

## SHORT COMMUNICATIONS

The August Cieszkowski Agricultural University, Poznań, Poland

### THE INCIDENCE OF DISEASES AND PATHOGENIC FUNGI ON SELECTED MEDICINAL AND SPICE PLANTS IN THE AREA OF POZNAŃ

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The number of medicinal and spice plant species grown in Poland and the area of their cultivation is increasing. The crops are threatened by pathogenic fungi. Species from genus *Fusarium* play a significant role in this respect. Herbs and spice plants are infested mainly by *F. avenaceum*, *F. culmorum*, *F. solani* and *F. equiseti* (Srivastava 1972, Reuveni 1982, Filoda et al. 1998, Machowicz-Stefaniak and Zalewska 2004). Fungi from *Alternaria* genus were isolated from shoots and leaves of *Hypericum perforatum* and *Thymus vulgaris*, while from roots and stem bases of these plant species *Rhizoctonia solani* was isolated (Machowicz-Stefaniak et al. 2002, Zimowska and Machowicz-Stefaniak 2004). Pathogens from *Septoria* genus were found on *H. perforatum* (*Septoria hyperici*), *Melissa officinalis* (*Septoria melissae*) and *Carum carvi* (*Septoria carvi*) by Studziński and Mikołajewicz (1989), Mikołajewicz and Filoda (1998) and Machowicz-Stefaniak et al. (2003).

Due to the increasing threat of fungal damage to medicinal and spice plants, it is of great importance to investigate the problem in detail. The first studies were performed in south-eastern Poland. The aim of this study was to identify species of pathogenic fungi infesting herbs in the area of Poznań.

In 2006 and 2007 two plantations were investigated: plantation of medicinal and spice plants in the Research Institute of Medicinal Plants in Poznań (situated in Plewiska, near Poznań) and collection of herbs and spice plants of the Department of Vegetable Crops, The August Cieszkowski Agricultural University in Poznań. Ten plant species were taken into consideration: *Althaea rosea* var. *nigra*, *Carum carvi*, *Coriandrum sativum*, *Hypericum perforatum*, *Levisticum officinale*, *Melissa officinalis*, *Mentha piperita*, *Origanum majerana*, *Salvia officinalis* and *Thymus vulgaris*. Every year from both plantations samples of 20 plants (of each species) with disease symptoms were taken at four-week intervals, from the beginning of May to

the end of October. The plants were subjected to mycological analysis. Fragments (with symptoms) of infested plants were treated with 95% ethanol for 1 min and transferred onto Petri dishes with PDA medium. Fungal colonies grown after seven days were identified on the basis of classification keys (Barnett and Hunter 1998, Sařata 1985, Kwařna et al. 1991). *Rhizoctonia* sp. isolates were examined for the number of nuclei in cell according to Bandoni (1979) and Mikołajska and Wachowska (1996). They were all multinucleate.

Symptoms noted on the plants in question were: shoot and leaf wilting, shoot dieback and leaf necrosis, spotting, coating and spore clusters. Wilting occurred from the beginning of May (both on seedlings and older plants), followed by spots and discolouration of leaves and stems in July. Grey mould appeared later, with cold rainy weather: in 2006 in August (after a hot sunny summer) and in 2007 in July.

Nine fungal species were found on analyzed plants: *F. avenaceum*, *F. culmorum*, *F. oxysporum*, *Alternaria alternata*, *Rhizoctonia solani*, *Puccinia malvacearum*, *Erysiphe cichoracearum* var. *cichoracearum*, *Septoria melissae* and *Botrytis cinerea*. The saprotrophic pathogens were isolated from roots, stem bases, shoots and leaves (Table 1). The most severe infestation was caused by soil fungi from genera *Fusarium* and *Rhizoctonia*, and also by *A. alternata*. The pathogens infesting over ground parts were less damaging. *Fusarium avenaceum* and *F. oxysporum* were isolated from plants of *M. officinalis*, *M. piperita*, *C. sativum*, whereas *F. culmorum* was isolated from *H. perforatum*, *S. officinalis* and *O. majorana*. In turn, on plants of *T. vulgaris* only *F. oxysporum* was identified.

With disease symptoms recorded on all analyzed species, wilting and necroses characteristic of *Fusarium* diseases occurred on *C. sativum*, *H. perforatum*, *M. officinalis*, *M. piperita*, *O. majorana* and *S. officinalis*. This confirms numerous reports on isolation of *Fusarium* spp. from herbal plants, published by Trueman and Wick (1995), Filoda et al. (1998), Machowicz-Stefaniak and Zimowska (2000), Machowicz-Stefaniak et al. (2002) and Machowicz-Stefaniak and Zalewska (2004). Another pathogen was *A. alternata*, a polyphagous fungus found commonly in both years on organs of *H. perforatum* and *L. officinale*, under various conditions. *Rhizoctonia solani*, often isolated from roots of four plant species in 2006 and 2007, is a common soil fungus, infesting several dozen crop species. The species was also isolated earlier from dying shoot bases and roots of *C. sativum*, *H. perforatum*, *M. piperita* and *S. officinalis* (Machowicz-Stefaniak et al. 2002, Dachler and Pelzmann 1999). Two severe pathogens of *H. perforatum*: *Seimatosporium hypericinum* isolated from leaves and stems by Zimowska and Machowicz-Stefaniak (2004), as well as *Colletotrichum gloeosporioides* isolated from leaves and shoot tips by Mikołajewicz and Filoda (1998) and Zimowska and Machowicz-Stefaniak (2004), were not found during the study.

