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ANTIFUNGAL ACTIVITY OF ETHANOL EXTRACTS OF DIFFERENT PARTS OF *JATROPHA CURCAS* AGAINST FUNGAL PATHOGENS OF VEGETABLE BEANS

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ABSTRACT

Ethanol extracts from leaf, stem and root parts of *Jatropha curcas* which belongs to the family Euphorbiaceae were evaluated for potential antifungal activity against fungal pathogen of vegetable beans. The present study is aimed at evaluating the *in-vitro* antifungal activity of ethanolic extracts of *Jatropha curcas* plant against *Alternaria alternata*, *Fusarium pallidoroseum*, *Curvularia lunata* and *Macrophomina phaseolina*. The leaf, stem and root parts of *Jatropha curcas* were collected and shade dried and extracted using ethanol in soxhlet assembly. 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 ethanol extract revealed the presence of phenols, tannins, flavonoids and reducing sugars in all plant parts viz. leaf, stem and root parts while alkaloids, glycosides and triterpenoids were present in leaf extracts. The observed inhibitory potential could be ascribed to the presence of secondary metabolites in the ethanol extracts. Thus the leaf, stem and root extracts in the ethanol can possibly be exploited in the management of fungal diseases of vegetable beans in an ecofriendly way.

KEYWORDS

Antifungal, Extracts and Beans.

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INTRODUCTON

Fungi are the most important common cause of plant diseases which result in heavy loss of plant products. Pathogenic fungi causes 20% reduction in the yield of major food and cash crops¹. Fungi produce different types of mycotoxins that can be mutagenic, teratogenic, carcinogenic causing feed refusal and emesis in humans and animals². Fungus like *Alternaria alternata*, *Fusarium pallidoroseum*,

Curvularia lunata and *Macrophomina phaseolina* were isolated from vegetable beans which cause losses in its yield and nutritive value. To suppress these fungi different synthetic fungicides have been commercialized in recent years but the intensive and indiscriminate use of these synthetic fungicides has caused many problems to the environment such as contamination of water, soil and toxic to animals. These synthetic fungicides are bound with various adverse effects³. The natural plant products, known as botanical pesticides or herbal medicine, have been used to control plant pathogens⁴⁻¹¹. However, only a few commercial products from plants are used in practical plant protection¹².

Plant derived natural substances are considered as non phytotoxic compounds and potentially effective against plant pathogenic fungi. Considering this fact, present investigation has been carried out to study the fungitoxic properties of ethanolic leaf, stem and root extracts *Jatropha curcas* against fungal diseases of vegetable beans.

MATERIAL AND METHODS

Collection of medicinal plant material

Fresh healthy leaves, stem and roots of *Jatropha curcas* 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 plant extract

20 gm of powder of each plant part viz. leaf, stem and root were filled in thimble and extracted with ethanol in Soxhlet extractor for 48 hrs. The extract were 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 sites of Ajmer and Jaipur regions of Rajasthan. Fungal pathogens were isolated on Potato dextrose agar¹³ (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 pathologists¹⁴⁻¹⁹. 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 method²⁰

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 *Jatropha curcas* 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 prepared in ethanol solvent were screened for the presence of phytochemicals namely, alkaloids, glycosides, saponins, terpenoids, phenols, tannins, flavonoids, triterpenoids, steroids and reducing sugars by standard phytochemical tests²¹⁻²⁴.

RESULTS AND DISCUSSION

The medicinal plant *Jatropha curcas* 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 200 mg/ml. The results are summarized in table.

Table No.1 showed zone of inhibition of leaf, stem and root extracts in the ethanol solvent against tested fungi. Similar results were on the methanolic extracts of the leaves extracts of *Jatropha curcas* against 13 bacterial species including *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*²⁵, ethanolic extract of the stem bark of *Jatropha curcas* inhibited *Bacillus subtilis*, *Escherichia coli* and *Pseudomonas vulgaris*²⁶, leaf and bark ethanol extract showed a significant response against *Bacillus subtilis*, *Escherichia coli* and *Pseudomonas aeruginosa*²⁷. Figure No.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 extracts against all fungi except fungi *Macrophomina phaseolina* on which leaf extract was very effective followed by root and then stem extracts. The inhibitory activity of plant extracts generally depends upon the concentration, type of parts used and microbes tested²⁸. Preliminary phytochemical analysis of ethanol extract revealed the presence of phenols, tannins, flavonoids and reducing sugars in all plant parts viz.

leaf, stem and root parts while alkaloids, glycosides and triterpenoids were present in leaf extracts. Present work agrees with the results of previous investigation by^{29,30}. The observed inhibitory potential could be ascribed to the presence of secondary metabolites in the ethanol extracts. Thus the leaf, stem and root extracts in the ethanol can possibly be exploited in the management of fungal diseases of vegetable beans in an ecofriendly way.

