

Antimicrobial activity of selected plant extracts against plant pathogens

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The frequently changing of ecological condition demands for developing ecofriendly herbal antimicrobial agents. The present study was under taken to evaluate the antimicrobial activity of ethanolic leaf extract of Neem leaf and flower extracts of Nochi against phytopathogens, *Xanthomonas* and *Fusarium*. All plant extracts showed considerable antibacterial activity against *Xanthomonas* and antifungal activity against *Fusarium*. The results showed that the leaf extract of Neem had high toxicity against tested pathogenic organisms, the antimicrobial activity of other extract increases with increasing concentration of extracts.

Key words: Antimicrobial activity, Neem, Nochi, *Xanthomonas* and *Fusarium*

INTRODUCTION

Citrus canker, caused by *Xanthomonas oxonopodis* pv. Citri, is a serious disease reducing the external quality of citrus fruits. It affects all types of citrus and severely infection on lime. Typical symptom on leaves is a raised necrotic lesions surrounding with yellow halo but on fruit and stem halo seldom occurs. Wilt of cotton caused by *Fusarium oxysporum*, the plants are affected during all stages of plant growth. Yellowing and browning of the cotyledons, a complete defoliation leaving the stem alone standing in the field. Young plants may turn them in black, the decolouration may be partial. Pathogenic microbial disease of plants cause malfunctions *ie.* reduce the yield or survival capacity resulting in death. The plant protection chemicals used for controlling the plant diseases posses a serious threat to our environment.

The problems encountered with the use of chemical microbialcides include environmental degradation, resistance problem in target organism, etc. Their frequent use change the ecological conditions which demands the need for developing ecofriendly herbal antimicrobial agents. In such a situation, natural plant products, which proved to be a correct choice, replace some of the chemicals in order to control plant diseases. Many focus on determining the antimicrobial activity of plant extracts found in folk medicine, essential oils or isolated compounds such as alkaloids, flavonoids, sesquiterpene, lactones, diterpenes, triterpenes or naphthoquinones, among others. Some of these compounds were isolated or obtained by bio-guided isolation after previously detecting antimicrobial

activity on the parts of the plant.

In recent year much interest has been developed in the antimicrobial effects of medicinal plants for plant disease control. Some plant extracts were reported as effective inhibitors of phytopathogenic bacterial growth (1998, Leksomboon *et al.*, 2000, Garelin *et al.*, 1978 and Grainage and Alvareg, 1987).

Many plants have been reported to contain antibacterial and antifungal substances (Grainage *et al.*, 1986 and Ambasta,1992). The present study has been emphasized with the objective of testing antimicrobial activity of Neem and Nochi plants against phytopathogens, *Xanthomonas* and *Fusarium*.

MATERIALS AND METHODS

Antimicrobial activity of leaf extract of Neem and leaf, flower extracts of Nochi plants were studied.

Plant materials collection :

Fresh healthy leaf of Neem and leaf, floral parts of Nochi were collected.

Extract Preparation :

10 grams of plant materials were washed in running water, surface sterilized with 0.1% mercuric chloride solution and finally washed in distilled water. The plant materials was crushed using mortar and pestle by adding 50% ethanol. The crushed extract was allowed to stand overnight for extraction. The extracts were filtered and made up to different concentrations (50% and 100%).

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Disc Preparation :

In the sterile condition, the extracts were loaded in sterile empty discs drop by drop with the help of micropipette. 50% and 100% concentrations discs were prepared separately and air dried.

Test organisms :

The bacterial pathogen *Xanthomonas* was isolated from infected citrus and used as test organism. The fungal pathogen *Fusarium* was isolated from infected cotton leaves and used as test organism.

Antibacterial assay :

Xanthomonas culture was swabbed on the surface of Mueller Hinton Agar media using sterile cotton swabs. Antibacterial activity was assessed using disc diffusion method (Bauer *et al.*, 1966). The plates were incubated at 37°C for 24 hours. The diameter of zone of inhibition were observed and tabulated.

Antifungal assay :

15 ml of Potato Dextrose Agar medium and 2 ml of plant extract from each concentration were poured into respective Petri dishes. The plates were gently shaken for the thorough mixing of the medium and the extracts. After solidification of the medium the test fungi *Fusarium* was aseptically inoculated on the centre of the plate (Food poisoned technique – Nene and Thapliyal, 2000). The plates were then incubated at 27°C for 7 days. The diameter of the mycelial growth was measured after third, fifth and seventh day.

RESULTS AND DISCUSSION

Antibacterial activity :

The antibacterial activity of ethanolic extracts from Neem and Nochi plants against *Xanthomonas* was studied. The

Table - 1: Antibacterial activity of plant extracts against *Xanthomonas*

Extract	Concentration	Zone of inhibition (mm in Diameter)			
		I	II	III	Average
Neem	50%	12	12	12	12
	100%	15	15	15	15
Nochi leaf	50%	10	10	10	10
	100%	13	11	12	12
Nochi flower	50%	9	9	9	9
	100%	12	11	10	11

average diameter of zone of inhibition at different extracts are given in Table- 1. Neem leaf extract shows 12mm zone of inhibition at 50%, and 15mm inhibition in 100% concentration and the Nochi flower extracts shows 9mm and 11mm zone in 50% and 100% concentration, respectively. The results showed that all the extracts moderately control the growth of pathogen on both 50% and 100% concentration. The leaf extract of Neem (100%) showed strong toxicity against the tested pathogen.

Antifungal activity :

Table - 2: Antifungal activity of plant extracts against *Fusarium* sp

Extract	Concentration	Colony growth (mm in diameter)		
		3 rd day	5 th day	7 th day
Neem	50%	9	15	29
	100%	-	8	21
Nochi leaf	50%	12	29	29
	100%	5	22	30
Nochi flower	50%	16	33	47
	100%	10	28	40

The antifungal activity of selected plant extracts from Neem and Nochi against *Fusarium* was studied. The diameter of colony growth of test pathogen on 3rd day, 5th and 7th day were showed in Table-2. Neem leaf extract, was found to be 9mm growth in 3rd day, 15mm growth in 5th day and 29mm in 7th day against 50% concentration. At 100% concentration of Neem leaf extract, shows no growth was observed on third day, 8mm in 5th day and 21mm on 7th day.

Nochi leaf extract, was found to be 5mm on 3rd day, 22mm on 5th day 30mm on 7th day in the 50% concentration. In Nochi flower extract, was found to be 16mm on 3rd, 33mm on 5th day and 47mm on 7th day in the 50% concentration. Nochi flower show extract, growth was 10mm on 3rd day, 28mm on 5th day and 40mm on 7th day at 100% concentration.

The results showed that all the extracts effectively control, the growth of pathogen. The leaf extract of Neem had strong toxicity against the tested fungal pathogen. The present study concluded that Neem and Nochi plants were effective against plant pathogens. It minimizes the problems encountered by the use of chemical antimicrobial agents. Further research is necessary to isolate and purify active compounds in these plants, which allow the scientific community to recommend their utilization as an accessible

alternative to synthetic antimicrobial agents.

Bactericides of plant origin can be one approach to disease management because of their ecofriendly nature (Raico *et al.*, 1989, Valsaraj *et al.*, 1997 and Bolkan and Reinert, 1994). The products of plant origin are of greater advantage to the user, the public and the radical environmentalists.

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