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Plant pathogenic fungi and their plant-host interactions

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Our work comprise of both genetic characterisation of fungal populations as well as studies to enhance our understanding on plant defence to different types of fungal pathogens. In East Africa we are taking part in two projects where we are trying to elucidate the genetic structures of *Cercospora* species that are attacking maize, sorghum as well as wild sorghum relatives, together with *Mycosphaerella fijiensis*, the cause of black Sigatoka on East African highland cooking banana. This fungal genetic approach has been taken as a first step which will be followed by addressing various breeding strategies in the region.

We are also working with several *Brassica* pathogens where we are partners in genetic diversity and phylogeny programmes as well as are running defence signalling and functional genetics projects on *Arabidopsis*. *Leptosphaeria maculans* and *Verticillium* species primarily *V. longisporum*, are two pathogens that have a central role in our work, but *Sclerotinia sclerotiorum*, *Alternaria brassicae*, *A. brassicicola*, *Botrytis cinerea* and *Peronospora parasitica* are use for comparative studies. Eleven *L. maculans* susceptible (*lms*) *Arabidopsis* mutants have been isolated which displayed differential susceptibility responses. *lms1* was crossed with Col-0 and Ws-0 and mapping data for both populations showed the highest linkage to a region on chromosome 2. Further mapping is now ongoing using various recombinant inbred lines. To assess the contribution of different defence pathways, genotypes implicated in salicylic acid, jasmonic acid, and in ethylene signalling were screened and found as resistant as the wild-type plants, demonstrating the dispensability of those pathways in *L. maculans* resistance. Camalexin, on the other hand, is only partially responsible for *L. maculans* containment in *Arabidopsis*, since *pad3-1* and *esa1* clearly showed a susceptible response while wild-type levels of camalexin were present in *lms1*. Thus, the plant response is quite different to *L. maculans* compared to the soil borne *V. longisporum* where for example ethylene and jasmonic acid signalling seems to play important roles. Further mutant and genetic studies are ongoing to get a more thorough understanding of defence responses to these two pathogens. In addition, since *V. longisporum* is a devastating pathogen on *Brassica* oilseed crops in Sweden, efforts are ongoing together with other disciplines at SLU, SJV and Svalöf Weibull AB to obtain a deeper understanding of this plant-fungal system, develop field scoring systems and means of control strategies.

Members of the group during 2003

Dr. Christina Dixelius, professor

Dr. Jan Fahleson, researcher
Anna Johansson, postgraduate student
Maria Kaliff, postgraduate student
Patrick Okori, postgraduate student
Jens Staal, postgraduate student
Gunilla Swärdh, laboratory technician
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Publications the last three years

Steventon, L.A., Okori, P., Dixelius, C. (2001) An investigation of the susceptibility of *Arabidopsis thaliana* to isolates of two species of *Verticillium*. **J. Phytopathology** 149:395-401.

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