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ANTIFUNGAL ACTIVITY OF AQUEOUS EXTRACTS OF DIFFERENT PLANT PARTS OF *JATROPHA CURCAS* L. 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 *Jatropha curcas* Linn. Which belongs to the family Euphorbiaceae. The leaf, stem and root parts of *Jatropha curcas* Linn. Were collected and shade dried and extracted using distilled water in soxhlet assembly. Antifungal activity aqueous extracts of leaf, stem and root 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 a flavonoids and reducing sugars in all plant parts while alkaloids, glycosides, phenols and tannins were present in leaf extracts. Steroids was present in stem extract and triterpenoids was present in root extracts. The observed inhibitory potential could be ascribed to the presence of secondary metabolites in the extracts. Thus the leaf, stem and root extracts of *Jatropha curcas* Linn. In distilled water can be exploited for the development of potential antimicrobial agents.

KEYWORDS

Jatropha curcas Linn, Disc diffusion method, Antifungal, Phytochemical and Soxhlet assembly.

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INTRODUCTION

Fungi play negative effectives on productivity of several economically important vegetable crop plants. In all over the world, scientists are associated in discovering methods or developing techniques to control of diseases. The most common and predominant method of disease control is chemical method. Fungicides seem to be effective financially and manage fungal diseases

immediately despite their shortcoming pathogen disease resistant and detrimental effects to human and environment (Karaman *et al*, 2003¹, Monyo *et al*, 2009²) they have also harmful effects on ecosystem and soil fertility as well as wild life health (Shiva *et al*, 2004)³. Currently, several studies have been developed regarding the discovery of new antimicrobial agents from natural products, with the objective of discovering new bio active compounds with a livability compared to the traditional drugs, but with less toxicity and greater effectiveness against the resistance of pathogenic microorganisms, besides having a lower environmental impact. (Al –Tomahy *et al*, 2018⁴, Arulmozhi *et al*, 2018⁵, Babahamad *et al*, 2018⁶)

In view of these, the present investigation was undertaken to screen the efficacy of antifungal potency of plant *Jatropha curcas* Linn. Against fungal pathogens of vegetable beans. The plant *Jatropha curcas* Linn. Belongs to the family Euphorbiaceae. Almost all parts of plants are used in the Indian traditional system of medicine. Antifungal activity of aqueous extracts of leaf, stem and root has been studied with a view to find out a cheaper and eco-friendly method for preventing fungal contamination.

MATERIAL AND METHODS

Collection of medicinal plant material

Fresh healthy leaves, stem and roots of *Jatropha curcas* Linn. 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.

Preparation of leaf, stem and root extract

20gm of powder of each plant part viz. leaf, stem and root of *Jatropha curcas* Linn. Were filled in thimble and extracted with distilled water in Soxhlet extractor for 72 hrs. The extract was concentrated under reduced pressure and preserved at 4°C in airtight bottles for further use.

Plant pathogenic fungi

Different samples of vegetable beans were collected from market as well as from different vegetable growing parts of Ajmer and Jaipur regions of Rajasthan. Fungal pathogens were isolated on Potato dextrose agar (PDA) (Ricker and Ricker, 2006)⁷ medium and cultured. The fungal isolates thus purified were subjected to morphological, cultural and microscopic examination and identified accordingly using the methods given by pathologists (Agrios, 2005⁸, Baudoin, 1997⁹, Barnett, 1955-1960¹⁰, Cappuccino, 2009¹¹, Clements, 1973¹², Ellis, 1971¹³) 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*.

Disc- diffusion method

(Omenka and Osouha, 2000)¹⁴ 20ml of PDA medium was poured in sterilized petridishes and allowed to solidify. Then pure culture of fungi were spread in petridishes. Disc prepared by aqueous extracts of leaf, stem and roots of *Jatropha curcas* Lin. 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.

Phytochemical analysis of leaf, stem and root extracts

The leaf, stem and root extracts of *Jatropha curcas* Linn. prepared in aqueous extract were screened for the presence of phytochemicals namely, alkaloids, glycosides, saponins, terpenoids, phenols, tannins, flavonoids, triterpenoids, steroids and reducing sugars by standard phytochemical tests (Iyenger, 1995¹⁵, Trease and Evans¹⁶, 1989, Singleton *et al*, 1999¹⁷, Siddiqui and Ali, 1997¹⁸, Singh *et al*, 2007¹⁹).

