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Antifungal Activity of Acetone Extracts of Different Plant Parts of *Polyalthia Longifolia* Against Fungal Pathogens of Vegetable Beans

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ABSTRACT

The present study was conducted with an aim of determining antifungal activity of leaf, stem and root extracts of *Polyalthia longifolia* which belongs to the family Annonaceae. The leaf, stem and root parts of *Polyalthia longifolia* were collected and shade dried and extracted using acetone in soxhlet assembely. Antifungal activity of leaf, stem and root extracts were tested against fungal pathogens of vegetable beans using disc diffusion method. The leaf extracts were very effective against fungal pathogens of vegetable beans in comparison to stem and root extracts. Preliminary phytochemical analysis of extract revealed the presence of alkaloids, glycosides, phenols, flavonoids in all plant parts while saponins steroids and reducing sugars were present in leaf and stem extracts. The observed inhibitory potential could be ascribed to the presence of secondary metabolites in the extracts. Thus the leaf, stem and root extracts in the acetone solvent can be exploited for the development of potential antimicrobial agents.

KEY WORDS - *Polyalthia longifolia*, Disc diffusion method, Antifungal, Phytochemical, Soxhlet assembely

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INTRODUCTION

Fungi are significant destroyers of food stuffs and grains during storage, rendering them unfit for human consumption by retarding their nutritive value and by producing mycotoxins[1]. Synthetic fungicides are generally used for preventing pre and post harvest crop losses caused by phyto-pathogenic microorganisms. Indiscriminative and extensive use of these synthetic fungicides are posing serious problem to the life supporting system due to their residual toxicity[2]. In recent years plant based fungicides are of great interest as a source of safer and more effective substitutes for synthetically produced antifungal agents and may provide an alternative way to prevent food and feed from fungal contamination.

In view of these, the present investigation was undertaken to screen the efficacy of antifungal potency of plant *Polyalthia longifolia* against fungal pathogens of vegetable beans. The plant *Polyalthia longifolia* belongs to the family Annonaceae. Almost all parts of plant are use in the Indian traditional system of medicine. Antifungal activity of acetone extracts of leaf, stem and root has been studied with a view to find out a cheaper and ecofriendly method for preventing fungal contamination.

MATERIAL AND METHODS

(a) Collection of medicinal plant material

Fresh healthy leaves, stem and roots of *Polyalthia longifolia* were collected from different locations of Ajmer, washed with tap water, surface sterilized with 2% sodium hypochlorite for 5 min. and washed thoroughly 2-3 times with sterile distilled water then shade dried. Dried leaves, stem and roots were grinded in fine powder.

(b) Preparation of leaf, stem and root extract

20 gm of powder of each plant part viz. leaf, stem and root were filled in thimble and extracted with acetone in Soxhlet extractor for 48 hrs. The extract were concentrated under reduced pressure and preserved at 4^{o}C in airtight bottles for further use.

(C) Plant pathogenic fungi

Different samples of vegetable beans were collected from market as well as from different vegetable growing sites of Ajmer and Jaipur regions of Rajasthan. Fungal pathogens were isolated on Potato dextrose agar[3] (PDA) medium and cultured. The fungal isolates thus purified were subjected to morphological, cultural and microscopic examination and identified according to the methods given by pathologists [4-9]. The culture samples were also sent to plant pathology laboratory , IARI,

Pusa, New Delhi for their confirmation. They were identified as *Fusarium pallidoroseum*, *Curvularia lunata*, *Macrophomina phaseolina* and *Alternaria alternata*.

(d) Disc- diffusion method[10]

20 ml of PDA medium was poured in sterilized petridishes and allowed to solidify. Then pure culture of fungi were spread in petridishes. Disc prepared by acetone extracts of leaf, stem and roots of *Polyalthia longifolia* were then put in the petriplates. These petriplates were incubated for 6 days at 30±2°C temperature and the inhibition in growth were recorded in mm. as diameter of zone of inhibition.

(e) Phytochemical analysis of leaf, stem and root extracts

The leaf, stem and root extracts prepared in acetone solvent were screened for the presence of phytochemicals namely, alkaloids, glycosides, saponins, terpenoids, phenols, tannins, flavonoids, triterpenoids, steroids and reducing sugars by standard phytochemical tests[11-15].

RESULTS AND DISCUSSIONS

Table 1 : Antifungal activity of acetone extracts of *Polyalthia longifolia*

	Concentration mg/ml	***Alternaria alternata***	***Fusarium pallidoroseum***	***Curvularia lunata***	***Macrophomina phaseolina***
		Zone of inhibition diameter in mm.			
Leaf	50	15.3	14.0	11.8	16.3
	100	16.5	15.6	13.9	18.8
	150	19.8	18.5	16.8	21.2
	200	21.5	20.5	20.0	22.8
Stem	50	11.5	9.8	9.2	10.5
	100	13.2	13.2	11.3	12.9
	150	16.3	16.3	12.1	14.1
	200	18.7	18.0	13.8	17.5
Root	50	7.0	6.8	5.8	6.9
	100	9.2	8.5	7.3	7.1
	150	11.3	11.4	10.0	11.0
	200	12.0	12.1	12.5	11.8

The medicinal plant *Polyalthia longifolia* is rich in bioactive phytocostituents and exhibited antifungal activity against phytopathogens of vegetable beans showing different sensitivity with different concentrations viz. 50, 100, 150 and 200 mg/ml. the results are summarized in table 1.

