

Antibacterial activity of some leaf extracts against *Xanthomonas campestris* pv. *mangiferaeindicae*

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SUMMARY

Mango bacterial canker disease (MBCD) caused by *Xanthomonas campestris* pv. *mangiferaeindicae* (*Xcmi*) is one of the important diseases of mango affecting a number of commercial cultivars. The pathogen affects different plant parts like leaf, stem and fruit. Favourable environmental conditions cause severe loss to the crop. Leaf extracts of various plants are known to possess antimicrobial activity. The *in vitro* studies have been performed by using cup-plate method to examine the antibacterial activity of some leaf extracts. Fresh leaf extracts of 30 plants were screened against 11 strains of *Xcmi*. Out of 30 leaf extracts, 12 leaf extracts showed antibacterial activity. The extract of *Terminalia thorelii* and *Azadirachta indica* showed maximum activity against the *Xcmi* strains under investigation.

Key words :
Antibacterial
activity,
Xanthomonas
campestris pv.
mangiferaeindicae

Bacterial diseases of fruit plants are known to cause great damages all over the world. Mango (*Mangifera indica* L.) is the most ancient among the tropical fruits. Among the bacterial diseases, bacterial canker is the most severe disease of mango, which is caused by *Xanthomonas campestris* pv. *mangiferaeindicae*. The pathogen affects different plant parts like leaf, stem and fruit. Favorable environmental conditions cause severe loss to the crop.

In order to manage plant diseases, various chemicals are used since last several years, all over the world. They tend to accumulate in animal tissues posing threat to human health. Moreover, the use of chemicals as plant protectant in agriculture, is having several other hazardous effects like pollution, ecological imbalance, development of resistance among the pathogens etc.

Green plants represent a reservoir of effective chemotherapeutants and can provide valuable sources of natural pesticides (Baladrin *et al.*, 1985; Hostettmann and Wolfender, 1997). Leaf extracts of various plants are known to possess antimicrobial activity. Antimicrobial activity of the leaves has been mentioned by Charjan (1995), Abd-Aziz *et al.* (1994-1996), Suhaila-Mohamed *et al.* (1996) etc. Therefore, fresh leaf extracts of 30 plants from this area were screened for their antibacterial activity against the MBCD

pathogen.

MATERIALS AND METHODS

Preparation of leaf extracts:

For the study, fresh leaf extracts were used. The fresh leaves were collected, thoroughly washed with tap water and then rinsed with sterile distilled water. Fresh leaves weighing 1 g were crushed in mortar and pestle with 10 ml sterile distilled water. Then it was centrifuged for 20 min at -4°C at the 11000 rpm speed.

Cup plate method :

The bacterial suspension was prepared by adding 10 ml sterile distilled water to two days old NA slope culture. Five drops of bacterial cell suspension were poured in sterilized Petridishes (9 cm diameter) on to which 20 ml of Nutrient agar was poured and thoroughly mixed. It was allowed to solidify.

In the centre of the medium, a cup cavity of 8 mm diameter was made with sterilized No. 4 cork borer. This cup was filled with 0.1 ml of the leaf extract (Mukadam and Gangawane, 1982). The Petridishes were incubated for 24 hrs at 25±2°C and the observations were recorded as diameter of inhibitory zone in mm. Cup plate filled with sterile distilled water was used as control in all the experiments. All experiments were in duplicate.

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Table 1: Antibacterial activity of leaf extracts against *Xcmi* strains

