



Effect of sowing date on quality seed production of sweet pepper in Bangladesh

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Abstract

A field experiment was conducted to study the effect of sowing date on quality seed production of sweet pepper at the research farm of Seed Technology Division, Bangladesh Agricultural Research Institute, Gazipur, during 2011-2012. The aim of this study was to find out the optimum sowing date for quality seed production of sweet pepper. The treatments were 4 four sowing dates viz. 15 October, 30 October, 15 November and 30 November. Seeds were sown in seed bed for 1st sowing on 30 September, for 2nd sowing on 15 October, for 3rd sowing on 30 October and for 4th sowing on 15 November. The experiment was laid out in randomized complete block design (RCB) with three replications. The highest individual fruit weight, 1000 seed weight was obtained from the October 15 sowing date in the year of 2011-2012 and it was significantly different from all other dates of sowing. Maximum seed yield (86.2 kg ha⁻¹) was recorded in 2nd sowing date (15 October) followed by 3rd sowing date (30 October) treatment while the lowest was found from 4th sowing date (15 November) (30.72, kg ha⁻¹). Maximum seed quality as measured by moisture content, dry weight, vigour index and germination percentage were obtained at different sowing date. Maximum seed weight (mass maturity) was achieved at 1st sowing when average seed moisture contents were 5% and 4%, respectively. For high seed quality, sweet pepper is better sowing time at 2nd sowing time (15 October) which could be regarded as the point of physiological maturity.

Key words: Planting time, quality seed, sweet pepper, vigour index, germination

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Introduction

Pepper (*Capsicum spp.*) belongs to the family solanaceae under the genus capsicum. Sweet pepper is also known as bell pepper or green pepper. Either green or red may be eaten as cooked or raw as well as liked in salads. It is also used for pickling in brine, baking and stuffing. The leaves are also consumed as salads, soups or eaten with rice (Loveloock, 1973).

Sweet pepper (*Capsicum annum L*) is one of the most important vegetable crops grown extensively throughout the world especially in the temperate countries. The crop is very sensitive to environmental factors (Bhatt et al., 1992). Owing to its sensitivity, its yield is affected significantly. Capsicum is the most important summer crop of temperate regions but now a

days effort are being made to grow sweet pepper in Bangladesh (Paul, 2009). Some advanced farmers grow capsicum sporadically to meet the demand of the periphery of Dhaka city (Saha and Salam, 2004). Sweet pepper is a minor vegetable in Bangladesh and its production statistics are not available (Hasanuzzaman, 1999). Small scale cultivation is found in peri-urban areas primarily for the supply to some city markets in Bangladesh. It has got a good demand to some big hotels in the capital city to feed the foreigners residing in Bangladesh (Rashid, 1999).

Seed development is the period between fertilization and maximum fresh weight accumulation and seed maturation begins at the end of seed development and continues till harvest (Mehta *et al.*, 1993). The seed reaches its maximum dry weight at physiological maturity. Studies on seed development and physiological maturity become important because seeds should be sowing and harvested at proper time to ensure their quality in terms of viability and vigor. Seed quality can be limited by environmental conditions both before and after physiological maturity, the stage of development at which the seed possesses its maximum dry mass (Indira and Dharmalingam, 1996). Seeds gradually attain viability and vigor during the developmental process as seed dry weight is accumulated. Maximum seed quality may be achieved at the end of seed filling period (Tekrony and Egli, 1997) or slightly after this phase (Ghassemi-Golezani and Hosseinzadeh-Mahootchy, 2009). The end of seed filling phase is described as physiological maturity. Viability, the least discriminating measure of seed quality, is quickly gained during seed development and strongly maintained after maturity relative to germination ability.

