YIELD AND YIELD ATTRIBUTES OF RAPESEED AS INFLUENCED BY DATE OF PLANTING

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ABSTRACT

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An experiment was conducted at the Agriculture Research Station, Bangladesh Agricultural Research Institute, Burirhat, Rangpur during rabi season of 2004-05 to find out optimum planting time for the newly selected genotype BCYS-03. There were five planting dates viz. October 20, October 30, November 10, November 20 and November 30. Significant variations due to different planting dates were observed in days to flowering, days to maturity, plant height, number of primary branches plant^{-1}, siliqua plant^{-1}, seeds siliqua^{-1}, 1000-seed weight, seed yield plant^{-1}, stover yield ha^{-1}and seed yield ha^{-1}. Results showed that the highest seed yield (1.86 t ha^{-1}) was obtained from the second planting (October 30) and it was significantly different from the yields of all other dates of planting. All other yield attributes were also found higher in the plants of second planting. The seed yield (1.47 t ha^{-1}) of last planting (November 30) was also satisfactory because of the prolong winter season prevails in the northern part of the country.

Keywords: Planting time, genotype BCYS-03, yield attributing characters

INTRODUCTION

Rapeseed (*Brassica campestris* L.) commonly known as mustard in Bangladesh, is a cool season crop. It is also a thermo sensitive as well as photosensitive crop (Ghosh and Chatterjee, 1988). The average yield of mustard in this country is 739 kg/ha whereas the world average yield of mustard is 1575 kg/ha (FAO, 2003). Annual requirement of edible oil is about 5 lakh metric tonnes. The internal production of edible oil can meet up only less than one-third of the annual requirement (Mondal and Wahhab, 2001). There is a great scope of increasing yield of mustard by selecting high yielding varieties and improving management practices. Time of sowing is very important for rapeseed/ mustard production (Rahman *et al*., 1988; Mondal and Islam, 1993 and Mondal *et al*., 1999). Sowing at proper time allows sufficient growth and development of a crop to obtain a satisfactory yield. The seed yield and maturity of mustard plants are greatly influenced by environmental conditions regardless of genotypes. Different sowing dates provide variable environmental conditions within the same location for growth and development of crop and yield stability (Pandey *et al*., 1981). Therefore, whenever a new genotype/variety is developed or introduced in a region, an appropriate package of production practices must be developed. A suitable planting date is very important for good agronomic performance of any crop. BCYS-03 is a newly selected *Brassica campestris* L. genotype with white flowers, yellow seed coat colour with shorter duration. Therefore, the present study was undertaken to find out the optimum planting time for the genotype for higher seed yield and to study the effect of sowing time on yield attributes and seed yield in the northern part of Bangladesh.

MATERIALS AND METHODS

The research work was conducted at the Agricultural Research Station, Burirhat, Rangpur during October 2004 to February 2005. One newly selected genotype of *Brassica campestris* L. BCYS-03 of Oilseed Research Centre, BARI was used for the experiment. There were five planting dates for the experiment as follows: D_1 = October 20, D_2 = October 30, D_3 = November 10, D_4 = November 20 and D_5 = November 30. The experimental design was Randomized Complete Block Design (RCBD) with four replications having unit plot size 4m X 3m. The fertilizer dose used for the experiment was 120, 35, 90, 27, 3 and 0.8 kg ha^{-1} of N, P_2O_5, K_2O, S, Zn and B in the form of urea, triple super phosphate, muriate of potash, gypsum, zinc sulphate, and boric acid respectively (BARC, 1997). Half of the urea and whole amount of all other fertilizers were applied in the unit plots at the time of final land preparation prior to sowing. The remaining half of the urea was applied as topdressing in 22 days after emergence of seedlings. Weeding cum thinning, irrigation and insect & disease control measures were done as per requirement. At maturity ten randomly selected sample plants were collected separately from each plot for data collection. Data were collected on the days to emergence, days to 1st flowering, days to flowering (50%), days to maturity, plant height (cm), number of primary branches plant^{-1}, number of siliqua plant^{-1}, number of seeds siliqua^{-1} , weight of seeds plant^{-1}, thousand seed weight, stover yield, seed yield ha^{-1} and biological yield. The Collected data were statistically analyzed using MSTAT-C statistical programme. The analysis of variance and level of significance along with the Least Significant Difference (LSD) Test were done following Gomez and Gomez (1984). Meteorological data on rainfall, temperature and relative humidity of the growing period have been presented in Figure 1.

