



Effect of Sowing Date on Growth and Yield Performance of Pea (*Pisum sativum* L.)

Research Paper

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Abstract

An experiment was conducted at Bangabandhu Academy for Poverty Alleviation and Rural Development (BAPARD) agricultural farm, Kotalipara, Gopalganj during 13 November 2020 to 16 February 2021 to justify the optimum sowing date of pea (*Pisum sativum* L.) for getting the maximum vegetative growth and yield performance. The experiment was laid on Randomized Complete Block Design (RCBD) with four replications and three treatments. The plant height was recorded at 20, 40, 60 DAS are 19.79 cm, 20.98 cm, 16.76 cm, 54.61 cm, 59.52 cm, 46.10 cm, 62.12 cm, 64.97 cm, 49.71 cm, respectively with highest plant height (64.97 cm) was shown in 60 DAS. Number of pods per plant and length of pod of 13 November, 28 November and 13 December sowing are 10.05, 11.75, 8.55 and 9.01 cm, 9.54 cm, 8.51 cm was recorded with highest number of pods per plant (11.75). In case of plant height, number of pods per plant, number of seeds per pod, 100 seed weight, 28 November sowing gave maximum performance. Weight of single pod and green seed yield of 13 November, 28 November and 13 December sowing are 6.17 g, 6.72 g, 4.86 g and 6.99 t/ha, 8.58 t/ha, 4.85 t/ha respectively. The highest dry matter content (26.50%) and the highest green seed yield (8.58 t/ha) was given by 28 November sowing. However, it was evident from the present study that around 28 November sowing of pea is more suitable for different growth parameters and green seed yield for this region and that can be extended to all the districts of Bangladesh.

Keywords: Pea, growth, dry matter content, pod, yield

1. Introduction

Pea (*Pisum sativum* L.) is one of the most important legume vegetables in Bangladesh belonging to the family Fabaceae and subfamily Papilionoideae. The edible part is green leaves, green pods and seeds. The green peas or pods or immature seed is a popular vegetable. It is also quite nutritious and contains a fair amount of fiber and antioxidants. Additionally, research shows it may help protect against some chronic illness such as heart disease and cancer. Green pea is a very filling food, mostly due to the high amount of protein and fiber. It has several properties that may help support healthy blood sugar control (Elliot, 2017). It also rich in protein, vitamin and has a balanced amino acid composition. Moreover, some important mineral such as calcium, phosphorus, iron is present in abundant quantities in peas. It contains 15-35% protein, 20-50% starch, 4-10% sugar, 2-4% minerals

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and 0.6-1.5% fat (Makasheva, 1983). It has been part of the human diet for hundreds of years and is consumed all over the world. Peas are grown from ancient times and it is native to Southwestern Asia (De Candolle, 1886). Now-a-days it is grown in many parts of the world. In Bangladesh the minimum requirement of vegetable is 200g per head per day but the people consume only 23g vegetables per head per day (Rashid, 1993). So, we need to cultivate the different types of vegetables and should increase the vegetable production. At present pea cultivated area is 7468 hectare and the production of 13540 tons (BBS, 2016). The yield is comparatively lower in Bangladesh. USA produces 3.94 ton/ha, France produces 2.23 ton/ha whereas we produce only 0.82 ton/ha (Makasheva, 1983).

