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# EFFECT OF SOWING DATES ON YIELD AND YIELD COMPONENTS OF RAPESEED VARIETIES

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## ABSTRACT

The study was carried out in the Field of Sher-e-Bangla Agricultural University farm, Dhaka to evaluate the effect of sowing date and variety on yield and yield components of rapeseed (*Brassica campestris* and *Brassica napus*). From the results it was observed that among the four sowing dates studied October 20 sowing and among the three rapeseed varieties studied BARI Sarisha-8 performed best in obtaining the highest values in all the studied components of the rapeseed varieties. The results further showed that BARI Sarisha-8 performed best by producing 52.4 % and 132.9 % higher yield than BARI Sarisha-9 and Improved Tori-7 respectively. In case of sowing date, grain yield was reduced gradually with the advancement of delay in sowing. October 20 sowing gave the highest grain yield (1422 kg $ha^{-1}$) and that of lowest (437.2 kg $ha^{-1}$) was observed in December 4 sowing. BARI Sarisha-8 on October 20 sowing showed significantly the highest grain yield (1865 kg $ha^{-1}$) and the lowest (130 kg $ha^{-1}$) was found in Improved Tori-7 on December 4 sowing. The variety BARI Sarisha-8 and October 20 sowing performed best in respect of grain yield as well as other studied parameters.

**Key Words:** sowing dates, yield components, rapeseed

## INTRODUCTION

Rapeseed/mustard is one of the most important and widely grown oilseed crops of Bangladesh. It belongs to genus *Brassica* under the family Cruciferae and has got several cultivated species, viz. *Brassica campestris* L., *Brassica juncea* L. Czern & Cross and *Brassica napus* L. etc. In Bangladesh, oil crops occupy only 0.561 million hectare which is about 4.2 % of the total cropped area (13.53 million hectare). Rapeseed/mustard occupies only 0.336 million hectare which is 60 % of total oil cropped area of Bangladesh (Wahhab *et al.,* 2002). The analysis of productivity trend reveals that rapeseed/mustard yield in Bangladesh has increased from 672 kg $ha^{-1}$ to 757 kg $ha^{-1}$ with the annual growth rate of 1.26% (Rahman, 2002) which is alarmingly poor compared to that of advanced countries.The major reasons for low yield of rapeseed/mustard in our country are due to lack of high yielding variety, inappropriate sowing time and improper management etc.

Planting time has significant effect on the growth, development, yield and yield components of rapeseed/mustard (Saran and Giri, 1987, Rahman *et al.*, 1988). Early sowing may result in vigorous growth and less resistance to cold during winter while late seeding may result in stunted growth and crop may be attacked with disease and insect pests leading to reduction in seed yield (Kaul and Das, 1986). Seed yield of mustard declined gradually by 11.7, 21.5, 43.4 and 62.9 % respectively, for each week delay after November 1 sowing (Rahman *et al.*, 1993).

So the trial on date of sowing with 3 varieties of rapeseed was undertaken to study the influence of sowing date on rapeseed varieties.

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## MATERIALS AND METHODS

The experiment was conducted at Sher-e-Bangla Agricultural University farm, Dhaka during the period from October 2004 to February 2005. The soil of the experimental plot belongs to the agro-ecological zone of the Madhupur soil tract (AEZ-28) of the Nodda soil series, silty loam in texture with 29.97 % sand, 54.86 % silt and 15.28 % clay particles and $p^H$ being 6.4. During the study period monthly maximum atmospheric temperature varies from 28.9$^0$C-31$^0$C, minimum atmospheric temperature varied from 18$^0$C -23.3$^0$C, monthly total rainfall varied from 3mm-208mm and relative humidity ranged from 61%-75.3%.

