IJMPR 2023, 7(9), 49-52

International Journal of Modern Pharmaceutical Research

www.ijmpronline.com

ISSN: 2319-5878
IJMPR
Research Article

SJIF Impact Factor: 5.273

MICROWAVE ASSISTED EXTRACTION AND SPORE GERMINATION INHIBITION ACTIVITY OF *SOLANUM INDICUM*

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Received on: 28/06/2023
Revised on: 18/07/2023
Accepted on: 08/08/2023

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ABSTRACT

Solanum indicum was collected from college campus. Microwave assisted Sohxlet extraction was carried out using solvents of increasing polarity i.e. petroleum ether, chloroform, ethyl acetate and ethanol. Crude extracts were subjected to phytochemical and spore germination inhibition screening in comparison to standard antifungal, water and DMF as controls. *Fusarium oxysporum* was inhibited to 83 % by chloroform extract, 81.92 % by Ethyl acetate extract, 80 % by Pet ether extract and only 53.91 % by ethanolic extract. *Curvularia lunata* was effectively inhibited by Pet ether and Chloroform extract, 83% by Ethyl acetate extract and 78% by ethanolic extract. The soil sample was examined for pH (5.45), Organic carbon (0.69%), Available Phosphorous (11 Kg acre^{-1}), Potash (122.79 Kg acre^{-1}), Zinc (1.3 Kg acre^{-1}), Manganese (15.58 Kg acre^{-1}), Copper (1.24 Kg acre^{-1}) and Iron (9.51 Kg acre^{-1}). The soil was found to be fertile. Chloroform extract was subjected to autobioassay by slant spray method and proved to be effective inhibitor of *Curvularia lunata.*

KEYWORDS: *Solanum indicum*, Spore germination Inhibiton, Autoassay, Antifungal activity.

1.1 INTRODUCTION

Medicinal plants are potential sources of cure for ailments since ancient times. In accordance to World Health Organization, 80% of the population of the world depends on traditional medical practitioners (non-allopathic) for their medicinal needs. India has around 45,000 species of lower and higher plants. Many formulations and their products derived from plants are used as medicines since ancient age. In recent years emphasis has been laid on scientific study of plants and their formulations.

Plant fungal diseases have been one of the major constraints in crop production, causing severe losses every year. The indiscriminate injudicious use of various synthetic fungicides, by farmers for the control of pests and diseases of crop plants, for the past several decades has posed serious threat to human health and environment leading to disturbed biodiversity, out breaks of secondary pests, development of resistance in the pathogens and contamination of food chain in the ecosystem. Scientists are involved in finding out alternative synthetic fungicides in the form of biodegradable plant products from medicinal plants to induce resistance in plants directly or indirectly. Several workers have used crude plant extracts in vitro, in glass house and field conditions against several plant pathogens. Various active principles isolated from the plants are proved effective (in vitro) against few plant pathogenic fungi.[1]

1.2 LITERATURE SURVEY

Solanum indicum belonging to family solanaceae, is found throughout India and Bangladesh, it is known by various names in different region in Kannada-Kirugullia or Ramagulla, Hindi-Bharanta, English-Indian nightshade, Sanskrit-sanhika.[2,3] etc…

The plant ***Solanum indicum*** has been showing varying biological activities like anti-inflammatory, antipyretic, anti-fungal, antiemetic, aphrodisiac, astringent, cardiac tonic, carminative, cordial resolvent (root), anticancer, cardio vascular system(plant) stimulator, expectorant, carminative(root and plant), toxic, laxative and digestive(fruits).[4]

Alkaloids and steroids are the chemical constituents in these plants. The plant is beneficial in various digestive ailments like; loss of appetite, abdominal pain, distorted worms and colitis. In respiratory problems like; colds, cough, asthma and sinusitis. The cough due to kapha and vata are controlled with the decoction of its roots given along with the honey and ghee. Being hot and sharp in properties, brhati liquefies the phlegm and relieves the blocked mucous and clears of the respiratory channels. It is the best blood purifier hence benevolent in the blood disorders, Brhati stimulates and strengthens the heart and

ameliorates the edema, it also works well in dysuria and urinary calculi as it is diuretic in action. It is mainly a weed and grows throughout the year.[5,6]

Limited reports on antifungal activity of the *Solanum indicum* led to this study.

1.3 MATERIALS AND METHOD

1.3. a COLLECTION

Based on the literature survey and discussion, the plant ***Solanum indicum*** was collected from our college campus I.D.S.G Govt. College Chickmagalur in the month of November, while selecting the materials, due care was taken to select only those materials which were healthy and clean, plants were dried, the dried materials was then coarsely powdered and extracted with petroleum ether, chloroform, ethyl acetate and ethanol using microwave irradiation.

Figure 1: *Solanum indicum.*

1.3.b Extraction

Method of extraction: - Hot extraction

Microwave assisted Sohxlet extraction was carried out using solvents of increasing polarity i.e. petroleum ether, chloroform, ethyl acetate and ethanol. Crude extracts were obtained after solvent recovery as shown in Table-1 and Figures 2 a-d.

