

Original Research Article

Effect of root leachate of mustard in the spore germination of *Fusarium oxysporum* f. sp. *ciceri*

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A B S T R A C T

Keywords

Chickpea;
Fusarium oxysporum f. sp. *ciceri*;
Mustard,
Micro and Macro conidia;
Root leachates.

Chickpea is the most important pulse crop grown mostly in rainfed areas. The crop is damaged due to wilt. Mustard is used as intercrop could help in reducing losses caused by soil borne fungi. Root exudates of various crops are known to adversely affect the pathogens build up in the soil. The root leachates of mustard evaluated against the germination of conidia of *Fusarium oxysporum* f. sp. *ciceri* in laboratory conditions. Beaker method was followed to test the efficacy of root leachates. Twenty five ml of sterilized distilled water was filled in the beaker. Ten seeds of mustard were planted on blotter paper. The root leachates of mustard collected after 15 days of germination delayed spore germination of *Fusarium oxysporum* f. sp. *ciceri* by five hours while, that of seven days delayed by four hours. Increasing dilution of root leachates had considerable effect on the germination of micro and macro conidia of *Fusarium oxysporum* f. sp. *ciceri*.

Introduction

Chickpea (*Cicer arietinum* L) is an important pulse crop of India and suffers with various diseases caused by fungi, bacteria and virus of which vascular wilt caused by *Fusarium oxysporum* f. sp.

ciceri is much dangerous than other diseases². The incidence of the disease varies from 10-100 percent depending on the locality. In Madhya Pradesh, its incidence has been reported from 0-60

percent¹. Mustard is used as intercrop could help in reducing losses caused by soil borne fungi⁵. Root exudates of various crops are known to adversely affect the pathogens build up in the soil^{3,4,5&6}. The root leachates of mustard evaluated against the germination of conidia of *Fusarium oxysporum* f. sp. *ciceri* is reported in this paper.

Materials and Methods

Experiment was conducted to see the effect of root leachates on the germination of micro and macro conidia of *Fusarium oxysporum* f. sp. *ciceri*. In this experiment Beaker method was followed to test the effect of root leachates. Twenty five ml of sterilized distilled water was filled in the beaker of 100 ml capacity. One disc of blotter paper was placed in touch of the water in the beaker. Ten seeds of mustard were planted on blotter and covered with another disc of blotter paper to maintain humidity. The beaker were incubated at room temperature (30 to 32 °C).

The root leachate of mustard was collected after 7 and 15 days of germination. The collected leachates were filtered through Millipore filter paper to avoid bacterial contamination. The filtered leachates served as 100 % concentrate and it was sterilized water in the ratio of 1:1, 1:2, 1:3 and 1:4 in the test tubes. Sterilized distilled water only was kept as control. The spore suspension of *Fusarium oxysporum* f. sp. *ciceri* was prepared by suspending 5 mm disc of 10 days old culture in each of the treatment mentioned above. The number of spore germinated per microscopic field was counted after one hour and continued up 7 hour and the percentage germination was calculated with reference to total number of spores.

Results and Discussion

The data presented in Table 1 clearly indicate that the germination of microconidia of *Fusarium oxysporum* f. sp. *ciceri* started after 5 hours (10.0%) while macro conidia did not germinated up to 7 hours in 7 days old concentrate mustard root leachate with the increase in dilution of concentrate from 1:1 to 1:4, the spore germination started early i.e. after two hours (15.4% and 11.1 % in micro and macro conidia, respectively).

The percentage germination of micro and macro conidia started just after one hour in sterilized distilled water (81.8 % and 66.7 %) and increased up to 6 hours and remained same in 7th hour. In general, the percentage germination of micro conidia was comparatively higher as compared to macro conidia in all the treatments (Table 1 and Figure 1).

The data of Table 2 and Figure 2 showed that in 15 days old concentrated root leachate of mustard the germination of micro conidia of *Fusarium oxysporum* f. sp. *ciceri* started after 5 hours (7.5 %), while macro conidia did not germinate even after 7 hours.

Dilution of 1:1 had maximum effect in inhibiting the germination of both micro and macro conidia up to four hours (10.0 and 7.5 %, respectively). The inhibitory effect decreased with the increase in dilution. The germination of micro and macro conidia increased with the duration and was maximum in sterilized distilled water (control). Fifteen days old leachate was more inhibitory than seven days old.

