



DISEASES OF HERBS FROM APIACEAE FAMILY

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Abstract. The largest participation in causing the disease of herbal plants have fungi. Studies on their occurrence on plants of the family Apiaceae are conducted in the Lublin region since 2001. The observations of plant healthiness are carried out directly on the plantations. Plants with symptoms of disease are studied in the laboratory. Identification of the fungi is performed based on etiological symptoms and on the base of fungal cultures isolated from plants. Among the many species of fungi obtained from diseased plants to the particularly harmful belong: *Septoria carvi*, *Colletotrichum gloeosporioides* and *C. dematium*, *Sclerotinia sclerotiorum*, *Passalora puncta* (*Cercosporidium punctum*) and *Erysiphe umbelliferarum*.

Key words: *Colletotrichum gloeosporioides*, *Colletotrichum dematium*, *Erysiphe umbelliferarum*, *Passalora puncta*, *Septoria carvi*, *Sclerotinia sclerotiorum*, diseases, pathogenic fungi, caraway, angelica, dill

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Introduction

In phyllosphere and rhizosphere of plants present a lot of various microorganisms and some of them are pathogenic. The pathogenic soil fungi infect roots and lower parts of the plants, causing their decaying and dying at the end. In this mean they cause the reduction of yields. Many species of fungi colonize seeds of herbs, which make moving diseases to the next growing season. The fungi occurred and developed very often, and in the case of biennial and perennial plants also overwinter on aboveground parts of the plant and caused a variety spots and contaminate herbal material with products of their metabolism. Herbs are grown widely in the Lublin region, so there are problems with their health status.

The aim of this study was to clarify the diseases and to identify the pathogens of chosen species of herbs from Apiaceae family.

Material and methods

The studies were carried out on several plantations of herbs: caraway (*Carum carvi* L.), angelica (*Archangelica officinalis* Hoffm.) and dill (*Anethum graveolens* L.) since 2001.

Directly on the plantation the participation of plants with disease symptoms was determined at the beginning of growing season, during the time of flowering and at the end at harvest time. Identification of fungi was carried out on the basis of occurrence of etiological symptoms as well as basing on obtained, growing cultures of fungi. To this purpose, a mycological analysis of diseased, superficially disinfected fragments of plants, using artificial culture method and malt agar medium was carried out (MACHOWICZ-STEFANIAK & ZIMOWSKA 2000; MACHOWICZ-STEFANIAK & ZALEWSKA 2008). The obtained cultures of fungi were identified on PDA medium and on standard media using light and scanning (SEM) microscope with elaborations of some authors (VON ARX 1957; PIDOPLIČKO 1978; SUTTON 1980; MARCINKOWSKA 2003; BOEREMA *et al.* 2004; LESLIE & SUMMERELL 2006).

Results

Caraway (*Carum carvi* L.)

The research has shown that the participation of plants with disease symptoms ranged from 15% to 75% dependently of the weather conditions at the growing season.

It was shown that the plants can be colonized by complex of various species of fungi including pathogenic and saprotrophic. The fungus *Septoria carvi* Syd., causing septoriosiis of plants has epidemic importance. This species was obtained often especially in the years 2001-2003, 2007-2008 and 2011 (MACHOWICZ- STEFANIAK & ZALEWSKA 2008). This fungus is considered to be a dangerous pathogen of caraway in other countries (TETREVNÍKOVA-BABAYAN 1987; ODSTRČILOVA *et al.* 2002; BEDLAN 2005). From studied plants a few isolates of *Phomopsis diachenii* Sacc., were obtained and in recent years the species *Colletotrichum dematium* (Fr.) Grove and *Colletotrichum gloeosporioides* (Penz.) Penz. *et Sacc.* were appeared more often. On the underground part of plants and on the stems *Sclerotinia sclerotiorum* (Lib.) de Bary and many species of fungi from the genus *Fusarium* were found. However, on the stems, leaves and schizocarps the powdery mildew is caused by *Erysiphe umbelliferarum* (Lev.) de Bary and was observed at the vegetation periods with high temperature.

Angelica (*Archangelica officinalis* Hoffm.)

The evaluation of healthiness of angelica plants indicated the presence of disease symptoms on all above-ground plant organs. The disease symptoms were observed on 15-55% of the studied plants.

The next obtained species belong to the particularly common pathogenic: *Colletotrichum gloeosporioides*, *C. dematium*, *Phomopsis diachenii*, *Fusarium* spp. The species *P. diachenii* was obtained only in 2010 from umbels at the beginning of ripening of schizocarps. At that time, the temperature arose up to 28°C and were often little rainfalls. The obtained 22 isolates of this fungus accounted 22.68% of all isolates of fungi grown from umbels. *P. diachenii* was isolated from caraway and angelica plants from field crops which did not show specific symptoms of disease. *P. diachenii* are recognized as dangerous pathogen of caraway grown in Germany and its prevalence was found in the Czech Republic and Bulgaria (GABLER & EHRIG 2000; RODEVA & GABLER 2004).

Dill (*Anethum graveolens* L.)

In the full growth period of plants on the leaves, stems, umbels and even on schizocarps black, dipped spots the fungi were observed. These symptoms occurred in 10-52% of the plants.

During the maturation of schizocarps on the infected tissue appeared gray or white, sprinkle tufts of mycelium. Lately, these etiological symptoms covered all surface of aboveground parts of plants as compact layer of mycelium. Schizocarps of dill were improperly developed, deformed and prematurely dropped up. Depending of the years and a variety the number of plants with disease symptoms ranging from 70% to 85% and sometimes 100% infection was observed and the death of all plant of studied varieties.

The conducted microscopic study of mycelium, sporodochia, conidiophores and conidia of fungus indicated a mass occurrence of the species *Passalora puncta* (Delacr.) Arx (*Cercosporidium punctum* (Lacroix) Deighton). This fungus was found to be the main pathogen of dill in the study area. This species is considered to be a dangerous pathogen of plants of Apiaceae family, especially dill, fennel and parsley grown in Germany, Bulgaria and in the Czech Republic as well as in North America and Central Asia (FARR *et al.* 1995; KUSTERER & GABLER 2000; KRAUTHAUSEN & KREISELMAIER 2002; ODSTRČILOVA *et al.* 2002).

Numerous species of genera *Alternaria*, *Fusarium*, *Phoma* and *Stemphylium botryosum*, isolated from various organs were recognized as fungi accompanying to this species.

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