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Reaction of different acid lime cultivars to isolates of *Xanthomonas axonopodis* pv. *Citri*

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Abstract

In present research work eight different isolates of *Xanthomonas axonopodis* pv. *citri* were tested on different acid lime cultivars. The pathogenicity was confirmed by reaction of these isolates on different citrus cultivars by inoculation. The water soaked lesions along with fully developed symptoms were developed after 9 to 12 days of inoculation. The Xac1 was highly virulent and Xac2, Xac4, Xac5, Xac6 were poor virulent and Xac3, Xac7, Xac8 were moderately virulent.

Keywords: *Xanthomonas axonopodis*, *Citri*, isolates

Introduction

Citrus canker is one of the most destructive and predominant on acid lime in Vidarbha region of Maharashtra. Citrus bacterial canker (CBC), caused by *Xanthomonas citri* subsp. *citri* (Schaad *et al.* 2006) [8] is one of the most devastating diseases through the world that affects many kind of commercial citrus varieties. It was first identified in Florida (USA) in 1915 and in India was reported from Punjab in 1942. The main symptoms of CBC are hyperplasia-type lesions on leaves, fruit and stems. In severe infections causes leaf abscission, twig dieback and premature fruit drop (Stall and Civerolo 1991; Gottwald *et al.* 1993) [9, 3]. The bacterium was first named as *Pseudomonas citri* (Hasse, 1915) [5]. In 1939 it was classified as genus *Xanthomonas* sp. (*X. citri*), then reclassified in 1980 (Dye *et al.*, 1980) [2] as *Xanthomonas campestris* pv. *citri* due to inadequate phenotypic data (Young *et al.*, 1978) [11].

There are many types of citrus canker caused by various pathovars and variants of the bacterium *Xanthomonas axonopodis* (Graham *et al.*, 1990) [4]. All cultivars of citrus are susceptible to canker, but grapefruit, Mexican lime and lemon are highly susceptible, whereas sour orange and sweet orange are moderately susceptible. Mandarins are moderately resistant (Gottwald *et al.*, 1993) [3]. All young, above-ground tissues of citrus are susceptible to *Xanthomonas axonopodis*. In fact, bacterial pathogens infects into the plant tissues through natural openings (stomata) and mechanical injuries (wounds).

Xanthomonas axonopodis pv. *citri* is a rod shaped gram negative bacterium with single polar flagellum. It is obligatorily aerobic, non spore former and produce yellow colonies on NA medium. The maximum temperature for growth is 35 to 39°C (Mehrotra, 1980; Whiteside *et al.*, 1988) [6, 10].

The present investigation was undertaken for reaction of different acid lime cultivars to the different isolates of Maharashtra region.

Material and Methods**Collection and isolation of diseased plant samples**

The disease sample infected with citrus canker collected from different locations of Maharashtra regions. *viz.* Gadchiroli, Yavatmal, Bhandara, Akola, Nagpur, Pune, Gondia, Solapur *etc.* The samples of acid limes infected with citrus canker were collected during July – October 2014. The fresh infected leaves sample were used for isolation by employing tissue isolation method on NA medium.

Pathogenicity test**Preparation of bacterial culture**

The eight pure bacterial isolates of *Xanthomonas axonopodis* pv. *citri* *viz.* Xac 1, 2, 3, 4, 5, 6, 7, 8 to be tested were inoculated on NA medium for.

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The cultures were incubated at 25°C for 3 to 5 days prior to inoculation. The 48 hrs old culture was used for the inoculation on NA medium.

Inoculation of bacterial culture Four varieties of acid lime viz. Chakradhar, Pramalini, Tahiti and Vikram were selected. The seedlings/ grafts. Were used for inoculation of each isolate separately. Inoculation was done by smearing the bacterial culture on leaves at 10 injury points made by pin prick method. The plants were maintained under humid condition. The observations were recorded on the basis of number of pricks made and number of spots exhibited diseased symptoms. Uninoculated injured plants treated with sterilized water served as control.

Results and Discussion

Table 1: Location of diseased samples

S. No	Location	Code no.
1	Gadchiroli	Xac1
2	Yavatmal	Xac2
3	Bhandara	Xac3
4	Akola	Xac4
5	Nagpur	Xac5
6	Pune	Xac6
7	Gondia	Xac7
8	Solapur	Xac8

Reaction of these isolates on the different citrus cultivars.

