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## Comparative Performance of Three Potato Cultivars on Five Sowing Methods

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**Abstract:** To investigate the effect of different sowing methods on the performance of potato cultivars, an experiment was carried out at potato section, ARI, Tarnab, Peshawar during autumn 1996-97. Results revealed that plant emergence (91.11%), plant spread after 60 days of planting (48.38%) and yield per hectare (14.02 tons/ha) were significantly higher when tubers were planted on plain soil, covered with soil from one side. Tubers planted on top of the ridge produced the tallest plants (49.71 cm). Maximum number of green potatoes (4.83%) recorded when tubers were planted in furrows. Of the three cultivars, emergence of Cardinal was better (83.75%) and exhibited more plant spread after 60 days (44.63%) of planting and more yield per hectare (13.07 tons/ha) as compared to the other two cultivars. Cultivar Desiree produced the tallest plants (45.03 cm) while cv., Ultimus produced significantly more tubers per plant (7.08). Planting the tubers on plain soil covering it with one side was found to be the best method of potato cultivation and Cardinal is the highest yielding cultivar and hence recommended for the growers of Peshawar region.

**Key words:** Potato cultivars, sowing methods, comparative performance

### Introduction

Potato (*Solanum tuberosum* L.) is an annual, herbaceous, dicotyledonous plant which belongs to family solanaceae. It is the most important vegetable and cash crop of Pakistan. It has attained world wide importance for its multipurpose use in human diet and its ability to produce more energy per unit areas. Beside different uses of potato in the country, it is exported to the nearby countries and a handsome amount of foreign exchange is earned (Rahman, 1986). Different planting methods are used for potatoes in different potato growing areas. In hilly areas tubers are planted in furrows while in plain areas tuber are planted on top of the ridges. Use of best suited varieties and effective sowing method is the easiest way to increase the yield of potato.

This project was initiated to investigate the response of potato cultivars to different sowing methods under the agroclimatic conditions of Peshawar.

### Materials and Methods

The experiment "comparative performance of potato cultivars on five sowing methods" was carried out at the potato section ARI, Tarnab Peshawar, during autumn 1996-97. The experiment was laid out in Randomized Complete Block Design (RCBD) with split plot arrangement. Varieties were assigned to the main plots and sowing methods to sub plots. The row to row distance was kept 75 cm<sup>2</sup>, while plant to plant distance was 20cm. Sub plot size of 3x3 m<sup>2</sup> was used. Well rotten farm yard manure was applied at the rate of 10 tones/ha. N and P were applied at the rate of 120 and 90 kg/ha, respectively. Seeds of two cultivars Desiree and Ultimus were obtained from the local market, while seed of cv. Cardinal was obtained from potato section ARI, Tarnab, Peshawar. The tubers were sown in the third week of September and were harvested in the first week of January. Earthing-up was done after the emergence was completed. Plots were hoed with Kudals. Urea was applied between rows and the soil was earthen-up from both sides. First irrigation was done immediately after planting. All subsequent irrigation were done at intervals of 10-12 days depending upon climatic conditions. Dithan M-45 was used for control of fungal diseases and laser for insect pests like cutworm, aphids and army worm.

Three potato cultivars Cardinal, Desiree and Ultimus were included in the trial. Five different sowing methods were adopted as follow:

- M1 Normal farmer planting method (planting on plain soil covered with soil from both sides).
- M2 Planting on plain soil covered with soil from one side.
- M3 Planting in furrows.
- M4 Planting in furrow with ridge.
- M5 Planting on top of the ridges.

The following parameters were recorded during the experiment:

Percent tuber emergence, plant height (cm), plant spread (cm), Yield per hectare (t/ha) and Number of green potatoes.

### Results and Discussion

**Percent tuber emergence:** Data regarding percent tuber emergence of potato cultivars are presented in Table 1. Statistical analysis of the data revealed that potato cultivars and sowing methods had significantly affected percent tuber emergence. Maximum percent tuber emergence (91.11%) was observed in plots, where potato was planted on plain soil covered with soil from one side (M2), while the least tuber emergence percentage was observed in plots (M3), (59.72%) in which potato was planted in furrow without ridge. Highest tuber emergence percentage (83.75%) was recorded in cultivar Cardinal While poor emergence percentage was noted in cultivars Desiree and Ultimus. It might be due to the facts that they were mixed varieties of poor quality, uneven size and dehydrated at the time of planting.

**Plant height (cm):** Data relating plant height of potato cultivars are presented in Table 1. Analysis of the data revealed that potato cultivars and sowing methods had significantly affected plant height. Tubers planted on top of the ridge attained greater plant height (49.7 cm) while tubers planted in furrows with ridge attained the lowest plant height (33.3 cm). These observation revealed that there was a significant differences in height of plants among the different cultivars. Cultivar Desiree produced the tallest plants (45.0 cm) followed by Ultimus (42.9 cm) while Cardinal produced shortest plants (39.8 cm). This could be attributed to heritable character to the specific variety. The results reported by Mustafa (1991) are in agreement with this investigation.

