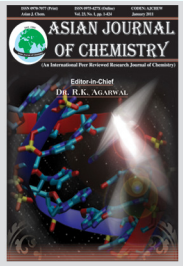
Asian Journal of Chemistry; Vol. 23, No. 3 (2011), 1415-1416

ASIAN JOURNAL OF CHEMISTRY

www.asianjournalofchemistry.co.in



NOTE

Antimicrobial Activity of Sequential Extracts from Leaves of *Cassia nodosa* Bunch.

D. SINGH, R.A. SHARMA*, B. SHARMA, S.K. SHARMA, D. SHARMA, P. CHANDRAWAT and S. SHARMA

Department of Botany, University of Rajasthan, Jaipur-302 055, India

*Corresponding author: E-mail: Sharma_ra2007@yahoo.co.in

(*Received*: 19 June 2010; *Accepted*: 19 November 2010) AJC-9325

The antimicrobial activity of the sequential extracts (petroleum ether, benzene, acetone, chloroform, ethanol, water *etc*.) of the leaves of *C. nodosa* carried out against certain bacteria *viz*., *Staphylococcus aureus*, *Salmonella typhi*, *Escherichia coli*, *Pseudomonas aeroginosa* and fungi *viz*., *Aspergillus flavus*, *A. niger*, *Fusarium moniliformae* and *Rhizoctonia bataticola* using disc diffusion technique. Present study showed that most of the extracts were effective against all the test microorganisms. The minimum inhibitory concentrations of the extracts of chloroform, benzene, acetone and ethanol were found to be 2×10^4 mg/mL, while the petroleum ether and water showed no inhibition. Present investigation provides scientific basis for the use of the plant extracts in the treatment of fungal and bacterial diseases. It is concluded that the active principles possessing antimicrobial activity may be extracted from the leaves of *Cassia nodosa* by various organic solvents.

Key Words: *Cassia nodosa*, Antimicrobial activity, Petroleum ether, Bezene, Chloroform, Acetone, Ethanol, Water, Bacteria, Fungi.

Cassia species have been of keen interest in phytochemical and pharmacological research due to their excellent medicinal values. Different classes of natural products, possessing potent physiological and pharmacological activities[1] have been isolated from *Cassia* species and they includes anthracene derivatives, flavonoids and polysaccharides. Some of these compounds have been shown to possess considerable antimicrobial activity[2]. *Cassia* species are well known in folk medicine for their laxative and purgative activities[3]. The leaves and pods are normally used. *Cassia nodosa* is one of the beautiful fast growing ornamental exotic plant with pink flowers found at the roadsides and gardens in Jaipur. It is widespread in world's tropical and sub-tropical parts. Phytochemically *Cassia nodosa* have been studied for fixed oils of the seeds[4], glactomann and nodoside a new anthraquinone glycoside from the flowers[5,6] from bark[7] and stilbenetral[8]. The phytochemical and cytotoxic screening of the plant have been carried out earlier and the four crude extracts showed strong cytotoxic activity. The extracts were found to be positive for carbohydrate, anthracene derivatives, cardiac and saponin glycosides as well as alkaloid[9]. The aim of the present study is to investigative the antimicrobial activity of the various extracts of the leaves of *Cassia nodosa* in different solvents.

The leaves of *Cassia nodosa* were collected from Central Park, Jaipur. The plant was identified at the Harbarium, Department of Botany, University of Rajasthan, Jaipur, India.

Extraction procedure: The leaves (50 g) were air dried, each of the experimental material was soxhlet extracted successively with petroleum ether (60-80 ºC), benzene, chloroform, acetone, alcohol and water 36-48 h. Each of the resultant extract was filtered, dried *in vauco* and weighed to calculate the extractive value (%) on dry weight basis. Later, following the established protocols[10] each of the test sample was used against test microorganisms.

Test microorganisms: Standard strains of *Staphylococcus aureus*, *Salmonella typhyi*, *Escherichia coli* and *Pseudomonas aeruginosa* obtain from microbiology Lab. SMS medical College, Jaipur and *Aspergillus flavus*, *A. niger*, *Fusarium monilliformae* and *Rhizoctonia bataticola* obtain from seed Pathology Lab, Department of Botany, University of Rajasthan, Jaipur.

Antimicrobial screening: The disc diffusion method was used to determine the antimicrobial activities of the crude extract of petroleum ether, benzene, acetone, chloroform, ethanol and water using standard procedure[9,10] of 6 mm disc were prepared from Whatmann's filter paper No. 1. Solutions of varying concentrations ranging from 1.0×10^4 - 5.0×10^4 mg/mL/disc were prepared. They were also prepared using the pure extruding solvent for each extract. Nutrient agar was prepared, sterilized and used as the growth medium for the culture of microorganisms, 20 mL of the sterilized medium was poured into each sterilized petri dish, covered and allowed to solidify. The treated discs were air dried at room temperature, to remove any residual solvent which might interfere with the determination, sterilized and inoculated. These plates were initially placed at low temperature for 1 h so as to allow the maximum diffusion of compounds from the test disc into the agar plate and later incubated at

