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Effect of Soil Amendments on Wilt of Chickpea (*Cicer areitinum* L) caused by *Fusarium oxysporum* f. sp. *ciceri In vitro*

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Studies were conducted to test the effect of oil cakes and organic manures on the growth of wilt pathogen under *in vitro* conditions. The extract of different oil cakes and organic manures were tested against *F. oxysporum* f. sp. *ciceri* by poisoned food techniques *in vitro*. Least growth of pathogen was recorded in extracts of neem cake showing excellent inhibitory effect of 70.87 percent reduction over control. Next best in order of mustard cake (65.36 %), linseed (62.99%), groundnut (53.36%) and least by other. Among the organic manures tested, vermi compost and FYM showed maximum growth inhibition of 35.95 and 30.62 percent over control, respectively.

Key words: Chickpea, *Fusarium oxysporum* f. sp. *ciceri*, Wilt, Soil born fungi, Oil cakes and Organic manures.

The wilt is being controlled through systemic fungicides but it leads to health hazards, environmental pollution and toxicity. It also to reduce population of beneficial micro-organisms in soil. Hence, it is obligatory to find out some alternate resources to reduce the chemical fungicides usage. Therefore, research on suitable organic subtracts (oil cakes) is needed to get positive results in the biological control of soil borne pathogens by (Chauhan 1963 and Chattopadyaya *et al*., 1986). The present investigation was taken to manage the disease by use of organic substrates due soil borne nature of the pathogen.

MATERIALS AND METHODS

In vitro experiments was conducted to find out the efficacy of soil amendments against *F. oxysporum* f. sp. *ciceri* using poisoned food technique. Required quantity of each oil cake was taken and made into powder separately by crushing the cakes in mechanical grinder. 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 1000 rpm for 15 min. The supernatant served as the standard extract solution (100%) (Dubey and Patel 2000). The freshly prepared extract was distributed @ 50 ml PDA medium per conical flask. Aqueous extracts of oil cake 5.0 ml was mixed with 50 ml of PDA medium to obtain 10 per cent and sterilized. The sterilized PDA medium (15 ml per Petri plate) was poured on sterilized Petri plate and then allowed to solidify. Three replication were maintained for each of oil cake extracts. A seven mm mycelial disc of *F. oxysporum* f. sp. *ciceri* was taken from actively growing culture and placed at the center of each Petri plates. The plates were incubated at 28 ± 1 °C for seven days. The PDA medium without extract of oil cake served as control. The diameter of colony (in mm) was measured after seven days of incubation. The radial growth of the colonies, sporulation per microscope

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field and growth pattern were recorded for assessment of the effectiveness of each oil cake extracts.

RESULTS AND DISCUSSION

Effect of oil cakes extract against *F. oxysporum* f. sp. *ciceri*

An effective organic amendment should reduce the population of plant pathogens, increase the activity of beneficial micro-organisms and improve the growth of crop plants. In order to manage the wilt of chickpea, the effect of organic amendment 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 growth of pathogen at 10 per cent concentration. The radial growth of *F. oxysporum* f. sp. *ciceri* as influenced by five oil cake amendments. The data presented in Table 1, revealed that all the oil cake amendment reduced the radial growth significantly over control. The maximum reduction in each growth was found with in neem cake where the mean growth was 24.66 mm. It was followed by mustard cake (29.33 mm), linseed (31.33 mm), groundnut (37.33 mm) and sesamum (40.66 mm) as compared to 84.66 mm in control. These finding are in full conformity with the results of (Singh 1976, Mayur *et al*., 2003, Raj and Singh 1996 and Raj and Kapoor 1996).

The maximum (70.87 %) reduction of *F. oxysporum* f. sp. *ciceri* was recorded in neem cake amendments followed by mustard (65.36 %), linseed (62.99 %), groundnut (55.90 %) and sesamum (51.98 %), respectively. Neem cake was found best suitable cake against *F. oxysporum* f. sp. *ciceri*.

Table 1. Efficacy of different oil cake extracts against *F. oxysporum* f. sp. *ciceri in vitro*

S.N.	Treatments	Concentration (10%)			
		Mean radial growth (mm)*	Percent reduction over (control)	Sporulation/ microscopic field	Growth pattern
1.	Neem	24.66	70.87	5.0	Partially submerged
2.	Linseed	31.33	62.99	8.0	Submerged
3.	Mustard	29.33	65.36	7.5	Partially submerged
4.	Groundnut	37.34	55.90	8.5	Submerged
5.	Sesamum	40.66	51.91	9.0	Submerged
6.	Control	84.66	-	18.6	Fluffy
S.E.M ±		0.62			
C. D. (at 5 %)		1.82			

*Mean of three replication

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

S.N.	Treatments	Concentration (10%)			
		Mean radial growth (mm)*	Percent reduction over (control)	Sporulation/ microscopic field	Growth pattern
1.	Vermi compost	54.22	35.95	7.0	Partially submerged
2.	Goat manure	61.22	27.69	8.0	Submerged
3.	FYM	58.74	30.62	7.6	Partially submerged
4.	Poultry manure	65.33	17.72	9.5	Submerged
5.	Cow dung	69.66	22.83	9.0	Submerged
6.	Control	84.66	-	18.6	Fluffy
S.E.M ±		0.76			
C. D. (at 5 %)		1.98			

*Mean of three replication

The sporulation reduced significantly on all the oil cake amendments. It was minimum in neem cake (5.0 million/ml) followed by mustard cake (7.5 million/ml), linseed (8.0 million/ml), groundnut (8.5 million/ml) and sesamum (9.0 million/ml) against 18.6 million/ml in control.

The growth habits of *F. oxysporum* f. sp. *ciceri* on five oil cake amendments were also recorded. The oil cake amendments exhibited three pattern of mycelia growth fluffy, partially submerged and submerged.

Effect of organic extract against *F. oxysporum* f. sp. *ciceri*

In order to study of efficacy of extracts of five organic manure they were tested against the growth of *F. oxysporum* f. sp. *ciceri*. The result revealed that at 10 percent concentration vermin compost and FYM were the most effective against the radial growth of pathogen by recording the maximum growth inhibition of 35.95 and 30.62 percent reduction over control, respectively (Table 2). This was also found in the study that goat manure and cow dung which recorded of 27.69 and 22.83 percent reduction and minimum growth of inhibition (17.72 %) was observed in poultry manure over control. Similarly, findings by Noble and Coventry (2005) and Yelmane *et al*., (2010) reported that the effect of composted organic waste on soil borne disease.

The sporulation reduced significantly on all the organic manures. It was minimum in vermicompost (7.0 million/ml) followed by FYM (7.6 million/ml), goat manure (8.0 million/ml), cow dung (9.0 million/ml) and poultry manure (9.5 million/ml) against 18.6 million/ml in control.

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