

Evaluation of Preliminary Antibacterial Screening of *Jatropha curcas* (L.): An *in vitro* study.

B.L. Chaudhary and Shabana Khanam*

Bryology Laboratory, Department of Botany, University College of Science,
M.L.S. University, Udaipur - 313001, India.

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The antibacterial activity of crude methanolic, ethanolic and aqueous extracts of *Jatropha curcas* (L.) fresh leaves extracts collected from Udaipur district of Rajasthan was evaluated against four common human pathogenic bacteria viz. *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* by Agar well diffusion method. All bacterial strains were found most sensitive while aqueous extract of this plant does not show any inhibition activity against *B. subtilis* and *S. aureus*.

Key words: *In vitro*, Antibacterial activity, *Jatropha curcas*.

Medicinal plants represent a rich source from which antimicrobial agents may be obtained. Plants are used medicinally in different countries and are sources of many potent and powerful drugs¹⁻². The interest in the scientific investigation of this plant from Rajasthan based on the claim of their effective use for the treatment of many diseases. Therefore, research into the effects of these local medicinal plants is expected to enhance the use of these plants against disease caused by the test pathogens. The active principles of many drugs found in plants are secondary metabolites^{3, 4}. In addition to these antibiotics is some times associated with adverse effects on the host like hypersensitivity. Therefore, there is a need to develop alternative antimicrobial drugs for the treatment of infectious disease from other

sources, such as plants⁵. Natural products of higher plants may be new sources of antimicrobial agents possibly with novel mechanisms of action^{6,7}.

Jatropha curcas (L.) member of family Euphorbiaceae, commonly known as Ratanjyot. It is a large, perennial, soft woody shrub, 3-4 m in height with sticky juice. The leaves are galactagogue (medicine that promotes secretion of milk), rubefacient, suppurative and have insecticidal properties, and are useful in foul ulcers, tumours and scabies. The latex is stypic, purgative and haemostatic and is good for wounds and ulcers. The seeds are useful in haemorrhoids (a bleeding pile), wounds, and splenomegaly (enlargement of spleen) and skin disease. The latex of this plant contains an alkaloid known as "jatrophin" which is believed to have anti-cancerous properties.

It is also used as an external application for skin disease and rheumatism and the tender twigs of the plant are used for cleaning teeth,

*To whom all correspondence should be addressed.
E-mail: pkhan07@yahoo.com

finally, the roots are reported to be used as an antidote for snake bites⁸.

In the present investigation, *In vitro* antibacterial activity of methanol, ethanol and aqueous extract of *Jatropha curcas* (L.) against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*.

MATERIAL AND METHODS

Plant material

Fresh leaves of *Jatropha curcas* were collected from Udaipur district of Rajasthan. The leaves were washed thoroughly with running tap water, shed dried and grinded to powder using a table model grinder and stored in air tight bottles.

Extraction

10g of powdered material of leaves was extracted with 100 ml methanol; ethanol and autoclaved water kept them for 72 hours at room temperature. Filtering it with Whatman filter paper No.1 and the crude extract were obtained by evaporating the solvent in open air.

Test microorganisms

Four test microorganisms were used in antibacterial sensitivity test. They were the gram positive bacteria, *Bacillus subtilis* (MTCC-441), *Staphylococcus aureus* (MTCC-740); gram negative bacteria *Escherichia coli* (MTCC-41) and *Pseudomonas aeruginosa* (MTCC- 424) procured from Microbial Type Culture Collection and Gene Bank (IMTECH, Chandigarh, India) were used during the investigation. All the

bacterial strains were maintained at 4°C on nutrient agar slants and sub cultured as and when required.

Antibacterial bioassay

The antibacterial activity of methanol, ethanol and aqueous extracts were evaluated separately by agar well diffusion method⁹. Each bacterial strain was plated out on nutrient agar plates and incubated for 24 hours at 37 °C and colonies from this fresh culture were used for making suspension. Bacterial suspension of approximately 0.6 optical densities and 100µl of it was uniformly seeded on nutrient agar medium when the temperature reached 35-40 °C in sterile glass Petri plates. After complete solidification, holes were made aseptically with a 6 mm sterile cork borer and 500µg/ml concentrated crude extracts dissolved in Di-methyl formamide and 100µl of extract were poured in the wells. The plates were incubated at 37 °C for 48 hrs and bioactivity of the extracts was determined by measuring the diameter zone of inhibition in mm including 6 mm wells. streptomycin (500µg/ml) and DMSO (500µg/ml) used as positive and negative control for bacteria. The experiment was performed in triplicates and average results were recorded.

RESULTS AND DISCUSSION

The antibacterial potential of crude extracts of *Jatropha curcas* (L.) collected from Udaipur district of Rajasthan was investigated. The antibacterial activity evaluated against four

Table 1. Antibacterial activity of different crude extracts of *Jatropha curcas* (L.) leaves by agar well diffusion method (100µl/ml).