Pea has the capacity to fix atmospheric nitrogen to the soil. After harvesting of pea, the green part of the plant can be used as fodder and the organic matter content of the soil can be improved by incorporating of the vegetative part of the plant. Pea cultivation reduces the nitrogen application for the succeeding crops (Rana and Sharma, 1993). In Bangladesh the pea can be cultivate after transplanted Aman rice. Sowing time is an important factor for the vegetative growth and yield of any crop. From seed germination to final harvesting, optimum sowing time ensures the effective utilization of moisture, temperature, light etc. Ali et al. (2016) reported that sowing date-based temperature variations significantly affected the crop growth, the flowering time, pod formation, seed setting, total dry matter production, yield and seed quality of pea. Late sowing increases starch content of green seed of pea that was noticed by Ali et al. (1994) but Chaubey (1997) reported that the crop was sown after 4 December yield was adversely affected. Sowing of peas beyond or before its optimum period causes reduction in pod yield (Ram et al., 1973). Economic return from early seeding date was the maximum and the lowest return was obtained from late seeding date (Anon., 1996). Late sowing and high temperature resulted in 38% lower yield than normal yield (Vander Graff, 1968). Pumphrey et al. (1979) stated that if the temperature is higher than 25°C during the flowering and pod filling stage, seeds yields must be reduced. There is a shortage of adequate research on garden pea. So, it has now become necessary to conduct the research for improving the yield performance of pea. Therefore, it is important to find out the optimum sowing time for the cultivation of pea. This experiment was undertaken with the following objectives, I. to determine the optimum sowing time for achieving maximum vegetative growth of pea. II. to determine the optimum sowing time of pea for getting maximum yield.

2. Materials and Methods

The field experiment was conducted at Bangabandhu Academy for Poverty Alleviation and Rural Development (BAPARD) Agricultural Farm, Kotalipara, Gopalganj during 13 November 2020 to 16 February 2021. The location of the site is between 21°51' and 23°10' north latitude and between 89°56' and 90°10' east longitude. The topography of the farm area was medium high land and the soil is sandy loam type. The average temperature of this location varies from 12.1 °C to 36.1 °C. Heavy rainfall occurs during rainy season.

Seeds are collected from an Indian seed company named Durga Seed Farm, Chandigarh, India. The M/S City Seed Company, Jessore, Bangladesh was imported this hybrid pea variety named PEAS-DS-10 from India. The size of the experiment field was 152m². The four cross ploughing were done and raised beds were prepared. The size of the plot was (4.0m×2.0m) and 0.5m drain was kept between two plots. Total number of plots was 12. The line to line spacing was 40cm and the seed-to-seed distance was 15cm. Randomized Completely Block Design (RCBD) was used with 4 replications and three sowing (S) date. The sowing dates are-

S1= 13 November, 2020; S2= 28 November, 2020; S3= 13 December, 2020

Fertilizer was used as the recommendation of BARI Krishi Projukti Hatboi 2019. The fertilizer dose was Cow dung 5 ton/ha, Urea 30 kg/ha, TSP 80 kg/ha, MoP 40 kg/ha. All fertilizers were given as basal dose during land preparation. But Urea splits in 10 DAS (Days after Sowing) and 25 DAS. Equal amount of fertilizer was used in each plot. Weak, injured and dead seedlings were removed and gap filling will be done within 10 days of sowing. Weeding was done when necessary. Irrigation was given depending on the soil condition. Rust disease was seen and the disease was controlled by using Tilt 250 EC @ 0.5ml/L of water at 7 days interval.

Data were recorded on the following parameters. Height of plant (cm) at 20 DAS, 40 DAS and 60 DAS, Number of pods per plant, Number of seeds per pod, Pod length (cm), Weight of single pod (g), 100 seed weight (g), Fresh weight of plant (g/plant), Dry weight of plant (g/plant), Dry matter content (%), Seed yield (ton/ha), Final harvesting was done at 16 February, 2021. All data were taken carefully at proper time.

3. Findings and Discussion

3.1. Height of Plant (cm)

Height of plant at 20 DAS observed from 16.76cm to 20.98cm (Table-1). Maximum plant height at 20 DAS was recorded with S₂ (20.98cm) and minimum plant height at 20 DAS was recorded with S₃ (16.76cm) which are statistically insignificant. As a result, we observed that the vegetative growth at the early stage did not vary due to sowing date. At 40 DAS plant height estimated from 59.52 cm to 46.60cm(table-1). The maximum and minimum plant height was recorded with S₂ (59.52cm) and S₃(46.60cm) respectively. The highest plant height was found with 28 November sowing and the lowest plant height found with 13 December sowing. At 60 DAS the tallest (64.97cm) plant was found with 28November sowing (S₂) and the shortest (49.71cm) plant was found from 13 December sowing (S₃). Sowing on November improves plant stand percentage and total sugar content as well as resulting in the tallest plants Ali *et. Al.* (1994).