Table.1 Effect of root leachate of mustard (collected after 7 days) on spore germination of *Fusarium oxysporum* f. sp. *ciceri*

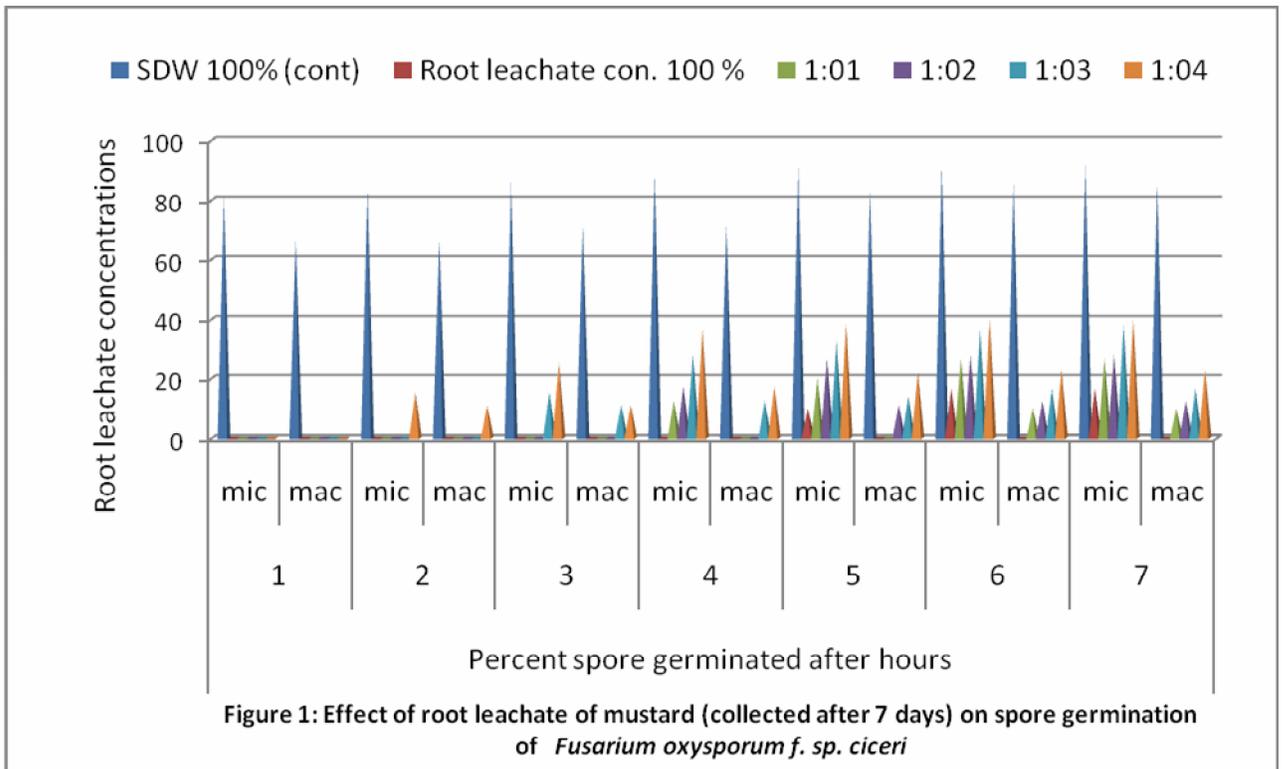
S. N.	Treatments	Percent spore germinated after hours													
		1		2		3		4		5		6		7	
		mic	mac	mic	mac	mic	mac	mic	mac	mic	mac	mic	mac	mic	mac
1	SDW 100% (cont)	1.1	6.7	3.9	6.7	5.7	1.4	9.1	1.6	0.7	3.3	1.7	5.7	1.7	5.7
2	Root leachate con. 100 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	6.7	0.0
3	1:1	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	6.8	0.0	6.8	0.0
4	1:2	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	6.8	1.1	8.0	2.5	8.0	2.5
5	1:3	0.0	0.0	0.0	0.0	5.4	1.1	8.1	2.5	2.7	4.2	6.5	6.7	7.9	6.7
6	1:4	0.0	0.0	5.4	1.1	5.4	1.1	6.7	7.3	8.7	2.2	0.1	3.1	0.1	3.1

1:1, 1:2, 1:3 and 1:4 = Root leachate con. (RL) 100%; Sterilized Distilled Water control 100% (SWD) Mic =micro conidia Mac= macro conidia