TABLE-1
ANTIMICROBIAL ACTIVITIES OF *Cassia nodosa* LEAVES

Test microorganism	Diameter of inhibition zone (mm)					
	Petroleum ether	Benzene	Acetone	Chloroform	Ethanol	Water
			Bacteria			
Staphylococcus aureus	07	13	14	17	16	06
Salmonella typhi	04	10	12	12	13	00
Pseudomonas aeurginosa	07	13	24	21	10	07
Escherichia coli	04	11	20	12	16	06
			Fungi			
Aspergillus niger	00	18	20	16	18	00
Aspergillus flavus	00	15	18	23	21	00
Fusarium moniliformae	03	11	12	15	17	00
Rhizoctonia bataticola	00	10	09	10	11	00

TABLE-2
ANTIMICROBIAL ACTIVITIES OF DIFFERENT CONCENTRATION OF *Cassia nodosa* (μg/mL)

Text organisms	Petroleum ether					Benzene					Chloroform					Acetone					Ethanol					Water				
	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4	1×10^4	2×10^4	3×10^4	4×10^4	5×10^4
Bacteria																														
Staphylococcus aureus	–	–	–	–	–	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	–	–	–	–
Salmonella typhi	–	–	–	–	–	–	–	±	+	+	–	±	+	+	+	–	±	+	+	+	–	–	+	+	+	–	–	–	–	–
Pseudomonas aeurginosa	–	–	–	–	–	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	–	–	–	–
Escherichia coli	–	–	–	–	–	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	–	–	–	–
Fungi																														
Aspergillus niger	–	–	–	–	–	–	+	+	+	–	–	+	+	+	–	–	+	+	+	–	–	+	+	+	+	–	–	–	–	–
Aspergillus flavus	–	–	–	–	–	–	–	+	+	+	–	+	+	+	+	–	+	+	+	+	–	+	+	+	+	–	–	–	–	–
Fusarium moniliformae	–	–	–	–	–	–	±	+	+	–	–	+	+	+	–	+	+	+	+	–	–	±	+	+	+	–	–	–	–	–
Rhizoctonia bataticola	–	–	–	–	–	–	±	+	+	–	–	+	+	+	–	+	+	+	+	–	–	±	+	+	+	–	–	–	–	–

37 ºC for 24 h in case bacteria and 48 h for fungi, after which the zone of inhibition could be essily observed. Five replicates of each text extract were examined and the mean values were then referred.

Table-1 shows the results of the antimicrobial activities against the test microorganisms. The zone of inhibition were measured in mm of the diametrical sections of the respective sequential extracts. Table-2 shows the results of minimum inhibitory concentrations. The results demonstrated that the chloroform, benzene, acetone and ethanol had very high growth inhibitory effects on all microorganisms. The MIC values for the chloroform on *Styphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Aspergillus flavus* and *A. niger* was found to be 2×10^4 μg/mL, while for *Salmonella typhyi*, *Fusarium monilliformae* and *Rhizoctonia bataticola*, the MIC value was 3×10^4 μg/mL. For acetone, the MIC value was observed to be 2×10^4 μg/mL. Against *Staphylococcus aureus*, Pseudomonas aeruginosa, *Escherichia coli*, *Aspergillus flavus*, *A. niger* and while for *Salmonella typhi*, *Fusarium monilliformae* and *Rhizoctonia bataticola*, the MIC value was 3×10^4 μg/mL. The MIC for the benzene and ethanol was found to be 2×10^4 μg/mL for all the test microorganisms, except for *Salmonella typhi* and *Rhizoctonia bataticola* which was 3×10^4 μg/mL. The petroleum ether and water extracts did not show any inhibition against the test microorganisms. The results of the antimicrobial activity of the various sequential extracts were in agreement with the uses of the extract of the leaves of *Cassia nodosa* in traditional medicine for the treatment of bacterial and fungal deseases. The leaves of the plant appeared to be a potential source of broad spectrum antibiotics. Studies are in progress to purify and characterize the active principles in the leaves.

REFERENCES

1. S.C. Jain, R.A. Sharma, R.Jain, F. Cappasso and N. Mecudo, *J. Ethnopharmacol.*, **58**, 135 (1997).
2. R.G. Ayo, J.O. Amupitan and Y. Zhao, *Afr. J. Biotechnol.*, **6**, 1276 (2007).
3. A.A. Eluojoba, A.T. Abere and S.A. Adelusi, *Nigerian J. Nat. Prod. Med.*, **3**, 51 (1999).
4. S.A. Rizvi, P.C. Gupta and R.K. Kaul, *Planta Med.*, **19**, 221 (1968).
5. S.A. Rizvi, P.C. Gupta and R.K. Kaul, *Planta Med.*, **16**, 317 (1971).
6. S.A. Rizvi, P.C. Gupta and R.K. Kaul, *Planta Med.*, **20**, 24 (1971).
7. N.K. Yadava, B.K. Singh and A. Kumar, *Asian J. Chem.*, **10**, 204 (1998).
8. P. Suhag, M. Rani and S.B. Kalithar, *Sciences*, **21**, 1026 (1999).
9. S.V. Agarkar and D.R. Jadge, *Asian J. Chem.*, **11**, 295 (1999).
10. J.C. Gould and J.H. Bowie, *Ednib. Med. J.*, **59**, 178 (1952).