RESULTS AND DISCUSSION

Effects of date of planting on plant characteristics yield and yield attributes are presented in Table 1 and 2. Days to emergence of the genotype for different planting dates were more or less similar. The plants of first sowing needed the highest number of days (29 days) to first flowering. Plants of last planting (November 30) needed the lowest number of days (25) to give first flower. The first sowing needed the highest number of days to 50 % flowering (34 days). Plants of second (October 30), third (November10) and fourth planting (November 20) needed 31 days and the last planting took 29 days to give 50 % plants to flower. The longest period to mature (80 days) was required by the plants of first sowing and it was followed by the second and third plantings. The shortest period (77 days) to mature was required by the fourth and fifth plantings. Early plantings required longer period to mature and delayed sowing reduces time to mature. The present results are in well agreement with Mondal *et al*. (1999), Islam *et al*. (1994) and Robertson *et al*. (2004) who reported that the maturity period became gradually shorter with the delayed sowing. The highest plant height, 115 cm was recorded from the plants of third planting (10 November) and it was significantly different from the all other planting dates. Mondal and Islam (1993) supported the above result and showed that sowing in the early November gave the highest plant height than in October and December. Shahidullah *et al*. (1997) also reported similar findings. Among the five planting dates the highest number of primary branches plant^{-1} (6.85) was found from the plants of first planting (October 20) and it was statistically similar with the plants of second planting (October 30) and fourth planting (November 20). The lowest number of primary branches plant^{-1} was recorded from the plants of fifth planting, which was 6.20. Angrej *et al*. (2002) also reported that primary and secondary branches plant^{-1} was obtained higher when the crop was sown in between 10 to 30 October in India.

The highest number of siliqua plant^{-1} (85) was obtained from the plants of second sowing (October 30), which was statistically similar to the first, third and fourth plantings. This finding was in conformity with the findings of Mondal *et al*. (1999) who stated that the plants of third planting (November 10) produced the highest number of siliqua plant^{-1} and reduced in the late sowings. The highest number of seeds siliqua^{-1} was produced in the plants of October 30 sowing, and it was statistically similar with those of October 20, November 10 and November 20 sowings. The lowest seed number siliqua^{-1} was found in the plants of November 30 sowing which was significantly different from all other sowing dates. These results are in agreement with the results of Mondal *et al*. (1999) and Shahidullah *et al*. (1997). The results presented in Table 2, showed that the highest weight of seeds plant^{-1} was in second sowing which was 3.78 g per plant, it was statistically different from all other dates of sowing. The lowest weight of seeds plant^{-1} (3.41 g plant^{-1}) was produced from the plants of November 30 sowing. Kalra *et al*. (1985) and Bukhtiar *et al*. (1992) also recorded that delaying in planting time reduced the seed yield plant^{-1}. The highest 1000-seed weight was recorded in October 30 sowing which was statistically similar to those of October 20 and November 10 sowings. The November 30 sowing was recorded the lowest weight of 1000-seed indicating reduced test weight with each successive delay in sowing after October 30. Mondal *et al*. (1999) stated that 1000-seed weight reduced with the delayed planting time. A wide range of variation in stover yield was observed with different dates of sowing. The highest stover yield (6.06 t ha^{-1}) was found from the plants of first sowing (October 20) and the lowest stover yield (4.80 t ha^{-1}) was obtained from the plants of November 30 sowing. The result was supported by the results of Islam *et al*. (1994), BARI (2001) and Degenhardt and Kondra (1981). The higher seed yield (1.86 t ha^{-1}) produced by October 30 sowing might be attributed to higher number of siliqua in individual plants, number of seeds per siliqua and 1000-seed weight. Sowing on October 20 yielded the second highest yield (1.59 t ha^{-1}). The lowest seed yield (1.47 t ha^{-1}) was obtained from the plants of November 30 sowing. The findings in the present study about seed yield were fully supported by Brar *et al*. (1998), Buttar and Aulakh (1999), Mondal *et al*. (1999) and Degenhardt and Kondra (1981). From the above findings, it may be concluded that mustard genotype BCYS-03 may be sown from the end of October to November 30 in the northern parts of the country.

Table 1. Plant characteristics of rapeseed genotype BCYS-03 as influenced by different dates of planting during rabi season, 2004- 05

Treatment	Days to emergence	Days to first flowering	Days to flowering (50%)	Days to maturity	Plant height (cm)	Primary branches plant^{-1}
D_1=Oct.20	4	29	34	80	100	6.85
D_2=Oct.30	5	27	31	79	105	6.72
D_3=Nov.10	5	26	31	79	115	6.22
D_4=Nov.20	5	26	31	77	104	6.25
D_5=Nov.30	5	25	29	77	100	6.20
CV (%)	-	-	-	1.18	2.76	6.16
LSD 0.05	-	-	-	2.97	6.27	0.17

N. B. Days to emergence, Days to first flowering and Days to flowering (50%) were not statistically analyzed.

Table 2. Yield and yield attributes of rapeseed genotype BCYS-03 as influenced by different dates of planting during rabi season, 2004- 05

