

## Original Research Article

# Influence of Different Planting Dates on Late Blight Incidence and Yield of Potato (*Solanum tuberosum* L.)

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## ABSTRACT

Field experiment was carried out during 2011-12 and 2012-13 at main experiment station Department of vegetable science, Narendra Dev University of Agriculture and Technology Kumarganj, Faizabad (UP). To evaluate the effects of five planting dates 17 October, 27 October, 7 November, 17 November and 27 November an incidence of late blight (*Phytophthora infestance*) in four potato cultivars Kufri Ashoka, Kufri Pushkar, Kufri Bahar and Kufri Arun during crop season 2011-12 and 2012-13. The maximum incidence of late blight was recorded in variety Kufri Ashoka when planted on 27 November while the minimum incidence was recorded in variety Kufri Arun was early planted on 17 October. The production of potato tubers was obtained i.e. 471.48q. and 487.48q/ha was significantly highest with 17 November planting of variety Kufri Arun during 2011-12 and 2012-13, respectively. Thus, the results revealed that the best time for planting of potato in eastern Uttar Pradesh on 17<sup>th</sup> November which shifted from 7<sup>th</sup> November of planting due to climate change.

### Keywords

Potato (*Solanum tuberosum* L.), late blight, yield

## Introduction

Potato (*Solanum tuberosum* L.) belongs to family 'solanaceae' is one of the most important vegetable crops grown throughout India. Potato plant is very sensitive to climate factors such as temperature and day length, which exert a considerable influence on its growth and development. A temperature of 15-20°C is optimum for sprouting and emergence of tubers. Maximum tuberization taken place a mean temperature of about 20°C. Soil has great influence on yield and quality of the potato tubers. Crop grown on coarse textured (light) soils produces better quality tubers

with characteristic shape and bright skin colour, which fetches higher price in the market, however, tuber grown in loamy soils have comparatively better keeping quality than those grown in sandy soils, as the latter become too hot by the time of main and late crops are harvested (Anonymous, 1960).

The criteria for working out the optimum time of planting is that the temperature at planting should be below 32°C, while minimum temperature should be less than 20°C by about 25-30 days after planting and the available growing period with this

temperature range should be more than 70 days so that economic yield could be obtained. Potato crop planted on 10 20 September at Jalandhar and harvested on 24 November resulted in higher yield as compared to the crop planted on September, however, the per day yield was higher with delay in planting due to favourable environment during plant growth and development stages (Anonymous, 1974). A number of factors like availability of quality seed of good variety, optimum time of planting, use of fertilizer, spacing, weed management etc. Play an important role in deciding the productivity and quality of produce.

### **Materials and Methods**

The experiment was conducted under humid, sub-tropical climate at 26.47<sup>0</sup> N latitude and 82.12<sup>0</sup> E longitudes with an elevation of about 113 meters above mean sea level in the Indo-gangetic alluvial plains of eastern Uttar Pradesh during 2011-12 and 2012-13.

The metrological data receives a mean annual precipitation about 1200mm. Maximum rainfall in this area is received from mid-June to end September. However, occasional showers are very common in the month of January and February. The winter months are very cold whereas, summer months are extremely hot. The hot Western winds locally known as *Loo* starts from April and continued till on set of monsoon in the month of June. In all the experimental plots recommended package of practices for potato FYM @ 25tonnes ha<sup>-1</sup> + 150: 100: 120 Kg ha<sup>-1</sup> was used. At the last ploughing, the whole quantity of FYM @ 20 tonnes per hectare was incorporated in the soil. In addition to this half quantity of nitrogen and full phosphorus and potassium were applied in rows about 4-5 cm away from seed tubers

and remaining quantity of nitrogen was top dressed in furrow at the time of earthing up.

Disease free certified seed tubers of the potato varieties i.e. Kufri Ashoka, Kufri Pushkar, Kufri Bahar and Kufri Arun were used for planting in the prepared plots on 17<sup>th</sup> October, 27<sup>th</sup> October, 7<sup>th</sup> November, 17<sup>th</sup> November and 27<sup>th</sup> November during 2011-12 and 2012-13. Tubers of 2.5-3.0 cm diameter were used. The tubers were planted on the surface of plots at a spacing of 60 cm x 20 cm and covered with soil to make the ridges. Irrigations were applied by tube well at fortnightly interval. Earthing up was done at 30 days after planting of tubers with the help of *Kudal*. At the same time remaining dose of nitrogen was also applied.

Application of Indofil M-45 @ 2.5 kg ha<sup>-1</sup> was done against late blight disease of potato. Haulms cutting was done on 2<sup>nd</sup> March (2011-12) and in 5<sup>th</sup> March (2012-13). The crop was dehaulmed after 110 days of planting. All plots were harvested after 10 days of dehaulming to allow tuber hardening (curing) and the yield of total tubers of each plot was weighed and recorded in kilograms separately and converted into quintal per hectare.

