

Research on *Plasmopara halstedii* : Recent Findings and Further Needs

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Due to my absence from the above meeting, I thought it important to inform you (my friends), as prominent members of the international scientific community on sunflower, of what we have recently done in regard to this subject, and what to my best knowledge is to be done in the future. This is done with the hope that we can establish an even more collaborative effort on this crop.

Regarding our results : Since 1996, no pathotypes of *Plasmopara halstedii*, other than those six (1, 2, 3, 4, 8 and 9) already published (Viranyi and Gulya, 1995 ; Gulya et. al., 1996) have been identified from Hungary (according to international acceptance, the term pathotype is recommended to be used instead of race in the future). However, this does not necessarily mean that none appeared since many of the field isolates collected during 1997 are unprocessed (at a deep-frozen state), and are waiting for testing (due to my move from the Plant Protection Institute, Budapest to Gödöllő University, I have lost facilities and finance to continue pathotype-testing so that this task was taken over by one of my friends, Dr. Sandor Csete, a sunflower pathologist working in the East of Hungary). According to Dr. Csete's results, most of the isolates tested so far appear to be a mixture of at least two different pathotypes where one of the components always dominates over the other (based on host reaction).

A series of experiments indicated that there was distinct competition between isolates belonging to either the same or different pathotypes (1, 3 or 4) as proven by differences found in tests which showed their aggressiveness at simultaneous inoculation. Even the reduced plant growth of inoculated sunflower as an indicator was suitable to differentiate among *P. halstedii* isolates in this respect.

Attempts have also been made to find out new ways of control. For this, both biological and chemical agents have been studied. As for microbial antagonists, Drs. Tom Gulya and Attila Toth carried out experiments the results of which are to be presented by Dr. Gulya. In a collaboration with German scientists, we have investigated the effect of a plant activator (BION, Ciba) under both *in planta* and *in vitro* conditions. While BION-treated plants showed retarded disease development (somewhat less sporulation and, in particular, reduced number of plants with systemic downy mildew symptoms), a 10-40 % decrease in sporangium germination was also evident during a 24h-incubation period. It might be of interest to know that BION-treated sunflower plants exhibited a significantly higher amount of scopoletin, a component known to be produced by sunflower at mildew infection.

As for future tasks, first I must stress the very need of coming to a consensus among scientists as far as a standard set of sunflower differentials is concerned. At present, there are two alternatives, the one suggested by Tom Gulya years ago that was based on an international consultation (Gulya et al., 1991), and was somewhat modified later (Gulya, 1995), and another

one used by the Clermont-Ferrand group (Tourvieille et al., 1988). We do not need two parallel methodologies. Instead, one is sufficient to be able to compare for virulence. Please, come to a compromise and I will be glad to accept the finalized form (remember the decision of our last year FAO meeting in Giessen).

With the appearance of metalaxyl-tolerant field populations of *P. halstedii* in France (Lafon et al., 1996), a worldwide monitoring of fungicide sensitivity as required involving detection and characterization of tolerant strains, looking for cross tolerance and/or for compounds that would replace phenylamides.

In order to understand better any change in fungal populations, both in pathogenicity and fungicide response, molecular methods should have more attention and support in our future investigations. The first steps have already been made by American (Borovkova et al. 1993) and French (Tourvieille et al. 1992) workers, and the possible use of molecular markers for describing *P. halstedii* strains has also been initiated in Germany, and in Spain, We just started a similar program aimed at characterizing our local fungus population.

And one more suggestion that will not necessarily meet the overall acceptance of breeders and seed companies. To my best knowledge, sufficient information is lacking, at least in our country, in relation to resistance of sunflower cultivars (already registered or just before registration) to pathotypes known to occur in a given area (country, continent). I understand that breeding and seed companies may be disappointed to learn that their good quality hybrids are susceptible to a particular pathotype. However, in the long term, their only interest should be in obtaining good quality hybrids that are safe.

References

- BOROVKOVA I.G., BOROVKOV A. YU., MCCLEAN P.E., GULYA T.J., VICK B.A., 1993 - RFLP and RAPD analysis of isolates of *Plasmopara halstedii*, the downy mildew fungus of sunflower. In : *Proc. 15th NSA Sunflower Research Workshop*, Fargo, ND, p. 14.
- GULYA T.J., 1995 - Proposal for a revised system of classifying races of sunflower downy mildew. In : *Proc. 17th NSA Sunflower Research Workshop*, Fargo, ND, pp. 76-78.
- GULYA T.J., MILLER J.F., SACKSTON W.E., 1991 - Proposed internationally standardized methods for race identification of *Plasmopara halstedii*. In : *Helia* 14 : 11-20.
- GULYA T.J., 1996 - New Races of sunflower downy mildew in Europe and Africa. In : *Proc. 18th NSA Sunflower Research Workshop*, Fargo, ND, pp. 181-184.
- LAFON S., PENAUD A., WALSER P., DE GUENIN M-CH., MOLINERO V., MESTRES R., TOURVIEILLE D., 1996 - Le mildiou du tournesol toujours sous surveillance. In : *Phytoma* 484 : 35-36.
- TOURVIEILLE D., CHAMPION R., VEAR F., MOUZEYAR SAID J., 1988 - Une nouvelle race de mildiou en France. In : *CETIOM Inform. Techn.* 104 : 3-8.
- TOURVIEILLE J., ROECKEL-DREVET P., NICOLAS P., TOURVIEILLE D., 1996 - Characterization of sunflower downy mildew (*Plasmopara halstedii*) races by RAPD. In : *Proc. 14th International Sunflower Conference*, Beijing, pp. 781-785.
- VIRANYI F., GULYA T.J., 1995 - Inter-isolate Variation for virulence in *Plasmopara halstedii* (sunflower downy mildew) from Hungary. In : *Plant Pathology* 44 : 619-624.