

Identification and pathogenicity of the fungi species causing root rot on pepper in West Azarbaijan Province, Iran

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ABSTRACT

Typical populations of soil microorganisms near the root surface contain bacteria, actinomycetes, fungi, protozoa and algae. Fungal species are among the known casual agents of soil born disease on cultivated plants. In present study, we investigated on the fungal agents involved in pepper wilt in West Azarbaijan province of Iran. Pepper fields were checked in Orumieh, Mahabad, Oshnavieh and Piranshahr in August and September during 2006-2007. Fungal and pseudo-fungal agents were isolated on acidified PDA, PCA and CMA as well as baiting from the infected plants rhizosphere. Eighty two isolates were recovered from infected plants and were subjected to a subsequent taxonomic study; hence, were identified at species level. These isolates were identified as *Phytophthora capsici*, *Pythium aphanidermatum*, *Rhizoctonia solani*, *Fusarium oxysporum*, *F. solani*, *F. clamydosporum*, *F. sambucinum* and *Verticillium dahlia*. Pathogenicity test was carried out at greenhouse using 34 selected isolates on two pepper cultivars (Bell and native cultivars) and the percentage of the infected plants was calculates after a definite time from inoculation depending on the fungi species. Among the selected isolates, one isolate from *F. sambosinum* and another from *F. clamydosporium* had no pathogenicity effect on Bell pepper, while four isolates from *Rhizoctonia solani*, one from *Verticillium dahliae* and another from *Pythium aphanidermatum* had a higher pathogenicity effect. The rest were placed between these two groups. Three isolates from *F. clamydosporium* and two from *F. sambosinum* had no pathogenicity on native cultivar, while two isolates of *R. solani* had the highest pathogenicity and the rest were between these mentioned groups. Furthermore, *F. solani* showed very low pathogenicity on the native cultivar. According to Koch rules, pathogens were isolated from infected plants again.

Keywords: Rhizosphere, Fungi, Pathogenicity, Pepper, Root Rot

INTRODUCTION

The root and crown rot is one of the prevalent and important diseases in almost all pepper-growing areas and it has been reported from several countries already. For first time, Ershad and Hille (1975) reported this disease from Garmsar, Varamin, Pishveha, Kahrizak, Shahriar, Damavand and Ghorghan. So, Fungi *Fusarium oxysporum*, *Fusarium solani*, *Rhizoctonia solani* and *Phytophthora capsici* were identified as casual agents of disease in Froumad of Shahrood. *Verticillium* wilt of pepper caused by *V. dahlia* is a new record on pepper from Iran.

MATERIALS AND METHODS

1-Isolation and Purification of casual agents

During 2006-2007, infected specimens were collected from 38 pepper fields of West Azarbaijan province, located on Northwest of Iran. Fungal pathogens and fungi like organisms were isolated and purified by hyphal tip method and 82 isolates were obtained.

2-Identification of Fungi and fungi-like organisms

Regarding the colonies morphology and microscopic characters and according to Nelson *et al* (1983), *Fusarium* species were identified. The species of *Verticillium* isolates on the basis of vegetative bodies

characters such as conidial shape and their arrangements, phialids shape and presence or absence of microsclerotes on 21 days culture using Bhat method were identified. For detection of *Phytophthora* species, Ershad (1992) keys was used. *Pythium* species were identified using monograph of *Pythium* (Vander Plats, 1981) and Dick (1990) key and *Rhizoctonia* species recognized using Krownland and Staglini (1988) method.

3-Pathogenicity test

Pathogenicity test was carried out at greenhouse using 34 selected isolates on two pepper cultivars (Bell and native cultivars) and the percentage of the infected plants was calculated after a definite time from inoculation depending on the fungi species. In order to inoculate of *F.oxysporum*,and *Verticillium dahlia* the pepper seedlings (12 cm in length) roots were floated in spore suspension (10^7 spore/ml) and were planted in pots (13 cm in diameter). For inoculum preparation of other species of *Fusarium* (*F. solani*, *F. chlamydosporum* and *F. sambucinum*), *Pythium* and *Rhizoctonia* isolates the wheat seeds mixed with fungus mycelium was used. For *Phytophthora* pathogenicity test, we utilized three pieces of culture medium (5×5mm) contain fungus hyphae for every seedling (Bhat et al, 2003).