Although not an environmental factor, sowing time is known to be a major factor responsible for physiological maturation, size and vigour of seed during maturation (Islam *et al.*, 2006; Mojumder *et al.*, 2007; Khatun *et al.*, 2008). The decision of when to sowing particularly under varying environmental

conditions is therefore of importance to get maximum seed quality (Hasan *et al.* 2006; Rahman *et al.* 2008; Ferdous *et al.*, 2014). Several studies examining the influence of seed development on seed quality in different crops have shown that sowing time is one of the major factors (Ferdous *et al.*, 2005; Mojumder *et al.*, 2007; Karim *et al.*, 2008; Ferdous *et al.*, 2008). Seed production for capsicum is inadequate. Most of the seeds used for cultivation are imported. Very small amount of seeds are present inside the capsicum fruit. As a results seed cost is very high. On the other hand, the package on quality seed production of capsicum is inadequate in our country. So the present study was taken to find out proper planting time for seed production of capsicum.

Materials and Methods

Site description and experimental design: The study was initiated at the research field and laboratory of Seed Technology Division, Bangladesh Agricultural Research Institute, Joydebpur, Bangladesh during October 2011 to May 2012 cropping season to find out the optimum sowing date for quality seed production of sweet pepper. The experiment was carried out in a randomized complete block design (RCBD) with 3 replications. The treatments were 4 four sowing dates viz. 15 October, 30 October, 15 November and 30 November. Seeds were sown in seed bed for 1st sowing on 30 September, for 2nd sowing on 15 October, for 3rd sowing on 30 October and for 4th sowing on 15 November. The study area is located at 24°09' N latitude and 90°41' E longitude with 16 m above mean sea level. The soils of this region are moderately acidic, low in organic matter content. Overall, the fertility level is low to medium, but the status of K and CEC is medium in most of the places. The land was well prepared by tractor driven disc plough followed by laddering. There were four treatments viz. 15 October, 30 October, 15 November and 30 November. Seeds were sown in seed bed for 1st sowing on 30 September, for 2nd sowing on 15 October, for 3rd sowing on 30 October and for 4th sowing on 15 November.. Zinc

sulphate monohydrate (ZnSO₄.H₂O) was used as a source of Zn. Urea, TSP, MOP, Gypsum and Boric acid were used as the sources of N,P,K,S and B, respectively.

Crop management: One month old seedlings were transplanted in the main field 30 October, 15 November, 30 November and 15 December, 2011. The unit plot size was 4m × 1m maintaining 50 cm × 40 cm plant spacing. The variety of capsicum was BARI Misti Morich -1. The fertilizer NPKS @ 100- 70-100-20 kg/ha was applied in the form of urea, TSP, MOP and gypsum along with cow dung 10 t/ha, half of the quantity of cow dung was applied during land preparation. The remaining cow dung, the entire quality of TSP, gypsum and one third each of Urea and MOP was applied are basal dose. Rest of N and K were applied in two equal splits at 25 and 50 days after transplanting. Intercultural operations were done when necessary. Germination test was conducted using sand medium in germination room maintained at 25^o c and 100% Relative Humidity (RH). Preventive measures were taken to control insect and diseases applying appropriate insecticides and fungicides.

Data collection and statistical analysis: After maturing randomly 5 plants were harvested to record the yield and yield contributing characters of sweet pepper. Fresh fruit yield was harvested from randomly pre-selected central areas (about 9 m²) of each plot and converted into tons per hectare (t ha⁻¹). Mean data was analyzed statistically and was carried out to analysis of variance (ANOVA) using the MSTAT-C (Gomez and Gomez, 1984). Further statistical validity of the differences among treatment means was estimated using the least significant difference (LSD) comparison method.

