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First Report on Association of Some Fungal Organisms with Dodder (*Cuscuta*) Blight from Pakistan

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Abstract

All the four fungi isolated from *Cuscuta* stem produced black necrotic lesions on *Cuscuta* when inoculated artificially. *Colletotrichum gloeosporioides* followed by *Fusarium pallidoroseum* and *Alternarai alternata* were most destructive when inoculated artificially separately. Severe attack was observed where *Alternarai alternata*, *Curvularia lunata*, *Colletotrichum gloeosporioides* and *Fusarium pallidoroseum* were inoculated artificially in combinations.

Introduction

Cuscuta spp. (dodders) are widely distributed plants throughout the Pakistan which parasitize a variety of hosts, belonging to different botanical families. It has been found to attack, alfalfa, clovers, linseed, potato some legumes and sugarbeet besides *Acacia, Jujuba, Artemisia, Citrus* and *Zyphus* spp. Hedges and ornamental plants are also infested. Dodder retards the growth and reduces the yield of infested plants (Hafiz, 1986).

Stojanovic and Boric (1981) noted that only *Alternarai* spp. could be used for bio-control of *C. trifolii* on lucerne. He also found *F. semitectum* and *F. oxysporum* var. orthoceras [*F. oxysporum*] could be used to control *C. trifolii* and *C. campestris*.

Riyad *et al.* (1990) reported that blight of dodder (*C. campestris*) was caused by *Alternarai alternata* and *Colletotrichum candidum*.

In 1996-97, it was observed that dodder, *Cuscuta reflexa* (thick vined) and *Cuscuta campestris* (thin vined) parasitizing on Khatti (*Citrus limon*) and Gardenia (*Clerodendrum inerme*) plantations became blight and dried (personal communication). Considering this aspect as a new area for research, systematic research work was carried to isolate the fungi associated with diseased *Cuscuta* stem and to find out their effectiveness against *Cuscuta*.

Materials and Methods

Collection: Diseased specimens of *Cuscuta reflexa* and *C. campestris* parasitizing on different host plants (Table 1) were collected. Diseased specimens of *Cuscuta reflexa* (thick vined) and *C. campestris* (thin vined) were brought to the laboratory from University of Agriculture, Faisalabad and surrounding of Ayub Agriculture Research Institute, Faisalabad for isolation of fungi. Infected parts showing different symptoms were cut into 8-12 mm pieces with the help of scissors and surface sterilized with 5 percent sodium hypochlorite (commercial bleaching solution) for about two minutes. The surface sterilized pieces of *Cuscuta* were plated separately in petridishes (9 cm) containing Potato Dextrose Agar (PDA) and on blotting papers by Standard Blotter method (Anonymous, 1993). 500 pieces of stem cuttings of *Cuscuta* were checked for isolation. Five pieces of stem of *Cuscuta reflexa* and *C. campestris* were placed in one petriplate (9 cm) separately. PDA plates and plates with blotting papers were incubated at 25 ± 2°C and isolation were made after 4-5 days from both species of *Cuscuta*. Isolated fungi were purified and identified with the help of relevant literature (Ellis, 1971; Booth, 1971; Sutton, 1980) and maintained on artificial medium (PDA) for further experiments.

Species of dodder and their hosts were inoculated by surface spraying and hypodermic needle with a spore suspension (1.2 x 10^6 spores/ml of water of *Alternarai alternata* and *Curvularia lunata*, 3.7 x 10^6 spores/ml of water of *Colletotrichum gloeosporioides* and 3.2 x 10^7 spores/ml of water of *Fusarium pallidoroseum*) and the inoculated stems were covered with a painter's masking tape separately to prevent drying. Spore suspension of all the four fungi was also sprayed on dodder stems coiling around Gardenia (Clerodendrum inerme) stems in the field and at high humidity rate which was maintained with the help of manual sprayer. Check plants were sprayed and injected with sterilized water. Data regarding appearance of necrotic lesions on *Cuscuta* stem were recorded after 7 days and 15 days interval.

Fungi were re-isolated from the black necrotic lesions and dead parts of *Cuscuta* to confirm their role in pathogenicity.