The treatments comprised of 3 rapeseed varieties viz. Improved Tori-7 ($V_1$), BARI Sarisha-8 ($V_2$) and BARI Sarisha-9 ($V_3$) and 4 date of sowing as October 20 ($D_1$), November 04 ($D_2$), November 19 ($D_3$) and December 04 ($D_4$). The experiment was laid out in a Randomized Complete Block Design (factorial) with three replications. Seeds of three rapeseed varieties were collected from Oilseed Research Centre, Bangladesh Agricultural Research Institute, Gazipur. The land was first opened with a tractor drawn disc plough on October 10 and brought into desirable fine tilth by 4 operations of ploughing and harrowing with country plough and ladder. The land was fertilized with recommended dose of fertilizer as per BARC. Seeds were sown on different dates according to treatment in lines 30 cm apart. Necessary thinning and weeding operations were done keeping the land weed free and maintaining desired plant population as 66.7 plants/m$^2$ with plant to plant distance 5 cm. Irrigation and spraying of insecticide were given as and when necessary.

Crop maturity varied with varieties and date of sowing. Harvesting started on January 05 and completed on February 28, 2005. One square meter area from centre of each plot was harvested, threshed and dried. Yield recorded converted as yield per hectare. Ten sample plants were selected from each plot and data on number of branches plant$^{-1}$, number of siliquae plant$^{-1}$, number of seeds siliqua$^{-1}$, length of siliqua (cm), weight of 1000 seeds (g) were recorded. The data recorded were analyzed statistically and the differences between means were compared by LSD at 5% level.

## RESULTS AND DSCUSSION

The attributes of rapeseed were designated as siliquae plant$^{-1}$, seeds siliqua$^{-1}$, siliqua length (cm) 1000-seed weight (g) and shelling percentage. The effect of sowing date on the above parameters (yield attributes of rapeseed) as well as grain yield and biological yield have been presented in the table 1.

**Table 1. Effect of sowing date on yield and yield attributes of rapeseed**

| Sowing date | Siliquae plant$^{-1}$ | Seeds Siliqua$^{-1}$ | Siliqua length (cm) | 1000-seed weight (g) | Grain yield (kg ha$^{-1}$) | Biological yield (kg ha$^{-1}$) |
|---|---|---|---|---|---|---|
| October 20 | 122.50a | 22.91a | 5.42a | 2.97a | 1422a | 4849a |
| November 04 | 86.77b | 20.21b | 4.67b | 2.78b | 1113b | 4072b |
| November 19 | 73.32c | 16.92c | 4.35c | 2.63c | 752.10c | 2854c |
| December 04 | 32.02d | 8.78d | 3.84d | 2.57d | 437.20d | 1880d |
| LSD | 2.87 | 0.55 | 0.08 | 0.04 | 40.52 | 145 |
| CV (%) | 3.73 | 3.30 | 1.92 | 1.43 | 4.45 | 4.35 |

From the table 1 it revealed that each of the yield attributes varied significantly with the varieties on sowing dates and it was further observed that there was a gradual reduction in the value of each yield attribute of rapeseed at every delayed sowing. October 20 (the 1st sowing date) in all the yield attributes produced statistically the highest value viz 122.50 (no.), 22.91(no.), 5.42cm and 2.97 (g) in siliquae plant$^{-1}$, seeds siliqua$^{-1}$, siliqua length and 1000-seed weight respectively. The second highest corresponding value of the above yield attributes were 86.79(no.), 20.21(no.), 4.67 cm and 2.78 g obtained respectively from November 04 sowing. November 19 (the third sowing date) produced the corresponding values of the yield attributes lower than those of November 04 but higher than those of December 04 (the last sowing date). November 04 sowing produced the value of siliquae plant$^{-1}$, seeds siliqua$^{-1}$, siliqua length (cm) and 1000-seed weight(g) as 73.32 (no.), 16.92 (no.), 4.35 cm and 2.63 g. while the lowest corresponding value of yield attributes were 32.02 (no.), 8.78 (no.), 3.84 cm and 2.57 g obtained respectively from December 04 sowing.

