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ANTIMICROBIAL ACTIVITY OF *WITHANIA SOMNIFERA* AND *DATURA INOXIA* AGAINST FUNGAL PATHOGENS OF VEGETABLE BEANS

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ABSTRACT

Ethanolic extracts from leaf of *Datura inoxia* and *Withania somnifera* of family solanaceae were evaluated for potential antifungal activity against fungal pathogens of vegetable beans. The present study is aimed at evaluating the *in-vitro* antifungal activity of ethanolic extracts of solanaceae plants against *Alternaria alternata, Fusarium pallidoroseum, Curvularia lunata* and *Macrophomina phaseolina.* These plants can further be used in folk medicine to determine their antifungal activity against fungal pathogens of vegetable beans. These plants extracts can possibly be exploited in the management of fungal diseases of vegetable beans in an eco-friendly way.

KEYWORDS

Antifungal, Extracts and Beans.

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INTRODUCTION

Vegetable beans are important source of vitamins, minerals, proteins and plant derived micronutrients. Vegetable beans belong to common fabaceae family and it includes cluster beans and snap beans. These are grown in different parts of Rajasthan. Fungus like *Alternaria alternata, Fusarium pallidoroseum, Curvularia lunata and Macrophomina phaseolina* were isolated from vegetable beans which causes losses in its yield and nutritive value. Fungicidal sprays are generally recommended for the control of these diseases because of lack of resistant varieties. Extensive use of chemical fungicides in agriculture has led to several environmental problems and is toxic to non target organisms[1]. The

toxic effect of synthetic chemicals can be overcome, only by persistent search for new and safer pesticides and fungicides, which are eco-friendly and effective[2]. Plants are the richest sources of drugs of traditional system of medicine, modern medicine and pharmaceutical intermediates and chemical entities of synthetic drugs[3]. It was found that green plants are reservoir of biotoxicants and inexhaustible source of pesticides[4]. Kumar[5] found that in comparison to synthetic compounds the chemical compounds of plant origin are more effective and have little or no side effects on human beings. Similarly Hooda and Srivastava have mentioned that natural fungicides are free from environmental toxicity as compared to synthetic compound[6]. Natural compounds are less phytotoxic, easily biodegradable and more systemic[7]. The extensive use of agrochemicals on fungi, leads to more carcinogenic risk than other pesticides which may give undesirable biological effects on animals and human beings[8]. Koche screened ethanolic extract of the leaves of *Ocimum gratissimum* which was screened for its phytochemical and antibacterial properties on *Escherichia coli* and *Listeria monocytogenus* at different concentrations[9].

Therefore, the development of bio-pesticides has been focused as a viable pest control strategy in recent years. One source of potential new pesticides is natural products produced by plants. Considering this fact, similar present investigation has been carried out to study the fungitoxic properties of ethanolic leaf extract of medicinal plants of solanaceae family against fungal diseases of vegetable beans.

MATERIAL AND METHODS

Collection of medicinal plant material

Fresh healthy leaves of *Withania somnifera* and *Datura inoxia* 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 were grinded in fine powder.

Preparation of leaf extract

20 gm of powder of each plant was filled in thimble and was extracted with ethanol 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.

Plant pathogenic fungi

Different samples of vegetable beans were collected from market as well as from different parts of Ajmer and Jaipur regions of Rajasthan. Fungal pathogens were isolated on PDA medium and cultured. The fungal isolates thus purified were subjected to morphological, cultural and microscopic examination and identified accordingly using the methods[10-16]. 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[17]

20 ml of PDA media was poured in sterilized petriplates and allowed to solidify. Then pure culture of fungi were spread in petriplates. Disc prepared by ethanolic leaf extracts of medicinal plants were then put in the petriplates. These petriplates were incubated for 6 days at 30$\pm$2^{o}Ctemperature and the observations were recorded in mm. as diameter of zone of inhibition. Minimum inhibitory concentration (MIC) assays: based on the preliminary screening of the ethanolic extract was found to have potent antimicrobial activity and MIC of the extract was determined as the lowest concentration of extracts inhibiting visible growth of each organism on the agar plate.

RESULTS AND DISCUSSION

Both medicinal plants are rich in bioactive phyto-constituents and exhibited antimicrobial activity against phyto-pathogens of vegetable beans showing different sensitivity with different concentrations (50, 100,150,200) mg/ml. The results are summarized in Table No.1 and 2. *Withania somnifera* showed higher antifungal activity as compared to *Datura inoxia. Withania*

somnifera and *Datura inoxia* both were highly effective on *Fusarium pallidoroseum* with zone of inhibition of 25.6mm and 20.3mm in diameter respectively. *Withania somnifera* was then effective on *Curvularia lunata* and *Alternaria alternata* and minimum zone of inhibition was found on *Macrophomina phaseolina.* Similar results were obtained from Prakash and Shailaja[18-19].

While *Datura inoxia* gave good inhibition against *Macrophomina phaseolina* followed by *Alternaria alternata* and less inhibited the growth of *Curvularia lunata.* Similar finding have been reported by Ranewane[20], Shinde[21] and Jalandher[22].Antifungal activity of plant extracts increase with the increase in the concentration of extracts.

Table No.1: Antifungal activity of ethanolic leaf extract of *Withania somnifera*

S.No	Name of pathogen	Concentrations mg/ml				MIC
		50	100	150	200	
1	*Alternaria alternata*	11.8	15.0	20.0	24.2	12.5
2	*Fusarium pallidoroseum*	13.2	18.8	21.7	25.6	10.0
3	*Curvularia lunata*	12.7	18.4	21.2	25.0	10.0
4	*Macrophomina phaseolina*	11.7	15.8	20.4	23.2	10.0

Table No.2: Antifungal activity of ethanolic leaf extract of *Datura inoxia*

S.No	Name of pathogen	Concentrations mg/ml				MIC
		50	100	150	200	
1	*Alternaria alternata*	9.2	13.7	16.5	19.4	15.0
2	*Fusarium pallidoroseum*	10.3	14.5	17.4	20.3	15.0
3	*Curvularia lunata*	9.0	13.0	17.2	18.7	17.5
4	*Macrophomina phaseolina*	8.5	13.2	17.0	19.8	15.0

Antifungal activity of *Withania somnifera* at concentration 150 mg/ml and 200 mg/ml

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

Antifungal activity of *Datura inoxia* at concentration 150 mg/ml and 200 mg/ml

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

CONCLUSION

It was concluded from present investigation that ethanolic leaf extracts of *Datura inoxia and Withania somnifera* can be used as antifungal agents against fungal pathogens of vegetable beans.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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