Short Communication

First report of metalaxyl resistant isolates of *Plasmopara halstedii* on cultivated sunflower in Germany

Erstbeschreibung Metalaxyl-resistenter Isolate von *Plasmopara halstedii* an Sonnenblumenkulturen in Deutschland

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Resistance to phenylamide fungicides such as metalaxyl is a recurrent problem in oomycetes which affect crop plants (MOLINERO-RUIZ et al. 2005). Resistance in *Plasmopara halstedii* (Farlow) Berl. et De Toni, the downy mildew pathogen of sunflower, was first described in France in 1998 (ALBOURIE et al. 1998). Since then similar reports of resistance have followed from other centers of sunflower cultivation in Europe (RUIZ et al. 2000) and the United States (GULYA 2000).

Since 2004, a decreased metalaxyl efficacy against *P. halstedii* has been observed in some ornamental sunflowers fields in Germany. In the fall of 2005, the first metalaxyl resistant isolate was detected in an ornamental sunflower field near Jülich (Northrhine-Westphalia). This isolate was defined as highly virulent (pathotype 730) when tested for infectivity on sunflower genotypes of different resistance according to the triplet code system previously described by GULYA et al. (1998). Sporangia from infected leaves were used to propagate the Jülich field isolate on sunflower seedlings of the generally susceptible genotype HA89 under laboratory conditions. Sensitivity to metalaxyl M was tested in leaf disc experiments according to the method previously described by ROZYNEK and SPRING (2001). For this test, leaf discs (10 mm in diameter) of sunflower were allowed to float upside down on water (control) and solutions of metalaxyl up to 100 ppm active ingredient (a.i.) in concentration, respectively. Tests were carried out with 10 replicates for each concentration and were conducted in 25-well replica plates (Multimed, Kirchheim, Germany). Each leaf disc was inoculated with 5000 freshly developed sporangia. Plates were kept for 14 days in a cabinet at 16°C with 14 h photoperiod. Sporulation on leaf discs was monitored and determined in comparison with controls without metalaxyl. The isolate from Jülich showed no reduced infection rate at metalaxyl concentrations up to 100 ppm a.i.

In a soil sample from Schlatt (Baden-Württemberg) in which ornamental sunflowers had regularly been grown, another pathotype 730 isolate showing resistance to metalaxyl at a concentration of 10 ppm a.i. was recently found when sunflower seedlings were germinated in the soil in the greenhouse. This infection was derived from oospores which overwintered from 2005 or earlier.

Although no metalaxyl resistant *P. halstedii* isolate has yet been detected associated with sunflowers commercially grown as an oil crop, the results show that metalaxyl resistant *P. halstedii* populations are already present in ornamental sunflower in Germany.

Literature

- ALBOURIE, J.-M., J. TOURVIEILLE, D. TOURVIEILLE DE LABROUHE, 1998: Resistance to metalaxyl in isolates of the sunflower pathogen *Plasmopara halstedii*. Eur. J. Plant Pathol. **104**, 235-242.
- GULYA, T.J., D. TOURVIEILLE DE LABROUHE, S. MASIREVIC, A. PENAUD, K. RASHID, F. VIRANYI, 1998: Proposal for standardized nomenclature and identification of races of *Plasmopara halstedii* (sunflower downy mildew). In: Proceedings of the ISA Symposium III, Sunflower Downy Mildew, Fargo, ND, USA, 13-14 Jan. 1998, 130-136.
- GULYA, T.J., 2000: Metalaxyl resistance in sunflower downy mildew and control through genetics and alternative fungicides. In: Proceedings of the 15th International Sunflower Conference, Toulouse (France), i79-i84.
- MOLINERO-RUIZ, M.L., J. DOMINGUEZ, T.J. GULYA, J.M. MELERO-VARA, 2005: Reaction of field populations of sunflower downy mildew (*Plasmopara halstedii*) to metalaxyl and mefenoxam. Helia **28**, 65-74.
- ROZYNEK, B., O. SPRING, 2001: Leaf disc inoculation, a fast and precise test for the screening of metalaxyl tolerance in sunflower downy mildew. J. Phytopathol. **149**, 309-312.
- RUIZ, M.L.M., J. DOMINGUEZ, J.M.M. VARA, T.J. GULYA, 2000: Tolerance to Metalaxyl in Spanish isolates of *Plasmopara halstedii*. In: Proceedings of the 15th International Sunflower Conference, Toulouse (France), G11-G15.