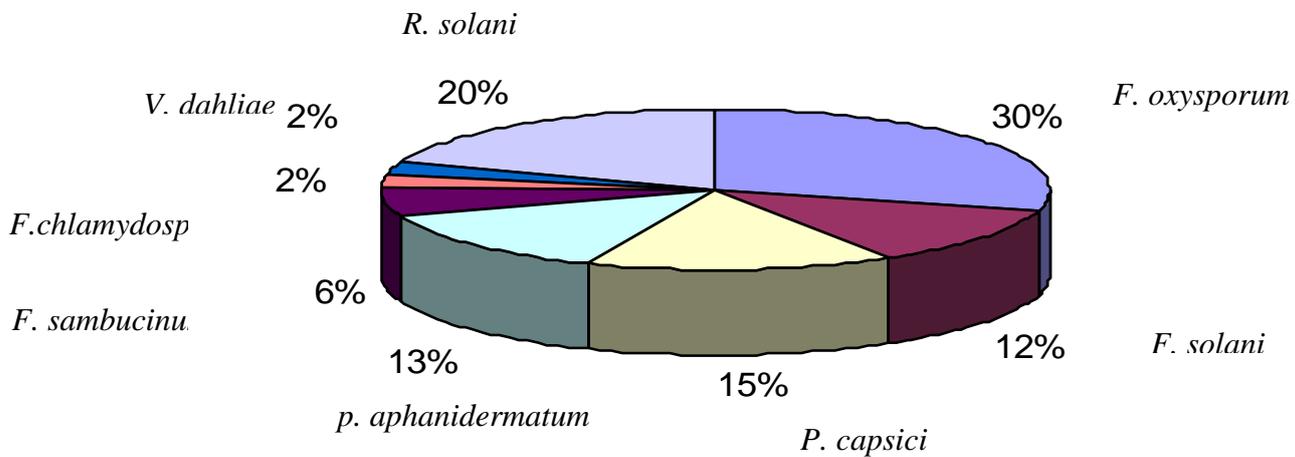
RESULTS AND DISSCUTION

Results of present study indicated that there are excessive diversity in casual agents of root and crown rot of pepper in surveyed regions. In this research, 82 isolates were obtained from infected plants and soils of contaminated fields including 8 species *Phytophthora capsici* ,*Pythium aphanidermatum* ,*Rhizoctonia solani* ,*Fusarium oxysporum* ,*F. solani* ,*F.chlamydosporum* ,*F. sambucinum* and *Verticillium dahlia*. The origion of samples and distribution and percentage of species are showed in table 1 and figure 1, respectively. *Fusarium oxysporum* with 24 isolates had most percentage among all species. The result of pathogenicity test indicated that among the selected isolates, *F. sambosinum* and *F. cladmydosporium* had no pathogenicity effect on Bell pepper, while four isolates from *Rhizoctonia solani*, one from *Verticillium dahliae* and another from *Pythium aphanidermatum* had a higher pathogenicity effect. The rest were placed between these two groups. Three isolates from *F.clamidosporium* and two from *F.sambosinum* had no pathogenicity on native cultivar, while two isolates of *R.solani* had the highest pathogenicity and the rest were between these mentioned groups. Furthermore, *F. solani* showed very low pathogenicity on the native cultivar .

Table 1. Distribution of the obtained species in sampling origin.

Species name	Origin of sample
1- <i>F. oxysporum</i>	Orumieh, Mahabad, Piranshahr, Miandoab Piranshar
2- <i>F. solani</i>	Orumieh, Mahabad, Piranshahr, Miandoab
3- <i>P. capsici</i>	Orumieh, Mahabad, Miandoab
4- <i>p. aphanidermatum</i>	Orumieh, Mahabad
5- <i>F.chlamydosporum</i>	Orumieh
6- <i>F. sambucinum</i>	Orumieh
7- <i>V. dahlia</i>	Orumieh
8- <i>R. solani</i>	Orumieh, Mahabad, Miandoab Oshnavieh

Fig1: The frequency percentage of species



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