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Short Note

Effect of sowing dates on growth, yield and economics of different varieties of pea (*Pisum sativum*) under dry temperate conditions

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Abstract

'Palam Priya' variety was found significantly superior (10.3 t/ha) to other two varieties. Azad P-1 has very closely followed this variety (10.1 t/ha).Palam Priya recorded the highest gross returns (Rs. 1, 44,148), net returns (Rs. 1, 09,148), economic efficiency (Rs. 598/ha/day) and B: C ratio (Rs. 4.12) per hectare, followed by Azad P-1 and Ageta Matter. But in case of B: C ratio Palam Priya remained statistically at par with Azad P-1. Interaction effects of date of sowing and variety showed that Palam Priya and Azad P-1 remained statistically at par with each other on 22nd April sowing.

Pea is an important off-season vegetable cash crop of Lahaul and Spiti district of Himachal Pradesh grown in an area of 1210 hectares with the productivity of 54.82 q/ha. This is a single seasoned cropped area i.e. only during *kharif* season because during winters from November to March, the area remains cut off from rest of the world. The fields are available from April but sometimes, due to heavy snowfall in winters and late occurrence of snowfall, the early sowing of crop experiences heavy losses due to cold injuries. It is well known that among different agronomic practices, time of sowing and selection of a suitable variety are important non-monetary inputs. Usually pea suffers more yield loss when sown either late or very early. Liakas *et al.* (2001) reported significant decline in seed yield of pea with delay in sowing from the optimum date at similar dry temperate conditions. Further, the selection of an appropriate variety is important for getting higher yields in a particular agro-climatic condition. Hence, the present investigation was carried out to study the effect of sowing dates and varieties on growth and yield of pea under high hill dry temperate conditions of Himachal Pradesh.

The field experiments were conducted during the *kharif* seasons of 2003 and 2004 at the research farm of Highland Agricultural Research and Extension Centre, Kukumseri (2772 m amsl), Lahaul and Spiti (H.P.). The experiment was laid out in factorial randomized block design with three replications. Twelve treatment combinations consisted of four dates of sowing (7th April, 22nd April, 7th May and 22nd May), and three varieties ('Azad P-1', ' Palam Priya' and 'Ageta Matter'). The soil of the experimental field was sandy loam in texture and neutral in reaction (pH 6.9), with 2.5% organic carbon. The soil had available N 262 kg/ha, P 52.7 kg/ha and K 175 kg/ha, respectively. The crop was raised using 100 kg/ha seed rate and spacing 30 X 5 cm. Recommended dose of 20 kg N, 60 kg P_2O_5 and 30 kg K_2O/ha was applied. Half dose of N and full of P and K were used at sowing time and remaining N was applied after hoeing (40-50 days after sowing). For weed control, pendimethalin @ 1.2 kg a.i/ha was used as pre-emergence herbicide and one hoeing was done at 40-50 DAS. Irrigation was done as and when required by sprinkler irrigation system using the glacier gravity water.

Plant growth was significantly influenced by dates of sowing and varieties (Table 1). Crop sown on 22nd April resulted in significantly higher plant height, followed by that sown on 7th April. Lowest plant height was recorded with the crop sown on 22nd May. Early sowing of pea coincided with low temperature, hence stunted growth was obtained. Being short season, the crops sown late resulted in poor growth of plants. Amongst varieties, 'Palam Priya' recorded significantly maximum plant height, followed by 'Azad P-1' and 'Ageta Matter'. Muhammad *et al.* (2001) and Demirci and Unver (2005) also observed significance of sowing dates on plant heights of pea.

The crop sown on 22nd April resulted in significantly higher number of pods per plant and seeds per pod, followed by 7th April sowing (Table 1). Sowing done on 22nd May recorded the lowest number of pods per plant and seeds per pod. It might be due to the poor growth in delayed as well as in early sown crops. However, higher shelling percentage with crop sown on 22nd May, while the

lowest shelling was recorded when crop was sown on 7th and with 22nd April sown crops. April sown crops produced significantly higher number of pods per plant and seeds per pod than May-sown crops. Obviously, in early-sown crops the pod shells were thicker with higher moisture content compared to late-sown crops, where pods were small and thin. Among varieties, Palam Priya produced significantly higher number of pods per plant and seeds per pod as compared to other varieties. Azad P-1 and Ageta Matter remained at par with each other and resulted in higher shelling percentage than Palam Priya.

