

Research Article

Studies on Some Bacterial diseases of Fruit Plants from Aurangabad District

B.T.PAWAR

Department of Botany, Shri Muktanand College,
Gangapur – 431 109, Dist. Aurangabad (Maharashtra) INDIA.

ABSTRACT

Studies on some bacterial diseases of fruit plants from Aurangabad district was carried out during 2003-2009. They are: Leaf necrosis of Custard apple caused by Xanthomonas annonae; Citrus canker caused by Xanthomonas campestris pv. citri; Bacterial canker of Mango caused by Xanthomonas campestris pv. mangiferaeindicae; Leaf necrosis of Guava caused by Xanthomonas psidae; and leaf spot of Badam Xanthomonas arboricola pv. pruni.

Keywords: Leaf necrosis, Citrus canker, Leaf spot, Custard apple, Mango, Guava, Badam.

INTRODUCTION

In recent years, fruits are in great demand for a balanced diet. The cultivation of fruits has been encouraged by the Government and presently India ranks no.1 in fruit production, but the productivity of fruits is low as compared to developed countries. One important reason towards low productivity is diseases [1]. In Aurangabad district several fruit trees are observed, either in cultivation or in forest. The total area under cultivation of fruit trees in the district is above 43000 hectares (Agri. Dept.-Personal communication). A survey of these fruit trees was undertaken during the years 2003-2009 and during the survey some bacterial diseases were observed on different fruit plants. These diseases are described with respect to the causal organism and symptoms in the present paper.

The custard apple (*Annona squamosa*) trees are commonly observed in the forests of Aurangabad district. The fruits of the plant from this area are sold in the local and national markets for its delicious flavor. Bacterial leaf necrosis of this plant caused by *Xanthomonas annonae* has been reported earlier from Aurangabad district [2] and from Osmanabad and Latur districts of Maharashtra (3Korekar and Papdiwal, 2004).

Citrus canker caused by *X. campestris* pv. *citri* is one of the important bacterial disease occurring in India. It was first reported from Punjab by Luthra and Sattar (41940). Now the disease is known to occur in almost all the citrus growing areas of the country [5-7]. The disease affects all the aerial parts of the plant and develop necrotic symptoms [1]. Fawcett [8] reported canker incidence on exposed roots of citrus plant. Interestingly, while uprooting some declining plants at Tirupati, Reddy and Naidu [9] noticed distinct canker lesions on the roots, which were completely buried under soil all the time. The rate of defoliation of infected leaves with the bacterium depends on area of lesions as well as the sites on leafblades, where the lesions develop [10]. Rangaswami *et al.*, [11] observed that sprays of the streptomycin sulphate at 1000 and 500 ppm at 15 days interval to check citrus canker. Ashok Krishna and Nema [12] observed four spray schedule of streptomycin at 500 ppm in effectively reducing the disease.

Mango bacterial canker disease (MBCD) which is also known as mango canker, bacterial spot, leaf spot, black spot, mango blight, bacterial black spot caused by *Xanthomonas campestris* pv. *mangiferaeindicae* (*Xcmi*) [1]. The disease was first recorded as bacterial leaf spot from Poona by Patel *et al.*, [13], and from other parts of the country by Shekhawat and Patel [14] and Kishun and Sohi [15]. The disease has also been reported from Aurangabad earlier by Papdiwal and Deshpande [5]. The MBCD bacterium has all the characteristics associated with the genus *Xanthomonas*, except for pigmentation. Unlike most xanthomonads, it produces non pigmented (creamy white colonies) when cultivated on agar medium. A few yellow-pigmented strains have been isolated from mango in Brazil, Florida, South Africa and Reunion [16]. Kishun [17] surveyed mango growing belts of Andhra

Pradesh, Karnataka, Punjab, Chandigarh, Uttar Pradesh and Bihar. He observed maximum incidence (90 %) at Ranchi (Bihar). The pathogen affects all the above ground plant parts like leaf lamina, petiole, twigs and fruits. The disease symptoms were also noticed on mango stones and true resistant source is lacking [18]. MBCD spreads rapidly during rains. In new area the disease spread through infected planting materials and from diseased to healthy plants through wind splashed rains. The disease development is favored by high humidity (>90 %) and temperature range 25-30°C [19]. Frequent rainfall is not essential for the build-up of inoculum (20Misra and Om Prakash, 1992). They observed disease inoculum built-up in May-1998 with one rainy day. However, early rains also play an important role in disease susceptibility [21].

Guava is an important fruit crop of subtropical countries, which is affected by about 177 pathogens (167 fungi, 3 bacteria, 3 algae, 3 nematodes and 1 epiphyte) [22]. From Aurangabad, Papdiwal [23] has reported a bacterial disease on guava causing marginal leaf necrosis.

A bacterial leaf spot disease of *Terminalia catappa* has been reported from Aurangabad by Papdiwal and Deshpande [24]. They have identified the phytopathogen as *Xanthomonas pruni*. *X. pruni* is known to cause crown gall of stone fruits, bacteriosis of apricot and leaf spot of plum [25].

