

Relative performance of late-sown, rainfed winter crops as influenced by sowing dates

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Received: December 1993

The optimum time for sowing of winter (*rabi*) crops in low hills of Himachal Pradesh is the first fortnight of November, and wheat (*Triticum aestivum* L. emend. Fiori & Paol.) is the main crop. However, due to the erratic rainfall the sowing is delayed up to the last week of December or even first fortnight of January under rainfed conditions, resulting in significant reduction in wheat yield (Sharma and Chakor, 1989). Information on the relative performance of different rainfed *rabi* crops under late-sown conditions in low hills of Himachal Pradesh is scanty, therefore the present study was undertaken.

The experiment consisting of 15 treatment combinations of 3 sowing dates, viz. (2, 9 and 16 December) and 5 crops, viz. wheat, barley (*Hordeum vulgare* L. sensu lato), oat (*Avena sativa* L.), pea (*Pisum sativum* L. sensu lato) and sunflower (*Helianthus annuus* L.), was carried out at Dhaulakuan in randomized block design with 3 replications during the winter season 1991–92. The soil was sandy loam in texture and neutral in reaction. The soil was low in available N, high in available P and medium in available K. The crops received recommended seed rates, fertilizer doses and other standardized cultural operations for

rainfed condition.

Delay in sowing by a week registered a decrease in the wheat-equivalent yield, gross return, net return and benefit : cost ratio; the effect was however not statistically significant (Table 1). Sowing in the first week of December gave 1.4 and 8.5% higher wheat-equivalent yield than that in second and third weeks of December respectively. The respective increase in net return was 2.2 and 17.3%. The depressing effect of delayed sowing on yield and economics may be attributed to low temperatures during vegetative growth of the crop which might have resulted in poor plant stand and tillering/branching; and abrupt rise in temperature from March onwards which forced the late-sown crops to mature almost with the early-sown one, reducing the growth period of crops for completion of different physiological stages. These results are in line with those of Singh *et al.* (1984).

Among the crops, sunflower gave significantly higher wheat-equivalent yield, followed by pea, wheat and barley owing to its thermo-photoinsensitive nature. Sunflower, wheat and pea remaining statistically at par each other resulted in the highest gross returns because of their higher yields and higher market prices. Although with less

Table 1. Effect of sowing dates and crops on wheat-equivalent yield, gross return, net return and benefit : cost ratio

Treatment	Wheat-equivalent yield (q/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	Benefit : cost ratio
<i>Sowing date</i>				
2 December	24.00	10,320	7,093	2.24
9 December	23.67	10,170	6,941	2.21
16 December	22.13	9,273	6,047	1.92
CD (P = 0.05)	NS	NS	NS	NS
<i>Crop</i>				
Wheat	25.43	10,980	7,912	2.58
Barley	18.24	8,683	5,853	2.07
Oat	10.98	8,219	4,517	1.22
Pea	27.85	10,550	6,973	1.95
Sunflower	33.83	11,160	8,214	2.78
CD (P = 0.05)	2.42	1,190.88	1,190.89	0.36

Cost of cultivation (Rs/ha) : Wheat, 3,065.5; barley, 2,830.0; oat, 3,702.0; pea, 3,579.0; sunflower, 2,950.0

wheat-equivalent yield than sunflower, wheat and pea were at par with it for gross return because of their valuable straw. However, sunflower and wheat crops remaining at par with each other resulted in significantly higher net return and benefit : cost ratio owing to their higher yields and lower cost of cultivation, followed by pea and barley. Chand *et al.* (1982) also reported higher net profits from wheat than barley under late-sown conditions.

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