

Report of some Bacterial diseases of fruit plants from Jalna district of Maharashtra

B. T. Pawar

Department of Botany, Deogiri College, Aurangabad – 431 005

Abstract:

Studies on some bacterial diseases of fruit plants from Jalna district were carried out during 2007-2009. Five bacterial diseases of fruit plants were observed. 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 Bengal almond caused by *Xanthomonas arboricola* pv. *pruni*.

Keywords: Bacterial plant diseases, Leaf necrosis, Citrus canker, Leaf spot, Custard apple, Mango, Guava, Bengal almond.

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 (Gupta and Sharma, 2000). In Jalna district several fruit trees are observed, either in cultivation or in forest. A survey bacterial diseases of these fruit trees was undertaken during the years 2007-2009 and during the survey five diseases were observed. These diseases are described with respect to the causal organism and symptoms in the present paper.

The custard apple (*Annona squamosa*) fruits are known for its delicious flavor. Bacterial leaf necrosis of this plant caused by *Xanthomonas annonae* has been reported earlier from Aurangabad district (Papdiwal and Deshpande, 1978-a) and from Osmanabad and Latur districts of Maharashtra (Korekar 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

(1940). Now the disease is known to occur in almost all the citrus growing areas of the country (Papdiwal and Deshpande, 1978; Chand and Pal, 1982; Kishun, 1993). The disease affects all the aerial parts of the plant and develops necrotic symptoms (Gupta and Sharma, 2000). Fawcett (1936) reported canker incidence on exposed roots of citrus plant. Interestingly, while uprooting some declining plants at Tirupati, Reddy and Naidu (1986). 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 (Goto and Yaguchi, 1979). Rangaswami *et al.*, (1959) observed that sprays of the streptomycin sulphate at 1000 and 500 ppm at 15 days interval to check citrus canker. Ashok Krishna and Nema (1983) observed four spray schedule of streptocycline 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) (Gupta and Sharma, 2000). The disease was first recorded as bacterial leaf spot from Poona by Patel *et al.*, (1948), and from other parts of the country by Shekhawat and Patel (1975) and Kishun and Sohi (1983). The disease has also been reported from Aurangabad earlier by Papdiwal and Deshpande (1978-b). 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 (Gagnevin and Pruvost, 2001). Kishun (1995) 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 (Kishun, 1997-a). 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 (Kishun, 1997-b). Frequent rainfall is not essential for the build-up of inoculum (Misra 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 (Kishun and Chand, 1988).

Guava is an important fruit crop of subtropical countries, which is affected by about 177 pathogens (167 fungi, 3 bacteria, 3algae, 3 nematodes and 1 epiphyte) (Misra, 2004). From Aurangabad district Papdiwal (1976) 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 (1979). 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 (Durgapal, 1971).

Materials and Methods:

The fruit trees in the orchards or elsewhere were visited periodically and the disease samples were collected and brought to the laboratory. 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. The pathogenecity of the isolates was confirmed by adopting Koch's postulates (Pawar, 2007).

Results and discussions:

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.