Table 2: Reaction of different acid lime cultivars to isolates of *Xanthomonas axonopodis* pv. *citri*

Varieties of acid lime	Days to initiate water soaked lesions by xac isolates							
	Xac1	Xac2	Xac3	Xac4	Xac5	Xac6	Xac7	Xac8
Chakradhar	3	3	4	6	4	7	5	7
Vikram	3	4	6	7	8	5	7	4
Pramalini	4	3	7	6	5	8	7	8
Tahiti	0	0	0	0	0	0	0	0

Eight isolates of *Xanthomonas axonopodis* pv. *citri* (Table 2) were assessed for their reactions on acid lime four cultivars viz. Chakradhar, Vikram, Pramalini, Tahiti by inoculating their pure culture by culture smearing on the leaves. The results (Table 2 and Plate 8) revealed that the test isolates of *X. axonopodis* pv. *citri* were able to induce canker disease on only three varieties of acid lime under artificial inoculation condition, except Tahiti. Isolates Xac1 and Xac2 represented distinct nature of virulence as it initiated water soaked lesion within four days of inoculation on Chakradhar, Vikram and Pramalini. While other isolates Xac2, Xac4, Xac5, Xac6 were poor virulent and Xac3, Xac7, Xac8 were moderately virulent.

Tahiti was found resistant against all isolates as none of the isolate was able to cause the disease. Rest of the three acid lime varieties viz. Chakradhar, Pramalini and Vikram showed susceptible reaction to test isolates. Overall, isolate Xac1 was found more aggressive and virulent, followed by other isolates.

These findings are similar to the results of Das, (2002)^[1] who reported pathogenic variability among the isolates of *Xanthomonas axonopodis* pv. *citri* and categorized them based on their virulence as highly virulent, moderately virulent and less virulent. Variable reaction of *Xanthomonas axonopodis* pv. *citri* on citrus varieties were also recorded by

Prasad *et al.* (1978)^[7], which can be used to differentiate the group of isolate into strains.



Plate 1: Symptoms of citrus canker on leaves, twigs and fruits



Plate 2: Isolates of *Xanthomonas axonopodis* pv. Nutrient agar medium



Weak symptom



Strong symptom

Plate 3: Reaction of isolates on different citrus cultivars

References

1. Das AK. Pathogenic variability of *Xanthomonas axonopodispv. citricausalagent* of citrus canker. J Mycol. Pl. Pathol. 2002; 17(2):175-178.
2. Dye DW, Bradbury JF, Goto M, Hayward AC, Lelliot RA, Schroth MN. International standards for naming pathovars of phytopathogenic bacteria and a list of pathovar names and pathotype strains. Rev. Plant Pathol. 1980; 59(4):153-168.
3. Gottwald TR, Graham JH, Civerolo EL, Barret HC, Hearn CJ. Differential host range reaction of citrus and citrus relatives to citrus canker and citrus bacterial spot determined by leaf mesophyll susceptibility. Plant Dis. 1993; 77:1004-1009.
4. Graham JH, Gottwald TR. Variation in aggressiveness of *Xanthomonas campestris* pv. *citrumelo* associated with citrus bacterial spot in Florida citrus nurseries. Phytopath. 1990; 80:190-196.
5. Hasse CH. *Pseudomonas citri*, the cause of citrus canker J Agric. Res. 1915; 4:97-100.
6. Mehrotra RS. Bacteria and Bacterial Diseases. Plant Pathology. Tata McGraw-Hill pub. Co. Ltd. New Delhi, 1980, 636-8.
7. Prasad MVR, Moses GJ, Reddy GS. Variability in *Xanthomonas citri* the incitant of citrus canker. Indian Phytopath. 1978; 31:227-229.
8. Schaad NW, Postnikova E, Lacy G, Sechler A, Agarkova I, Stromber PE *et al.* Emended classification of *Xanthomonas* pathogens on citrus. Syst Appl. Microbiol. 2006; 29:690-695.
9. Stall RE, Civerolo EL. Research relating to the recent outbreak of citrus canker in Florida. Ann. Rev. Phytopathol. 1991; 29:399-420.
10. Whiteside JO, Garney SM, Timmer LW. Compendium of citrus diseases. The American Phytopathological Society, 1988, 80.
11. Young JM, Dye DW, Bradbury JF, Panagopoulos CG, Robbs CF. A proposed nomenclature and classification for plant pathogenic bacteria. New Zealand J Agric. Res. 1978; 21:153-177.