**Plant spread (cm) after 60 days:** Data referring plant height of potato cultivars are reported in Table 2. Perusal of the data indicated that potato cultivars and sowing methods had significantly affected by plant spread of potato. The data analyzed for plant spread (cm) after 60 days of planting showed that maximum plant spread was recorded in case the tubers were planted on ridges while potato planted in furrows showed poor plant spread after 60 days. Cultivar cardinal showed maximum spread of plant than the other two cultivars. Cultivar Desiree and Ultimus showed low plant spread, it may be due to the different varietal character, and poor emergence. Early and higher plant spread accounted

**Yield per hectare:** Data referring the yield per hectare of potato cultivars are reported in Table 2. Data indicated that potato cultivars and sowing methods had significantly affected yield per hectare of potato. Planting on plain soil and covered it from one side produced maximum tuber yield per hectare (14.0 t/ha). These results are in agreement with Gupta *et al.* (1994), who concluded that ridge method of planting may be attributed to more aeration in the soil. Potato cultivars also exhibited a significant difference in yield per hectare. This variation can be attributed to the differences in genetic constitution among different cultivars. Cultivar cardinal out for maximum interception of light radiation and this consequently enhanced photosynthesis and increased yield. yielded the other two cultivars by

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Table 1: Percent tuber emergence and Plant height (cm) as influenced by three different potato cultivars, planted on five different sowing methods at Peshawar.

Sowing methods	Percent Emergence				Plant height (cm)			
	Cardinal	Desiree	Ultimus	Mean	Cardinal	Desiree	Ultimus	Mean
M 1	91.7	86.7	80.8	86.4B	47.4G	46.5D	44.9E	44.3 C
M 2	95.8	90.8	86.7	91.1A	43.3F	48.0C	46.9D	46.0 B
M 3	66.7	59.6	52.9	59.7E	35.5I	42.8F	39.8H	39.3 D
M 4	76.2	69.6	62.9	69.6D	30.4K	36.1I	33.5J	33.3 E
M 5	88.3	82.5	78.3	83.1C	48.0C	51.8A	49.4B	49.7 A
Mean	83.8 A	77.8 B	72.3 C		39.7C	45.0A	42.9B	

Means of the same category followed by different letters are significantly different from each other.

M1 = Normal farmer planting method (planting on plain soil covered with soil from both sides, M2 = Planting on plain soil covered with soil from one side, M3 = Planting in furrows, M4 = Planting in furrow with ridge, M5 = Planting on top of the ridges.

Table 2: Plant spread (cm) and Yield per hectare (tons) as influenced by three different potato cultivars, planted on five different sowing methods at Peshawar.

Sowing methods	Plant spread after 60 days of sowing				Yield per hectare (tons)			
	Cardinal	Desiree	Ultimus	Mean	Cardinal	Desiree	Ultimus	Mean
M 1	47.00BC	45.4E	41.8G	44.7B	15.5	12.5	10.6	12.9B
M 2	50.80A	47.9B	46.5CD	48.9A	16.6	14.1	11.4	14.0A
M 3	37.10I	34.0J	30.9K	34.0E	8.2	5.4	2.5	5.4E
M 4	42.80FG	39.3H	35.0J	39.0D	11.6	8.7	5.2	8.5D
M 5	45.50DE	43.4F	39.9H	42.9C	13.4	10.6	7.3	10.5C
Mean	44.60A	42.0B	38.8C		13.1A	10.3B	7.4C	

Means of the same category followed by different letters are significantly different from each other.

Table 3: Number of green potato tubers during harvesting as influenced by three different potato cultivars, planted on five different sowing methods at Peshawar.

Sowing methods	Number of green potatoes			
	Cardinal	Desiree	Ultimus	Mean
M 1	4.5	5.3	6.0	5.3C
M 2	5.3	8.0	9.3	7.5B
M 3	11.0	13.0	13.5	12.5A
M 4	3.3	4.8	6.5	4.8C
M 5	7.0	8.0	10.2	8.4B
Mean	6.2B	7.8A	9.1A	

Means of the same category followed by different letters are significantly different from each other.

producing vigorously healthy plants, more dry weight per plant, large size tubers leading to increased weight of tubers per plant, per plot and per hectare. While on the other hand low yield per plant, per plot and per hectare of cultivar Ultimus might be due to low emergence, low plant spread, and under sized tubers.

**Number of green potato tubers:** Data referring number of green tubers of potato cultivars are reported in Table 3. Perusal of the data indicated that potato cultivars and sowing methods had significantly affected number of green potato tubers. Planting in furrow with ridge and normal

farmer planting methods showed the best results with less number of green tubers while planting on top of the ridge showed poor performance by having maximum number of green tubers.

The results coincides with the findings of Escobar *et al.* (1988) who reported that ridge planting significantly increased yield and reduced tuber greening. Ultimus produced maximum number of green tubers (9.1) while in case of Cardinal it was minimum (6.2).

The following recommendation can be formulated from this investigation. Planting on plain soil, covered with soil from one side is recommended as the best planting method for potatoes. Cultivar cardinal because of its better emergence, excellent plant spared and good yield per hectare is recommended for farmers and for general cultivation in Peshawar region.

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