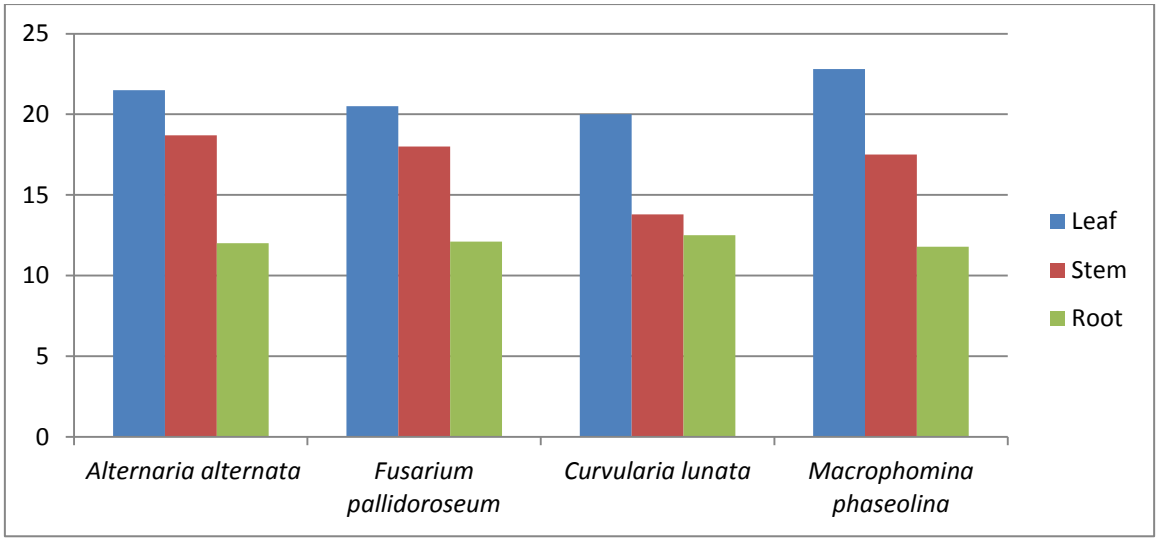
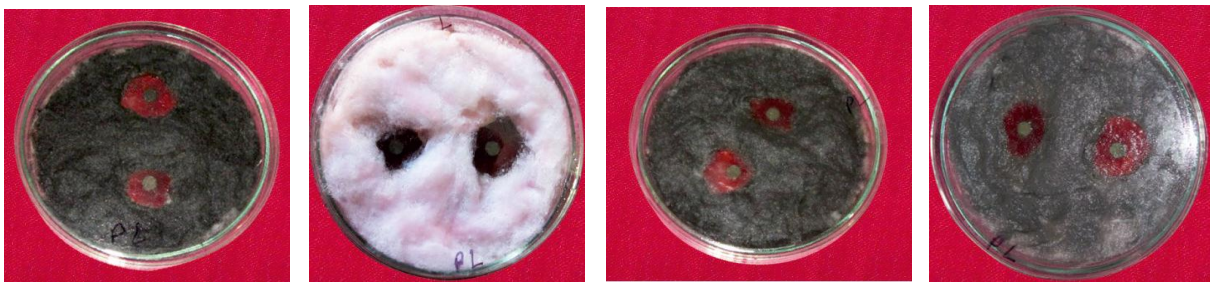


Figure 1 : Comparison of *Polyalthia longifolia* Acetone plant parts extracts effects on test fungi

Table 2 : Preliminary phytochemical screening of *Polyalthia longifolia* acetone extracts

S. no.	Chemical constituents	Leaf	Stem	Root
1.	Alkaloids	+	+	+
2.	Glycosides	+	+	+
3.	Saponins	+	+	-
4.	Terpenoids	-	-	-
5.	Phenols	+	+	+
6.	Tannins	+	-	-
7.	Flavonoids	+	+	+
8.	Triterpenoids	-	-	-
9.	Steroids	+	+	-
10.	Reducing sugars	+	+	-
Present +, Absent -				

Antifungal activity of *Polyalthia longifolia*



Alternaria alternata *Fusarium pallidoroseum* *Macrophomina phaseolina* *Curvularia lunata*

Table 1 showed zone of inhibition of leaf, stem and root extracts in The acetone solvent against tested fungi. Figure 1 showed comparison of leaf, stem and root extracts at concentration 200 mg/ml. this figure showed that leaf extract was highly effective followed by stem and root extract was less effective. Similar results were on the leaf extract of *Polyalthia longifolia* which exhibited inhibition of *Sclerotium rolfsii* causing collar rot of lentil[16]. Extracts of leaves were found to exhibit

inhibitory activity against several species of *Aspergillus*[1], various fungi viz., sp. of *Drechslera, Alternaria, Fusarium, Aspergillus and Penicillium* isolated from sorghum grains[2]. Similar inhibition was recorded on *Fusarium solani* isolated from rhizome rot of ginger[12] and aflatoxin producing *Aspergillus parasiticus*[17], *fungal* inhibition of *Sorghum* seeds by ripe pericarp extract [18].

