



Determination of Antibacterial Activity of Leaf Extracts of *Jasminum officinale* Against *Xanthomonas campestris* pv. *mangiferaeindicae*

B.T. Pawar*

Research Centre in Botany, Shri Muktanand College, Gangapur – 431109, India

Date of Receipt- 13/11/2014
Date of Revision- 28/11/2014
Date of Acceptance- 23/12/2014

ABSTRACT

Introduction: 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. Favorable environmental conditions cause severe loss to the crop.

Objective: Leaf extract of 37 plants were tested against *Xcmi*; out of them, leaf extract of *Jasminum officinale* L. gave promising results. Hence, fresh leaf extracts of *J. officinale* were screened for its antibacterial activity against 25 strains of *Xcmi* collected from different parts of Maharashtra.

Material & Method: The *in vitro* studies have been performed by using cup-plate method to examine the activity. Cup cavity filled with sterile distilled water was used as control in all the experiments. All experiments were repeated for four times (Experiment A, B, C & D).

Result: The maximum activity was recorded against *Xcmi*.21 (Mean activity zone – 21.94 mm) followed by *Xcmi*.10 (Mean activity zone – 21.67 mm) and comparatively minimum activity was recorded against *Xcmi*.14 (Mean activity zone – 20.27 mm).

Conclusion: The ultimate aim of the research work was to develop economically and technically viable field formulations for the farmers, which will be Bio-ecologically compatible for management of plant bacterial diseases.

Keywords: Antibacterial activity, *Xanthomonas campestris* pv. *mangiferaeindicae*, *Jasminum officinale*.

Address for Correspondence

Research Centre in Botany, Shri Muktanand College, Gangapur – 431 109 Dist. Aurangabad (M.S.) India

E-mail:
drbtpawar@gmail.com

INTRODUCTION

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 on Mango, which is caused by *Xanthomonas campestris* pv. *mangiferaeindicae* (*Xcmi*). The pathogen affects different plant parts like leaf, stem and fruit. Favorable environmental conditions cause severe loss to the crop. Fruit cracking due to the disease causes extensive loss to the cultivator.

For the management plant diseases, various chemicals are used since last several years, the world over. They tend to accumulate in animal tissues posing threat to human health. Green plants represent a reservoir of effective chemo-therapeutants and can provide valuable sources of natural pesticides^{1,3}. Medicinal properties of leaf extracts have been reported by many workers^{8,9,16}. The medicinal properties of leaf extracts have also been mentioned by Kirtikar and Basu⁶.

J. officinale (Oleaceae) is a vigorous climbing plant, which grows 05 to 25 ft. it prefers partial shade. Cytotoxic and genotoxic potential of petroleum ether and aqueous leaf extracts of the *J. officinale* var. *grandiflorum* has been evaluated by Ghurde *et al*². Hussain *et al*⁴ studied *in-vitro* antimicrobial activities of flower and whole plant extracts of *J. officinale* against some human pathogenic microbes. The leaf juice of the plant is applied to corns and ear discharges. The plant contains salicylic acid used as analgesic and febrifuge. The root is used in the treatment of ringworm. Jain *et al*⁵ studied medicinal uses and phytochemical analysis of 09 *Jasminum* spp. Patil *et al*¹⁰ performed preliminary phytochemical studies of *J. multiflorum* and *J. officinale*. They observed that these plants

are rich sources of medicinally active metabolites.

However, during this research work antibacterial activity of leaf extract of *J. officinale* has been assessed against 25 strains of *Xcmi* to observe the behavior of these strains.

MATERIALS AND METHODS

The strains of causal organism of MBCD i.e. *Xcmi* were collected from various districts of Maharashtra. Diseased Mango samples were collected and brought to the laboratory for further investigation. Studies were performed using these samples and maintained various 25 *Xcmi* strains on Nutrient Agar (NA) medium.