Sr. No.	Name of the plant	Zone of Inhibition (in mm)											Mean
		<i>Xcmi</i> 1	<i>Xcmi</i> 2	<i>Xcmi</i> 3	<i>Xcmi</i> 4	<i>Xcmi</i> 5	<i>Xcmi</i> 6	<i>Xcmi</i> 7	<i>Xcmi</i> 8	<i>Xcmi</i> 9	<i>Xcmi</i> 10	<i>Xcmi</i> 11	
1.	<i>Acorus calamus</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
2.	<i>Adhatoda zaylanica</i> Medic.	-	-	-	-	-	-	-	-	-	-	-	-
3.	<i>Aegle marmelos</i> (L.) Corr.	-	-	-	-	-	-	-	-	-	-	-	-
4.	<i>Albizia lebbbeck</i> (L.) Willd.	-	-	-	-	-	-	-	-	-	-	-	-
5.	<i>Alstonia scholaris</i> (L.) R.Br.	-	-	-	-	-	-	-	-	-	-	-	-
6.	<i>Annona sqamosa</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
7.	<i>Araucaria excelsa</i> R. Brown	-	-	-	-	-	-	-	-	-	-	-	-
8.	<i>Azadirachta indica</i> A.Juss.	14	15	17	15	16	14	14	15	16	16	16	15.27
9.	<i>Bougainvillea spectabilis</i> Willd.	-	-	-	-	-	-	-	-	-	-	-	-
10.	<i>Butea monosperma</i> (Lamk.) Taub.	12	14	15	12	10	11	12	13	13	12	14	12.54
11.	<i>Callistemon rigidus</i> R. Br.	10	10	10	11	11	10	10	10	10	12	10	10.36
12.	<i>Capsicum annum</i> L.	10	10	11	10	11	12	10	10	11	11	10	10.54
13.	<i>Caesalpinia pulcherrima</i> (L.) Swartz.	12	10	10	14	12	12	11	12	14	14	10	11.90
14.	<i>Citrus aurantifolia</i> (Christm.) Sw.	-	-	-	-	-	-	-	-	-	-	-	-
15.	<i>Cycas circinalis</i> Linn.	-	-	-	-	-	-	-	-	-	-	-	-
16.	<i>Datura inoxia</i> Mill.	10	11	10	10	12	10	10	11	10	10	12	10.54
17.	<i>Dolichandrone falcata</i> (Wall ex DC) Seem.	10	11	10	12	12	10	10	10	11	10	11	10.63
18.	<i>Euphorbia tirukalli</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
19.	<i>Cordia sebestena</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
20.	<i>Holoptelea integrifolia</i> (Roxb.) planch.	13	15	14	15	14	14	14	14	12	14	12	13.72
21.	<i>Kigelia pinnata</i> (Jacq.) DC.	-	-	-	-	-	-	-	-	-	-	-	-
22.	<i>Lantana camera</i> L.	10	10	11	10	12	10	10	10	12	11	11	10.63
23.	<i>Lawsonia inermis</i> L.	11	13	12	14	14	12	12	11	12	14	12	12.45
24.	<i>Lepisanthes tetraphylla</i> (Vahl.) Radlk.	-	-	-	-	-	-	-	-	-	-	-	-
25.	<i>Manilkara zapota</i> (L.) P. Van Royen	-	-	-	-	-	-	-	-	-	-	-	-
26.	<i>Mimusops elengi</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
27.	<i>Nerium indicum</i> Mill.	-	-	-	-	-	-	-	-	-	-	-	-
28.	<i>Santalum album</i> L.	-	-	-	-	-	-	-	-	-	-	-	-
29.	<i>Terminalia thorelii</i> Ganep	18	20	19	20	19	18	18	19	18	20	20	19.00
30.	<i>Vitex negundo</i> L.	10	11	11	10	10	10	11	11	10	10	12	10.54

- : No activity

RESULTS AND DISCUSSION

The antibacterial activity of 30 leaf extracts against 11 strains of *X. campestris* pv. *mangiferaeindicae* is presented in Table 1 as zone of inhibition (in mm). It is observed from Table 1 that out of 30 leaf extracts tested against *Xcmi* strains, 12 leaf extracts showed antibacterial activity, however, remaining 18 leaf extracts had not shown any inhibitory effect. Out of these 12 leaf extracts which have shown antibacterial activity, maximum activity was recorded in *Terminalia thorelii* (Mean activity zone – 19.00 mm), followed by *Azadirachta indica* with mean activity zone 15.27 mm. While minimum activity was recorded in *Callistemon rigidus* (Mean activity zone – 10.36 mm). The leaf extracts of *Butea monosperma*, *Calistemon rigidus*, *Capsicum annum*, *Caesalpinia*

pulcherima, *Datura inoxia*, *Dolichandrone falcate*, *Holoptelea integrifolia*, *Lantana camera*, *Lawsonia inermis* and *Vitex negundo* also showed good antibacterial activity. Osborn (1943) screened 2300 plant species so as to know their antibacterial activity against the bacteria like *Escherichia coli* and *Staphylococcus aureus*. Pawar (1999) has screened 110 leaf extracts, 09 root extracts, 36 fruit extracts, 05 stem extracts, 10 seed extracts, 04 bark extracts, 08 gum and 06 latex against 05 bacterial phytopathogens.

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