Results and Discussion

Isolation: Isolation were made from stems of *Cuscuta reflexa* (thick vined) and *Cuscuta campestris* (thin vined attacked by fungi. Four fungi namely *Alternarai alternata* (Fr.) Keissler, *Colletotrichum gloeosporioides* (Penz.) Sacc., *Curvularia lunata* (Wakker) Boed. and *Fusarium pallidoroseum* (Cooke) Sacc. were isolated from stem pieces of C. *reflexa* and *C. campestris*. Isolated fungi were purified and maintained on potato dextrose agar (PDA) slants for further experiments. Culture of different fungi were stored at 4°C.

Data regarding pathogenicity revealed that *A. alternata*, *C. gloeosporioides* and *F. pallidoroseum* produced necrotic lesion after 7 days while *C. lunata* failed to produced any symptoms. After 15 days, it was noted that black necrotic lesions produced by fungi were extended upto 3 times

except *C. lunata*. It indicates that *C. lunata* do not have potential to kill *Cuscuta* individually (Table 2).

Table 1: List of host plants of *Cuscuta*

Common Name	Botanical Name
Kikar	*Acacia niloica*
Lucern (Alfalfa)	*Medicago sativa*
Khatti	*Citrus limon*
Gardenia	*Clerodendrum inerme*
Shisham	*Dalbergia sissoo*
Gul-e-Nashtar	*Erythrina suberosa*
Pepal	*Ficus religiosa*
Shoe flower	*Hibiscus rosa-sinensis*
Panchphuli	*Lantana camara*
Data palm	*Phoenix dactylifera*
Baru Grass	*Sorghum halepense*
Glu Bail	*Tinospora cordifolia*
Aksin (Asgand)	*Withania somnifera*
Berry	*Zizyphus jujuba*

Table 2: Symptoms expression of blight on *Cuscuta* stems coiling around Gardenia (*Clerodendrum inerme*) stems incited by spraying spore suspension of *Alternarai alternata*, *Colletotrichum gloeosporioides*, *Curvularia lunata* and *Fusarium pallidoroseum* of their different combinations after one or two weeks of inoculations.

Treatments (Inoculations)	Necrotic lesions after 7 days (cms)	Necrotic lesions after 15 days (cms)
Alternarai alternata	3.1	8.9
C.gloeosporioides	3.7	9.4
Curvularia lunata	0.0	2.0
F.pallidoroseum	3.2	9.2
A.A. + C.G.	3.4	9.0
A.A. + C.L.	3.2	8.3
A.A. + F.P.	3.7	10.1
C.G. + C.L.	3.8	9.3
C.G. + F.P.	4.0	10.2
C.L. + F.P.	3.3	9.5
A.A. + C.G. + C.L.	3.9	9.4
A.A. + C.G. + F.P.	4.6	11.2
A.A. + C.L. + F.P.	3.7	9.9
C.G. + C.L. + F.P.	3.6	9.4
A.A. + C.G. + C.L. + F.P.	4.7	12.1
Control	0.0	0.0

A.A. = *Alternarai alternata*; C.G. = *Colletotrichum gloeosporioides*; C.L. = *Curvularia lunata*; F.P. = *Fusarium pallidoroseum*

Four fungi were also used against *Cuscuta* spp. in differe combinations which gave some more information abo pathogenic potential of these fungi. This experimen revealed that in all the combinations, these fungi gave mo or less better performance over control and sing treatments but combination number 7, 9, 12 and 15 (Tab 2) gave maximum black necrotic lesions after 15 da which were 10.1, 10.2, 11.2 and 12.1 cm respectivel Our these result are in conformity with those of Rudako (1961), Wilson (1969), Hasan (1980), Stojanovic and Bor (1981) and Fayad *et al.* (1990) who isolated different fun and obtained the same results by using them as bio-contr agents.

In combination effectiveness of all the four fungi compared to their individual effect tells us about the synergistic effect which may lead to better control *Cuscuta*. In future, by conducting more comprehensi studies, these fungi can be used as bio-control agen against species of *Cuscuta*.

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