Treatment	Siliqua plant^{-1} (No.)	Seeds siliqua^{-1} (No.)	1000- seed weight (g)	Seed yield plant^{-1} (g)	Stover yield ha^{-1} (t)	Seed yield ha^{-1} (t)
D_1=Oct.20	84	21.25	3.68	3.69	6.06	1.59
D_2=Oct.20	85	24.00	3.80	3.78	5.98	1.86
D_3=Nov.10	77	22.75	3.68	3.66	5.40	1.56
D_4=Nov.20	77	21.75	3.28	3.44	5.04	1.52
D_5=Nov.30	66	18.75	3.24	3.41	4.80	1.47
CV (%)	11.09	7.48	6.44	6.17	8.13	5.41
LSD 0.05	18.69	3.51	0.08	0.34	0.25	0.19

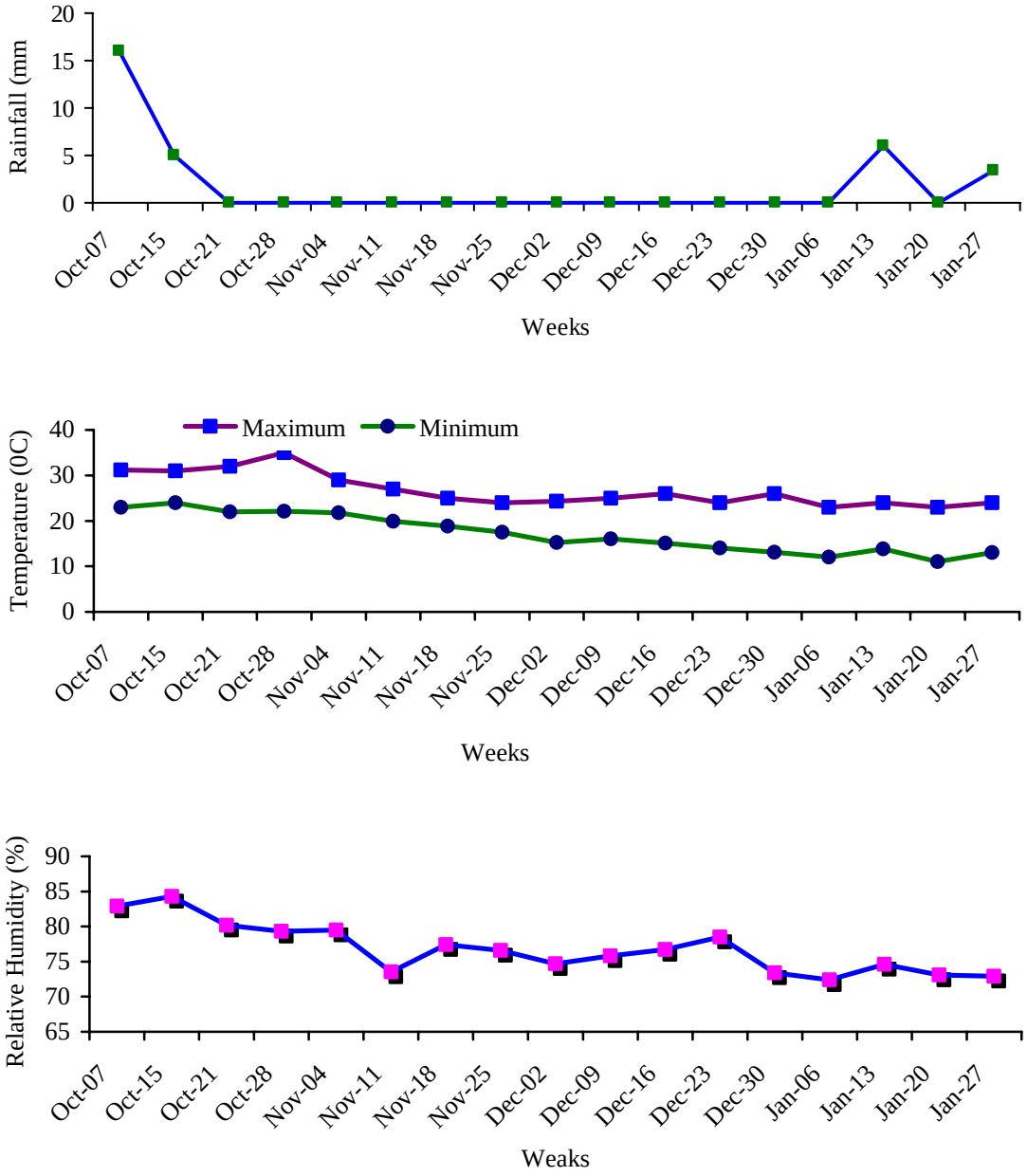

Figure 1. Weekly average total rainfall, air temperature and relative humidity during the study period (October, 2004 to January, 2005)

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