

Antifungal activities of some fractions of extract from *Coriaria nepalensis* on growth of three plant pathogenic fungi

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From the crude extract of *Coriaria nepalensis* different solvent fractions were prepared. Antifungal activities of fractions were studied against three plant pathogenic fungi by different methods. Some fractions showed high, some low and some no inhibitory properties at different concentrations. The inhibitory properties of the extracts fractions were higher when used without sterilization than when sterilized.

Key words : Plant extract, *Coriaria nepalensis*, antifungal activity

INTRODUCTION

Coriaria nepalensis, belonging to the family Coriariaceae, is a well known medicinal plant. Roots, stems and leaves of the plants were used in different countries for medicinal values. Its act as a poison when taken in large doses. Antifungal properties of the plant were not uncommon. With the objective of finding alternative for fungicides for plant disease control, different fractions of the plant extracts have been screened against a number of plant pathogenic fungi in this laboratory (Biswas *et al.*, 1981; Mukherjee, 1974; Chowdhury *et al.* 1976. Chatterjee and Chatterjee, 1992). In order to find out more potent plant extracts against such plant pathogenic fungi this programme has been undertaken. The plant produce the compounds against the pathogens are of different skeletal patterns and are responsible for natural resistance of the plants (Reddy and PapaRao, 1960; Mixon, 1965).

Different methods of exposures were used for reasons of differential sensitivity of the fungi towards different phases of growth of the fungi. The present work is aimed towards working out the effect of the extract fractions against the growth of the three fungi at different concentrations.

MATERIALS AND METHODS

Different fractions of *Coriaria nepalensis* extract were used for the study. Pure cultures of the three plant pathogenic fungi were used in the study for mycelial growth test. The fungi were *Alternaria solani*, *Helminthosporium oryzae* and *Macrophomina phaseolina*. The

effects of the different fractions on growth against the fungi were studied by two methods of exposures : by mixing in potato dextrose medium (PDA) and sterilized at 121°C for 15 minutes at 15 lb/sq. inch pressure, and by mixing the extracts in the sterilized potato dextrose medium (PDA) in front of a laminar airflow cabinet. In all the cases the medium was poured in the petriplates and 3-day old fungal blocks were transferred aseptically on the medium. The plates were then incubated at $28 \pm 1^\circ\text{C}$ for 72 h. The effects were observed in terms of diameter of the colony growth compared to that on solvent (chloroform) control. Results were taken at every 24 h intervals.

Extract fractions were prepared from the dried whole plant of *Coriaria nepalensis* with petrol ether in soxhlet apparatus for 30 h. The extract was then poured into a silica gel chromatographic column and eluted successively with petrol ether; petrol-ether-benzene (1:1), benzene; benzene: ethylacetate (9:1) and benzene: ethyl acetate (1:1). Thus the different fractions were obtained and designated as C₁, C₂, C₃, C₄ and C₅ respectively. After removal of solvents the gummy oily concentrates were ready for testing. By adding chloroform with the gummy oily substances the desired concentrations were prepared and applied accordingly.

RESULTS AND DISCUSSION

Effects of the extract fractions on growth of the fungi particularly when treatments were made by using it without sterilized media is presented in Table I.

Total growth inhibition of the pathogenic fungi of *A. solani* was observed by C₃, C₄ and C₅ fractions within 24 h. The growth of the fungus was slightly inhibited by 10 percent solution of C₁ fraction. Growth of *H. oryzae* was totally inhibited in C₄ and C₅ fractions within 24 h. The growth of the fungus was slightly inhibited by 10 percent solution of C₁ fraction. Growth of *H. oryzae* was totally inhibited in C₄ and C₅ fractions but in case of C₁ and C₂ normal growth was observed. In C₃ the growth was not totally inhibited but poor inhibition was recorded in all concentrations.

The growth of the *M. phaseolina* was totally inhibited by the C₄ fraction of the extract. In other fractions i.e. C₁, C₂, C₃ and C₅ normal growth of the fungus was recorded as compared to control.

Effects on growth of the some extract fractions on same pathogens were recorded when the treatments were made by using the extract fractions with media and autoclaved at 121°C for 15 minutes (Table 2).

In case of C₃, C₄ and C₅ fractions growth of *A. solani* was totally inhibited within 24 h and no inhibition was recorded in C₁ and C₂ fractions.

