

STUDY OF PHENOLIC COMPOUNDS FROM THE LEAVES OF *LANTANA CAMARA* L.

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Phenolic compounds extracted from the leaves of *Lantana camara* L. with orange-brown flowers were found to be phytotoxic to rice, wheat and three grass seedlings. Antimicrobial activity of the compounds was observed against *Penicillium* sp. and *Pseudomonas solanacearum*.

Keywords : Antimicrobial activity; *Lantana camara*; Phytotoxicity; TLC.

Lantana camara, a common weed and member of the family Verbenaceae, contains phenolic compounds. Phytotoxicity of these compounds has been reported. Phenolic compounds from methanolic extracts of *L. camara* (variety not mentioned) have inhibitory activity on germination of rye grass seeds¹. There are reports on phenolics of the leaves of *L. camara* (var. not mentioned) having phytotoxicity on *Lolium multiflorum*^{2,3}. The present investigation reports the phytotoxicity and antimicrobial activity of the phenolic compounds extracted from the leaves of *L. camara* (variety orange brown flower).

Phenolic compounds were extracted from the sun dried young leaves of leaves of *L. camara*⁴. Presence of phenolic compounds in the alkali extract was detected on TLC plates⁵. The phenol content was estimated from a standard curve prepared with different concentrations of catechol⁶. To study the phytotoxic property of extracted phenolic compounds, seeds of rice, wheat and grasses viz. *Cyperus rotundus*, *Digitaria adscendens* and *Eragrostis tenella* were surface sterilized with 1% sodium hypochlorite solution and rinsed in several changes of sterile distilled water. The seeds were germinated in humid chamber. Ten days old seedlings of each plant, were collected and divided in three sets/plant. The roots of one set/plant was dipped continuously for 72 h

in the alkali extract containing phenolic compounds, another set in 0.5 NaOH and the third in water. Observations were recorded at 12 h intervals.

In the study of *in vitro* antimicrobial activity, the extracted phenols were tested against some fungal and bacterial isolates which included common contaminants and plant and human pathogens such as *Penicillium* sp., *Aspergillus niger*, *Fusarium moniliforme*, *Helminthosporium oryzae*, *pseudomonas solanacearum*, *Rhizoctonia solani*, *salmonella typhi*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Candida albicans*. The cultures were obtained from central Drug Laboratory, Calcutta and Department of Botany, University of Kalyani. The antimicrobial activity was assayed by paper disc diffusion method⁷. The sterile paper discs (4mm, Whatman filter paper no. 42) were soaked with phenolic compounds (50µg) present in the alkali extract and dried under aseptic condition. The discs were transferred to the surface of soyabean casein digest agar medium (HiMedia, Mumbai) previously seeded with 1 ml (10⁸ cells/ml) of each bacterial and *C. albicans* suspension. In the case of plant pathogenic fungi and common contaminants, the agar plates were inoculated with 8 mm mycelial discs cut from the margin of actively growing colony in Petridishes and incubated at 25°C for 2 days. The treated discs were

Table 1. TLC of extracted phenolic compounds of *L. camara*.

Rf value	hRf value	Colour of spot
0.24	24	Blue
0.43	43	"
0.53	53	"
0.71	71	"

Table 2. Phytotoxicity of extracted phenolic compounds.

Plant	Treatments	Observation (h)					
		12	24	36	48	60	72
Rice	Phenol	-	+	++	+++		
	Water	-	-	-	-	-	-
	NaOH	-	-	-	-	-	-
Wheat	Phenol	-	-	+	+	++	+++
	Water	-	-	-	-	-	-
	NaOH	-	-	-	-	-	-
<i>Cyperus rotundus</i>	Phenol	-	+	+	++	+++	
	Water	-	-	-	-	-	-
	NaOH	-	-	-	-	-	-
<i>Digitaria adscendens</i>	Phenol	-	+	++	+++		
	Water	-	-	-	-	-	-
	NaOH	-	-	-	-	-	-
<i>Eragrostis tenella</i>	Phenol	-	+	++	+++	-	-
	Water	-	-	-	-	-	-
	NaOH	-	-	-	-	-	-

'+' = Leaf droop, '++' = Leaf dry, '+++ = Total wilt and death,
'-' = No effect.

Table 3. Antimicrobial activity of extracted phenolic compounds.

Organism	Inhibition zone (%)
	Mean \pm S.E.
<i>Penicillium sp.</i>	7.32 \pm 0.018
<i>A. niger</i>	-
<i>F. moniliforme</i>	-
<i>R. solani</i>	-
<i>H. oryzae</i>	-
<i>P. solanacearum</i>	9.15 \pm 0.223
<i>S. typhi</i>	-
<i>S. aureus</i>	-
<i>E. coli</i>	-
<i>P. aeruginosa</i>	-
<i>C. albicans</i>	-

"-" = Nil

transferred to these plates on the 3rd day. A control was maintained with 0.5 M NaOH. The bacterial and fungal plates were incubated at 37°C and 25°C respectively for 48 h. Five replications were maintained for each organism.

The alkali extracts of the leaves of *L. camara* when spotted on TLC plates developed four blue spots with different Rf values (Table 1).

From the standard curve, it was estimated that 1 g dried leaves of *L. camara* contained 5.75 mg of phenolic compounds. Phenolic compounds were found to be phytotoxic to seedlings of rice, *Cyperus rotundus*, *Digitaria adscendens* and *Eragrostis tenella*. The leaves started drooping 24 h after treatment and the rice seedlings died within 48 h. Seedlings of *D. adscendens*, *C. rotundus* and *E. tenella* died after 60 h. The phytotoxic effect on wheat seedlings was slow and the first effect of leaf drooping was observed 36 h after treatment. The leaves completely dried

after 72 h. No drooping or wilting of plants were observed in the control with water and sodium hydroxide (Table 2).

From the data in Table 3, it could be inferred that the phenolic compounds of *L. camara* did not inhibit most of the organisms tested except *Penicillium sp.* and *P. solanacearum*. Further characterization of the phenolic compounds are being carried out.

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