The number of late blight infected plants out of total number of plants in a plot was recorded. Per cent disease incidence was calculated by the following formula:

$$\text{Disease Incidence(\%)} = \frac{\text{Number of late blight infected plants per plot}}{\text{Total number of examined plants per plot}} \times 100$$

Statistical analysis of data recorded in all observations were carried out by method of analysis of variance and treatments were compared with the help of critical difference, following the techniques described by Panse and Sukhatme (1961) and results were evaluated at 5% level of significance.

## Results and Discussion

An examination of data presented that delayed planting significantly increased the incidence of late blight. Late planting on 27 November produced maximum incidence of late blight i.e., 80.39%. However, the minimum incidence of late blight (5.67%) was recorded when crop was planted early on 17 October during 2011-12 (Table No. 1). Similar results were also noted in the year 2012-13. A perusal of data indicated that among the varieties Kufri Arun recorded lowest per cent of late blight incidence followed by Kufri Pushkar. However, variety Kufri Bahar showed maximum per cent of late blight incidence. The results tally with the findings of Basu

(2002) who reported that maximum number of infected sprouts (about 22.5%) was observed when tubers were planted on 5 December. However, the fourth week of November appears to be a suitable time for planting because the incidence of infected sprouts was low (9.2%) compared to other planting dates. Das and Chakraborty (2007) also reported that delayed planting beyond 15 April to 15 June encourage the *phytophthora* blight severity. Shailbala (2006) also found that maximum late blight severity was recorded in early planted Kufri Bahar, while early planted Kufri Sutlej had significantly less incidence of disease. Late planted Kufri Bahar showed less disease and late planted Kufri Sutlej showed no disease under Pantnagar conditions.

**Table.1** Effect of planting dates and varieties on yield and incidence of late blight of potato (2011-12 & 2012-13)

Treatments	Tubers Yield (q/ha.)		Incidence of late blight (%)	
	2011-12	2012-13	2011-12	2012-13
<b>Planting dates (D)</b>				
17 October	291.78	304.98	5.67 (13.72)	5.45 (13.44)
27 October	330.13	341.72	7.00 (15.17)	6.70 (14.82)
7 November	367.86	380.68	35.08 (36.16)	33.66 (35.29)
17 November	391.59	404.59	61.63 (51.79)	59.16 (50.32)
27 November	282.61	291.74	80.39 (66.96)	77.15 (63.32)
SEM	5.322	5.591	0.727	0.593
C.D. (P=0.05)	15.073	15.834	2.060	1.679
<b>Cultivars (V)</b>				
Kufri Ashoka	309.09	320.18	42.61 (40.77)	40.91 (38.89)
Kufri Pushkar	343.23	355.53	35.73 (34.68)	34.29 (33.74)
Kufri Bahar	302.53	313.40	45.75 (42.39)	43.89 (40.64)
Kufri Arun	376.33	389.87	27.73 (29.20)	26.61 (28.47)
SEM	4.761	5.001	0.651	0.530
C.D. (P=0.05)	13.481	14.162	1.842	1.502
<b>Interaction (DxV)</b>				
SEM	10.645	11.182	1.455	1.186
C.D. (P=0.05)	30.145	31.667	4.120	3.358

(Figures in parentheses are angular transformed values)

The yield data indicated that planting on 17 November produced maximum tuber yield i.e. 391.59 quintals and 404.59 quintals per hectare during 2011-12 and 2012-13, respectively. However, the minimum total tuber yield i.e. 282.61 q/ha and 291.74 q/ha was recorded when planted on 27 November during both the years of investigation. The results confirm the findings of Sharma and Prasad (1999) observed total tuber yield was highest from potatoes planted on 30 October and lowest when planted on 20 November in Kufri Badshah under Delhi conditions. Patel *et al.*, (2000) and Khan *et al.*, (2011) found similar results. Among the varieties the maximum total tuber yield was obtained i.e. 376.33 quintal per hectare in variety Arun followed by Kufri Pushkar. However the variety Kufri Ashoka and Kufri Bahar found to be at par during 2011-12 and 2012-13, respectively. The combination of planting dates and varieties have showed significant results on total tuber yield. The maximum production was obtained i.e. 471.48 quintal and 487.33 quintal per hectare when variety Kufri Arun was planted on 17 November. However, the minimum production of total tubers was recorded in variety Kufri Bahar when planted on 17 October during both the years of experimentation. The results confirm the findings of Ezekiel and Bhargava (1992) and Sharma and Prasad (1999).

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