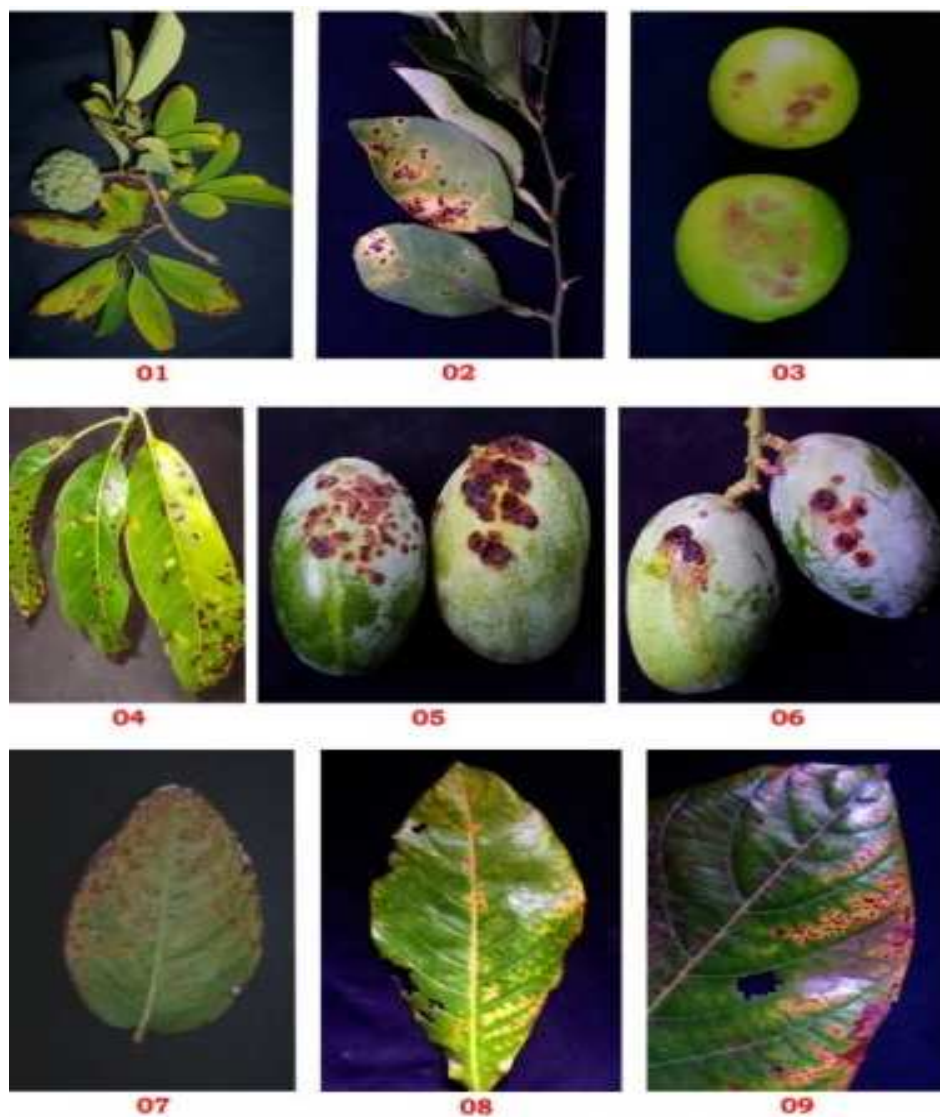


Fig. 01: Leaf necrosis of Custard apple.
Fig. 02: Citrus canker - Symptoms on leaves.
Fig. 03: Citrus canker - Symptoms on fruits.
Fig. 04: MBCD - Symptoms on leaves.
Fig. 05: MBCD - Symptoms on fruits.
Fig. 06: MBCD - Symptoms on fruits showing gummy exudations.
Fig. 07: Marginal leaf necrosis of Guava.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

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 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.

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 Bengal almond (*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.

References:

- Ashok Krishna and A.G.Nema (1983):** Evaluation of chemicals for the control of Citrus canker. *Indian Phytopath.* **36:** 348-350.
- Chand, J. N. and V.Pal (1982):** Citrus canker in India and its management. In : *Problems of citrus diseases in South* (Eds. Raychaudhuri, S.P. and Y.S.Ahlawat), Sarabhai Printers and Publishers, New Delhi, pp. 21-36.
- Durgapal, J.C. (1971):** A preliminary note on bacterial isolates of temperate plants in India II, Bacterial diseases of stone fruits. *Indian Phytopath.* **24:** 379-382.
- Fawcett, H. S. (1936):** *Citrus Diseases and their control*. McGraw-Hill Book Co.,Inc., New York, pp. 656.
- Gagnevin, L. and O.Pruvost (2001):** Epidemiology and control of mango bacterial black spot. *Plant Dis.* **85(9):** 928-935.

