CSL 1: Evaluation of parsley (*Petroselinum crispum*) focused to *Septoria petroselini* and *Plasmopara petroselini* causing *Septoria* blight and downy mildew

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Introduction

Parsley (*Petroselinum crispum* [Mill.] Nyman) is grown in temperate and subtropical climate worldwide and predominantly used as a pot herb. In Germany parsley is the most important spice plant, cultivated on more than 1,700 ha (Hoppe, 2006).

Evaluation of the species *P. crispum* for existence and availability of resistances to pathogens is of great interest. Widespread origins of tested accessions provide the opportunity for first-time characterization of existence, spreading and level of resistance / susceptibility to the economically important pathogens *Septoria petroselini* (Lib.) Desm. and *Plasmopara petroselini* Săvul. & O. Săvul. causing *Septoria* blight and downy mildew, respectively, throughout the species *P. crispum*.

Septoria blight (*S. petroselini*) is worldwide one of the most important pathogens for parsley. It is seed-borne (Tahvonen, 1978). Pycnidia are fixed permanently within the pericarp of the schizocarpic fruit, containing pycniospores for mass infection (Ferri, 1969).

In extensive tests for resistance to *S. petroselini* under climate chamber conditions with inoculation of fungus no accession was found to be without any symptom (Marthe and Scholze, 1996). Infection of resistant plants starts delayed and extent of lesions is considerably smaller.

Plasmopara petroselini was split from *Plasmopara nivea* by Săvulescu and Săvulescu (1951). Downy mildew on parsley was found several times in Germany at the end of 19th and the first half of 20th century (Brandenburger and Hagedorn, 2006). Damage caused by *P. petroselini* is new and of increasing significance. First reports came from Italy, *Plasmopara nivea*, seed-transmitted (D'Ercole, 1990), Germany, Pfalz, autumn 2000 (Leinhos et al., 2006), Belgium, d*uring the winter seasons of 2001 and 2002, Plasmopara petroselini (*Crepel and Inghelbrecht, 2003*), Sweden,* September 2004, Borgeby in southern Sweden (Amein et al., 2006), Germany, Quedlinburg at experimental field in 2005, and Turkey 2009 (Soylu et al., 2010). Together with *Septoria* blight they are currently the most relevant pathogens.

Results and discussion

A collection of 220 accessions of parsley (*Petroselinum crispum*) was evaluated at two experimental stations (Gatersleben and Quedlinburg, Germany) under natural infection. Widespread origins of tested accessions provide the opportunity for first-time characterization of existence, spreading and level of resistance / susceptibility to the economically important pathogens *Septoria petroselini* and *Plasmopara petroselini* throughout the species *P. crispum*. For each pathogen, accessions free or nearly free of symptoms were found: *S. petroselini*: free 1, nearly free 25, (Figure 1) *P. petroselini*: free 51, nearly free 22 (Figure 2). Nine accessions are free or nearly free of symptoms for both pathogens: PET16, PET36, PET169, PET172, PET177, PET178, PET192, PET212 and PET214.

To characterize level of resistance to *S. petroselini* for accessions free or nearly free of infection, additional climate chamber tests with inoculation are necessary.

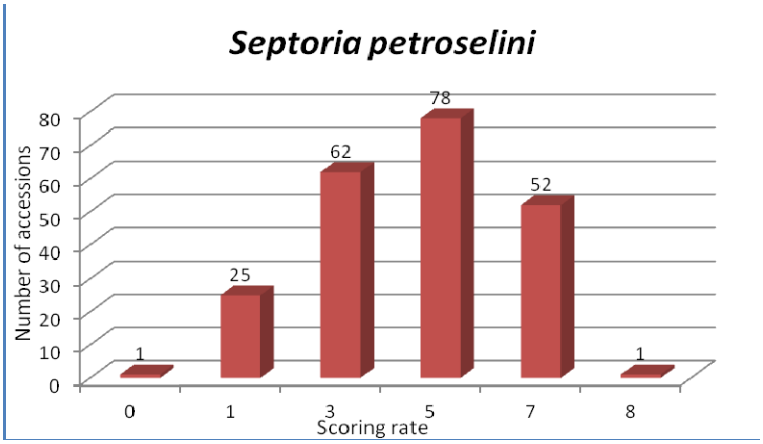

Fig. 1: Number of parsley accessions with scoring rates 0, 1: free or nearly free of symptoms; 3, 5: moderately susceptible; 7, 8: highly susceptible to natural infection by *Septoria petroselini*

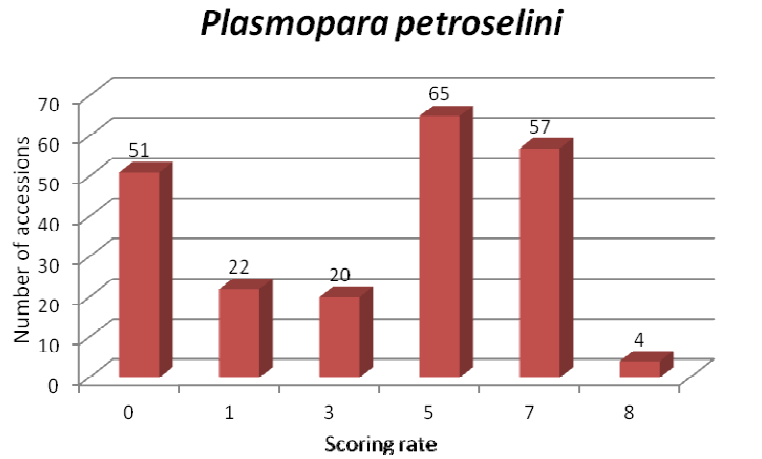

Fig. 2: Number of parsley accessions with scoring rates 0, 1: free or nearly free of symptoms; 3, 5: moderately susceptible; 7, 8: highly susceptible to natural infection by *Plasmopara petroselini*

For *P. petroselini* between both experimental places a good correlation was found of $r_s = 0.71$ for scoring results. From this, susceptibility is concluded for 146 out of 220 accessions with scoring rate of 3 and higher. The 73 accessions free or nearly free of symptoms of *P. petroselini* together with variety 'Felicia' tested free of symptoms out of nine varieties by Krauthausen and Leinhos (2007) are first candidates for intraspecific resistance in parsley. These candidates should be tested again for level of resistance. The accessions free of symptoms also open up for the first time the possibility to look for candidates for tests of race differences in *P. petroselini* because from many other downy mildew varieties a high number of different races are known.

The results from evaluation are essential for characterization of origin and domestication, but also for breeding cultivars with new resistances. The special importance of this evaluation comes from the combination of results for each accession. For practical use candidates with combinations of resistances can be detected and tested again (Marthe et al., 2013).

Keywords: resistance to phytopathogens, genetic resources, field conditions, natural infection

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