Results and Discussion

Effect of sowing time on yield and yield contributing characters of sweet pepper: As the result shown in the Table-1, significant difference was observed in average fruit weight. The highest fruit weight (175.93g) was

recorded from the 2nd sowing crop followed by the 1st sowing (172.02g). The lowest average fruit weight was recorded at 4th sowing (126.92g). The highest number of seed/fruit was found from 4th sowing (152.6) followed by 3rd (95.6) & 2nd (85.53) sowing and the lowest was found from 1st sowing (60.47). The number of seed/fruit was recorded highest (115.6) from 4th sowing fruit but statistically similar with 2nd & 3rd sowing. In case of weight of 1000 seed, the highest weight (8.48 g) was obtained from 2nd sowing followed by 1st sowing (8.23g). On the other hand, lowest weight of 1000 seed was obtained from 3rd (6.75g) and 4th (6.85g) sowing.

Table 1. Effect of sowing time on seed yield and yield components of Capsicum

Sowing date	Individual fruit weight (g)	Number of Seeds/ fruit	1000 seed weight (g)	Seed yield (kg/ha)
1 st sowing (30 September)	172.017	60.47	8.23	52.08
2 nd sowing (15 October)	175.93	82.53	8.48	82.6
3 rd sowing (30 October)	166.19	95.6	6.95	32.36
4 th sowing (15 November)	126.92	115.6	6.85	30.72
LSD (0.05)	32.27	47.24	0.91	23.48
Level of significance	**	**	**	**

** = Significant at 1% level of probability, NS = Not significant

From the Table 1 we can see that the weight of individual fruit decreased with the advancement sowing times but number of seed/fruit was increase from 1st sowing to onward. Initially the fleshes of fruits were developed better with the utilization at photosynthesis. On the other hand number of seeds increased in delay sowing. In case of seed yield (kg/ha), the highest yield (82.6 kg) was obtained from the 2nd sowing, followed by 1st sown (52.08 kg). There is a significant difference in seed yield (kg/ha) was observed. Significantly higher yield (82.6 kg/ha) was recorded from 2nd sowing than the other sowing. Significant difference was also observed in 1000 seed

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weight. Thousand seed weight at 1st & 2nd sowing are statistically similar. But seeds 3rd and 4th sowing were lower 1000 seed weight. Due to higher number of fruits per plant and higher 1000 seed weight seed yield was produced by the crop of 2nd sowing.

Effect of sowing time on germination, moisture, seedling dries weight and vigour of sweet pepper:

In Figure 1, moisture content of the seeds are shown. The range of the moisture percentage was 4.33-5.33. The highest germination percentage was also found quite similar in the 1st sowing (68%) and 2nd sowing

(67.33%). The germination percentage reduced to 44.33 to 36.67 in 3rd & 4th sowing. The highest seedling dry weight was observed in the 1st sowing (10.33g) and the lowest was found in the 2nd sowing (6.67g), whereas the similar seedling dries weight (7.67g) was found in the 3rd and 4th sowing. On the other hand, the highest vigor index was recorded from the 1st sowing (704) and the lowest was from the 4th sowing (286.67). The second highest vigor index was recorded at the 2nd sowing (449.67) followed by the 3rd sowing (339).

