



Asian Journal of Plant Sciences

ISSN 1682-3974

science
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Effect of Different Sowing Dates on the Growth and Yield of Canola (Sarson) Varieties

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Abstract: The objective of this study was to determine the response of canola to different sowing dates (SD) on growth and yield parameters of canola. The treatments included two canola varieties (Dunkled and Rainbow) and three sowing dates (11, 21 and 31st October (1999-2000)). Dunkled variety planted on early sowing date (October 11) produced higher grain yield of 2111.05 kg ha⁻¹ as compared to rainbow and late sowings, comparatively low seed yield of 1806 kg ha⁻¹ was produced by sowing date of October 31. The different sowing dates effects significantly on number of primary branches/plant, number of secondary branches/plant, number of pods/plant and seed yield.

Key words: *Brassica napus*, varieties, sowing dates, seed yield

Introduction

Edible oil production in the country is very low as compared to the demand of consumption of people. Almost 70 % of its requirements are being met through import. Pakistan spends a huge amount of 40 billion rupees on the import of edible oil each year. The total area under rapeseed and mustard in Pakistan is 327.3 thousands hectare with the average yield of 908 kg ha⁻¹, which is far below than other country of the world (Anonymous, 2000).

Through the substitution of indigenous rapeseed and mustard crop with that of canola cultivars and by adopting the improved production technology, the production of edible oil can be increased. Planting time is one of the most important factors for maximizing canola yield especially in those areas where temperature, day length, rainfall and humidity vary throughout the year. Johnson *et al.* (1995), Karam (1998) and Tanveer *et al.* (1998) noted the significant effects of sowing date on the yield of canola sarson. Ansari *et al.* (1990) reported that yield of sarson varieties is adversely affected by delayed planting due to intensive cultivation, farmers are unable to plant sarson timely especially after cotton, rice, potato and other kharif crops. Aphid attack and chances of blight diseases also increased with delayed sowing, which not only increases the cost of production, but also results in low yield of the crop. So the main area, where the scientists need to focus their attention is to find out the optimum sowing date for canola cultivation, which results in higher yield of the crop and maximum benefit to the farmer.

In the present study two canola varieties (rainbow and dunkled) with three different sowing dates (11, 21 and 31st October) were compared to find out the high yielding one and appropriate planting time for increasing production to assess the effects of sowing time on important agronomic characters.

Materials and Methods

The study was carried out at Arid Zone Research Institute, Bahawalpur during 1999-2000. Two canola varieties, rainbow and dunkled were planted on three different sowing dates (11, 21 and 31st October). The experiment was laid out in randomized complete block design (RCBD) with split plot arrangement. The crop was planted in rows spaced 45 cm with 10 cm plant to plant distance.

The net plot size was 4.5 x 10 m². The nitrogen and phosphorus were applied @ 75 and 50 kg ha⁻¹. All P₂O₅ and one third N were applied at sowing and remaining doses of N were applied at 1st and 2nd irrigation. All other agronomic practices were kept normal and uniform for all treatments. Date of germination was recorded from the date of planting to the completion of 90 % field emergence. Days to 50 % flowering completion were calculated from the planting date to the time when the 50 % plants in the plots set the first flower.

Plant height was measured at physiological maturity of crop as an average of 10 randomly selected plants per plot from ground level

to the top of the plant. The number of primary branches, secondary branches, pods/plant, pod size and number of grains/pod were also counted at physiological maturity of the crop as an average from the same 10 randomly selected plants per plot. Data collected were statistically analyzed by analysis of variance technique at 5 % level of probability (Steel and Torrie, 1998).

Results and Discussions

The data regarding the days to germination completion (DG) ranged from 7 to 9 days for three sowing dates. The seeds of early sowing date (11th October) germinate in 7 days, while in case of sowing date of 31st October, the seeds comparatively taken more days (9) to complete their germination. This small variation in days to germination was due to change in temperature. The two varieties almost have taken equal days for 50 % flowering completion. The maximum (118) days to 50 % flowering completion were recorded in case of sowing date (11th October) while maximum (106) days were recorded in case of sowing date 31st October, for 50 % flowering completion (Table 1). The results showed that delay in sowing of 20 days decreased the period of flowering almost up to 12 days.

Highly significant differences ($p < 0.05$) in the yield of two canola varieties (dunkled and rainbow) planted on the same date were found due to the differences in performance and adaptation of varieties under the prevailing climatic conditions. The canola variety dunkled produced higher yield of 2000.23 kg ha⁻¹ as compared to the variety rainbow that gave yield of 1914.17 kg ha⁻¹ (Table 1). These differences in the yield of two varieties were the results of the best performance of the variety dunkled in case of plant height, primary branches, secondary branches and pods per plant as compared to the canola variety rainbow. These results infer that under the hot arid climatic condition, canola variety, dunkled is superior in yield as compared to the variety rainbow. Ahmed *et al.* (2001) reported the similar results through their experiment of varietal comparison, supports these findings.