The results of preliminary phytochemical analysis of acetone extracts of leaf, stem and roots of *Polyalthia longifolia* are seen in table 2. This table shows that alkaloids, glycosides, phenols, flavonoids are present in the acetone extract of all parts tested while saponins, steroids and reducing sugars are only present in leaf and stem extracts. Similar results were obtained from the previous studies[19-20].

CONCLUSION

It was concluded from present investigation that acetone extracts of leaf, stem and root of *Polyalthia longifolia* can be used as antifungal agents against fungal pathogens of vegetable beans.

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REFERENCES

1. Satish S, Mohana DC, Raghavendra MP and Raveesha KA. Antifungal activity of some plant extracts against important seed borne pathogens of *Aspergillus* spp. J. of Agri. Technol., 2007; 3: 109-119.
2. Satish S, Mohana DC, Raghavendra MP and Raveesha KA. In vitro evaluation of the antifungal potentiality of *Polyalthia longifolia* against some *Sorghum* grain moulds. J. of agri. technol., 2010; 6(1): 135-150.
3. Ricker AJ and Ricker RS. Introduction to research on Plant disease. St. Louis Jonh's Swift Co., New Yark; 1936; 117.
4. Agrios GN. Significance of plant diseases in plant pathology. Academic press, *London* ; 2005.
5. Baudoin ABAM. Laboratory exercise in plant pathology: An instructional kit. APS Press , St. Paul MN; 1988.

6. Barnett HL. Illustrated genera of fungi. 2nd ed. Burgess publishing company. Minnaopolis; 1955-1960 .
7. Cappuccino JG. Microbiology, A Laboratory manual. 7th ed. Pearson Education; 2009.
8. Clements FE and Shear CL. The genera of fungi. Hafner Publishing Company, Inc. New Yark, N. Y; 1973.
9. Ellis MB. Dematiaceous hyphomycetes. Commonwealth mycological institute, Kew, Surrey, England, 1971.
10. Omenka CA and Osouha JO. Antimicrobial potency of grapefruit seed extract on five selected pathogens. *Nigerian J. of Microbiol*. 2000; 14(2): 39-42.
11. Trease GE and Evans WC. A text book of of Pharmacognosy. 13th ed. Bacilliere Tinal Ltd., London. 1989.
12. Singleton VL, Orthofer R and Lamuela–Raventos RM. Analysis of total phenols and oxidization substrates and antioxidants by means of folin-ciocalteu reagent. Methods Enzymole; 1999; 299: 152-177.
13. Siddiqui AA and Ali M. Practical and Pharmaceutical Chemistry. CBS Publisher and Distributor, 1st ed. New Delhi; 1997; 126-131.
14. Iyenger MA. Study of crude drugs. 8th ed. Manipal power press, Manipal, India; 1995; 2.
15. Singh SR, Prajapati RK, Srivastava SSL, Pandey RK, Gupta PK. Evaluation of botanicals and non target pesticides against Sclerotium rolfsii causing collar rot of lentil. Ind. phytopathol. 2007; 60(4): 499-501.
16. Ramteke PK and Kamble SS. Evaluation of phytoextracts against *Fusarium solani* (Mart.) Sacc. causing rhizome rot of ginger (*Zingiber officinale).* Current Biotica. 2011; 4(4): 469-474.
17. Rajani P, Sridevi V, Lakshmi CMVV and Kumari KSP. Inhibitory effect of aqueous plant extracts on the growth of aflatoxin producing *Aspergillus parasiticus* (NSIM898). Inter. J. of Engin. Sci. & Adv. Technol. 2012; 2(2): 365-371.
18. Kekuda PTR, Mallikarjun N, Swarnalatha SP, Surabhi KS, Preethi HR and Vinayaka KS. Studies on effect of methanol extract of *Polyalthia longifolia* Thw and *Abrus pulchellus* wall on germination and mycotic infection of Sorghum seeds. J. of App. Agri. Res. 2010; 5(4): 503-509.
19. Pal RS, Pal Y, Rai AK, Wal P, Wal A, Shrivastava A, Chandra S and Sasarwat N. Phyiochemical and Phytochemical evaluation of crude drug powder (leaves) of *Polyalthia longifolia*. J. of Pharma. & Phytochem. 2016; 5(3): 212-213.
20. Kokate CK. Textbook of Pharmacognosy, 49ed, Nirali Prakashans, Pune, 2014; 108-109.