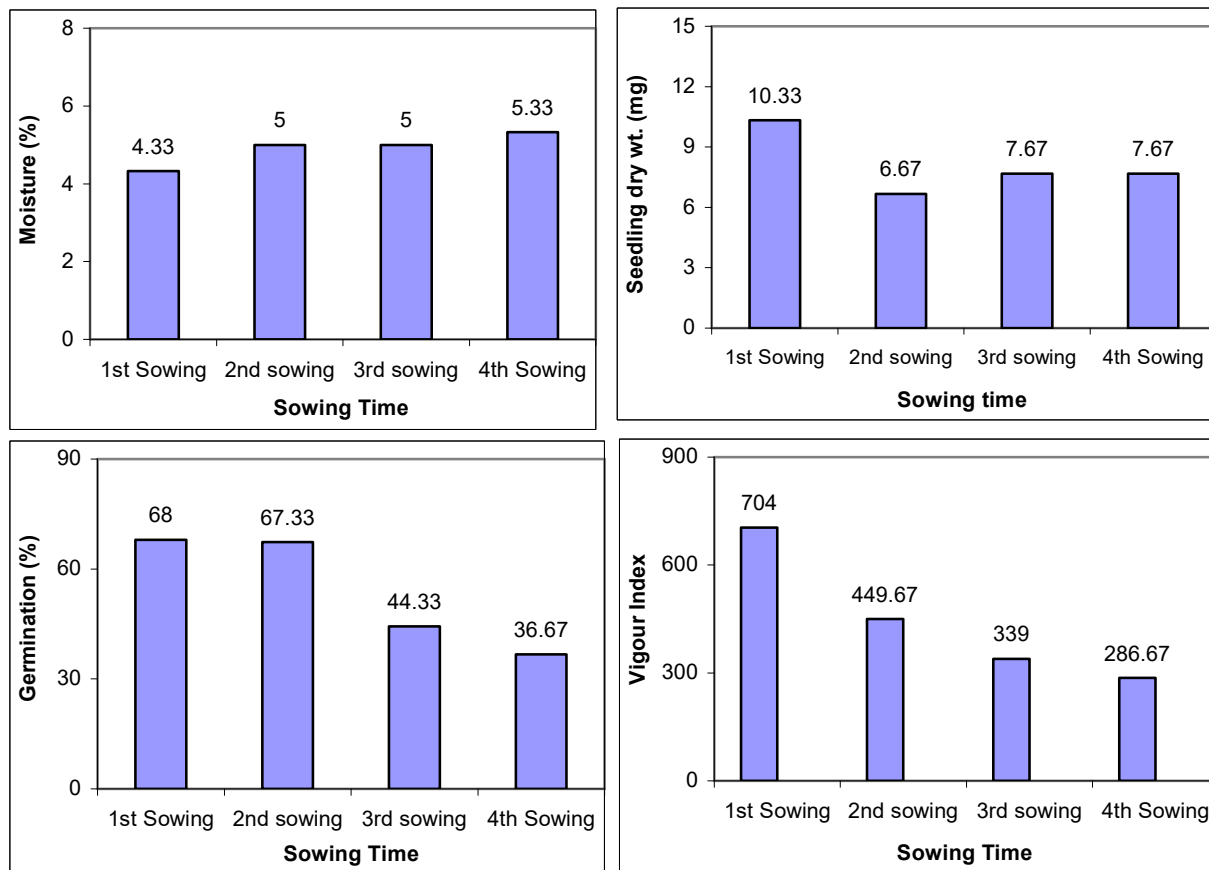


Figure 1. Effect of moisture, dry weight of seedlings, germination percentage and vigour index on sowing time sweet pepper

The highest individual fruit weight was observed in 2nd sowing (175.9 g). The higher individual fruit weight might be attributed due to better vegetative growth of the plants grown under optimum weather condition

(Islam *et al.*, 2006; Karim *et al.* 2008; Mahamood *et al.*, 2016; Ahmed *et al.*, 2017). The highest number of seeds (115.6) per plant was recorded in 4th sowing time when crop duration was short and lack of seed filling

period increasing number seeds per plant. The highest 1000 seed weight (8.4 g) was recorded from the 2nd sowing time it was suggested that quality seed produced from 2nd sowing time for capsicum in Bangladesh condition. Islam et al. (2006), Mojumder et al. (2007) and Karim et al. (2008) opined that optimum sowing time is very much effective for good quality seed production for different crop in Bangladesh. The highest seed yield (82.6 kg/ha) was observed in 2nd sowing time. Karim et al. (2008) also recorded better seed yield when the crop was grown at optimum sowing time.

Conclusion

From the result of this experiment, it may be concluded that 2nd sowing 15 October, showed better performance in respect average fruit weight, germination, 1000 seed weight and seed yield of capsicum. For high seed quality, sweet pepper is better sowing time at 2nd sowing time (15 October) which could be regarded as the point of physiological maturity.

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