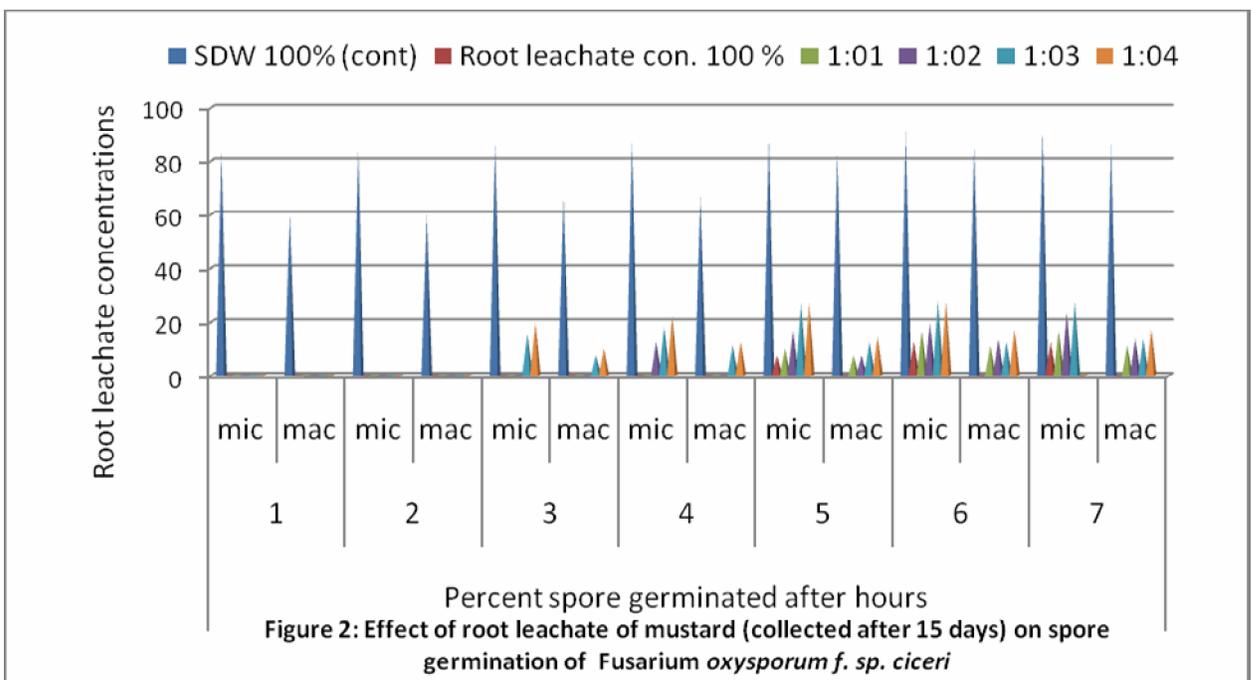
Table.2 Effect of root leachate of mustard (collected after 15 days) on spore germination of *Fusarium oxysporum* f. sp. *ciceri*

S. N.	Treatments	Percent spore germinated after hours													
		1		2		3		4		5		6		7	
		mic	mac	mic	mac	mic	mac	mic	mac	mic	mac	mic	mac	mic	mac
1	SDW 100% (cont)	83.3	60.0	84.8	60.0	86.5	66.7	87.3	66.7	88.9	83.3	90.6	85.7	91.5	86.0
2	Root leachate con. 100 %	00.0	00.0	00.0	00.0	00.0	00.0	00.0	00.0	7.5	00.0	12.5	00.0	12.5	00.0
3	1:1	00.0	00.0	00.0	00.0	00.0	00.0	00.0	00.0	10.0	7.5	16.7	11.1	16.7	11.1
4	1:2	00.0	00.0	00.0	00.0	00.0	00.0	12.5	00.0	16.7	7.5	19.7	13.5	23.6	13.5
5	1:3	00.0	00.0	00.0	00.0	15.4	7.5	18.2	11.1	26.8	12.5	27.6	12.5	27.6	13.5
6	1:4	00.0	00.0	00.0	00.0	19.7	10.0	22.6	12.5	26.8	14.2	27.6	17.3	27.6	17.3

1:1, 1:2, 1:3 and 1:4 = Root leachate con. (RL) 100%; Sterilized Distilled Water control 100% (SWD) Mic =micro conidia Mac= macro conidia



1:1, 1:2, 1:3 and 1:4 = Root leachate con. (RL) 100%; Sterilized Distilled Water control 100% (SWD) Mic =micro conidia Mac= macro conidia



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