Available Online at http://www.recentscientific.com

ISSN: 0976-3031

International Journal of Recent Scientific Research
Vol. 6, Issue, 4, pp.3358-3360, April, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

JATROPHA CURCAS: ANTIBACTERIAL POTENTIAL OF LEAF EXTRACT

B.T. Pawar and G.M. Waghmare

Research Center in Botany, Shri Muktanand College, Gangapur Dist. Aurangabad (M.S.) India

ARTICLE INFO

Article History:

Received 2nd, March, 2015
Received in revised form 10th, March, 2015
Accepted 4th, April, 2015
Published online 28th, April, 2015

Key words:

Jatropha curcas, Leaf extract, Antibacterial potential, *Xanthomonas campestris* pv. *mangiferaeindicae*

ABSTRACT

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. Leaf extract of 37 plants were tested against *Xcmi*; out of them, leaf extract of *Jatropha curcas* showed good antibacterial activity. Hence, leaf extracts of *J. curcas* tested for its antibacterial activity against 25 strains of *Xcmi* collected from different parts of Maharashtra state. *In-vitro* studies have been performed by using cup-plate method to examine the activity. Fresh leaf extracts of *J. curcas* plants were screened against 25 strains of *Xcmi.* The maximum activity was recorded against *Xcmi*.1 (Mean activity zone – 15.67 mm) followed by *Xcmi*.2 and *Xcmi*.4 (Mean activity zone – 15.56 mm) and minimum against *Xcmi*.24 (Mean activity zone – 14.75 mm) strain under investigation. 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.

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 (Balandrin *et al*, 1985; Hostettmann and Wolfender, 1997). Medicinal properties of leaf extracts have been reported by many workers (Naik, 1998; Suhaila *et al*., 1996; Kirtikar and Basu, 1991). (Burt 2004) reported that the antibacterial activity of the essential oils is not carried out by one specific mechanism but acts over several specific targets in the cell. Plants produce a good deal of secondary metabolites which have benefited mankind in various ways, including treatment of diseases (Elaine *et al*., 2002). The antibacterial activity of the methanolic extract of the leaves of *J. curcas* was investigated against 13 bacterial species including *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus.* The extract showed appreciable inhibitory activity against these organisms (Akinpelu *et al*., 2009). *J. curcas* leaf extracts and leaf derived callus extracts of high concentrations (1.0 and 1.2%) inhibited the growth of the bacterial species *Staphylococcus aureus* and *Pseudomonas sp*. (Kalimuthu *et al*., 2010). (Singh, 2013) tested antibacterial activity of *J. curcas* against the gram negative bacteria and the results showed that, the methanol extracts of the plant exhibited high activity against the tested organism rather than aqueous extract of those plants.

However, during this research work antibacterial activity of leaf extract of *J. curcas* 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.

Preparation of leaf extract: The leaves of the plant were collected, thoroughly washed with tap water and then rinsed with sterile distilled water. Leaves were dried in shade until

Corresponding author:* **B.T. Pawar
Research Center in Botany, Shri Muktanand College, Gangapur Dist. Aurangabad (M.S.) India

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 rpm (Pawar and Pandit 2014). This leaf extract was used for the further study.

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 solidify (Pawar and Papdiwal 2010). 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±2°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 leaf extract of *J. curcas* showed antibacterial activity against all 25 strains of *Xcmi* under investigation. The maximum activity was recorded against *Xcmi*.01 (Mean activity zone – 15.67 mm) followed by *Xcmi*.2 and *Xcmi*.4 (Mean activity zone – 15.56 mm) and comparatively minimum activity was recorded against *Xcmi*.24 (Mean activity zone – 14.75 mm) strain under investigation. Average activity of leaf extract of *J. curcas* against all *Xcmi* strains was 15.17 mm. Activity ranges between 14 to 16 mm (Fig. 01).

Twelve *Xcmi* strains (*Xcmi*.1, *Xcmi*.2, *Xcmi*.4, *Xcmi*.7, *Xcmi*.11, *Xcmi*.12, *Xcmi*.13, *Xcmi*.14, *Xcmi*.15, *Xcmi*.16, *Xcmi*.20 and *Xcmi*.23) have showed more activity than average activity of all strains i.e. 15.17 mm; while 12 *Xcmi* strains (*Xcmi*.3, *Xcmi*.5, *Xcmi*.6, *Xcmi*.8, *Xcmi*.9, *Xcmi*.10, *Xcmi*.17, *Xcmi*.19, *Xcmi*.21, *Xcmi*.22, *Xcmi*.24 and *Xcmi*.25) showed less activity than average activity.