- Goto, M. and Y.Yaguchi (1979):** Relationship between defoliation and disease severity in Citrus canker. *Annals of the Phytopathological Society of Japan*.
- Gupta, V.K. and S.K.Sharma (2000):** (Eds.) *Diseases of Fruit crops*. Kalyani Publishers, Ludhiana.
- Kishun, R. (1993):** Bacterial diseases of fruits. In : *Advances in Horticulture*. Vol.3-Fruit crops: Part 3. (Eds. Chadha, K.L. and O.P.Pareek), Malhotra Publishing house, New Delhi. pp. 1389-1406.
- Kishun, R. (1995):** Distribution of *Xanthomonas campestris* pv. *mangiferaeindicae* variable in India. In: *National symposium on recent trends in the management of biotic and abiotic stresses in plants* (Ed. Tyagi, P.D.), Palampur, Nov. 2-3, 1995, pp. 24-25. (Abstr.)
- Kishun, R. (1997-a):** Emerging problem of mango, the bacterial canker disease. In : *Forty-ninth Annual meeting and National symposium on emerging issues in plant pathology, Jabalpur, February 15-17, 1997*. (Abstr.)
- Kishun, R. (1997-b):** Mango bacterial canker disease in India and its management. In : *National symposium on recent advances in diagnosis and management of important plant diseases and zonal chapter meeting, Kanpur, December 19-20, 1997*, pp. 6 (Abstr.)
- Kishun, R. and H.S.Sohi (1983):** Bacterial canker of mangoes. *Indian Farmer's Digest*. **14**: 21-23.
- Kishun, R. and R.Chand (1988):** Changing situation in relation to bacterial diseases of fruits. In : *National seminar on changing pest situation in the current agriculture scenario of India*. June 14-16, 1988, Publications and information division, ICAR, Krishi Anusandhan Bhavan, Pusa, New Delhi. pp. 375-383.
- Korekar, S.L. and P.B.Papdiwal (2004):** Diseases of some fruit trees of Osmanabad and Latur districts of Maharashtra. *Geobios* **31**(2-3): 143-145.
- Luthra, J.C. and A.Sattar (1940):** A note on Citrus canker (*Phytomonas citri*) in the Punjab. *Proc. 27th Ind.Sci.Congr.Part.III*, pp. 228-229. (Abstr.)
- Misra, A.K. (2004):** Guava diseases-their symptoms, causes and management. In: *Diseases of fruits and vegetables: Vol.II. Diagnosis and Management*. Springer, Netherlands. (Abstr.)

- Misra, A.K. and Om Prakash (1992):** Bacterial canker of mango : incidence and control. *Indian Phytopath.* **45**(2): 172-175.
- Papdiwal, P.B. (1976):** *Pathology and Physiology of bacterial disease-I*, Ph.D. thesis, Marathwada University, Aurangabad.
- Papdiwal, P.B. and K.B.Deshpande (1978-a):** Bacterial leaf necrosis of custard apple. *Geobios* **5**(6): 285-286.
- Papdiwal, P.B. and K.B.Deshpande (1978-b):** A survey of plant bacterial diseases of Aurangabad. *Nat.Sci.J. Marathwada Univ.* **17**(10): 77-82.
- Papdiwal, P.B. and K.B.Deshpande (1979):** Occurrence of *Xanthomonas pruni* (E.F.Smith) Dowson on *Terminalia catappa*. *Nat.Sci.J. Marathwada Univ.* **18**(11): 37.
- Patel, M.K., Y.S.Kulkarni and L.Moniz (1948):** *Pseudomonas mangiferaeindicae* pathogenic on mango. *Indian Phytopath.* **1**: 147-152.
- Pawar, B.T. (2007):** *Studies on the bacterial diseases of fruit plants from Aurangabad district*. Ph.D. thesis, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad (M.S.).
- Rangaswami, G., Rao Rama Rao and A.R.Lakshmanan (1959):** Studies on the control of Citrus canker with Streptomycin. *Phytopathology* **49**: 224-226.
- Reddy, M.R.S. and P.H.Naidu (1986):** Bacterial canker on roots of acidlime (*Citrus aurantifolia*) – a new report. *Indian Phytopath.* **39**: 588-590.
- Shekhawat, G.S. and P.N.Patel (1975):** Studies on bacterial canker of mango. *Z.Pflkrankh Pflschutz.* **82**: 129-138.