1.3.c. Phytochemical Screening

The crude extracts obtained after microwave extraction were subjected to phytochemical screening. Standard procedure was followed for the testing and results obtained are as in Table-2.

1.3.d. Spore Germination Inhibition Assay

Agar slants of fungal culture where prepared and incubated for five days at 25+/-1^{0}c. Suspension of culture was prepared (one drop ~ 1 X 10^4 spores /ml) and 1µ liter of test and 1 µ liter of spore suspension was placed in cavity and incubated at 25 +/-1^{0}c for 12 hours.

The spores were observed at 12 hour, under microscope for presence of germ tubes. The results are tabulated in Table-3.

1.3.e. Soil Sample Analysis

Six Soil samples were collected from 1 feet depth of plant 3 meter away of plant 1, 1 feet depth of plant 2.1 feet depth of plant 3 and sieved. The soil sample was divided into 4 parts and opposite quarters discarded until 500 grams of sample was obtained for analysis.

The soil sample was examined for the following parameters using standard procedures, the results are tabulated in Table 4.

1.3.f. Antifungal Activity By Autobioassay Method

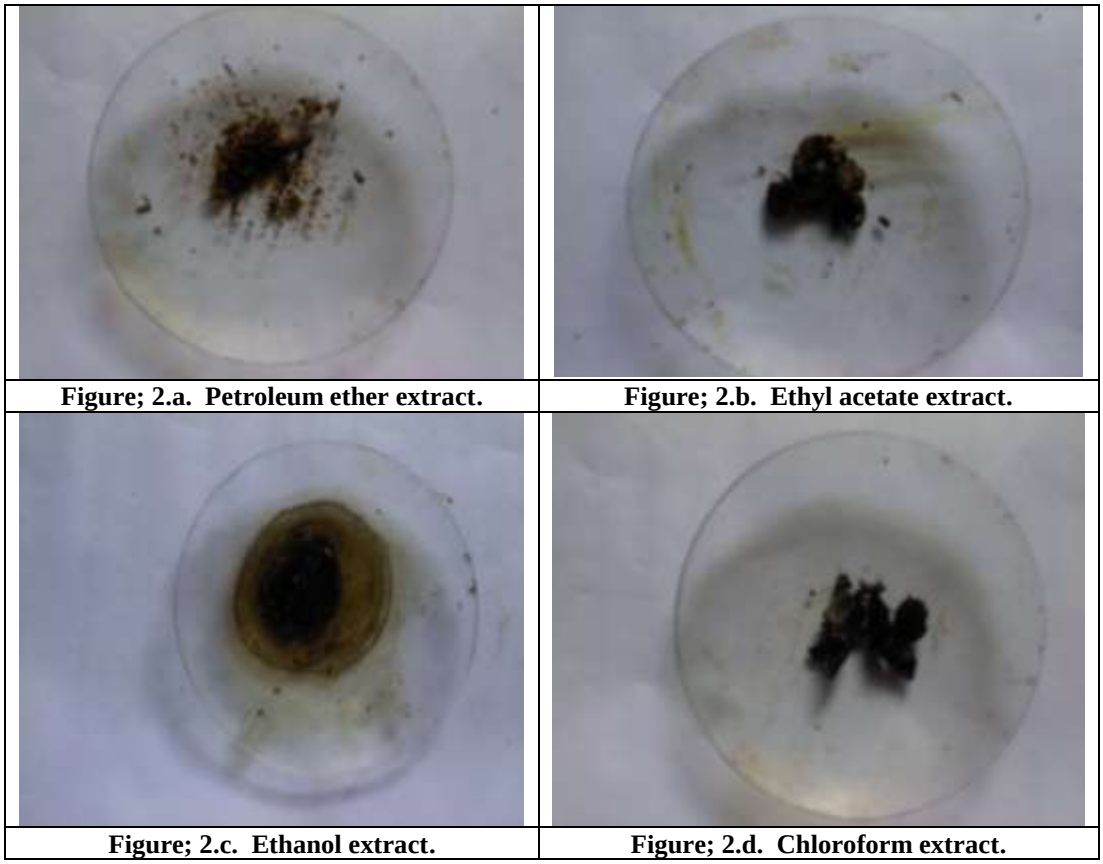
Autobioassay was carried out by slant spray method. The dissolved chloroform extract spotted slides was placed at angle 45^o slant position, the fungi ***Curvularia lunata*** in nutrient medium is sprayed on the plates uniformly. The slides were observed after 48 hours. The region active in Figure-3 shows that the particular fraction inhibits the fungal growth and hence active.

1.4 RESULTS AND DISCUSSION

1.4.b. Extraction

Hot microwave assisted method of extraction gave considerable amount of crude extracts. Pet ether extract

was green (0.72 g), Chloroform extract was dark green (1.16 g), Ethyl acetate extract was green (0.64 g) and alcohol extract was green (1.976 g).



Figure; 2.a. Petroleum ether extract. **Figure; 2.b. Ethyl acetate extract.**

Figure; 2.c. Ethanol extract. **Figure; 2.d. Chloroform extract.**

Table 1: Nature and weight of different extracts obtained from *Solanum indicum*.