In case of sowing dates highly significant differences in the yield of three sowing dates were noted. The best sowing date in the comparison of three sowing dates was appeared to be 11th October as it produced higher yield of 2111.05 kg ha⁻¹ (Table 1) as compared to other sowing dates, 21st October and 31st October which produced low yield of 1914.17 and 1806 kg ha⁻¹, respectively. These findings are inconvenient with findings of Mendham *et al.* (1990), Rajput *et al.* (1991), Taylor *et al.* (1992) and Tanveer *et al.* (1998) they reported that delay in sowing of rapeseed and mustard results in low yield.

Plant height, pod size and grains per pod were non-significant in both varieties and also in different sowing dates (Table 1). There was a little-bit variation in results of these parameters but these variations are not statistically prominent to cause much effect on the yield. It is obvious from these results that different sowing dates have no prominent effect on plant height, pod size and grains per pod.

Table 1: Grain yield and yield components of canola as affected by different sowing dates

Treatments	D.G	DFC	Plant height (m)	Primary branches plant ⁻¹	Secondary branches plant ⁻¹	Pods plant ⁻¹	Pod size (cm)	Grains pod ⁻¹	Yield (kg ha ⁻¹)
Varieties									
V ₁	7	118	1.67	8.53	29.33	640.30	5.21	24.04	2000.23a
V ₂	8	120	1.69	8.54	29.88	597.64	5.46	23.94	1914.17b
LSD (0.05) value			NS	NS	NS	000.053	0.288	NS	0.045
Sowing dates									
S ₁	7	118	1.71	10.01a	33.76a	671.18a	5.47	24.16	2111.05a
S ₂	8	112	1.69	8.10b	28.83b	609.81b	5.41	23.93	1954.55b
S ₃	9	106	1.65	7.51c	26.23c	575.80c	5.11	23.87	1806.00c
LSD (0.05) value			NS	0.000	00.000	000.050	0.296	NS	000.000
Interaction									
V ₁ S ₁	7	118	1.69	10.36	34.18	595.65	5.38	24.27	2166.60
V ₁ S ₂	8	112	1.68	8.06	28.83	626.29	5.28	23.96	2000.90
V ₁ S ₃	9	106	1.66	7.18	25.14	598.70	4.97	23.99	1833.20
V ₂ S ₁	8	119	1.74	9.65	33.35	646.70	5.58	24.05	2055.50
V ₂ S ₂	9	113	1.70	8.12	28.98	593.33	5.55	24.90	1908.20
V ₂ S ₃	9	107	1.65	7.85	27.33	552.99	5.26	23.85	1778.80
LSD (0.05) value			NS	0.106	NS	NS	NS	NS	NS

NS: Non significant DG: Days to 90 % germination DFC: Days to 50 % flowering
 S₁ = 11th October S₂ = 21st October S₃ = 31st October V₁ = Dunkled V₂ = Rainbow

Primary branches, secondary branches and number of pods per plant differ significantly ($p < 0.05$) which indicate that the sowing dates have pronounced effect on primary branches and number of pods per plant. The maximum number of primary branches per plant (10.01) was produced in case of sowing date, 11th October and the lowest number (7.5) was in case of sowing date 31st October (Table 1). Similarly the highest number of secondary branches (33.76) were produced by sowing date 11th October as compared to the other two sowing dates (21st and 31st October). The lowest number of secondary branches per plant was produced (26.23) by the plots sown on 31st October. The greatest number of pods per plant (671.18) was produced by the sowing date 11th October (Table 1) as compared to the other sowing dates (21st and 31st October). The lowest number of pods per plant of 575.80 was produced by the plots sown on 31st October (Table 1) as reported by Andersson and Bengtsson (1989) and Sudeep *et al.* (1996). The interaction between sowing dates and varieties (V x S) was found to be non-significant in all type of yield and yield components (Table 1). However, variety dunkled with sowing date 31st October produced higher yield of 2166.60 kg ha⁻¹ as compared to other sowing dates and varieties. But statistically it did not significantly differ from other combinations of sowing dates and varieties.

It is concluded through this study that 11th October, is the best sowing date of canola for obtaining maximum yield. The late planting of canola adversely effect the yield and yield components due to its adverse effect on growth, because the different growth stages canola acquired enough time for their development. On the other hand the late-planted crop (21st and 31st October) were severely affected by aphid attack as compared to the early-planted canola (11th October) that results in heavy loss of yield of canola varieties. Among varieties dunkled appeared to be the high yielding variety under the existing climatic conditions. So it is suggested to the farmers of the area that they should plant canola variety dunkled before 11th October for obtaining maximum yield.

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