A) Preparation of leaf extract

The leaves of the plants were collected, thoroughly washed with tap water and then rinsed with sterile distilled water. For the study, leaf extract was used. They were dried in shade until moisture evaporated. These leaves were powdered by using electric grinder and packed into polythene bags. One gm of the powder was taken and added to 10 ml of sterile distilled water. Then it was subjected to ultracentrifuge for 20 min at -4°C at the 11000 rpm¹¹.

B) Cup Plate Method

It is a method of testing antibacterial activity. For this, the bacterial suspension was prepared by adding 10 ml sterile distilled water to 2 days old NA slope culture. Five drops of bacterial cell suspension were poured in sterilized petridishes (9 cm diameter) onto which 20 ml of nutrient agar was poured and thoroughly mixed. It was allowed to solidify¹².

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. The petridishes were incubated for 24 hrs at $25\pm 2^\circ\text{C}$ and the observations were recorded as diameter of inhibitory zone in mm. Diameter of the activity zone was measured in 3-4 angles and mean was considered for accuracy. Cup cavity filled with sterile distilled water was used as control in all the experiments. All experiments were repeated for four times (Experiment. A, B, C & D).

RESULT AND DISCUSSION

It is observed from table 01 that *J. officinale* showed antibacterial activity against all 25 strains of *Xcmi* under investigation. The maximum activity was recorded against *Xcmi.21* (Mean activity zone – 21.94 mm) followed by *Xcmi.10* (Mean activity zone – 21.67 mm) and comparatively minimum activity was recorded against *Xcmi.14* (Mean activity zone – 20.27 mm) strain under investigation.

Average activity against all *Xcmi* strains was 21.08 mm. Activity of *J. officinale* ranges between 20 to 22 mm (Fig.01). Fourteen *Xcmi* strains (*Xcmi.3*, *Xcmi.5*, *Xcmi.6*, *Xcmi.7*, *Xcmi.8*, *Xcmi.9*, *Xcmi.10*, *Xcmi.11*, *Xcmi.12*, *Xcmi.13*, *Xcmi.20*, *Xcmi.21*, *Xcmi.24* and *Xcmi.25*) have showed more activity than average activity of all strains i.e. 21.08 mm; while 11 *Xcmi* strains (*Xcmi.1*, *Xcmi.2*, *Xcmi.4*, *Xcmi.14*, *Xcmi.15*, *Xcmi.16*, *Xcmi.17*, *Xcmi.18*, *Xcmi.19*, *Xcmi.22* and *Xcmi.23*) showed less activity than average activity.

Similar results were reported by Rama and Ampati¹⁴. They reported antibacterial activity of flower extracts against *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Bacillus pumilis*, *P. vulgaris* and *E. coli* by cup plate method. Kumar *et al*⁷ tested flower extract of *J. officinale*

(flowers) against acne-inducing bacteria by using disc diffusion and broth dilution methods. Sandeep and Paarakh¹⁵ studied Ethnobotanical, Phytochemical and Pharmacological aspects of *J. grandiflorum*. Rahaman *et al*¹³ screened dried extracts of *J. grandiflorum* and *F. religiosa* for cytotoxicity and antibacterial activity as well as for some important phytochemical groups.

It was observed from the research work, that leaf extract of *J. officinale* is effective against all the strains of *Xcmi*. The leaf extract is eco-friendly, economic and technically viable field formulation, which will be Bio-ecologically compatible for management of various strains of *Xcmi*.

ACKNOWLEDGEMENT

Authors are thankful to University Grants Commission, New Delhi (Major Research Project, File No.41-384/2012 (SR) Dated: 16th July, 2012) for providing financial assistance and also very much thankful to The Principal, Shri Muktanand College, Gangapur, for providing necessary facilities and support.

REFERENCES

1. Balandrin MF, Klocke JA, Wurtele ES, Bollinger WH. Natural plant chemicals: Sources of industrial and medicinal materials, *Science*, 1985; 228: 1154-1160.
2. Ghurde MU, Deshmukh VR, Pulate PV, Malode SN. Cytotoxic and genotoxic potential assesment of leaf extract of *Jasminum officinale* L. var. *grandiflorum* L. *International Journal of Innovations in Bio-Sciences*, 2012; 2(3): 112-117.
3. Hostettmann K, Wolfender J. The search for Biological active secondary metabolites, *Pesticides Science*, 1997; 51: 471-482.