Weight of plant material taken(g)	Solvents	Nature	weight(g)
32.09	Petroleum ether	Green	0.72
	Chloroform	Dark green	1.16
	Ethyl acetate	Green	0.64
	Alcohol	Green	1.976

1.4.c. Phytochemical Screening

Phytochemical screening showed presence of alkaloids and steroids in pet ether, chloroform and ethyl acetate extracts. Carbohydrates were seen in ethyl acetate and ethanol extracts. Flavanoids, phenolics and tannins were absent in all the extracts. Saponins, glycosides and amino acids were present in ethanol extract and only amino acids were seen in ethyl acetate extract.

Table -2: Phytochemical analysis of different extracts of *Solanum indicum*.

Sl. No.	Test for	Per ether extract	Chloroform extract	Ethyl acetate extract	Ethanol extract
1	Alkaloids	+	+	+	-
2	Steroids	+	+	+	-
3	Carbohydrates	-	-	+	+
4	Flavonids	-	-	-	-
5	Phenolics&tannis	-	-	-	-
6	Saponins	-	-	-	+
7	Glycosides	-	-	+	+
8	Amino acids	-	-	-	+
9	Lactones	-	-	-	-

1.4.d. Spore Germination Inhibition Assay

Fusarium oxysporum was effectively inhibited to an extent of 83 % by chloroform extract. Whereas it inhibited *Curvularia lunata* to 100 %. Ethyl acetate extract inhibited *C. lunata* to 83 % and pet ether to 100% in comparison to standard antifungal.

Table 3: Effect of Crude extract of *Solanum indicum* on spore germination of fungi.

Test fungi	Tested Concentration=50 mg					
	% spore germination inhibition assay					
F.oxysporum NCIM 1281	Pet ether	Chloroform	Ethyl acetate	Ethanol	Control 1(water)	Control 2(DMF)
	80 ± 0.04	83± 0.05	81.92± 0.02	53.91± 0.023	0.00	0.00
C.lunata NCIM 1131	100	100	83± 0.03	78± 0.04	0.00	0.00

Key: P<0.05 means highly significant

1.4. e. Soil Sample Analysis

The soil sample harboring *Solanum indicum* was found to be highly fertile. It was rich in potash and had considerable amount of other metals. The pH of soil was slightly acidic with organic carbon content of 0.69%.

Table 4: Summary of Soil Sample analysis.

SL.NO	Examined parameters	Unit	Report	Type of Soil
1	pH	-	5.45	Acidic
2	Organic carbon	%	0.69	Fertile
3	Available Phosphorous	Kg $acre^{-1}$	11	Moderately fertile
4	Available potash	Kg $acre^{-1}$	122.79	Highly fertile
5	Available zinc	Kg $acre^{-1}$	1.30	Highly fertile
6	Available manganese	Kg $acre^{-1}$	15.58	Highly fertile
7	Available copper	Kg $acre^{-1}$	1.24	Highly fertile
8	Available iron	Kg $acre^{-1}$	9.51	Highly fertile

1.4.f. Antifungal Activity by Autobioassay Method

Autobioassay method adopted to chloroform extract showed effective inhibition of fungal growth around the sample area.

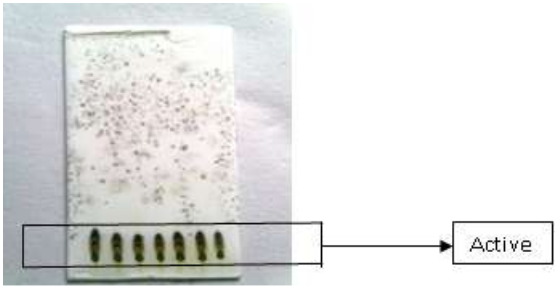


Figure 3: Autobioassay of Chloroform extract.

1.5 CONCLUSION

The microwave assisted extraction was simple, easy and rapid method of extraction. Out of pet ether, chloroform, ethyl acetate and alcohol extracts the former two showed potent antifungal activity. The weed ***Solanum indicum*** did not decrease the fertility of soil. Thus they can be used as natural pesticides. The Chloroform extract effectively inhibit the growth of fungi ***Curvularia lunata*** when screened by autobioassay method.

1.6 REFERENCE

1. Singh, S. Singh, T.D. Singh, V.P. Singh, V.B. Pandey and U.P, *The journal of plant protectionresearch*, 2009; 49(3): 287-289.
2. "*A hand book of medicinal plants, A complete source book"*. Narayan Das prajapathi, Dr S.S Purohit, Arun H Sharma, Tarun Kumar. Agrobios(India), 2010. ISBN: 81-7754-134-X.
3. www.genius sherbs.com retrieved on, 03/08/2023.
4. www.ayurvedic community.com retrieved on, 03/08/2023.
5. Impgc.com/test php retrieved on, 03/08/2023.
6. Logayurveda. Com/ plant profiles/313 retrieved on, 03/08/2023.