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

	Concentration mg/ml	<i>Alternaria alternata</i>	<i>Fusarium pallidroseum</i>	<i>Curvularia lunata</i>	<i>Macrophomina Phaseolina</i>
		Zone of inhibition (diameter in mm.)			
Leaf	50	11.5	12.5	11.9	10.9
	100	15.2	16.0	15.0	14.9
	150	17.3	17.5	18.9	18.0
	200	21.5	22.5	21.4	20.5
Stem	50	7.5	7.0	8.0	7.0
	100	10.0	9.2	10.8	9.2
	150	13.2	13.0	14.1	11.7
	200	16.0	15.8	17.8	14.2
Root	50	6.5	6.0	7.2	6.5
	100	8.4	8.7	9.6	9.0
	150	12.0	11.4	13.6	12.3
	200	13.0	14.0	16.8	15.8

Table No.2: Preliminary phytochemical screening of *Jatropha curcas* ethanol 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 -				

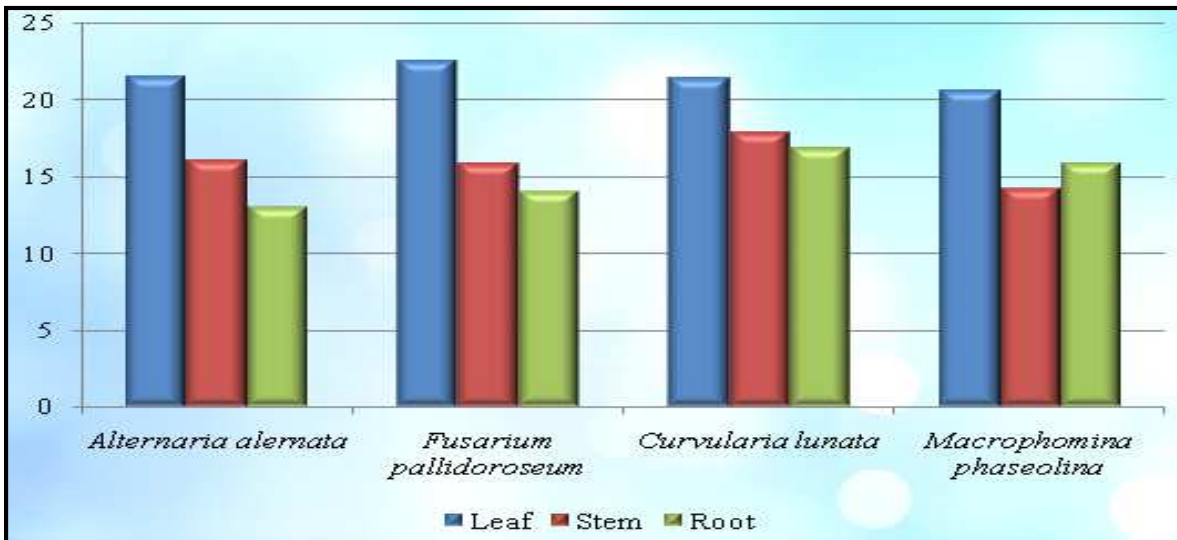
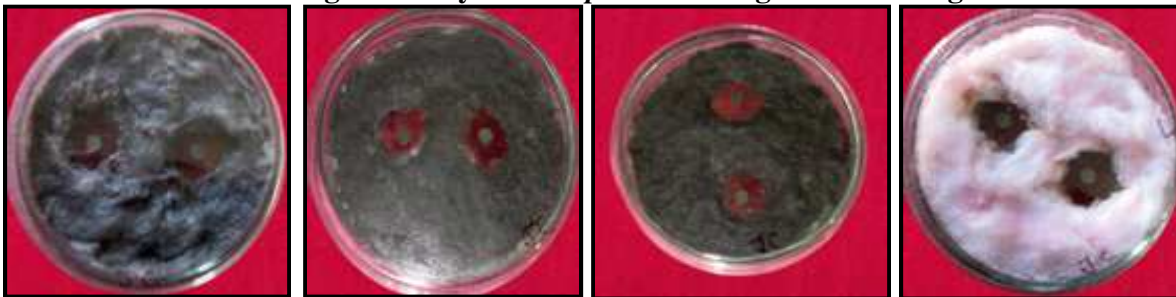


Figure No.1: Comparison of ethanol extract of *Jatropha curcas* plant parts on test fungi
Antifungal activity of *Jatropha curcas* against test fungi



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

CONCLUSION

It was concluded from present investigation that the ethanol extracts of leaf, stem and root of *Jatropha curcas* can possibly be exploited in the management of fungal diseases of vegetable beans in an ecofriendly way.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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