4. Hussain M, Bakhsh H, Aziz A. Comparative *in-vitro* study of antimicrobial activities of flower and whole plant of *Jasminum officinale* against some human pathogenic microbes. *Journal of Pharmacy and Alternative Medicine*, 2013; 2(4), 33-43.
5. Jain A, Sharma R, Kumar A, Sharma S. *Jasminum* species: an overview. *International Journal of Institutional Pharmacy and Life Sciences*, 2011; 1(1): 251-266.
6. Kirtikar KR, Basu BD. *Indian Medicinal Plant*, Vol. I to IV, Bishen Singh Mahendrapal Singh Publishers, Dehra Dun; 1991.
7. Kumar GS, Jayaveera KN, Ashok Kumar CK, Sanjay UP, Vrushabendra Swamy BM, Kishore Kumar DV. Antimicrobial effects of Indian medicinal plants against acne-inducing bacteria. *Tropical Journal of Pharmaceutical Research*, 2007; 6(2): 717-723.
8. Mishra, P. (1996) Ethno-botanical screening of the members of the family Leguminoceae from Parasnath hills, Bihar, In : *Proceedings of 82nd Indian Science Congress, Calcutta*, (Abstr.)
9. Naik VN *Marathwadyatil Samanya Vanaushadhi*, Amrut Prakashan, Aurangabad; 1998.
10. Patil KJ, Patil VA, Patil SV, Bhuktar AS. Comparative preliminary phytochemical studies of *Jasminium multiflorum* and *Jasminum officinale*. *Trends in Life Science*, 2012; 1(3): 43-45.
11. Pawar BT. Antibacterial activity of leaf extracts of *Azadirachta indica* against *Xanthomonas campestris* pv. *mangiferaeindicae*. *Indian Journal of Applied Research*, 2014; 4(5): 56-57.
12. Pawar BT, Papdiwal PB. Antibacterial activity of some leaf extract against *Xanthomonas campestris* pv. *mangiferaeindicae*, *International Journal of Plant Protection*, 2010; 3(1): 104-106
13. Rahman M, Khatun A, Khan S, Hossain F, Khan AA. Phytochemical, cytotoxic and antibacterial activity of two medicinal plants of Bangladesh. *Pharmacology on Line*, 2014; 1: 3-10.
14. Rama G, Ampati S. Evaluation of flowers of *Jasminum officinale* for antibacterial activity. *Journal of Advanced Pharmaceutical Sciences*, 2013; 3(1): 428-431.
15. Sandeep, Paarakh PM. *Jasminum grandiflorum* Linn (Chameli): Ethnobotany, Phytochemistry and Pharmacology – A review. *Pharmacologyonline*, 2009; 2: 586-595.
16. Suhaila M, Sizama S, Sharkawy SHE, Ali AM, Muid S. Antimycotic screening of 58 Malasian plants against plant pathogens, *Pesticide science*, 1996; 43(3): 259-264.

Table 1. Antibacterial Activity of Leaf extract of *Jasminum officinale* against *Xcmi* strains

