

Surveillance of Diseases on Potato Crop in Coastal Plains of Odisha

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Received 22 August 2022, Accepted 11 February 2023, Published on 16 March 2023

ABSTRACT

Field experiments were conducted on surveillance of diseases by growing eight potato varieties in two consecutive years during winter season in the year 2016-17 and 2017-18 in the Research Farm under All India Co-ordinated Research Project Odisha University of Agriculture and Technology. Observations revealed the occurrence of different diseases like early blight, phoma blight, mild mosaic and leaf roll which were recorded 70 days after planting while brown rot incidence was accounted after harvest. Early blight was the major foliar disease potato followed by phoma blight. All the varieties were affected by early blight, mild mosaic, leaf roll and brown rot diseases in both the years. The incidence of early blight varied from 4.7% in Kufri Chipsona-3 to 29.40% in Kufri Ashoka. Maximum incidence of phoma blight was observed in Kufri Pukhraj (3.15%)

followed by Kufri Ashoka (2.25%). Mild mosaic incidence was maximum in Kufri Ashoka (4.9%) and minimum in Kufri Surya (<1%). Minimum leaf rolling was found in Kufri Chipsona-3 (2.4%) and maximum in Kufri Ashoka (5.7%). Kufri Chipsona-3 exhibited least incidence of brown rot (1.8%) while maximum incidence was recorded in Kufri Khyati (8.5). Maximum yield was recorded in Kufri Pukhraj (17.55 t/ha) irrespective of incidence of different diseases followed by Kufri Khyati (15.59 t/ha). Among these varieties lowest yield was recorded in Kufri Ashoka (11.75 t/ha).

Keywords Surveillance, Diseases, Early blight, Phoma blight, Mild mosaic, Leaf roll.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is the most popular vegetable crop of Odisha. It is grown during winter season in all the districts. In rainy season, it is grown in hilly tracts of undivided Koraput and Phulbani districts (Satapathy *et al.* 2012). The annual production of potato in Odisha is around 3.0 lakh tons and the productivity is nearly 13.0 t/ha against the national average of 22.5 t/ha. Incidence of insect pests and diseases is one of the major reasons for low productivity in our state (Biswal *et al.* 2010 and Satapathy *et al.* 2012). It is very essential to know the occurrence of different diseases influencing yield potential of varieties. There are several strategies which may be followed effectively in integrated manner for sustainable potato production (Pandey and Sarkar

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Table 1. Disease scoring scale used in early blight disease of potato. HR*=Highly resistant, R**= Resistant, *** HS= Highly susceptible.

Disease rating	Symptoms developed on leaves and whole plant	PDI	Disease reaction
0	No visible symptom	0	Immune
1	A few minute lesions on leaves 10% leaf area is blighted on two bottom leaves	0.1-10	HR*
2	Leaves on 10-25% of the total area affected	10.01-25	R**
3	Leaves on 25% of the total area affected	25.01-40	Tolerant
4	Leaves on 50% of the total area affected	40.01-60	Susceptible
5	Leaves on 75% of the total area affected	>60.0	HS***

2005, Pandey 2007, Saxena and Mathur 2013).

Among these, selection of varieties plays a decisive role (Pandey *et al.* 2006). A good stable variety can maintain its yield even grown under existing adverse conditions. In the present investigation, surveillance of diseases were done by growing eight potato varieties in two consecutive years during winter season in the year 2016-17 and 2017-18 in the Research Farm under All India Co-ordinated Research Project on Potato of Odisha University of Agriculture and Technology, Bhubaneswar.

MATERIALS AND METHODS

Eight potato varieties namely, Kufri Ashoka, Kufri Khyati, Kufri Pukhraj, Kufri Lalima, Kufri Lalit, Kufri Chipsona-3, Kufri Surya and Kufri Jyoti were grown in pest capture plots of 20 m² size (5 m × 4 m) in the Research Farm under All India Co-ordinated Research Project on Potato of Odisha University of Agriculture and Technology, Bhubaneswar-3, Odisha during winter season in the years 2016-17 and 2017-18. The experiment was replicated four times. The varieties were grown in natural condition with spacing of 60 cm × 20 cm. Normal package of practices

(FYM 10 t/ha along with N: P₂O₅: K₂O @ 150:80:100 kg ha⁻¹) was followed to raise the crop. Phorate was applied @ 1.0 g m⁻² to minimize incidence of sucking pests. Crop monitoring was done regularly throughout the season until harvest. Observations were taken on the occurrence of different diseases, particularly early blight, phoma blight, severe mosaic, mild mosaic and leaf roll at 70 days after planting and the degree of severity was calculated (Salem *et al.* 2016) At harvest, the brown rot incidence was recorded (Biswal and Dhal 2013).

