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## MANAGEMENT OF WILT OF PIGEON PEA (CAJANUS CAJAN L.) THROUGH BIOPESTICIDE (LEAF EXTRACTS)



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### A B S T R A C T

*Biopesticides (leaf extracts) obtained from eight plants (Vitex negundo, Polyalthia longifolia, Vinca rosea, Withania somnifera, Lawsonia inermis, Adhatoda zylanica, Datura stramonium and Hyptis suaveolens) showed antifungal activities against the fungal pathogen (Fusarium oxysporum) of wilt of Pigeon pea (Cajanus cajan L.) Both in vivo and in vitro higher concentration of ethanotic leaf extracts of all eight plants shows complete inhibition in linear growth and sporulation in test fungi.*

**Key words :** Biopesticide, P.C.E., Wilt, Sporulation.

#### Introduction :

Biopesticides offer one the best alternative for synthetic pesticides to tackle diseases of crop plants, biopesticides are certain type of pesticides derived from such natural material as plant parts. Fungicides or pesticides are very danger to ecosystem as their, action remains mostly broad spectrum, which killing targate and non-targate organisms. But biopesticides are eco-friendly manages the crop diseases. Wilt of Pigeon pea (*Cajanus cajan*, L.) is a very common disease. It is the worst disease of red gram in India.

The present research work has been undertaken to manage the wilt of Pigeon pea caused by *Fusarium oxysporum* both in vivo and in vitro through the biopesticides (leaf extracts) of very common plants. viz. *Vitex negundo*, *Polyalthia longifolia*, *Vinca rosea*, *Withania somnifera*, *Lawsonia inermis*, *Adhatoda zylanica*, *Datura stramonium* and *Hyptis suaveolens*.

#### Materials and methods:

Fresh leaves of *Vitex negundo*, *Polyalthia longifolia*, *Vinca rosea*, *Withania somnifera*, *Lawsonia inermis*, *Adhatoda zylanica*, *Datura stramonium* and *Hyptis suaveolens* were collected, washed, dried under shed and pulverized to obtain dry powder. For each plant extract 100 gm powder was taken. Extract of each plant was prepared with 95% ethanol (1:5 W/V) and condensed to serve as stock extract or mother extract. The toxicity of mother extract was determined against the fungal pathogen of wilt of Pigeon pea viz. *Fusarium oxysporum*. Following the poisoned food technique (Mishra and Tiwari, 1992) at 10,25,50 and 100% concentrations. Petri plates containing Czapek Dox agar suplimented with different plant extracts at the four concentrations with three replications were

inoculated with six mm disc of mycelium, obtained from seven day old culture of fungal pathogen, the pathogen viz. *Fusarium oxysporum* was isolated from diseased plant part of Pigeon pea. The agar plates were kept upside down and inoculated in BOD incubator at 28°C. The plates without leaf extracts were served as control. Radial growth of fungal colonies were measured at different intervals. Sporulation and percentage control efficacy (PCE) is also done with the help of following equation antifungal activities of biopesticides i.e. exactly sporulation in the test fungi in different concentrations of plant extracts was studied.

The percentage control efficacy (PCE) of each biopesticide was calculated by following equation,  
 $PCE = 100 (1 - X/Y)$

Where, X= The diameter of the lesion on biopesticides  
Y = The diameter of lesion on untreated host (control)

#### Results and discussion:

The ethanolic leaf extracts at different concentration of eight plants were tested against pathogenic fungus (*Fusarium oxysporum*), which was isolated from infected parts of (*Cajanus cajan*) Pigeon pea significantly inhibited the growth of test fungi both in vivo and in vitro. Biopesticides (leaf extracts) of *Vitex negundo*, *Polyalthia longifolia*, *Vinca rosea*, *Adhatoda zylanica* and *Hyptis suaveolens* inhibited the radial growth of *Fusarium oxysporum* at 25% concentration only (table 1) and remaining biopesticides extracted from plants like *Withania somuifera*, *Lawsonia inermis* and *Datura stramonium* completely inhibited the growth of *Fusarium oxysporum* at 50% concentration (Table 1)

Effect of leaf extracts on sporulation of test fungus was also studied. After treatment of different

**Table No. 1: Antifungal activities of leaf extracts on growth of *Fusarium oxysporum***

Biopesticides	conc %	Diameter of fungal colony (mm) <sup>*</sup> ( <i>Fusarium oxysporum</i> )
<i>Vitex negundo</i>	10%	24.6
	25%	0.00
<i>Polyalthia longifolia</i>	10%	14.6
	25%	0.00
<i>Vinca rosea</i>	10%	11.3
	25%	0.00
<i>Withania somnifera</i>	10%	37.3
	25%	17.0
<i>Lawsonia inermis</i>	10%	75.0
	25%	18.3
<i>Adhatoda zylanica</i>	10%	30.3
	25%	0.00
<i>Datura stramonium</i>	10%	9.6
	25%	0.00
<i>Hyptis suaveolens</i>	10%	15.3
	25%	0.00
	Control	90.0
	S.E.	7.72
	C.D.	17.21

