

Evaluation of Potato Germplasms Against Potato Apical Leaf Curl Virus Disease

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Abstract: Potato (*Solanum tuberosum* L.) a leader among vegetables suffers from viral disease potato apical leaf curl virus disease (PALCVD). Resistant germplasm is the cheapest way by which the viral disease can be managed. A total of 298 genotypes were evaluated against PALCVD under field conditions during Rabi season of 2014-15. The incidence of PALCVD was recorded at 20, 30, 40, 50, 60, 70 and 80 days after planting. Three lines namely, Kufri Bahar, CP 1458, and HIS 98-55 were found to be resistant to the disease and 30 genotypes were moderately resistant, while 57 were categorized under highly susceptible group.

Key Words: PALCVD, Potato, Resistant, Germplasm

INTRODUCTION

Potato (*Solanum tuberosum* L.) popularly known as 'the king of vegetables', has emerged as fourth most important food crop in India after rice, wheat and maize. Potato also known as white or Irish potato is an annual herbaceous plant and the edible part is an underground modified-stem as tuber. It can be grown under a wide range of climatic conditions with wide flexibility in planting and harvesting time. It is a good source of carbohydrates and is used as staple food in many parts of the world. In world scenario, India became the second largest producer of potato [6]. India produced 45.34 million ton from 1.99 million ha area with an average yield of 22760 kg/ha of potato during 2012-13 [2]. The productivity (22.94 t/ha) of potato crop in the state is better than the national yield, however, lower than the potential yield (35 t/ha). Number of factors, govern the productivity and quality of potato tubers, and disease is one of the vital factors. Potato crop suffers from the sporadic incidence of potato apical leaf curl virus disease (PALCVD), which was observed first time in early sown October potato crop at Hisar during Dec. 1996 [4]. The fast spread of this disease under high whitefly (*Bemisia tabaci*) population has been noticed in early sown susceptible varieties of potato.

MATERIAL AND METHODS

The study related to evaluation of germplasm lines of potato against PALCVD was carried out at research

area of the Department of Vegetable Science, CCS HAU, Hisar during Rabi season of 2014-15. A total of 298 germplasm lines of potato were screened against PALCVD under field conditions. All the agronomic practices were followed for better health of plants. The standard spacing followed for potato planting was 60 cm (row-to-row) and 20 cm (plant-to-plant) which was planted in single row having 3-meter row length, in two replication with five tubers in each row. After every 5th test row infector row of Kufri Khyati was maintained around the field for *Bemisia tabaci* attack. The number of infected plants was recorded after 20 days of planting and thereafter at ten days interval until 80 days after planting to identify the resistant sources to potato apical leaf-curl virus disease.

Disease incidence was calculated by using the following formula:

$$\text{Disease Incidence} = \frac{\text{Total number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

Scale used for screening of resistance

Disease Reaction	Disease Incidence (%)
Resistant	<10
Moderately Resistant	10.1-20
Moderately Susceptible	20.1-40
Susceptible	40.1-60
Highly Susceptible	>60

* Scale used for disease incidence is a/c to All India Coordinated Research Project (Potato)

RESULTS AND DISCUSSION

298 genotypes were evaluated against potato apical leaf curl disease under field conditions. The cultivars along with per cent disease incidence are presented in Table 1. The disease incidence was recorded 20 days after planting (DAP) at 10 days interval. There were no incidence of disease recorded at 20 days after planting in all the genotypes under field conditions and the reactions of different genotypes are presented in Table 1.

298 potato germplasm lines were evaluated for their resistance to potato apical leaf curl virus disease (PALCVD) under field conditions. Infector row of variety Kufri Khyati at every five test cultivars and all around the plot was sown to create congenial conditions after whitefly attack in the crop. The incidence of potato apical leaf curl virus disease was recorded at 20, 30, 40, 50, 60, 70 and 80 days after planting. Three Lines namely, Kufri Bahar, CP 1458, and HIS 98-55 were resistant to the disease and 30 genotypes were moderately resistant, while 57 were categorized under highly susceptible group.

Table 1
Diseased reaction of potato genotypes screened under potato apical leaf curl virus disease condition during 2013

Sr. No.	Disease Reaction	Disease Incidence	No. of Germplasm Lines
1.	Resistant	<10	3
2.	Moderately Resistant	10.1-20	30
3.	Moderately Susceptible	20.1-40	99
4.	Susceptible	40.1-60	109
5.	Highly Susceptible	>60	57

In present study, it has been observed that 298 potato germplasm lines were evaluated for their resistance to potato apical leaf curl virus disease (PALCVD) under field conditions. Three lines Kufri Bahar, CP 1458 and HIS 98-55 were resistant to the disease. The present findings are in conformity with

the results demonstrated by Kumare *et al.* [3] who also concluded that three lines Kufri Bahar, CP 1458 and HIS 98-55 were resistant to the disease. Similarly, Lakra [5] evaluated 266 germplasm lines and 15 cultivars and found that Kufri Bahar and CP 1246 were resistant to PALCVD. Baswana *et al.* [1] conducted a similar trend on screening of 180 accessions of potato against potato apical leaf curl disease, which reported one accession CP-1716 and cultivar Kufri Bahar as resistant, while three accessions namely, CP 1813, CP 1818 and CP 1859 exhibited disease incidence <20% and were categorized under moderately resistant group.

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