Table: 1. Effect of date of sowing on Plant height, Number of pods/plants, Pod length, Number of seeds/pods of pea

Treatment (Sowing Date)	Plant height(cm) 20 DAT	Plant height(cm) 40 DAT	Plant height(cm) 60 DAT	Number of pods/plants	Pod length (cm)	Number of seeds/pods
S ₁	19.79	54.61b	62.12b	10.05ab	9.01ab	8.32a
S ₂	20.98	59.52a	64.97a	11.75a	9.54a	8.54a
S ₃	16.76	46.10c	49.71c	8.55b	8.51b	7.55b
F-test	NS	*	*	*	*	*
CV (%)	11.55	4.48	2.42	11.39	4.47	2.66

In a column, figure with same letter do not differ significantly; *Significant at 5% level of significance; NS= Non-Significant

3.2. Number of pods per plant

Number of pods per plant is one of the most important yield contributing characters. The number of pods per plant varied from 8.55 to 11.75 (Table-1). Maximum number of pod was recorded with S₂ (11.75) which was statically similar with S₁ (10.05) but statistically dissimilar with S₃ (8.55) and minimum number of pod was found with S₃ (8.55). As a result, 28 November sowing gave the highest number of pods per plant and sowing at 13 December gave the lowest number of pods per plant which supports the **Baloch *et.al.* (1999)** stated that later sowing decreases the number of pod per plant.

3.3. Pod length (cm)

The pod length was varied from 8.51cm to 9.54cm (Table-1) due to effect of different date of sowing. Maximum length of pod was recorded with S₂ (9.54cm) which was statically similar with S₁ (9.01cm) but statistically dissimilar with S₃ (8.51cm) and minimum length of pod was found with S₃ (8.51). As a result 28 November sowing gave the highest length of pod and sowing at 13 December gave the lowest length of pod. The higher vegetative pod was obtained from 30 November sowing and pod yield also started to declines significantly after November sowing that was noticed by Anon. (1996).

3.4. Number of seeds per pod

Number of seeds per pod significantly varied due to different time of sowing (Table-1). The maximum number of seeds per pod was found in S₂(8.54) which was statically similar with S₁ (8.32) but statistically dissimilar with S₃ (7.55). So, it can be concluded that in case of number of seeds per pod, 28 November sowing was statistically identical with (S₁) 13 November sowing. The lowest

number of seeds per pod (7.55) was observed in (S₃) 13 December sowing. This result supported by the statement of Anon. (1996).

Table: 2. Effect of date of sowing on Weight of single pod (g), 100 seed weight, Green seed yield (ton/ha), Fresh weight of plant (g/plant), Dry weight of plant (g/plant), Dry matter content (%)

Treatment (Sowing Date)	Weight of single pod (g)	100 seed Weight (g)	Fresh weight of plant (g/plant)	Dry weight of plant (g/plant)	Dry matter content (%)	Green Seed yield (ton/ha)
S ₁	6.17ab	50.0a	46.03ab	11.55ab	25.06ab	6.99b
S ₂	6.72a	51.46a	50.19a	13.31a	26.50a	8.58a
S ₃	4.86b	45.05b	43.63b	10.13b	23.19b	4.85c
F-test	*	*	*	*	*	*
CV (%)	13.64	4.78	5.70	10.68	5.63	12.49

In a column, figure with same letter do not differ significantly; *Significant at 5% level of significance; NS= Non-Significant

3.5. Weight of single green pod (g)

Weight of single green pod of pea varied significantly because of different sowing date (Table-1). The weight of single green pod was varied from S₃ (4.86g) to S₂ (6.72g). The highest weight of single green pods (6.72g) was found from 28 November sowing and the lowest weight of single green pods (4.86g) was observed from 13 December sowing. Sowing on November increases the weight of fresh pods (Ali et al., 1994). Meicenheimer and Muchlbauer (1983) also stated that dry weather interferes in seed setting and lowers the quality of pod produced.

