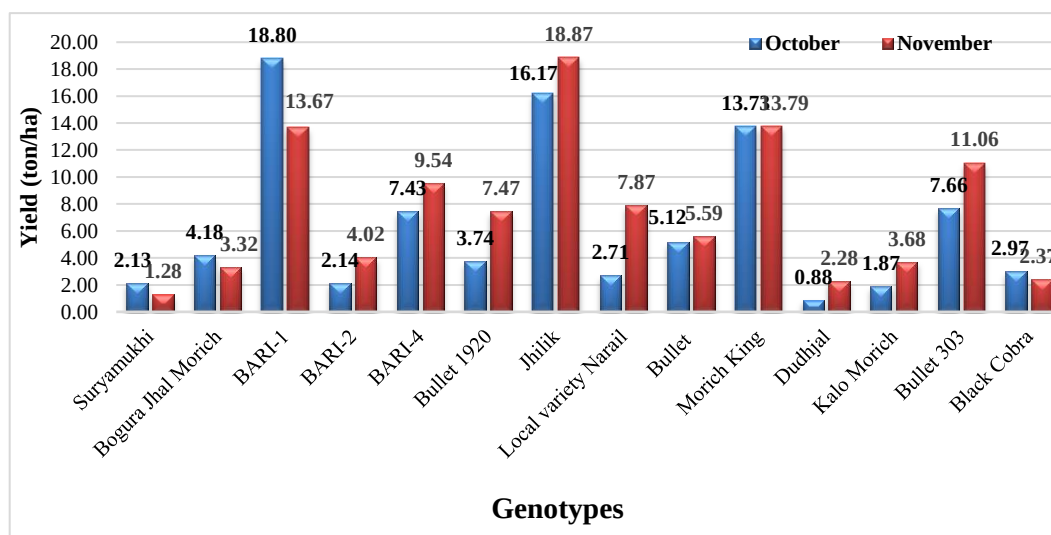


Fig. 1. Effect of two planting times on the yield of chili genotypes

The current results of morphological evaluation of chili germplasm are supported by the study of Hill *et al.* (2013). The findings of Thul *et al.*, 2009 and Ibiza *et al.*, 2012 further strengthen the current findings. Different planting times may affect crop yield and quality due to varying climatic conditions at different stages of crop growth and development (Hossain, 2021). For year-round chili production, November transplanting with BARI Morich-2 is preferable to other transplanting and variety options (Rahman *et al.*, 2023).



Plate 2 (a-d). Photographs showing different growth stages and fruits of chili.

a) Growth stage b) Flowering stage c) Flowers of a chili plant d) Fruits of different chili genotypes

Conclusion: In the present study, fourteen genotypes of chili (*Capsicum annuum* L.) from diverse sources were evaluated. The study was conducted to determine the suitable planting time and the suitable genotypes based on the morpho-physiological characteristics among them. The genotypes that were sown at two different times showed distinct differences in all quantitative measures. The studied characteristics had a strong correlation with each other. Genotypes sown in November showed comparatively better results for all the quantitative traits except the days to 1st germination, plant height, number of primary branches, number of secondary branches and number of flowers per plant. Maximum fruit weight per plant was observed in BARI-1 (376.02 gm) and Jhilik (377.38 gm) which were sown in October and November, respectively. The highest fruit yield was recorded in BARI-1 (18.80 ton/ha) that was sown in October followed by Jhilik (16.17 ton/ha) and Morich king (13.73 ton/ha) while November sown Jhilik (18.87

ton/hac) showed the foremost result followed by BARI-1 (13.67 ton/ha), Morich King (13.79 ton/ha) and Bullet 303 (11.06 ton/ha). The results showed that the genotypes varied considerably in the majority of the attributes across both seasons, providing an excellent opportunity to choose seasonally relevant genotypes for commercial purposes.

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