Sr. No.	Name of the Strain	Zone of Inhibition (in mm)					Remark
		Exp. A	Exp. B	Exp. C	Exp. D	Mean	
1	<i>Xcmi.01</i>	20.33	20.25	20.66	20.50	20.44	-
2	<i>Xcmi.02</i>	20.25	20.50	20.66	20.00	20.35	-
3	<i>Xcmi.03</i>	20.75	21.00	21.25	21.33	21.08	-
4	<i>Xcmi.04</i>	20.66	20.50	20.75	20.25	20.54	-
5	<i>Xcmi.05</i>	21.50	21.33	21.25	21.00	21.27	-
6	<i>Xcmi.06</i>	21.00	21.33	21.50	21.66	21.37	-
7	<i>Xcmi.07</i>	21.75	21.50	21.33	22.00	21.65	-
8	<i>Xcmi.08</i>	22.00	21.50	21.66	21.33	21.62	-
9	<i>Xcmi.09</i>	21.33	21.25	21.50	22.00	21.52	-
10	<i>Xcmi.10</i>	22.00	21.50	21.66	21.50	21.67	Max. II
11	<i>Xcmi.11</i>	21.33	21.50	21.75	22.00	21.65	-
12	<i>Xcmi.12</i>	21.00	21.75	21.66	21.25	21.42	-
13	<i>Xcmi.13</i>	21.33	21.25	21.50	22.00	21.52	-
14	<i>Xcmi.14</i>	20.00	20.25	20.33	20.50	20.27	Min.
15	<i>Xcmi.15</i>	20.75	20.66	20.50	20.66	20.64	-
16	<i>Xcmi.16</i>	20.50	20.66	20.33	21.00	20.62	-
17	<i>Xcmi.17</i>	20.75	20.50	20.33	21.00	20.65	-
18	<i>Xcmi.18</i>	21.00	20.66	20.25	20.33	20.56	-
19	<i>Xcmi.19</i>	20.25	20.66	20.75	21.00	20.67	-
20	<i>Xcmi.20</i>	22.00	21.00	22.00	21.25	21.56	-
21	<i>Xcmi.21</i>	22.00	21.75	22.00	22.00	21.94	Max.
22	<i>Xcmi.22</i>	20.33	20.66	20.75	20.66	20.60	-
23	<i>Xcmi.23</i>	20.66	20.50	20.33	20.00	20.37	-
24	<i>Xcmi.24</i>	21.33	21.50	21.66	21.75	21.56	-
25	<i>Xcmi.25</i>	22.00	21.50	21.33	21.00	21.46	-
Total		526.80	525.46	527.69	527.97	526.99	-
Average		21.07	21.02	21.11	21.12	21.08	-

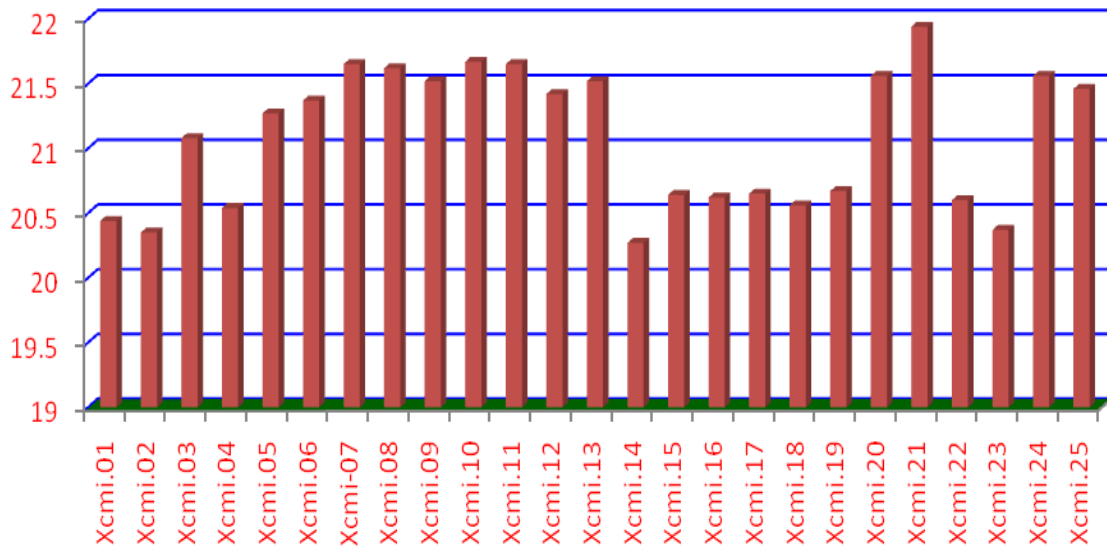


Figure 1. Antibacterial activity of leaf extract of *Jasminum officinale* against *Xcmi* strain

X-Axis: Name of the Strain, Y-Axis: Zone of Inhibition in mm