3.6. Weight of 100 green seeds (g)

The effects of different sowing time have a significant effect on 100 green seeds weight of pea (Table 2). The weight of 100 green seeds of pea varied from 51.46g (S₂) to 45.05g (S₃). The highest weight of 100 green seeds (51.46g) found by (S₂) 28 November sowing and lowest weight of 100 green seeds (45.05g) were found in (S₃) 13 December sowing.

3.7. Fresh weight of plant (g/plant)

The Fresh weight of plant was varied from 50.19g to 43.63g (Table-2). Maximum Fresh weight of plant was recorded with S₂ (50.19g) which was statically similar with S₁ (46.03g) but statistically dissimilar with S₃ (43.63g) and minimum fresh weight of plant was found with S₃ (43.63g). As a result (S₂) 28 November sowing gave the highest fresh weight per plant and sowing at (S₃) 13 December gave the lowest fresh weight per plant. Sowing on November improves the total fresh weight that was observed by Ali *et. al.* (1994).

3.8. Dry weight of plant (g/plant)

The dry weight of plant was varied from 13.31g to 10.13g (Table 2). Maximum dry weight of plant was recorded with S₂ (13.31g) which was statically similar with S₁ (11.55g) but statistically dissimilar with S₃ (10.13g) and minimum dry weight of plant was found with S₃ (10.03g). As a result (S₂) 28 November sowing gave the highest dry weight per plant and sowing at (S₃) 13 December gave the lowest dry weight per plant. Ali *et. al.* (1994) observed that the Sowing on November increases the dry weight of plant.

3.9. Dry matter content of plant (%)

The dry matter content of plant was varied from 23.19% to 26.50% (Table 2). The highest dry matter content was recorded with S₂ (26.50%) which was statistically resemble to S₁(25.06%) and the lowest dry matter content was found with S₃ (23.19%). As a result (S₂) 28 November sowing gave the highest dry matter content and sowing at (S₃) 13 December gave the lowest dry matter content. Ali *et. al.* (1994) stated that the sowing on November increases the dry matter content.

3.10. Green seed yield (t/ha)

The green seed yield was varied significantly due to different sowing time (Table 2). Green seed yield varied from 8.58 ton/ha to 4.85 ton/ha. The highest yield was S_2 (8.58 ton/ha) which was obtained when the crop was sown in 28 November and the lowest yield was S_3 (4.85 ton/ha) which was obtained when the crop was sown in 13 December that supports the statement of Ali *et. al.* (2016), Plants with November 20-30 sowing performed the best in respect of yield and yield contributing characters. Vonella *et. al.* also observed that the delay sowing decreases the yield of pea. The higher seed yield was obtained between 20 November and 30 November sowing and seed yield also started to declines significantly after November sowing Anon (1996).

4. Conclusion

The result of the present study showed that the optimum sowing date is an important factor for increasing of vegetative growth, yield and yield contributing characters of pea (*Pisum sativum* L.) named DS-10 pea variety. It was demonstrated that sowing date around 28 November had positive effect to significantly increase the Number of pods/plants, Number of seeds/pods, 100 seed weight, Dry matter content of plant, green seed yield etc. PEAS-DS-10 variety was shown excellent adaptation results in our country soil and weather. Pea cultivation is profitable for farmer's level if they follow the optimum sowing date. It can be introduced all the district of Bangladesh to increase the total production of pea (*Pisum sativum* L.).

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