Early blight

Early blight is the major foliar disease of this zone. The potentiality of the test varieties against this disease was categorized according to 0-5 point scale developed (Salem *et al.* 2016) as follows.

Mild mosaic and leaf roll

Occurrence of these diseases were recorded by counting number of infected plants in a plot in each variety at 70 days after planting (DAP). Per cent of disease incidence was calculated by using the following formula.

$$\text{Per cent of disease incidence (PDI)} = \frac{\text{Number of affected plants in the plot}}{\text{Total number of plants in the plot}} \times 100$$

Brown rot

The occurrence of this disease was recorded by counting number of tubers showing brown rot symptom per plot in each variety after harvest. Per cent of rotting was calculated by using the following formula.

$$\text{Percent of rotting} = \frac{\text{Number of rotted tubers in the plot}}{\text{Total number of tubers in the plot}} \times 100$$

RESULTS AND DISCUSSION

Among different diseases recorded early blight was the major foliar disease. The degree of severity was

Table 2. Disease incidence in different potato varieties at Bhubaneswar (average of two years, 2016-17 and 2017-18).

Varieties	Early blight (%)	Phoma blight (%)	Mild mosaic (%)	Leaf roll (%)	Brown rot (%)	Tuber yield (t/ha)
Kufri Ashoka	29.4	2.25	4.9	5.7	4.8	11.75
Kufri Khyati	18.4	1.80	3.5	4.5	8.5	15.59
Kufri Pukharaj	10.9	3.15	3.5	4.3	7.5	17.55
Kufri Lalima	6.6	0.00	3.6	4.6	7.15	12.90
Kufri Lalit	12.7	1.15	2.7	3.1	4.4	12.70
Kufri Surya	7.8	1.20	1.0	4.0	6.6	13.10
Kufri Jyoti	6.5	1.25	2.2	2.9	3.3	12.87
Kufri Chipsona 3	4.7	0.00	1.8	2.4	1.8	12.5

measured following disease scoring scale (Table 1). The observations of both the years revealed the variation in incidence of early blight, phoma blight, severe mosaic, mild mosaic and leaf roll in different varieties (Table 2). Other workers also reported the occurrence of these diseases in this region (Biswal *et al.* 2010 and Satapathy *et al.* 2012). Early blight was the major foliar disease of fungal origin in potato followed by phoma blight. All the varieties were affected by early blight in both the years. The degree of incidence was calculated which was varied from 4.7% in Kufri Chipsona-3 to 29.40% in Kufri Ashoka. Early blight incidence was comparatively less in the heat tolerant variety, Kufri Surya (7.8%) than Kufri Pukharaj. The disease incidence in Kufri Lalima (6.6) and Kufri Jyoti (6.5) are almost same. In Kufri Lalit the incidence was 12.7%. According to disease scoring scale out of eight varieties Kufri Ashoka is tolerant while Kufri Chipsona-3, Kufri Surya, Kufri Lalima and Kufri Jyoti are highly resistant. Kufri

Pukharaj, Kufri Lalit and Kufri Khyati were resistant varieties to early blight disease (Table 3).

Phoma blight was absent in Kufri Chipsona 3 and Kufri Lalima in both the years. Maximum incidence of phoma blight was observed in Kufri Pukharaj (3.15%) followed by Kufri Ashoka (2.25%). Mild mosaic incidence was maximum in Kufri Ashoka (4.9%) and minimum in Kufri Surya (<1%). Minimum leaf rolling was found in Kufri Chipsona 3 (2.4%) and maximum in Kufri Ashoka (5.7%). Kufri Chipsona 3 exhibited least incidence of brown rot (1.8%) while maximum incidence was recorded in Kufri Khyati (8.5). Maximum yield was recorded in Kufri Pukharaj (17.55 t/ha) irrespective of incidence of different diseases followed by Kufri Khyati (15.59 t/ha). Among these varieties lowest yield was recorded in Kufri Ashoka (11.75 t/ha) (Table 3).

CONCLUSION

By adopting adequate nutrient and disease management practices, the yield can be improved in each variety. Kufri Pukharaj was the maximum yielding variety followed by Kufri Khyati in this region. There is need for regular surveillance of diseases in order to take up plant protection measures in time and to enhance potato productivity of the state.

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Table 3. Response of test varieties against early blight (average of two years (2016-17 and 2017-18).

Varieties	Disease incidence (%) blight	Varietal character
Kufri Ashoka	29.4	Tolerant
Kufri Khyati	18.4	Resistant
Kufri Pukharaj	10.9	Resistant
Kufri Lalima	6.6	Highly resistant
Kufri Lalit	12.7	Resistant
Kufri Surya	7.8	Highly resistant
Kufri Jyoti	6.5	Highly resistant
Kufri Chipsona-3	4.7	Highly resistant

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