

Effect of Rhizosphere Microflora of Healthy and Wilt-Diseased *Carthamus tinctorius* L. Plants

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In the rhizosphere of healthy and partially recovered plants, antibiotic producing microorganisms were more. These are known to be antagonistic to several species of *Fusarium*. In the rhizosphere of badly infected plant secondary invaders and saprophytic fungi were more. Only four out of a total of twenty-one fungi isolated from the rhizosphere of healthy and diseased plants were common to both.

Key Words: Rhizosphere, Wilt of safflower

Introduction

Fusarium oxysporum Sheld. f. sp. *carthami* Klis. and Houston the incitant of safflower wilt was first reported from this country in 1975 (Singh et al. 1975) and since then it is becoming a serious threat to safflower (*Carthamus tinctorius* Linn.) cultivation. During disease survey (Chakrabarti & Basuchaudhary 1978) and pathogenicity test, a waxing and waning of the disease symptoms was observed. Ghosal et al. (1976) reported that partial recovery was related to the accumulation of carthamidin (4, 5, 7, 8 tetrahydroxy flavanone) an antifungal compound, during blossoming stage which later on was oxidised into carthamon a less effective antifungal compound at the time of seed setting. Chakrabarti and Basuchaudhary (1978) observed that

variation in temperature, soil moisture too exerted influence on the fluctuation of the disease expression and severity. Rhizosphere microflora play a significant role in safeguarding plant health. The secretion of rhizosphere microflora in close proximity of roots may diffuse into or be actively taken up by them. An antagonistic biotic events occurring in the rhizosphere may create an unfavourable environment for pathogen. In the present paper, an attempt has been made to determine the rhizosphere microorganisms of healthy, partially recovered and totally wilted safflower plants.

Materials and Methods

Earthen pots were filled with garden soil and infested with 5 percent inoculum

(*Fusarium oxysporum* f. sp. *carthami*) grown on sand-maize meal in Erlenmeyer flasks for 21 days at $21 \pm 2^\circ\text{C}$. Seven days after the infestation, surface sterilized (with 0.1 percent HgCl_2 solution) seeds were sown in the pot soil. Similarly, seeds were sown in uninfested pot soil to serve as control. Fungi were isolated by Warcup soil dilution technique (1960) on Martin Rose Bengal-Agar medium from the rhizosphere of sixteen

and twenty-two-weeks-old infected and healthy plants. A portion of the isolated fungi has been deposited in the Commonwealth Mycological Institute, Kew, England.

Results and Discussion

The fungi isolated from the rhizosphere of healthy and diseased plants have been tabulated. A total of twenty-one fungi was isolated, of which four were

Table 1 List of the fungi isolated from the rhizosphere of healthy and diseased safflower plants

Sl. No.	Name of the fungus	Healthy plants		Diseased plants	
		16 weeks-old blossoming stage	22 weeks-old seed setting	16 weeks-old blossoming stage	22 weeks-old seed setting
1.	<i>Acremonium charticola</i> W. Gams	+	+	—	—
2.	<i>Alternaria alternata</i> (Fr.) Keissler	++	+	+	—
3.	<i>Aspergillus flavus</i> Link ex Fr.	—	—	—	+
4.	<i>A. niger</i> Van Tiegh.	—	—	—	+
5.	<i>A. quadrilineatus</i> Thom & Raper	—	—	—	+
6.	<i>A. terreus</i> Thom	+++	+	++	—
7.	<i>Cephalosporium</i> sp.	+++	++	+	—
8.	<i>Cladosporium cladosporioides</i> (Fresen) De Vries	++	+++	++	+
9.	<i>Fusarium moniliforme</i> Sheld.	++	+	+	+
10.	<i>F. oxysporum</i> sp. <i>carthami</i>	—	—	+	+++
11.	<i>F. solani</i> (Mart.) Sacc.	—	—	—	+
12.	<i>Humicola fuscoatra</i> Traaen	++	+	++	+
13.	<i>Macrophomina phaseolina</i> (Tassi) Goid	++	++	++	+
14.	<i>Penicillium chrysogenum</i> Thom	+++	+++	+	—
15.	<i>P. cyclopium</i> Westling	+++	+++	++	—
16.	<i>P. funiculosum</i> Thom.	—	=	+	++
17.	<i>P. oxalicum</i> Currie & Thom.	+	+	++	—
18.	<i>P. variable</i> Sopp	—	—	—	+
19.	<i>Phoma pomorum</i> Thum	+	+	++	—
20.	<i>Rhizopus oryzae</i> Went & Prien Geerling	++	+	+	—
21.	<i>Thielavia terricola</i> (Gilman & Abbott) Emmons	—	—	—	+

— absent; + present; ++ more; +++ ample

common in the rhizosphere of healthy and diseased plants. *A. charticola* was isolated only from the rhizosphere of healthy plants while *A. spergillus flavus*, *A. niger*, *A. quadrilineatus*, *Fusarium solani*, *Penicillium variable*, *Thielavia terricola* from twenty-two-weeks-old diseased plants. Of the four species of *Aspergillus*, three were present in the twenty-two-weeks-old diseased plants. *Macrophomina phaseolina* was isolated in more number from the rhizosphere of healthy and sixteen-weeks-old diseased plants, but in low number from twenty-two-weeks-old diseased plants.

Alternaria alternata, *Aspergillus terreus*, *Cephalosporium* sp., *Penicillium*,

cyclopium, *P. chrysogenum*, *P. oxalicum*, all known antibiotic producers were totally absent in the rhizosphere of completely wilted plants (twenty-two-weeks-old), while in partially recovered plants (sixteen-weeks-old) they were present in low to moderate numbers.

Therefore, the partial recovery of the infected safflower plants is a complex phenomenon and the presence of antibiotic producing microorganisms which are known to be antagonistic to several species of *Fusarium* is likely to be responsible in suppressing the expression of disease symptoms at the early stage of blossoming.

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