The growth of the *H. oryzae* was normal in C₁ and C₂ fractions as compared to normal. Total inhibition of the growth was recorded in C₄ fraction, but in C₃ and C₅ fractions inhibitions zones were developed gradually in the higher percentage of the fractions.

Table 1. Effect of various fractions of *Coriaria nepalensis* on growth of different plant pathogenic fungi without sterilization

Fractions	Hours after	Diameter* of colony (mm) at different concentrations								
		A. solani			H. oryzae			N. phaseolina		
		1%	5%	10%	1%	5%	10%	1%	5%	10%
C ₁	24	5.5	4.5	4.5	0.5	9.5	9.7	7.1	8.5	8.2
	48	14.5	14.0	14.0	15.5	16.2	17.5	12.2	12.5	12.6
	72	20.5	20.5	18.5	23.5	23.0	23.3	15.5	16.0	16.5
C ₂	24	6.0	6.0	6.0	9.5	9.6	9.6	7.1	7.2	7.5
	48	12.0	12.0	12.0	15.0	15.0	17.5	14.0	14.0	14.1
	72	20.5	20.5	20.5	23.5	23.5	23.3	16.5	16.5	16.5
C ₃	24	0	0	0	7.5	7.0	7.1	8.1	8.2	8.5
	48	0	0	0	8.6	8.2	8.0	10.4	14.5	14.5
	72	0	0	0	12.5	12.5	8.0	16.5	16.2	16.3
C ₄	24	0	0	0	0	0	0	0	0	0
	48	0	0	0	0	0	0	0	0	0
	72	0	0	0	0	0	0	0	0	0
C ₅	24	0	0	0	0	0	0	8.5	8.5	8.5
	48	0	0	0	0	0	0	14.5	14.5	14.0
	72	0	0	0	0	0	0	16.5	16.2	16.5
Control	24	10.0			10.5			8.5		
	48	15.0		2	16.5			14.5		
	72	20.5			23.5			16.5		

* Average of six replication.

C₁ = Petrol ether; C₂ = Petrol ether-benzene (1:1); C₃ = Benzene; C₄ = Benzene:ethyl acetate (9:1); C₅ = Benzene : ethyl acetate (1:1)

After sterilization the inhibition property of the fractions were totally lost in all cases against the growth of the *M. phaseolina* because no inhibition zones were developed in all

the fractions.

The extracts fractions C₃, C₄ and C₅ of *C. nepalensis* showed promising inhibitory property as because it contain prospective inhibitory substance in them.

Table 2. Effect of various fractions of *Coriaria nepalensis* on growth of different fungi after sterilization

Fractions	Hours after	Diameter* of colony (mm.) at different concentrations								
		A. solani			H. oryzae			M. phaseolina		
		1%	5%	10%	1%	5%	10%	1%	5%	10%
C ₁	24	5.5	4.3	4.3	9.1	9.1	9.0	7.1	8.5	8.5
	48	14.5	14.2	14.5	15.5	15.5	15.0	12.2	12.5	12.5
	72	20.5	20.5	20.5	23.5	23.5	23.5	15.5	16.0	16.5
C ₂	24	10.0	10.0	10.0	9.5	9.5	9.0	7.0	7.0	7.5
	48	15.0	14.5	14.5	15.5	15.5	15.5	14.0	14.0	14.5
	72	20.5	20.0	20.5	23.5	23.5	23.5	16.5	16.5	16.5
C ₃	24	0	0	0	7.5	6.2	2.1	8.1	8.1	8.5
	48	0	0	0	8.6	8.2	2.1	10.4	14.5	14.5
	72	0	0	0	12.5	12.5	2.0	16.5	16.2	16.2
C ₄	24	0	0	0	0	0	0	8.0	8.5	8.5
	48	0	0	0	0	0	0	14.5	14.0	14.0
	72	0	0	0	0	0	0	16.5	16.5	16.3
C ₅	24	0	0	0	8.5	8.5	8.5	8.5	8.5	8.5
	48	0	0	0	15.5	6.5	6.3	14.5	14.3	14.5
	72	0	0	0	15.5	3.2	3.2	16.2	16.5	16.5
Control	24	10.0			10.5					
	48	15.0			16.5					
	72	20.5			23.5					

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