Smilar results have been reported by (Oloyede *et al*., 2012). They reported the phytochemical content, radical scavenging and antibacterial properties of aqueous extract of *J. curcas* Linn leaves. Their results showed antibacterial activity against *Klebsiella pneumonia*, *Escherichia coli*, and *Pseudomonas aeruginosa* at 250 and 500 mg/ml (MIC = 125 mg/mL), which were resistant to ampicillin, chloxacillin and erythromycin, and the extract was inactive against *Staphilococcus aureus* and Proteus species at these concentrations, though all were sensitive to gentamycin. (Narayani *et al.,* 2012) also experimented phytochemical and antibacterial studies on *J. curcas.* Antibacterial activity showed varied degree of zone of inhibition against the tested bacterial pathogens. Chloroform extracts of *J. curcas* showed the broadest spectrum of antibacterial activity against *E. coli* and *S. aureus.* Omoregie and Folashade, (2013) studied antimicrobial activity of extracts of *J. curcas.* (Adamu *et al.,* 2013) investigated the antimicrobial potential and minimum inhibitory concentrations (MICs) of aqueous, chloroform and ethanol extracts *of J. curcas* leaves against *E. coli*, *S. aureus*.

It was observed from the research work, that leaf extract of *J. curcas* is effective against all 25 strains of *Xcmi* under investigation. 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*.

Table.01 Antibacterial Potential of *Jatropha curcas* Leaf extract 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	*Xcmi*.01	15.25	15.66	15.75	16.00	15.67	**Max.**
2	*Xcmi*.02	15.50	15.75	15.00	16.00	15.56	**Max.- II**
3	*Xcmi*.03	15.33	15.00	15.50	14.66	15.12	-
4	*Xcmi*.04	15.25	15.25	16.00	15.75	15.56	**Max.- II**
5	*Xcmi*.05	15.33	15.00	14.75	15.25	15.08	-
6	*Xcmi*.06	14.75	15.50	14.33	15.33	14.98	-
7	*Xcmi-07*	16.00	15.75	14.66	15.33	15.44	-
8	*Xcmi*.08	14.75	14.66	15.00	15.25	14.92	-
9	*Xcmi*.09	14.66	14.50	15.25	15.25	14.92	-
10	*Xcmi*.10	14.33	15.25	15.25	14.75	14.90	-
11	*Xcmi*.11	15.25	15.33	15.25	15.00	15.21	-
12	*Xcmi*.12	14.75	15.50	15.75	15.50	15.38	-
13	*Xcmi*.13	15.25	14.75	15.50	15.25	15.19	-
14	*Xcmi*.14	15.66	15.33	14.75	15.00	15.19	-
15	*Xcmi*.15	15.33	14.66	15.66	15.25	15.23	-
16	*Xcmi*.16	14.66	15.50	15.66	15.25	15.27	-
17	*Xcmi*.17	15.66	15.25	14.75	14.66	15.08	-
18	*Xcmi*.18	15.50	15.66	14.75	14.75	15.17	-
19	*Xcmi*.19	15.00	14.25	15.33	15.00	14.90	-
20	*Xcmi*.20	15.25	15.66	15.75	15.33	15.50	-
21	*Xcmi*.21	15.66	14.66	14.75	14.33	14.85	-
22	*Xcmi*.22	15.50	14.75	15.25	15.00	15.13	-
23	*Xcmi*.23	15.33	15.75	15.50	15.25	15.46	-
24	*Xcmi*.24	15.00	14.75	14.25	15.00	14.75	**Min.**
25	*Xcmi*.25	15.25	15.33	14.75	14.33	14.92	-
	Total	380.20	379.45	379.14	378.47	379.32	-
	Average	15.21	15.18	15.17	15.14	15.17	-

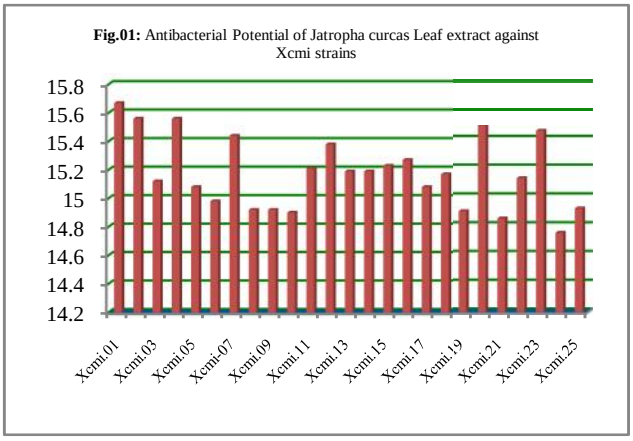

Fig.01: Antibacterial Potential of Jatropha curcas Leaf extract against Xcmi strains

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, Dist. Aurangabad (M.S.) India, for providing necessary facilities and support.