These findings were in conformity with the findings of Rahman *et al.* (1988); Mendhan and Scott (1975); Thurling (1974); Gosh and Chattarjee (1988); Hossain *et al.* (1986) and Saran and Giri (1987) who observed and reported that delay in sowing from October to December caused reduction in siliquae plant$^{-1}$, seeds siliqua$^{-1}$, 1000-seed weight(g) and siliqua length (cm).

From the table 1 it further revealed that both grain and biological yield of rapeseed varied significantly with varying sowing dates. October 20 sowing recorded the highest grain yield (1422 kg ha$^{-1}$) and biological yield (4849 kg ha$^{-1}$) which were followed by 1113 kg ha$^{-1}$ and 4072 kg ha$^{-1}$, 752.1 kg ha$^{-1}$ and 2854 kg ha$^{-1}$, 437.2 kg ha$^{-1}$ and 1880 kg ha$^{-1}$ obtained respectively from November 04, November 19 and December 04 sowing.

Both grain and biological yield of rapeseed are the resultant effect of the cumulative action of yield attributes on the sowing dates. The highest values of yield attributes obtained from October 20 sowing resulted in obtaining the highest grain and biological yield of rapeseed. Delay sowing effect similarly was also reflected on grain and biological yield of rapeseed as was shown on yield attributes, i.e. there was a gradual reduction in both grain and biological yield at each delay in sowing.

Varietal response to yield and yield components of rapeseed

The weighted average yield of BARI Sarisha-8 considering all sowing dates was 1339 kg ha$^{-1}$ and in BARI Sarisha-9 it was 878.8 kg ha$^{-1}$ and only 575 kg ha$^{-1}$ in Improved Tori-7. The highest accumulation of the yield components of rapeseeds such as number of siliquae plant$^{-1}$, number of seeds siliqua$^{-1}$, siliqua length and 1000-seed weight in BARI Sarisha-8 resulted (Table 2) in its significant higher yield than that of BARI Sarisha-9 and Improved Tori-7. This finding was in support of the finding of Rahman (2002) who reported that BARI Sarisha-8 was one of the high yielder of rapeseed varieties and Tori-7 was the low yielder. This result was in conformity with the findings of Islam (1994) who also indicated the yield variation due to the varietal differences.

**Table 2. Varietal effect on yield and yield components of rapeseed**

| Varieties | Yield and yield components | | | | |
|---|---|---|---|---|---|
| | Siliquae plant$^{-1}$ | Seed siliqua$^{-1}$ | Siliqua length (cm) | 1000 seed weight (g) | Grain yield ( kg ha$^{-1}$) |
| Improved Tori-7 | 75.97b | 11.30c | 3.43c | 2.45b | 575.00c |
| BARI Sarisha -8 | 83.87a | 26.70a | 6.52a | 3.34a | 1339.00a |
| BARI Sarisha-9 | 76.10b | 13.62b | 3.76b | 2.43b | 878.80b |
| LSD | 2.48 | 0.48 | 0.07 | 0.03 | 35.09 |
| CV (%) | 3.73 | 3.3 | 1.92 | 1.43 | 4.45 |

From the interaction table 3 it revealed that variety BARI Sarisha-8 ($V_2$) in combination with October 20 sowing date ($S_1$) performed best in all the yield attributes (studied) of the rapeseed. The performance of the combination $V_2S_1$ were respectively 129.0 (no.), 32.27 (no.), 7.87cm and 3.52 g as per table 3 for siliquae plant$^{-1}$, seeds siliqua$^{-1}$, siliqua length and 1000 seed weight. The worst performance were obtained from the combination of variety Improved Tori-7 ($V_3$) with December 04 sowing date ($S_4$) and the values obtained with $V_3S_4$ combination were 20.87 (no.), 3.83 (no.), 3.45 cm and 2.217g for siliqua plant$^{-1}$, seeds siliqua$^{-1}$, siliqua length (cm) and 1000 seed weight (g). The cumulative effect of the highest values obtained by variety BARI Sarisha-8 on October 20 sowing was resulted in obtaining the highest grain yield in BARI Sarisha-8 on October 20 sowing. Moreever BARI Sarisha-8 as revealed from the table 3 on other sowing dates also performed better in all the yield attributes than these of other varieties.

