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RESEARCH ARTICLE

Efficacy of organic amendments on wilt of carnation (*Dianthus caryophyllus* L.) caused by *Fusarium oxysporum* f.sp.*dianthi in vitro*

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ABSTRACT

Studies were conducted to test the effect of oil cakes and organic manures on the growth of wilt pathogen under *in vitro* conditions. The extracts of different oil cakes and organic manures were tested against *F.oxysporum* f.sp.*dianthi* by poisoned food technique in *in vitro*. Least growth of pathogen was recorded in extracts of neem cake showing excellent inhibitory effect of 80.44 per cent reduction over control. Next best in order of merit was Mahua cake (75.11%) followed by neem seed kernel extract (60%) and pungam cake (38.22%) and least by others. Among the organic manures tested, vermicompost and composted coir pith showed maximum growth inhibition of 37.56 and 36.55 per cent over control, respectively.

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INTRODUCTION

Carnation (*Dianthus caryophyllus* L.) is one of the most popular commercially grown flowers of the world. Carnation is preferred to roses and chrysanthemums by several exporting countries, on account of its excellent keeping quality, wide range of forms and colours and ability to withstand long distance transportation. Cut carnations, roses and chrysanthemums contribute close to 50 per cent of the world cut flower trade (Jawaharlal *et al*., 2009). There are several diseases reported in carnation including rust caused by *Uromyces dianthi*, leaf blight by *Alternaria dianthi,* grey mold by *Botrytis cinerea,* Fusarium wilt caused by *Fusarium oxysporum* f. sp. *dianthi,* leaf spot by *Cercospora* and *Cladosporium* and root and stem rots caused by *Rhizoctonia solani* or *F. roseum*. Among them, Fusarium wilt is an important soil borne disease occurring prevalently in carnation fields (Kyounge *et al.*, 2001).

The wilt is being controlled through systemic fungicides but it leads to health hazards, environmental pollution and toxicity. It also reduces population of beneficial microorganisms in soil. Hence, it is obligatory to find out some alternate resources to reduce the chemical fungicides usage. Therefore, research on suitable organic substrate (oil cakes) is needed to get positive results in the biological control of soil borne pathogens. The present investigation was taken to manage the disease by use of organic substrates due soil borne nature of the pathogen.

MATERIALS AND METHODS

Efficacy of oil cake extracts against F.oxysporum f.sp.dianthi *in vitro* :

Preparation of aqueous extracts from oil cakes :

Required quantity of each oil cake was taken and made into powder separately. It was soaked in sterile distilled water @ one g in 1.25 ml of water separately and kept overnight. The material was ground using a pestle and mortar and filtered through a muslin cloth and the filtrate was centrifuged at 10,000 rpm for 15 min. The supernatant served as the standard extract

solution (100%) (Dubey and Patel, 2000).

Testing the antifungal activity of oil cake extracts against *F.oxysporum* f. sp. *dianthi in vitro* :

The efficacy of oil cake extract was tested against *F. oxysporum* f. sp. *dianthi* using poisoned food technique. The freshly prepared extract was distributed @ 50 ml PDA medium per conical flask. Aqueous extracts of oil cake 5 ml was mixed with 50 ml of PDA medium to obtain 10 per cent and sterilized. The sterilized PDA medium (15 ml per Petri dish) was poured on sterilized Petri dish and then allowed to solidify. A nine mm mycelial disc of *F. oxysporum* f. sp. *dianthi* was taken from actively growing culture and placed at the centre of each Petri dish and incubated at room temperature. The PDA medium without extract of oil cake served as control. The radial growth (cm) of *F. oxysporum* f. sp. *dianthi* was recorded after seven days of incubation.

RESULTS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads:

Efficacy of oil cakes against growth of *F. oxysporum* f. sp. *dianthi* :

An effective organic amendment should reduce the population of plant pathogens, increase the activity of beneficial microorganisms and improve the growth of crop plants. In order to manage the wilt of carnation, the effect of organic amendments including different oil cakes and organic manures were studied. The results indicated that there was a significant difference among the oil cakes in inhibiting the

Table 1: Efficacy of different oil cake extracts against *F. oxyspoum* f. sp. *dianthi in vitro*

Sr.No.	Treatments	Concentration			
		5 (%)		10 (%)	
		Mycelial growth (cm)*	Per cent reduction over control	Mycelial growth (cm)*	Per cent reduction over control
1.	Neem cake	4.02	55.33	1.76	80.44
2.	Castor cake	8.21	8.78	7.40	17.78
3.	Coconut cake	8.80	2.20	8.54	5.11
4.	NSKE	6.34	29.56	3.51	61.00
5.	Gingelly cake	7.86	12.67	6.27	30.33
6.	Pungam cake	6.45	29.55	5.56	38.22
7.	Mahua cake	4.63	48.55	2.24	75.11
8.	Groundnut cake	8.42	6.44	8.22	8.67
9.	Control	9.0	0.0	9.0	0.0
C.D. (P=0.05)		0.24		0.21	

* Mean of three replications

Table 2: Efficacy of different organic manures against *F. oxysporum* f. sp. *dianthi in vitro*

Sr.No.	Treatments	Concentration (10%)	
		Mycelial growth (cm)*	Per cent reduction over control
1.	Composted coir pith	5.71	36.55
2.	Vermicompost	5.62	37.56
3.	Mushroom waste	7.74	14.00
4.	Composted sugarcane leaves	7.85	12.78
5.	Composted banana leaves	8.02	10.80
6.	Coffee waste	6.80	24.44
7.	FYM	6.67	25.89
8.	Goat manure	7.12	20.88
9.	Poultry manure	7.53	16.33
10.	Cow dung	6.98	22.44
11.	Control	9.0	-
C.D.(P=0.05)		0.25	

* Mean of three replications

growth of pathogen at 10 per cent concentration. The study revealed that the oil cake extracts of neem cake at 10 per cent concentration was found to be effective having 80.44 per cent mycelial growth inhibition followed by Mauha cake (75.11%). At 5 per cent concentration, neem cake and Mauha cake extracts were inferior to inhibit the pathogen growth which recorded 55.33 and 48.55 per cent reduction, respectively of mycelial growth (Table 1). This study confirms the earlier result given by Yelmame *et al.* (2010), who reported that the extracts of Neem cake showing excellent inhibitory effect (59.8 %) against *F. solani* caused chilli wilt.

In order to study of efficacy of extracts of ten organic manures, they were tested against the growth of *F. oxysporum* f. sp. *dianthi*. The result revealed that at 10 per cent concentration vermin compost and composted coirpith were the most effective against the mycelial growth of pathogen by recording the maximum growth inhibition of 37.56 and 36.55 per cent reduction over control, respectively (Table 2). This was followed by farm yard manure, coffee waste and cow dung which recorded of 25.89, 24.44 and 22.44 per cent reduction over control, respectively. The minimum growth of inhibition (10.80%) was observed in composted banana leaves over control. The findings of the present study are clearly supported by Noble and Coventry *(*2007), who reported a suppressive effect of composted organic waste on soil borne disease such as damping off, root rot and wilt diseases.

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