MATERIALS AND METHODS

The infected leaves or fruits were washed with running tap water. The infected spots together with the healthy parts were cut with a sterile blade. The leaf pieces were then placed in sterile cavity blocks and cut to ooze in the sterile distilled water. Twenty ml of the NA medium at 45°C was poured and solidified in petridishes (9 cm size). The bacteria were streaked out with a sterile wire loop on to the agar plate. Laminar flow was used for this purpose. After 48 hrs of incubation at 30±2°C ; the developed colonies were transferred to agar slopes.

In order to obtain bacteria from rotted fruits, they were squeezed together with the fingers to press out the bacteria containing sap, which was later streaked on NA plates. After incubation, colonies of bacteria were developed, which were then transformed on NA slants for pure culture. The pathogenicity of the isolates was confirmed by adopting Koch's postulates [26].

RESULTS AND DISCUSSION

1. Leaf necrosis of Custard apple (*Annona squamosa* L.)

Leaf necrosis of *A. squamosa* has been reported to be caused by *Xanthomonas annonae* Papdiwal and Deshpande.

Symptoms were mainly observed on the leaves. The leaves showed local lesions which were irregular, spreading, dark brown in color with yellow margin and raised on dorsal surface (Fig. 01). Initially the infection was observed on the leaf margin near the tip. Afterwards it spreads downwards and turns black in color. In most of the cases, apex of the leaf was found completely affected. With the advancement of the disease, chlorosis was observed followed by defoliation. The disease was observed during winter season.

2. Citrus canker (*Citrus aurantifolia*)

Citrus canker of *C. aurantifolia* has been reported to be caused by *Xanthomonas campestris* pv. *citri* (Hasse) Dye.

The disease affects all above ground parts of the plant like leaves, twigs, branches thorns and fruits. Lesions first appear as small, round, watery, translucent spots on lower surface of the leaf and then on upper surface. As the disease advances, spots become brown and give a rough corky crater appearance (Fig. 02). The lesions were surrounded by yellow halo. The halo persists even in very old lesion. The old lesion becomes hard and lignified. The lesions which are often circular when young, become frequently irregular when they are old. In severe leaf infection defoliation was observed. Cankers were also found on the bark of mature lignified branches. Elongated lesions were observed on twigs and on larger branches. The cankers were irregular, rough and more prominent.

Individual canker lesions had much the same appearance on the fruits (Fig. 03) as on the leaves except that the yellow halo was absent and crater like depression in the centre was more pronounced. The lesions turn into spongy, rough eruptions involving the surface layers and some of the underlying tissues. The lesion on fruit remains confined to the rind, but sometimes it causes cracks and fissures of the skin. The canker on fruit causes the most serious damage since they reduce

the yield and market value of the fruits. The disease was recorded throughout the year but during rainy season disease was more prominent.



Fig. 01: Leaf necrosis of Custard apple.
Fig. 02: Citrus canker - Symptoms on leaves.
Fig. 03: Citrus canker - Symptoms on fruits.
Fig. 04: MBCD - Symptoms on leaves.
Fig. 05: MBCD - Symptoms on fruits.
Fig. 06: MBCD - Symptoms on fruits showing gummy exudations.
Fig. 07: Marginal leaf necrosis of Guava.
Fig. 08: Leaf spot of Badam.
Fig. 09: Leaf spot on margin of Badam

3. Bacterial canker of Mango (*Mangifera indica* L.)

Bacterial canker of *M. indica* has been reported to be caused by *Xanthomonas campestris* pv. *mangiferaeindicae* (Patel *et al.*) Robbs *et al.*

The disease was observed on leaves, petioles, twigs, stems and fruits. Small, water-soaked lesions appeared in groups on any part of the leaf blade. They increase in size, turn brown to black and surrounded by yellow halo (Fig. 04). Several lesions coalesced to form large, necrotic, irregular patches which were often rough and raised. In severe infection the leaves turn yellow and defoliation was observed. On young fruits, water-soaked lesions developed, which also turned dark brown to black (Fig. 05), gradually turn into cankers and cause severe cracking of the fruits, accompanied by heavy bacterial gummy exudations (Fig. 06). There may be only a few lesions on each fruit but more lesions on tender fruit may lead to severe fruit drop. The disease advances in

summer but lesions on leaf in moderate number were recorded throughout the year. Only the old leaves were found infected.

4. Marginal leaf necrosis of Guava (*Psidium guajava* L.)

Marginal leaf necrosis of *P. guajava* has been reported to be caused by *Xanthomonas psidae* Papdiwal and Deshpande.

Infection was recorded on the leaves. Initially leaves show dark brown, small, rounded spots towards the margin (Fig. 07) and later on the spot became whitish. In severe stage of the disease, pathogen attacks other parts like young stem and fruits also. The disease occurs on host plants during winter season.

5. Leaf spot of Badam (*Terminalia catappa* L.)

Leaf spot *T. catappa* has been reported to be caused by *Xanthomonas arboricola* pv. *pruni* (E.F.Smith) Vauterin, Hoste, Kersters and Swings.

The symptoms of the disease were observed mainly on leaf lamina. The disease was characterized by small, water-soaked, irregular spots. These spots were brown in the initial stage but later became dark brown with yellow halo and necrotic (Fig. 08). In severe infection, spots were observed near the margin (Fig. 09). As the disease advances, several spots coalesced and cover large area of the leaf lamina. The disease was recorded during summer season.

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