**Table 3. Interaction effect of sowing date and variety on yield and yield components of rapeseed**

| Treatment Sowing date X Variety | Yield and yield components | | | | |
|---|---|---|---|---|---|
| | Siliquae plant$^{-1}$ | Seed siliqua$^{-1}$ | Siliqua length (cm) | 1000-seed weight (g) | Grain yield (Kg ha$^{-1}$) |
| $D_1V_1$ | 132.9a | 16.73e | 4.043f | 2.633d | 1000.0e |
| $D_1V_2$ | 129.0a | 32.27a | 7.867a | 3.517a | 1865.0a |
| $D_1V_3$ | 105.5b | 19.73d | 4.337e | 2.767c | 1400.0b |
| $D_2V_1$ | 83.53d | 14.60f | 3.383ej | 2.450e | 766.7f |
| $D_2V_2$ | 86.70cd | 28.93b | 6.957b | 3.450a | 1439.0b |
| $D_2V_3$ | 90.07c | 17.10e | 3.670g | 2.433e | 1133.0d |
| $D_3V_1$ | 71.77e | 10.60g | 3.267g | 2.383ef | 403.0h |
| $D_3V_2$ | 60.20f | 26.37c | 6.200c | 3.217b | 1230.0c |
| $D_3V_3$ | 88.0cd | 13.80f | 3.573gh | 2.283gh | 623.3g |
| $D_4V_1$ | 15.63h | 3.27h | 3.013k | 2.317fg | 130.0i |
| $D_4V_2$ | 59.57f | 19.23d | 5.063f | 3.183b | 823.3f |
| $D_4V_3$ | 20.87g | 3.83h | 3.450hi | 2.217h | 358.3h |
| LSD ( 5%) | 4.966 | 0.9989 | 0.1515 | 0.07573 | 70.18 |

$D_1$= October 20, $D_2$= November 04, $D_3$= November 19, $D_4$= December 04
$V_1$=Improved Tori-7, $V_2$= BARI Sarisha-8 and $V_3$= BARI Sarisha-9.

As a result the highest grain yield was obtained in BARI Sarisha-8 on all sowing dates (Table 3). The yield of BARI Sarisha-8 on October 20, November 4, November 19 and December 4 sowing dates were respectively 1865.00, 1439.00, 1230.00 and 823.3 kg ha$^{-1}$, each of which was significantly different from its corresponding yield of BARI Sarisha-9 and Improved Tori-7. The corresponding yield of BARI Sarisha-9 were 1400.00, 1133.00, 623.30, 358.30 and those of Improved Tori-7 were 1000.00, 766.70, 403.00 and 130.00 kg ha$^{-1}$ respectively (Table 3)

Grain yield was reduced in successive delay in sowing. October 20 sowing gave the highest yield (1865 kg ha$^{-1}$) in BARI Sarisha-8 which was reduced to 823 kg ha$^{-1}$(55%) in December 4 (4$^{th}$) sowing (Table 3).

The appreciable yield of 1230 kg ha$^{-1}$ was obtained in BARI Sarisha-8 up to November 19 sowing but in case of BARI Sarisha-9 the acceptable yield of 1133 kg ha$^{-1}$ was obtained up to November 4, whereas Improved Tori-7 lost its acceptable yield level from November 4 sowing (Table 3). It was because the possession of higher value of the yield components in BARI Sarisha-8 were not affected much up to November 19 but in Improved Tori-7, November 4 sowing could not keep these traits unaffected. So it may be concluded here that Improved Tori-7 seeds should be sown within the month of October, BARI Sarisha-8 may be sown up to November 19 and BARI Sarisha-9 up to November 4.

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