Research Paper :

Bio-efficacy of plant extracts against *Fusarium solani*

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International Journal of Plant Protection (October, 2010), Vol. 3 No. 2 : 306-308

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SUMMARY

A laboratory experiment was conducted at Main Forage Research Station, Anand Agricultural University, Anand during 2007 to evaluate bio-efficacy of 15 plant extracts against cowpea wilt caused by *Fusarium solani in vitro* by poisoned food technique with five replications of each treatment. The results indicated that all the phytoextracts inhibited the growth of the fungus as compared to control except baramasi. Among the plant extracts, turmeric powder extract showed maximum inhibition followed by neem, garlic, aonla, onion and imli extracts where as, borseli, kadipatta, Ashok, bael, sargavo and lantana, showed less inhibitory effect.

Key words : Bio-efficacny, Plant extracts, *fusarium solani*, Cowpea

Accepted :
August, 2010

Cowpea [*Vigna unguiculata* (L.) Walp.] is an important Leguminous forage crop which serves as a good source of protein for animal, but for the last few years a severe wilt was found in middle Gujarat. The pathogen was isolated and identified as *Fusarium solani* (ITCC No. 5598, 07). The wilt of cowpea has also been reported from different parts of India by Singh (1954); Monga and Grover (1991) and Ushamalini *et al.* (1998).

The disease is very important as it causes heavy losses (15 to 75 %) in yield of fodder as well as grain (Singh 1954; Haware, 1993 and Florini, 1997). Looking to the seriousness of the disease, an experiment was conducted to overcome the loss due to the disease by using plant extracts *in vitro* condition.

MATERIALS AND METHODS

The efficacy of phyto-extracts of 15 plant species belonging to different families listed in Table 1 was evaluated against cowpea wilt fungus, *Fusarium solani in vitro* by poisoned food technique.

Fresh healthy leaves / bulbs were washed thoroughly with clean tap water and subsequently with sterile distilled water. Fifty gram of either leaves or bulbs were mixed in a grinder by adding 50 ml sterile distilled water. Fifty gram turmeric dry powder was thoroughly mixed in 50 ml sterile distilled water. The resultant 100 per cent phytoextracts were filtered through double layered muslin cloth in 150 ml conical flasks and plugged with non absorbent cotton. These filtered phytoextracts were autoclaved at 1.2 kg cm^{-2} pressure for 20 minutes. Autoclaved extracts were individually added in previously sterilized PDA @ 10 per cent (*i.e.* 2 ml extracts / 18 ml PDA / plate) at the time of pouring in the plates and mixed thoroughly. All the pates containing phytoextracts were inoculated by placing a mycelical bit of 5 mm diameter of 10 days old culture of *Fusarium solani* grown on PDA in each petriplates and incubated these petriplate at room temperature (27 ± 2^0C) for 15 days. Five replications of each treatment were maintained and the plates without phytoextracts served as control. Observations on fungal growth were taken periodically and statistically analyzed and the per cent growth inhibition was worked out as mentioned earlier.

RESULTS AND DISCUSSION

The results present in Table 1 reveal that the mycelial growth of the fungus was significantly reduced by all the phytoextracts except baramasi (*Vinca rosea*) (90.00 mm). Among the effective phytoextracts, significantly lowest mycelial growth of *F. solani* was recorded in turmeric powder (*Curcuma longa*) (29.00 mm) followed by neem leaf extracts (*Azadirachta indica*) (33.75 mm) and these both were significantly superior over the rest. The next best in order of merit was garlic (*Allium sativum*) (38.25 mm) followed by aonla

Table 1 : Effect of plant extracts of various plant species on growth of *F. solani in vitro*

Sr. No.	Common or local name	Botanical name	Family	Plant part used for preparing extract	Av. colony diameter (mm) after 9 days	Inhibition growth over control (%)
1.	Turmeric	*Curcuma longa*	Zingiberaceae	Dry powder	29.00	67.77
2.	Neem	*Azadirachta indica*	Meliaceae	Leaves	33.75	62.50
3.	Aonla	*Emblica offjicinalis*	Euphorbiaceae	Leaves	47.75	47.22
4.	Onion	*Allium cepa*	Liliaceae	Bulb	62.00	31.11
5.	Imli	*Tamarindus indica*	Coesalvuiniaceae	Leaves	62.00	31.11
6.	Naffatia	*Ipomoea fistulosa*	Convolvulaceae	Leaves	64.25	28.61
7.	Tulsi	*Ocimum .sanctum*	Labiatae	Leaves	71.50	20.55
8.	Sargavo	*Moringa oleifera*	Moringaceae	Leaves	82.50	8.33
9.	Bael	*Aegle mormelos*	Ruthaceae	Leaves	82.50	8.33
10.	Baramasi	*Vinca rosea*	Apocyraceae	Leaves	90.00	00.00
11.	Garlic	*Allium sativum*	Liliaceae	Bulb	38.25	57.50
12.	Ashok	*Polyalthia longifolia*	Annonaceae	Leaves	84.75	5.83
13.	Lantana	*Lantana camara*	Verbenaceae	Leaves	71.50	20.55
14.	Kadipatta	*Murllva koenigii*	Moringaceae	Leaves	87.50	2.77
15.	Borseli	*Minuropus dengi*	Sapotacea	Leaves	86.25	4.16
16.	Control				90.00	00.00
	S.E. ±				0.710	
	C.D. (P=0.05)				1.98	
	CV %				2.10	

leaf (*Emblica officinalis*) (47.75mm), onion bulb (62,00 mm), imli leaf (*Tamarindus indica*) (62.00 mm), naffattia leaf (*Ipomoea fistulosa*) (64.25 mm), tulsi leaf (*Ocimum.sanctum*) (71.50 mm) and lantana leaf (*Lantana camara*) (71.50 mm), while leaf extracts of bael (*Aegle mormelos*) (82.5 mm), sargavo (*Moringa oleifera*) (82.5 mm), Ashok (*Polyalthia longifolia*) (84.75 mm), borseli (*Minuropus dengi*) (86.25) and kadipatta (*Murllva koenigii*) (87.50 mm) exhibited poor inhibitory effect.

The extracts of turmeric and neem produced the maximum inhibition per cent of 67.77 and 62.50, respectively followed by garlic (57.50) and aonla (47.22). The next best in order of merit was onion (31.11 %). imli (31.11%) naffattia (28.61%) tulsi (20.55 %) lantana (20.55 %) bael (8.33 %), sargavo (8.33 %), Ashok (5.83 %), borseli (4.16 %), kadipatta (2.77 %) exhibited poor inhibition of mycelial growth.

The extracts of turmeric and garlic were proved effective in inhibiting the growth of *Fusarium* spp. (Assadi and Behroozin, 1987, Patel and Vala, 2004) garlic clove extract for *F. solani* f. sp. *phaseolii* (Russel and Mussa, 1997) and Neem leaf extracts against *Fusarium solani* and *F. oxysporum* (Philip and Sharma, 1997). Datar (1995) investigated the antifungal activity of neem leaf extract against six phytopathogenic fungi among which lowest reduction in germination count, lowest inhibition of conidial germination and lowest mycelial growth were observed in *Fusarium* spp. These findings are in agreement with the present results.

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