Evaluation of phytoextracts against *Fusarium solani* causing root rot of okra

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ABSTRACT

Okra (*Abelmoschus esculentus* L.) is an important vegetable crop, severely attacked by root rot (*Fusarium solani*) in Junagadh district, Gujarat state (India). The pathogen caused grayish discoloration of stem near the soil base, root became soft and vascular bundles turned into brownish in colour results in drying of plants. Therefore effords was made to screen the different phytoextracts in laboratory condition against test fungus. Among that maximum inhibition was obtained in turmeric rhizome extract (62.72%) which followed by jatropha leaf extract (52.57%) and neem leaves extract (48.46%).

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INTRODUCTION

Okra [*Abelmoschus esculentus* (Linnaeus) Moench], belongs to the family *Malvaceae* is one of the most important vegetable crops grown extensively throughout the India during the summer and *kharif* seasons. Due to intensive cultivation practices the crop has been found to suffer from many diseases of which, root rot caused by *Fusarium solani* has been contributing significantly for low yield in Gujarat which cause wilting of leaves, tips, loss of turgidity followed by yellowing and drooping of leaves and underground stem become dry, brown and peeling of epidermis. Roots become soft, watery and browning of vascular bundle was also observed (Gangopadhyay, 1984). *Fusarium solani* (Mart.) Sacc., a soil inhabiting pathogen, attacks a large number of host plants including oilseeds, pulses, vegetables and ornamentals (Mani and Sethi, 1968; Bazalar and Delgadi, 1981; Kumar *et al.,* 1983 and Kore and Mane 1992). The affords were made in other region to manage the root rot (*Fusarium* spp.) through phytoextrects (Mamatha and Ravishankar, 2004; Joseph *et al.,* 2008; Mallesh *et al*., 2009; Patel *et al*., 2010 and Obongoya, 2010) in various crops. However, information is lacking in Gujarat for management of root rot in okra. Hence the present investigation was under taken to screen arious phytoextrects *in vitro* condition to manage the root rot.

MATERIALS AND METHODS

Evaluation of phytoextract *in vitro*

Nine phyoextracts were treated *in vitro* for their antifungal efficacy against growth of *Fusarium solani* using the procedure given by Ansari (1995) with a slight modification. Fresh leaves, rhizomes or cloves of respective plants as shown in (Table I) were first washed with tap water and then with sterilized water at 5000 rpm for 20 minutes and the supernatant was filtered with sterilized sintered funnel (pore size 1-2 microns), which formed the standard plant extract solution (100%). The extracts were individually incorporated into PDA medium at 2, 5 and 10 per cent concentration in 250 ml conical flasks separately and sterilized at 1.036 kg/cm^2 for 15 minutes. These were poured in 90 mm sterilized Petridishes keeping three replications for each concentration of extract. PDA without extracts was maintained as control. All the Petridishes were inoculated with four mm disc of mycelium of the pathogen and incubated at 28 ± 2^0 C. Seven days after inoculation, the per cent inhibition in growth due to various phytoextracts treatments at different concentrations was computed as follows:

Mycelial growth inhibition (%)

= [(dc- dt)/ dc] × 100(%)

Where dc = average diameter of fungal colony in control, and dt= average diameter of fungal colony in treatment group.

Table 1. List of different plant species and their parts with different concentrations screened in the experiment

Plants	Plant parts used	Concentrations (%)		
Allium sativum	Cloves	2	5	10
Zingiber officinale Rosc.	Rhizomes	2	5	10
Ocimum sanctum L.	Leaves	2	5	10
Lantana camera	Leaves	2	5	10
Jetropha curcas	Leaves	2	5	10
Adhatoda vasica Ness.	Leaves	2	5	10
Allium cepa L.	Bulbs	2	5	10
Azadirachta indica A. Juss.	Leaves	2	5	10
Curcuma longa	Rhizomes	2	5	10

Each sample was then homogenized in sterilized distilled water at the rate of 1 ml/g of tissues (1:1 V/W) with a pestle and mortar and filtered through fine muslin cloth. The filtrate was centrifuged at

RESULTS AND DISCUSSION

The results presented in (Table II) revealed that maximum mean inhibition was obtained in turmeric rhizome extract (62.72%) which followed by jatropha leaf extract (52.57%) and neem leaves extract (48.46%). In comparison to these three extracts other treatments showed lower inhibition which ranged between 38.39 per cent (onion) to 15.83 per cent (tulsi), respectively. Ten per cent extracts of turmeric rhizome, jatropha leaves, neem leaves and onion bulbs were also highly effective where 66.41, 66.17, 65.17 and 66.58 per cent growth inhibition were recorded, respectively. It was also seen that ardusi, lantana, garlic, ginger and tulsi performed moderately to poorly at all concentrations. The findings of present investigation were in favour of work done by Patel *et al*., (2010). They have reported strong growth inhibition of *F. solani* by using extract of termeric rhizomes. Obongoya (2010); Joseph *et al.* (2008); and Mamatha and Ravishankar (2004) reported that neem extract was effective in growth inhibition of *F. solani*. Mallesh *et al*. (2009) and Joseph *et al.* (2008) recorded that garlic clove extract and neem leaf extract were most effective for the growth inhibition of *F. solani*. Within the phytoextracts, all three levels of phytoextracts significantly differed from each other. Higher concentration of all the phytoextracts gave significantly higher inhibition as compared to their lower level. Among the different phytoextracts, turmeric extract was significant antifungal properties against root rot pathogen of okra as compare to other plant extracts.

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Table 2. Growth inhibition of *F. solani* at different concentrations of various phytoextracts after seven days of incubation at 28 ± 2º C

Phytoextracts	**Concentration (%)/ per cent inhibition***			
	2	**5**	**10**	Mean
Turmeric (Rhizomes)	60.50	61.25	66.41	62.72
Jatropha (Leaves)	26.39	65.14	66.17	52.57
Neem (Leaves)	16.75	63.47	65.17	48.46
Onion (Bulbs)	16.26	32.33	66.58	38.39
Ardusi (Leaves)	16.22	44.34	53.72	38.09
Lantana (Leaves)	16.02	35.55	53.71	35.09
Garlic (Cloves)	15.33	16.66	24.45	18.81
Ginger (Rhizomes)	14.42	17.19	20.15	17.25
Tulsi (Leaves)	14.30	16.54	16.65	15.83
	Phytoextract (P)	Concentration (C)		P×C
S.Em.±	0.31	0.18		0.54
C.D (P= 0.05%)	0.88	0.51		1.53

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