**Table No. 2: Effect of leaf extracts on sporulation of *Fusarium oxysporum***

Biopesticides	conc %	Sporulation of <i>Fusarium oxysporum</i>	
		No. of Conidia per microscopic field	No. of Conidia per ml Suspension
<i>Vitex negundo</i>	10%	0.00	0.00
	25%	0.00	0.00
<i>Polyalthia longifolia</i>	10%	1.6	5312
	25%	0.00	0.00
<i>Vinca rosea</i>	10%	1.0	3200
	25%	0.00	0.00
<i>Withania somnifera</i>	10%	0.6	211
	25%	0.00	0.00
<i>Lawsonia inermis</i>	10%	9.0	28800
	25%	0.00	0.00
<i>Adhatoda zylanica</i>	10%	1.3	4256
	25%	1.0	3200
<i>Datura stramonium</i>	10%	1.0	3200
	25%	0.0	0.00
<i>Hyptis suaveolens</i>	10%	4.0	12800
	25%	0.00	0.00
	Control	13.0	41600
	S.E.	1.52	4945
	C.D.	3.60	11721

leaf extracts at different concentration with test fungi number of conidia per microscopic field and number of conidia per ml of suspension was studied and calculated (table 2). The leaf extract of *Vitex negundo* found zero conidia per microscopic field and per ml of suspension.

## REFERENCE

1. Bhowmic B.N. and Chaudhari B.K., (1982). Antifungal activity of leaf extracts of medicinal plants on *Alternaria alternata* (fr.) Keissler. Indian Botanical reporter, 1-2: 200-205.
2. Chitra H. V., Gomathi, (2000). Effect of extracts of *Datura innoxia* miller. On the spore germination and mycelial growth of *Colletotrichum*. Biological Abstract, 107:26-4.
3. Kumar and Nene (1968). Antifungal properties of *Cleome isocandral* extract, Indian Phytopathology, XXI-4:445-446.
4. Mishra Mansi and Tiwari S.N. (1992)

**Table No. 3: In Vivo percentage control efficacy (PCE) of the plant extracts.**

Biopesticides	conc %	<i>Fusarium oxysporum</i>	
		Growth in mm	% Control efficacy (PCE)
<i>Vitex negundo</i>	10%	13.0	71.1
	25%	0.00	100.0
<i>Polyalthia longifolia</i>	10%	8.0	82.2
	25%	0.00	100.0
<i>Vinca rosea</i>	10%	8.0	82.2
	25%	0.00	100.0
<i>Withania somnifera</i>	10%	16.0	64.4
	25%	9.0	80.0
	50%	0.00	100.0
<i>Lawsonia inermis</i>	10%	24.0	46.6
	25%	9.0	80.0
	50%	0.0	100.00
<i>Adhatoda zylanica</i>	10%	11.00	75.3
	25%	0.0	100.0
<i>Datura stramonium</i>	10%	7.0	84.4
	25%	0.0	100.0
<i>Hyptis suaveolens</i>	10%	8.0	82.2
	25%	0.0	100.0
	Control	45.0	0.00
	S.E.	3.2	4.29
	C.D.	7.2	8.9

sion at 10% concentration to this the leaf extract of *Polyalthia longifolia*, *Vinca rosea*, *Withania somnifera*, *Lawsonia inermis*, *Datura stramonium* and *Hyptis suaveolens* exhibit zero number of conidia per microscopic field and per ml of suspension at 25% concentration (table 2). In vivo percentage control efficacy (PCE) of every leaf extract against pathogenic fungi was also studied, leaf extract of *Vitex negundo*, *Polyalthia longifolia*, *Vinca rosea*, *Adhatoda vasica*, *Datura stramonium* and *Hyptis suaveolens* gave 100% control efficacy (PCE) (table 3). According to Bhowmic and Chaudhari (1982). *Acalpha indica* completely checked the growth, sporulation and spore of germination in *Alternaria alternata*, Shetty (1989) reported that the leaf extract of *Azadirachta indica* was useful in the control of *Trichoconiella padwickii*, the seed borne fungus in paddy. According to Ramesh et.al. (1991) Ethanol extracts of leaves of *Croton sparsiflorus* had shown inhibition of a growth of fungal pathogen (*Rhizoctonia solani*, *Alternaria tenuis* and *Fusarium javanicum*), Narshiman et.al. detected the efficacy of leaf extracts of *Prosopis julifera* against *Alternaria tenuissima*. According to Chitra et.al. (2000). The leaf extract of *Datura innoxia* inhibited spore germination of *Colletotrichum capcici*. Kumar and Nene (1968) reported that leaf extract of *Cleome isocandra* inhibited the growth of *Helminthosporium maydis*.

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