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Performance of *gobhi sarson* (*Brassica napus* subsp. *oleifera* var. *napus*) under various planting dates and row spacing in Himachal Pradesh

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ABSTRACT

An experiment was conducted during the winter seasons of 1990–91 and 1991–92 to study the effect of planting date and row spacing on the seed and oil yield of *gobhi sarson* (*Brassica napus* L. subsp. *oleifera* DC. var. *napus* L.) under mid-hill conditions. The maximum seed and oil yields were obtained when crop was sown on 25 September at 30 cm row spacing. There was a consistent reduction in yield with delay in sowing and increase in row spacing. However, the oil content in seeds increased with delayed sowing.

Gobhi sarson (*Brassica napus* L. subsp. *oleifera* DC. var. *napus* L.) has wider adaptability, suitability for early planting to exploit the residual moisture of rainy season as well as for late planting by transplanting. To achieve maximum production, sowing at right time is important. The optimum time of sowing varies with rainfall pattern, temperature and relative humidity etc. Similarly, the space available for individual plant also affects the plant yield due to competition for growth factors like light, moisture, nutrients etc. Row spacing in *gobhi sarson* is important because accurate plant-to-plant spacing is difficult to maintain due to small seeds. The present investigation was therefore undertaken to find optimum planting date and row spacing to obtain higher seed and oil yields of *gobhi sarson* under mid-hill conditions of Himachal Pradesh.

MATERIALS AND METHODS

The experiment was conducted in split-plot design with 4 replications during winter (*rabi*) seasons of 1990–91 and 1991–92 at the Himachal Pradesh Krishi Vishvavidyalaya, Palampur. The experimental soil was silty-clay loam (Typic Hapludalf) in texture, acidic in reaction (pH 5.7), medium in available nitrogen (388.0 kg/ha) and phosphorus (16.5 kg/ha), high in available potassium (277.4 kg/ha) and medium in organic matter (0.8%). Four dates of sowing commencing from 10 October with 15-day interval and 3 row spacings of 30, 45 and 60 cm were tested in 1990–91, whereas 1 additional sowing date of 25 September was added in 1991–92. The results were interpreted on the basis of pooled data of both the years. One pre-sowing irrigation was given for proper germination. The seeds of 'HPN 1' *gobhi sarson* were sown @ 6 kg/ha in the furrows. The crop was rainfed and received 648.9 and 708.1 mm rainfall during the consequtive crop seasons.

For dry matter, 5 plants at 30-day inter-

val after sowing were sampled, chaffed and dried in oven at 70 °C till constant weight and then averaged to obtain dry matter/plant. The different yield-attributing characters were recorded from the tagged 5 plants. The crop was harvested, threshed and cleaned and then seeds yield/plot was converted into q/ha. Oil content was determined by Soxhlet's extraction method and then oil yield was computed by multiplying it with seed yield.

RESULTS AND DISCUSSION

Effect of dates of sowing

Dry-matter accumulation: The delay in sowing resulted in significant reduction in dry-matter accumulation at all the stages (Table 1). Up to 90 days, very slow increase in dry matter occurred because of low temperature and photoperiod. After 90 days it had an abrupt increase due to rise in temperature and photoperiod as the crop is responsive to these factors (Kunelius *et al.* (1987).

Yield and yield attributes : The delay in sowing reduced the yield attributes which ultimately reflected in seed yield with significant variation (Table 2). The highest seed yield (18.96 q/ha) obtained from 25 September-sown crop was 171% higher than 24 November-sown crop. The number of silique/plant and seeds/siliqua contributed 117 and 57% towards seed yield, while 1,000-seed weight caused a reduction of 3% in obtaining 171% higher seed yield from the crop sown on 25 September compared to that sown on 24 November. The reduced yield with delayed sowing is in conformity with the findings of Singh and Yadav (1986) and Vasi *et al.* (1986).

Oil yield: The consistent increase in oil content in delayed sown crops could be attributed to greater utilization of applied nutrients for production of seed yield (Table 2). In contrast, the estimated oil yield—a resultant of oil content and seed yield—exhibited decreasing trend with delay in planting mainly due to consistent and significant reduction in the seed yield.

Table 1. Effect of planting date and row spacing on dry-matter accumulation (g)/plant of *gobhi sarson* at different growth stages

Treatment	Days after sowing				
	30	60	90	120	150
Planting date					
25 Sep	0.58	1.39	1.86	8.70	16.44
10 Oct	0.40	1.18	1.69	8.33	15.44
25 Oct	0.36	0.94	1.90	9.00	13.07
9 Nov	0.24	0.65	1.14	8.20	11.26
24 Nov	0.20	0.59	1.04	7.66	10.33
CD (P = 0.05)	0.06	0.15	0.05	0.63	0.36
Row spacing (cm)					
30	0.30	0.84	1.41	7.89	12.29
45	0.32	0.88	1.47	8.26	12.94
60	0.36	0.94	1.56	8.96	13.50
CD (P = 0.05)	0.016	0.025	0.03	0.21	0.28

Table 2. Effect of planting date and row spacing on yield and yield-contributing characters of *gobhi sarson*

Treatment	Plants/ m^2	Siliquae/ plant	Seeds/ siliqua	1,000-seed weed (g)	Seed yield (q/ha)	Oil content (%)	Oil yield (q/ha)
Planting dates							
25 Sep	30.7	167.8	17.7	3.29	18.96	37.92	7.18
10 Oct	29.5	148.7	15.9	3.33	13.43	38.90	5.31
25 Oct	28.8	143.1	15.1	3.39	12.87	40.20	5.15
9 Nov	27.2	100.3	12.3	3.49	7.99	41.77	3.33
24 Nov	25.8	77.3	11.2	3.40	7.00	43.51	3.04
CD (P = 0.05)	2.04	7.01	0.88	0.13	2.90	0.94	1.11
Row spacing (cm)							
30	36.1	104.5	13.2	3.40	12.90	41.27	5.24
45	27.0	123.8	14.0	3.40	11.27	40.52	4.49
60	20.9	139.3	14.7	3.37	9.55	40.45	3.79
CD (P = 0.05)	1.17	3.46	0.36	NS	1.50	0.31	0.62

Effect of row spacing

Dry-matter accumulation: With the increase in row spacing from 30 to 60 cm there was consistent increase in dry-matter accumulation at all the stages of crop growth (Table 1). The trend could be attributed to the availability of more inter-row space in wider row spacing enabling the plants to grow well utilizing the growth factors. The result supports the finding of Chauhan *et al.* (1992).

Yield and yield attributes: The average seed yield (12.90 q/ha) of *gobhi sarson* produced under narrow row spacing of 30 cm was 33.6% higher than wider row spacing of 60 cm due to 72.6% increase in plant population (Table 2). Significantly more number of siliquae/plant and seeds/ siliqua could not compensate the yield loss under 60 cm spacing over 30 cm. The results are in conformity with Chauhan *et al.* (1992) and Gupta and Saini (1988).

Oil yield: Significant reduction in oil yield with increasing row spacing from 30 to 60 cm was mainly because of significant variation in seed yield, though the oil content was less variable.

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