Microorganisms	Zone of Inhibition in (mm)*			Control	
	Met. extract (500µg/ml)	Eth. extract (500µg/ml)	Aq. extract (500µg/ml)	St.(Positive) (500µg/ml)	DMSO (Negative) (500µg/ml)
<i>Bacillus subtilis</i>	23.5	25.5	NI	20.0	NI
<i>Staphylococcus aureus</i>	14.3	12.0	NI	19.0	NI
<i>Escherichia coli</i>	23.0	22.5	8.5	18.0	NI
<i>Pseudomonas aeruginosa</i>	15.0	25.0	25.0	20.0	NI

Key: - *= Values include cup borer diameter (6.00) and are mean of three replicates; **NI**= No Inhibition zone; **DMSO** = Di-methyl sulfoxide; **Met** = Methanolic; **Eth**= Ethanolic; **Aq** = Aqueous; **St** = Streptomycin.

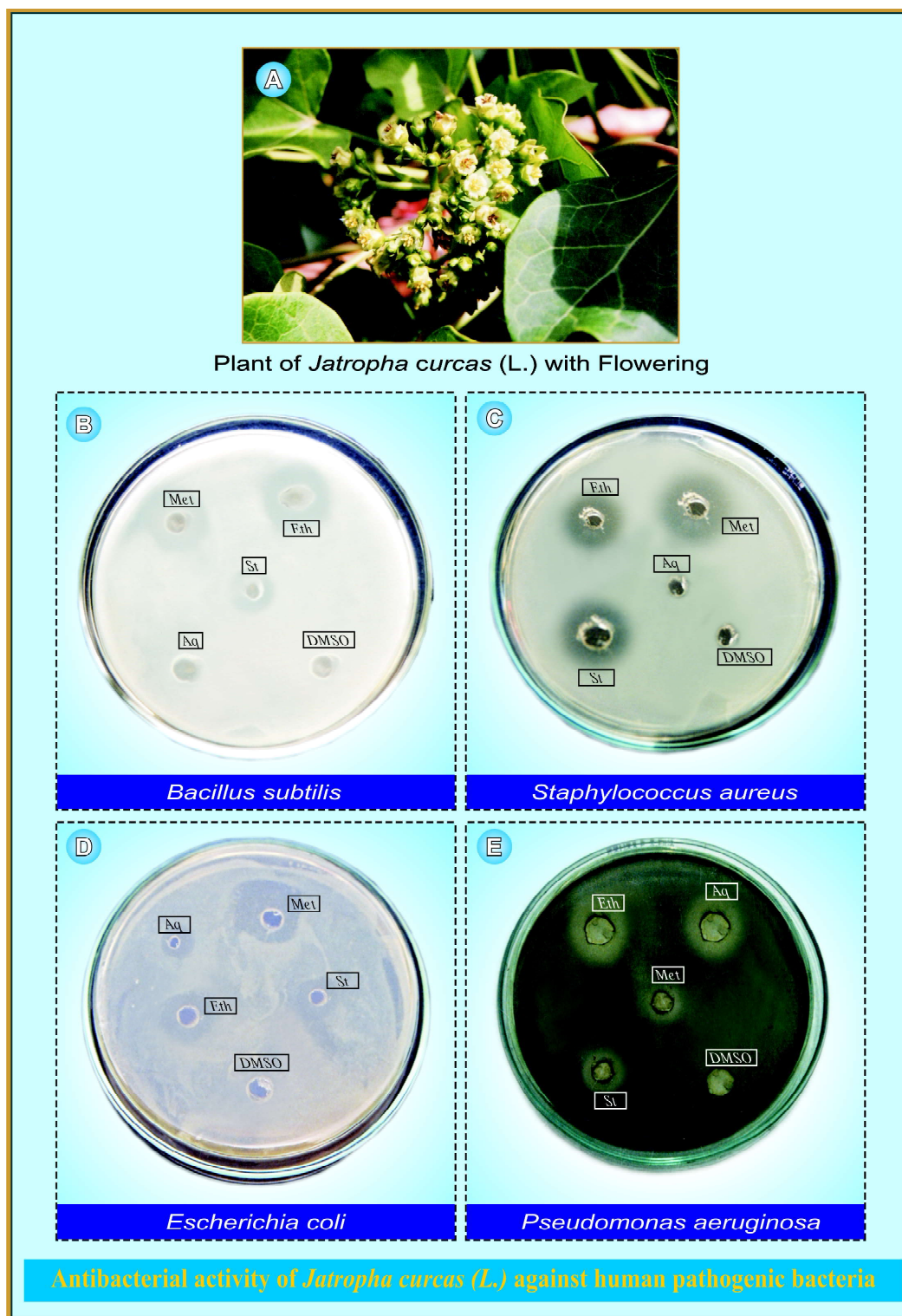


Plate 1.

bacterial strains such as *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. The bioactivity measured in terms of zone of inhibition exhibited by the different extracts against the respective bacterial strains is presented in Table 1.

All the extracts of the plant (methanolic, ethanolic and aqueous) showed activity against the tested bacteria. The methanolic, ethanolic and aqueous extract showed maximum zone of inhibition against *Pseudomonas aeruginosa* and methanolic, ethanol extract active against *Bacillus subtilis*. The minimum inhibition zone observed in aqueous extract of this plant against *E. coli*, and no inhibitory activity of aqueous extract observed against *Bacillus subtilis* and *Staphylococcus aureus* Plate 1.

In conclusion, the result of this initial antibacterial screening suggests that fresh leaves extract of the *Jatropha curcas* (L.) possess compound with antibacterial properties that can further be explored.

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