The crop sown on 22nd April produced significantly higher green pod yield (10.15 t/ha) than all other dates of sowing (Table 1). Delay in sowing from 22nd April onwards decreased the green pod yields significantly. Even early sowing

Table I. Effect of different treatments on growth, yield attributing characters and yield of Pea crop (Pooled over 2 years)

Treatments	Plant height at maturity (cm)	Pods/ plant	Seeds/ pod	Shelling (%)
Date of sowing				
7th April	55.5	8.7	6.6	51.9
22nd April	57.7	8.9	7.0	52.3
7th May	51.7	7.7	6.2	55.3
22nd May	48.2	6.5	5.8	57.8
CD (P=0.05)	1.05	0.13	0.09	0.63
Variety				
Azad P-1	59.3	8.9	7.2	54.7
Palam Priya	60.7	9.2	7.4	53.6
Ageta Matter	39.8	5.7	4.7	54.7
CD (P=0.05)	0.91	0.11	0.08	0.55

(7th April) resulted in decrease in the yield to the tune of 5.12 per cent. Similarly, the losses estimated with delay in sowing were to the tune of 13.89 and 28.96 per cent, respectively compared to sowing done on 22nd April. The positive influence of yield contributing characters recorded in 22nd April sowing manifested in significantly higher green pod yields. 'Palam Priya' variety was found significantly superior (10.3 t/ha) to other two varieties. Azad P-1 has very closely followed this variety (10.12 t/ha). Singh and Gautam (2000) recorded highest pod yiels o Azad P-1 with early sowing. Similarly, Likas *et al.* (2001) observed that sowing of pea on 25-30 April and 5-10 May resulted in higher seed yields comparable to 5-10 June sowing.

However, Ageta Matter lagged far behind these two varieties. Interaction between date of sowing and varieties revealed that Palam Priya sown on 22nd April was statistically at par with Azad P-1 on the same date of sowing in terms of pod yields. These two varieties when sown early on 7th April again remained statistically at par with each other.

Table 2. Interaction between date of sowing and varieties on green pod yield of pea (t/ha) (Pooled over 2 years)

Date of sowing	Variety			Mean
	Azad P-1	Palam Priya	Ageta Matter	
7th April	10.70	10.89	7.31	9.63
22nd April	11.62	11.81	7..03	10.15
7th May	9.93	10.14	6..13	8.74
22nd May	8.22	8.35	5.06	7.21
Mean	10.12	10..30	6.38	
CD (P=0.05)	Date of sowing	0.20		
	Variety	0.17		
	Interaction	0.34		

Similar trend was obtained with delayed sowing though crop yields fell drastically. However, Ageta Matter resulted in significantly lower green pod yields under all the dates of sowing. Further, the reduction in green pod yields in delayed sown crop of Ageta Matter was not at the same pace as that obtained from timely sown varieties of pea. The results corroborated with the results obtained by Liakas *et al.* (2001), Vieira *et al.* (2000) and Dhillon and Singh (1993).

Table 3 Effect of different treatments on economics of pea crop (Pooled over 2 years)

Treatments	Gross Returns (Rs/ha)	Net Returns (Rs./ha)	Economic efficiency (Rs/ha/day)	B:C ratio (Rs.)
Date of sowing				
7th April	134820	99820	546.9	3.85
22nd April	142100	107100	586.8	4.06
7th May	122267	87267	478.2	3.49
22nd May	100870	65870	360.9	2.88
CD (P=0.05)	2744.9	2744.6	15.0	0.77
Variety				
Azad P-1	141593	106593	584.1	4.05
Palam Priya	144148	109148	598.1	4.12
Ageta Matter	89303	54303	297.6	2.55
CD (P=0.05)	2377.2	2376.9	13.0	0.68

Economics

The crop sown on 22nd April recorded the highest gross returns (Rs. 1,42,100/ha), net returns (Rs. 1,07,100/ha) and economic efficiency (Rs. 886.8/ha/day), followed by crop sown on 7th April which gave Rs. 1,34,820/ha, Rs. 99,820/ha and Rs.846.9/ha/day gross returns, net returns and economic efficiency, respectively (Table 3). The crops sown on 22nd May gave the lowest gross returns, net returns and economic efficiency. However, B:C ratio obtained with sowing on 22nd April (Rs. 4.06) statistically remained at par with early sowing date (7th April) and even with 7th May, but numerically it was superior to 22nd April. Among varieties, Palam Priya recorded the highest gross returns (Rs. 1, 44,148), net returns (Rs. 1, 09,148), economic efficiency (Rs. 598.1/ha/day) and B: C ratio (Rs. 4.12) per hectare, followed by Azad P-1 and Ageta Matter. But in case of B: C ratio Palam Priya remained statistically at par with Azad P-1. Interaction effects of date of sowing and variety showed that Palam Priya and Azad P-1 remained statistically at par with each other on 22nd April sowing, followed by 7th April sowing with similar trend. Hence, for getting highly remunerative crop of pea either Palam Priya or Azad P-1 could be sown on 22nd April.

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