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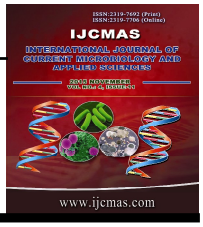

Original Research Article

Antifungal Activity of Some Locally Available Plants Against *Fusarium oxysporum* F. Sp. Udum

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Keywords

Extract, Antifungal activity, Wilt disease

A B S T R A C T

The antifungal activity of crude extracts of some plants was evaluated against *Fusarium oxysporum* f. sp. *udum*, a causal agent for wilt disease of pigeon pea. On screening the crude extracts of 20 plants for their antifungal activity by "food poisoning method", the crude extract of leaf of *Phyllanthus nurai Linn*, and *Vitex negundo Linn* exhibited maximum toxicity against the test fungus.

Introduction

Pigeon pea **(***Cajanus cajan* (L.) Mill sp.) is an important grain legume crop of the family Fabaceae. It is one of the important pulse crops with much higher productivity. Almost all pigeon pea growing states of India, the diseases effect the crop at all stages of development (Ahlawat *et al.*, 2005), which result into 100% loss in the yield (Reddy *et al.*, 1993).

In Gorakhpur and adjacent districts the crop is cultivated by farmers in traditional manners. Diseases are major biological constraints to production. Of these, *Fusarium* wilt is widespread and causes heavy damage. As the management of this soil borne disease through conventional technology such as growing resistant varieties, fungicidal seed treatment, and single treatment of fungicide or bio-agent cannot provide a remedy for disease control. The non judicious use of synthetic fungicides for the last four decades leads to the several problems to human health, animal health and environmental problems.

This scenario therefore, calls for alternative approaches which are economically feasible and ecofriendly to control the disease and increase the yield of pigeon pea. In view of the hazardous effect of synthetic fungicides, that too for the soil borne ones the present

investigation has been carried out for evaluating the phytotoxic activity of locally available plants against wilt disease of pigeon pea.

Materials and Methods

Twenty locally available plants viz. Amaranthus virdis Linn., Ageratum conyzoides Linn., Ageratum houstoniaanum Mill., Acalpha indica Linn., Coccinia grandis (Linn.) J. O. Voigt Celocia Linn., Eclipta alba Linn., Euphorbia hirta Linn., Achyranthes aspera Linn., Melia japonica Linn., Nicotiana plumbaginifolia Viv., Oxalis curniculata Linn., Riccinus communis Linn., Physalis minima Linn., Phyllanthus nurai Linn., Parthenium hysterophorous Linn., Solanum nigraum Linn., Vitex negundo Linn., Vernonia cinerea Schreb., and *Withunia somnifera (Linn) Dunal* are tested for their antifungal activity against *Fusarium oxysporum f. sp. udum*

Preparation of extracts

100 gm leaf samples of each plant were washed thoroughly with 4% sodium hypochlorite solution and finally with sterile distilled water, air dried and then ground with the help of sterile pestle and mortar. Extracts were filtered through double layered cheese cloth. Extracts were stored aseptically in airtight bottles and served as mother extract.

Test fungi

The fungal strain of *Fusarium oxysporum* f. sp. *udum* (MTCC - 2204) was obtained from the Microbial Type Culture Chandigarh, India. The culture was maintained on PDA medium, which was served as the test fungus for antifungal activity.

Antifungal activity assay of extract

PDA medium with crude extracts of the test plants were prepared and autoclaved and poured into pre sterilized Petriplates (17ml each) and allowed to solidify. After complete solidification of the medium, 5 mm disc of seven days old culture of the test fungus were placed aseptically in the centre of the Petriplates and incubated at 28 ± 2°C for six days, simultaneously 0.02ml of antibiotic solution was added to each assay plate to check the bacterial contamination as suggested by Gupta and Banerjee (1970). Observations were recorded on seventh day. The colony diameter was recorded in terms of millimetres. PDA medium devoid of extract served as control. For each treatment four replicates were maintained. The fungi toxicity of extracts was calculated in terms of percent inhibition of mycelia growth by using the formula (Singh and Tripathi, 1999).

$$\text{Percent Inhibition} = \frac{dc - dt}{dc} \times 100$$

Where,

dc = Average increase in mycelia growth in control.

dt = Average increase in mycelia growth in treatment.

Results and Discussion

Antifungal activity of 20 plants was screened by food poisoning method. The result revealed that the extracts of *Phyllanthus nurai* Linn. and *Vitex negundo* Linn. showed significant reduction in the growth of *Fusarium oxysporum f sp udum* (Table 1). *Phyllanthus nurai* Linn. Showed 89% of mycelial inhibition at 5% concentration of extract but it shows 100% of mycelia inhibition at 10% and 15% concentration of extract.

Table.1

Antifungal Assay of Plant Extracts by Poisoined Food Technique				
S.No	Plants	% Inhibition of Mycelial Growth		
		5% concentration	10% concentration	15% concentration
1	*Amranthus virdis* Linn.	15	15	15
2	*Ageratum conyzoides* Linn.	8	10	10
3	*Ageratum houstoniaanum* Mill	12	15	15
4	*Achlpha indica* Linn.	44	53	53
5	*Achyranthus aspera* Linn.	57	62	62
6	*Coccinia grandis* (Linn.) J. O. Voigt	48	56	56
7	*Celocia* Linn.	49	52.57	52.57
8	*Eclipta alba* Linn.	62	66	66
9	*Euphorbia herita* Linn.	50	56.86	56.86
10	*Melia japonica* Linn.	3	3	5
11	*Nicotiana plumbaginifolia* Viv.	5	5	5
12	*Riccinus communis* Linn.	60	62	62
13	*Physalis minima* Linn.	40	48	48
14	*Phyllanthus nurai* Linn.	89	100	100
15	*Parthenium hysterophorous* Linn.	32	36	36
16	*Oxalis curniculata* Linn.	45	49	50
17	*Solanum nigraum* Linn.	55	61.53	61.53
18	*Vitex negundo* Linn	88	98	98
19	*Vernonia cinerea* Schreb.	39	39	39
20	*Withonia somnifera* (Linn) Dunal	69	70	70

Phyllanthus nurai

Linn.*Vitex negundo* Linn

Control with treatment set of *Phyllanthus nurai*

Control with treatment set of *Vitex negundo*

Vitex negundo Showed 88% of mycelial inhibition at 5% concentration of extract but it shows 98% of mycelia inhibition at 10% and 15% of extract concentration.

Many agriculturally important pesticides have been banned by World Health Organization (WHO) due to their wide range of toxicity against non target organisms including humans, besides such pesticides are also known to cause pollution problems (Barnard *et al.*, 1997). The use of plant extracts in the treatment of diseases caused by bacteria, viruses and fungi have already been reported. Fungitoxic properties of plant extracts are widely recognized (Bylka *et al.*,

2004; Kosalec *et al.*, 2005; Natarajan *et al.*, 2003).

In our present investigation, the results are quite encouraging because most of the extracts screened showed antifungal efficacy against test fungus. However, the extracts of *Phyllanthus nurai* Linn. and *Vitex negundo* Linn. showed strong antifungal activity against test fungus. Therefore the extract can be used as an alternative drug for controlling diseases in pigeon pea crop.

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