Importance of the genetic background for sustainable resistance: experimental evidence for a major resistance gene to nematodes

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Scientific Programme and Abstracts

Sessions

Session 1: Impact of plant disease resistance on the structure and evolution of pathogen populations

Session 2: Sustainable and integrated breeding and deployment of genetic resistance

Session 3: From plant-pathogen molecular interactions to the durability of resistance

Session 4: Socio-economic issues related to the use of resistant varieties and their deployment in agro-systems

Invited Speakers

Philippe Baret, Université Catholique de Louvain, Belgium - **James Brown**, John Innes Centre, England - **Marion Desquilbet**, INRA, France - **Sylvain Gandon**, CNRS, France - **Benoit Moury**, INRA, France - **Chris Mundt**, Oregon State University, USA - **Laura Rose**, Heinrich-Heine University, Germany - **Walter Rossing**, Wageningen University, The Netherlands - **Peter Thrall**, CSIRO Plant Industry, Australia

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Importance of the genetic background for sustainable resistance: experimental evidence for a major resistance gene to nematodes

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Abstract

Root-knot nematodes, *Meloidogyne* spp., are extremely polyphagous plant parasites worldwide. Since the use of most chemical nematicides is being prohibited, genetic resistance is an efficient alternative way to protect crops against these pests. However, resistance genes (R-genes) are limited and nematode populations are able to overcome them with time. Good management of these valuable resources is thus a key point of R-gene durability. In pepper, *Me3* is a dominant major resistance gene, currently used in breeding programs, that control *M. arenaria*, *M. incognita* and *M. javanica*, the three main root-knot nematodes species. In this study, it was introgressed in either a susceptible or a partially resistant genetic background in either homozygous or heterozygous allelic status. Confronting these genotypes with a high inoculation pressure of an avirulent *M. incognita* isolate or a *Me3* virulent laboratory-selected population (obtained by successive re-inoculation on a *Me3* R-pepper line) demonstrated i) that the genetic background plays an important role, *Me3* being overcome more easily in a susceptible genetic background than in a partially resistant one, ii) that the allelic status has no effect. These results are in good agreement with concepts recently developed from the analysis of very different plant-pathogen interactions: pepper-virus (Palloix et al., 2009) or rapeseed-*Leptosphaeria* (Brun et al., 2012). Experiments are now underway to detect and localise genes or loci providing partial resistance (QTLs = Quantitative Trait Loci) to root-knot nematodes explaining the differences observed between susceptible and partially resistant genetic backgrounds, and to determine the effectiveness of their « protective » role on the major R-genes. All these results are of main importance for the creation of new varieties by breeders who have to take into account the plant material used and the resistance gene they want to introgress.

Keywords: *Meloidogyne spp.*, *Capsicum annuum* (pepper), Me(s) resistance genes, dosage allele effect, resistance durability

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