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Screening of potato varieties against bacterial wilt caused by *R. solanacearum* under field condition in Konkan region of Maharashtra

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Abstract

In the present investigation eight varieties of potato were screened under natural epiphytotic in bacterial wilt sick plot condition at Central Experiment Station (Tuber Crops), Wakawali, Dr. BSKKV, Dapoli during *Rabi*, 2019-20 for testing their reaction against bacterial wilt disease. Results revealed that, all eight varieties of potato exhibited bacterial wilt disease incidence in the range of 25.93 to 40.74%. Among them, five varieties viz., Kufri chandramukhi, Kufri sindhuri, Kufri pukhraj, Kufri jyoti and Kufri laukar were found moderately susceptible. Two varieties viz., K1 and Wai Local-1 were found susceptible. Wai Local-2 was found highly susceptible to bacterial wilt with 40.74% disease intensity. None of the variety found immune to bacterial wilt disease.

Keywords: Screening, potato, variety, bacterial wilt, *Ralstonia solanacearum*

Introduction

Potato (*Solanum tuberosum* L.) is the most important solanaceous vegetable crop grown worldwide due to their excellent source of nutrients as well as significant amount of starch, vitamins and minerals. Potato is the staple food in many parts of the world and is an important part of the world's food supply. Potato is a winter crop which can be well grown under subtropical environments in India. It is considered as the high yielding crop in arable land and is suitable to agro-ecological conditions where other crops fail. Bacterial wilt or brown rot is caused by the pathogenic bacterium *Ralstonia solanacearum* (Smith) Yabuuchi. The disease pathogen has extensively been distributed in tropical, subtropical and some warm temperate regions of the world and is one of the major constraint in the production of potato in India, these diseases have been reported to cause about 30-40% crop yield losses. Bacterial wilt disease is responsible for yield loss in potato upto 70%, in India. (Staff K. J., 2018) [7]. Thus, growing resistance cultivars of crop to minimize or reduced bacterial wilt disease incidence is one of the most important eco-friendly and integrated disease management strategy.

Materials and Methods

In the present investigation, eight cultivars / genotypes / varieties of potato available with Central Experiment Station, Wakwali were evaluated against the bacterial wilt under natural epiphytotic in bacterial wilt sick plot condition. The experiment was carried out on Randomized Block Design during *Rabi*, 2019- 20 at Central Experiment Station (Tuber crop), Wakwali. The blocks of 2.40m x 3.15m size were prepared and each cultivar / genotype / varieties were sown on ridges and furrows at spacing of 60 x 45 cm. The observations for disease incidence were observed and recorded fortnightly from 45th days after planting. The final observations were recorded 75 days after planting.

Table 1: Treatment Details

Tr. No.	Treatments
T ₁	Kufri chandramukhi
T ₂	Kufri sindhuri
T ₃	Kufri pukhraj
T ₄	Kufri jyoti
T ₅	Kufri laukar
T ₆	K1
T ₇	Wai Local-1
T ₈	Wai Local- 2

Method of recording observations

Observations on wilt incidence were recorded at fortnightly interval after plantation, by counting the number of plants

affected by the disease. Then the per cent disease incidence (PDI) was calculated by the following formula:

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

Table 2: The per cent disease incidence (PDI)

Grade	Disease Description	Disease Reaction (%)
0	Plants did not show any wilt Symptoms	Highly resistant (HR)
1	1 - 10% plants wilted	Resistant (R)
2	11-20% plants wilted	Moderately resistant (MR)
3	21- 30% plants wilted	Moderately susceptible (MS)
4	31- 40% plants wilted	Susceptible (S)
5	More than 40% plant wilted	Highly susceptible (HS)

Winstead and Kelman (1952) ^[8] and Hussain *et al.* (2005) ^[2]

Results and Discussion

Eight varieties of potato were screened under natural epiphytotic in bacterial wilt sick plot condition at Central Experiment Station (Tuber Crops), Wakawali, Dr. B. S. K. K. V., Dapoli during *Rabi*, 2019-20 for testing their reaction against bacterial wilt disease. The disease intensity was recorded in standard 0-5 scale, (Winstead and Kelman, 1952 and Hussain *et al.*, 2005) ^[8, 2]. Based on terminal (75 Days after planting) per cent disease intensity all the potato entries screened were categorized as shown in Table 1.

Results revealed that, under natural epiphytotic (bacterial wilt sick plot) conditions, all eight varieties of potato exhibited bacterial wilt disease incidence in the range of 25.93 to

40.74%. However, five varieties *viz.*, Kufri chandramukhi (29.63%), Kufri sindhuri (27.78%), Kufri pukhraj (25.93%), Kufri jyoti (27.78%), Kufri laukar (29.63%) were found moderately susceptible to bacterial wilt. Whereas, two varieties *viz.*, K1 (33.33%) and Wai Local (Agra) (35.19%) were found susceptible to bacterial wilt. Wai Local (Indore) was found highly susceptible to bacterial wilt with 40.74% disease intensity.

These results obtained on varied reactions of the potato tested entries against bacterial wilt (*R. solanacearum*) are analogous to that reported earlier by many workers (Hussain *et al.* 2005; Pawaskar *et al.* 2014; Bhanwar *et al.* 2019; Salvi, 2020 and Sharma and Lakpale, 2020) ^[2, 4, 1, 5, 6].

Table 3: Screening of potato varieties against bacterial wilt. (Field Condition)

Sr. No.	Cultivars/ genotypes/ varieties	Per cent disease intensity mean	Reactions
1.	Kufri chandramukhi	29.63	Moderately susceptible (MS)
2.	Kufri sindhuri	27.78	Moderately susceptible (MS)
3.	Kufri pukhraj	25.93	Moderately susceptible (MS)
4.	Kufri jyoti	27.78	Moderately susceptible (MS)
5.	Kufri laukar	29.63	Moderately susceptible (MS)
6.	K1	33.33	Susceptible (S)
7.	Wai Local 1	35.19	Susceptible (S)
8.	Wai Local 2	40.74	Highly susceptible (HS)
	S.Em ±	0.41	
	CD at 5%	1.25	

Conclusion

Out of the eight promising varieties of potato were screened against *R. solanacearum* under natural epiphytotic in bacterial wilt sick plot condition, five entries were found moderately susceptible, two varieties were found susceptible and one entry was found highly susceptible to bacterial wilt disease. Similarly, under artificial inoculation conditions of the glass house, one entry was found moderately resistant, three varieties were found moderately susceptible, two varieties were found highly susceptible and two varieties were found susceptible to bacterial wilt disease. None of the tested entry was found highly resistant or immune to the bacterial wilt of potato disease.

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