References

Adamu, L.G.O., Edeghagba, B., Abiola, O.M., Elijah, A.I. and Ezeokoli, O.T. 2012. Antimicrobial activity of extracts of *Jatropha curcas* and *Calotropis procera* leaves against pathogenic isolates from motorcycle helmets in Lagos metropolis. *Int. J. Curr. Microbiol*. App. Sci., 2(12): 292-302.

Akinpelu, D.A., Aiyegoro, O.A. and Okoh, A.I. 2009. The bioactive potentials of two medicinal plants commonly used as folklore remedies among some tribes in West Africa. *Afr. J. Biotechnol.*, 8(8): 1660-1664.

Balandrin, M. F., Klocke, J.A., Wurtele, E.S. and Bollinger, W.H. 1985. Natural plant chemicals: Sources of industrial and medicinal materials. Science, 228: 1154-1160.

Burt, S. 2004. Essential oils: their antibacterial properties and potential applications in foods - a review. *Int. J. Food Microbiol*., 94(3): 223-253.

Elaine, M.S., Ana, B.Q., Olindo, A.M., Giovanni, G., Rodrigo, C., Tania, M.A. and Carlos, L.Z. 2002. Screening and fractionation of plant extracts with antiproliferative activity on human peripheral blood mononuclear Cells. Memorias do Instituto Oswaldo Cruz, 97(8):1207-1212.

Hostettmann, K. and Wolfender, J., 1997. The search for Biological active secondary metabolites. Pesticides Science, 51: 471-482.

Kalimuthu, K., Vijayakumar, S. and Senthilkumar, R. 2010. Antimicrobial activity of the biodiesel plant, *Jatropha curcas* l. *International Journal of Pharma and Bio Sciences*, 1(3): 1-5.

Kirtikar, K.R. and Basu, B.D., 1991. Indian Medicinal Plant, Vol. I to IV, Bishen Singh Mahendrapal Singh Publishers, Dehra Dun.

Naik, V.N. 1998. Marathwadyatil Samanya Vanaushadhi, Amrut Prakashan, Aurangabad.

Narayani, M., Johnson, M., Sivaraman, A. and Janakiraman, N. 2012. Phytochemical and antibacterial studies on *Jatropha curcas* L. *Journal of Chemical and Pharmaceutical Research*, 4(5): 2639-2642.

Oloyede, O.B., Salau, A.K., Akeusola, R.T., Ganiyu, O.T., Azeez, L. and Ogunbode, S.M. 2012. Phytochemical content, radical scavenging and antibacterial properties of aqueous extract of *Jatropha curcas* Linn leaves. *Fountain Journal of Natural and Applied Sciences*, 1(1): 41-48.

Omoregie, E.H., and Folashade, K.O. 2013. Broad Spectrum Antimicrobial Activity of Extracts of *Jatropha curcas. Journal of Applied Pharmaceutical Science*, 3(4): 083-087.

Pawar, B.T. and Pandit, B.D. 2014. Antibacterial activity of Leaf extract of *Ocimum sanctum* L. against *Xanthomonas campestris* pv. *mangiferaeindicae. Research Journal of Recent Sciences*, 3(ISC-2013): 291-294.

Pawar, B.T. and Papdiwal, P.B. 2010. Antibacterial activity of some leaf extracts against *Xanthomonas campestris* pv. *mangiferaeindicae. International Journal of Plant Protection*, 3(1): 104-106.

Singh, A. 2013 Antimicrobial Activity of Traditional Medicinal Plants of India. Science, 3(8): 649-650.

Suhaila, M., Sizama, S., Sharkawy, S.H.E., Ali, A.M. and Muid, S. 1996. Antimycotic screening of 58 Malasian plants against plant pathogens. Pesticide science, 43(3): 259-264.

How to cite this article:

B.T. Pawar and G.M. Waghmare., Jatropha Curcas: Antibacterial Potential Of Leaf Extract. *International Journal of Recent Scientific Research Vol. 6, Issue, 4, pp.3358-3360, April, 2015*

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