*Puccinia malvacearum* observed on *A. rosea* var. *nigra* plants, caused considerable losses in the yield. The fungus uredinia and telia were particularly abundant, both on leaves and stems, during warm and humid weather, as it was mentioned earlier by Majewski (1979) and Studziński and Mikołajewicz (1989).

Table 1

## Fungi obtained from investigated medicinal and spice plants

Fungal species	Plant species	Affected organ / / number of isolates	
		2006	2007
<i>Alternaria alternata</i>	<i>Hypericum perforatum</i>	leaves / 49	leaves / 20
	<i>Levisticum officinale</i>	leaves / 30	leaves / 18
<i>Botrytis cinerea</i>	<i>Carum carvi</i>	leaves / 6 stems / 3	leaves / 5 stems / 3
	<i>Levisticum officinale</i>	leaves / 5 stems / 0	leaves / 5 stems / 4
	<i>Melissa officinalis</i>	leaves / 0 stems / 0	leaves / 9 stems / 2
<i>Erysiphe cichoracearum</i> var. <i>cichoracearum</i>	<i>Carum carvi</i>	leaves / 3	leaves / 6
	<i>Hypericum perforatum</i>	leaves / 2	leaves / 10
	<i>Levisticum officinale</i>	leaves / 0	leaves / 5
<i>Fusarium avenaceum</i>	<i>Coriandrum sativum</i>	roots / 19 stem base / 20	roots / 30 stem base / 14
	<i>Melissa officinalis</i>	roots / 12 stem base / 10	roots / 10 stem base / 3
	<i>Mentha piperita</i>	roots / 30 stem base / 18	roots / 13 stem base / 11
<i>Fusarium culmorum</i>	<i>Hypericum perforatum</i>	roots / 40 stem base / 17	roots / 5 stem base / 20
	<i>Origanum majerana</i>	roots / 9	roots / 20
	<i>Salvia officinalis</i>	roots / 18 stem base / 12	roots / 24 stem base / 15
<i>Fusarium oxysporum</i>	<i>Coriandrum sativum</i>	roots / 13 stem base / 15	roots / 16 stem base / 21
	<i>Melissa officinalis</i>	roots / 9 stem base / 12	roots / 8 stem base / 16
	<i>Mentha piperita</i>	roots / 9 stem base / 11	roots / 10 stem base / 20
	<i>Salvia officinalis</i>	roots / 4 stem base / 17	roots / 6 stem base / 30
<i>Puccinia malvacearum</i>	<i>Althaea rosea</i> var. <i>nigra</i>	leaves / 18	leaves / 9
<i>Rhizoctonia solani</i>	<i>Coriandrum sativum</i>	roots / 12	roots / 15
	<i>Hypericum perforatum</i>	roots / 10	roots / 15
	<i>Mentha piperita</i>	roots / 9	roots / 15
	<i>Salvia officinalis</i>	roots / 12	roots / 14
<i>Septoria melissae</i>	<i>Melissa officinalis</i>	leaves / 0	leaves / 5

Studziński and Mikołajewicz (1989) and Mikołajewicz and Filoda (1998) reported also infestation of *A. rosea* var. *nigra* by *Colletotrichum malvacearum*, which was not found here.

Wiaderny (2006) is of opinion that infestation of *M. officinalis* by a mitosporic fungus *Septoria melissae* is the greatest threat to the plant. The pathogen was also isolated in this study in 2007 (Table 1). According to Zalewska and Machowicz-Stefaniak (2003), *Septoria* spp. may be found on *Carum carvi* infesting already eight-week-old plants. However, no representative of *Septoria* genus was isolated from *C. carvi* in this study. *Erysiphe cichoracearum* var. *cichoracearum* was recorded on plants of *C. carvi*, *H. perforatum* and *L. officinale*. Powdery mildew caused by the fungus was also recorded on other herbal plants such as *M. piperita* (Kordana et al. 2003), which were free from the pathogen in our study. The grey mould causing agent, *Botrytis cinerea*, was isolated only from well developed plants of *C. carvi* and *L. officinale*. According to other authors the pathogen affects plants at various development phases (Studziński and Mikołajewicz 1989, Machowicz-Stefaniak and Zimowska 2000), causing considerable losses (Kordana et al. 2003).

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