RESULTS AND DISCUSSION

The medicinal plant *Jatropha curcas* Linn. Is rich in bioactive phytoconstituents and exhibited antifungal activity against phytopathogens of vegetable beans showing different sensitivity with

different concentrations viz. 50, 100, 150 and 200mg/ml. the results are summarized in Table No.1.

Table No.1 showed a zone of inhibition of leaf, stem and root extracts in distilled water against tested fungi. In 50 and 100mg concentration of root extract zone of inhibition not detected. Graph 1 showed comparison of leaf, stem and root extracts at concentration 200mg/ml. This figure showed that leaf extract was highly effective followed by stem and root extract was less effective. The results of preliminary phytochemical analysis of aqueous extracts of leaf, stem and roots of *Jatropha curcas* Linn, are seen in Table No.2. This table shows presence of a flavonoids and reducing sugars in all plant parts while alkaloids, glycosides, phenols and tannins were present in leaf extracts. Steroids was present in stem extract and triterpenoids was present in root extracts.

Discussions

Similar results were obtained by Saleh *et al*, (2023)²⁰ in anticancer and antimicrobial activity of *Jatropha curcas* Linn. Similar to this work, Bendigeri *et al*, (2023)²¹ in phytochemical analysis and antimicrobial activity of *Jatropha curcas* Linn, caused a significant inhibition of fungal growth. It can be used as antifungal agents against fungal pathogens of vegetable beans.

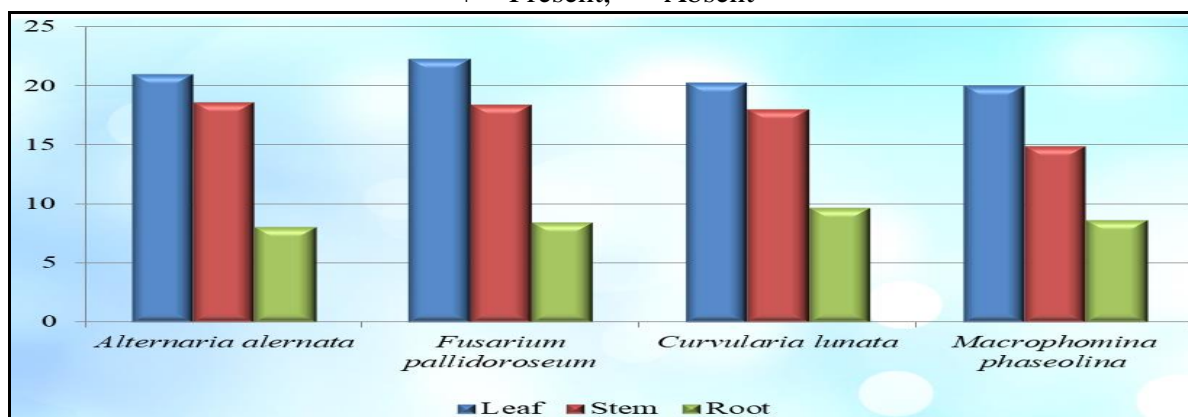
Table No.1: Antifungal activity of aqueous extracts of *Jatropha curcas* Linn

S.No	Plant part	Concentration mg/ml	<i>Alternaria Alternata</i>	<i>Fusarium pallidoroeseum</i>	<i>Curvularia lunata</i>	<i>Macrophomina Phaseolina</i>
			Zone of inhibition diameter in mm			
1	Leaf	50	12.2	13.0	11.7	11.0
		100	15.0	15.4	14.6	13.9
		150	17.9	18.6	17.0	16.7
		200	21.0	22.3	20.3	20.0
2	Stem	50	9.7	9.0	8.6	7.5
		100	12.2	11.7	11.2	9.7
		150	15.4	15.0	14.6	12.0
		200	18.6	18.4	18.0	14.9
3	Root	50	ND	ND	ND	ND
		100	ND	ND	ND	ND
		150	6.2	6.5	7.0	5.8
		200	8.1	8.5	9.7	8.7
ND = Not detected						

Table No.2: Preliminary phytochemical screening of plant parts of *Jatropha curcas* Linn, in aqueous extract

S.No	Chemical constituent	Distilled water		
		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



Graph No.1: Comparison of aqueous extract of *Jatropha curcas* Linn, plant parts on test fungi

CONCLUSION

It is concluded from my research studies that Aqueous extracts of leaves, stem and roots of *Jatropha curcas* L. can be used as antifungal agent against fungal pathogens of Vegetable beans.

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CONFLICT OF INTEREST

I declare that I have no conflict of interest.

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