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## **The GEDUNEM project: Varietal and technical innovations for the sustainable and integrated management of root-knot nematodes in protected vegetable cropping systems**

Caroline Djian-Caporalino, Alain Palloix, Mireille Navarrete, Amélie Lefevre, Thierry Mateille, Hélène Védie, Claire Goillon, Yannie Trottin, P. Boniol, Philippe Castagnone-Sereno

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# PLANT RESISTANCE SUSTAINABILITY

International Conference \_\_\_\_\_ 2012



La Colle-Sur-Loup (France)  
October 16th-19th, 2012



## Scientific Programme and Abstracts

### Sessions

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

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

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

Organised by the Institut National de la Recherche Agronomique (INRA)  
Metaprogramme on Sustainable Management of Crop Health (SMaCH)



**The GEDUNEM project: Varietal and technical innovations for the sustainable and integrated management of root-knot nematodes in protected vegetable cropping systems**

**Djian-Caporalino C.<sup>1</sup>; Palloix A.<sup>2</sup>; Navarrete M.<sup>3</sup>; Lefevre A.<sup>4</sup>; Mateille T.<sup>5</sup>; Védie H.<sup>6</sup>; Goillon C.<sup>7</sup>; Trottin Y.<sup>8</sup>; Boniol P.<sup>9</sup>; Castagnone-Sereno P.<sup>1</sup>**

<sup>1</sup>INRA PACA (Provence Alpes Côte d'Azur), UMR1355 INRA/UNSA/CNRS, Institut Sophia Agrobiotech, BP167, F-06903 Sophia Antipolis, France

<sup>2</sup>INRA PACA, UR1052, Génétique et Amélioration des Fruits et Légumes, F-84143 Montfavet, France

<sup>3</sup>INRA PACA, UR0767, Écodéveloppement, Domaine Saint-Paul, Site Agroparc F- 84914 Avignon Cedex 9, France

<sup>4</sup>INRA, Sciences pour l'Action et le Développement, Domaine Expérimental de Alénia Roussillon, Mas Blanc, 66200 Alénia, France

<sup>5</sup>IRD, UMR CBGP, Campus de Baillarguet, CS30016, F-34988 Montferrier-sur-Lez Cedex, France

<sup>6</sup>GRAB, Groupe de Recherche en Agriculture Biologique, BP 11283, 84 911 Avignon Cedex 9, France

<sup>7</sup>APREL, Association Provençale de Recherche et d'Expérimentation Légumière, Route de Mollégès, 13210 Saint-Rémy de Provence, France

<sup>8</sup>CTIFL, Centre Technique Interprofessionnel des Fruits et Légumes, Centre de Balandran, BP 32, 30127 Bellegarde, France

<sup>9</sup>Groupe Azura, Disma International - sales office, 332, rue de Turin, BP 5434, 66034 Perpignan Cedex, France & Société Maraissa, Route de Tiznit, km 39 Tin mansour, Chtouka Aït Baha, Agadir, Maroc.

**Abstract**

The recent banning of the most active chemical nematicides raised root-knot nematodes (RKN) as the major problem of vegetable growing in the south-east of France, with over 40% of horticultural farms affected. Resistant (*R*) cultivars successfully limit nematode attacks of the crop itself and reduce nematode abundance in soil in the short term. But their use in commercial fields faces two major constraints: (1) the limited number of cultivated species with RKN *R*-genes available (tomato, pepper), which would lead to major changes in crop rotations with socio-economic constraints; (2) the emergence of virulent root-knot nematode populations, able to overcome the resistance conferred by some of the *R*-genes. Recent research showed that the durability of the resistance per se was possibly increased with an optimal choice of the *R*-gene or allele combination, and of the genetic background in which the major *R*-genes were introgressed. However, the requirement for agronomic performance, does not always allow the breeder to fully use the genetic diversity available in *R*-genes and genetic backgrounds. In such cases, spatio-temporal deployment strategies of resistant cultivars in the rotation were proposed and provided some success. But combination of genetic resistance with cultivation practices including multicrop rotations, intercultural management and/or prophylactic treatments was poorly tested for its ability to provide complementary selection pressures on the pathogen populations and to increase the durability of the protection.

The project aims at identifying innovative strategies across the agrosystem, combining varietal resistance in crop rotations with agronomic practices, for a sustainable control of RKN that infect vegetable crops in protected crop systems. This pilot and demonstrative project involves analytical and systemic aspects: i/ the validation of previous results on the durability of RKN genetic resistance in tomato and pepper by long-term experiments in research stations and in farms, ii/ the impact of agronomic practices on the parasitic pressure in the soil and its contribution in the increase of resistance durability, and iii/ the impact of such innovations on the yield and the economic viability for protected



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crop systems in a Mediterranean climate. The added value here is to combine together currently dispersed approaches based on synergistic and long-term effects, towards a satisfying level of nematode control over pluri-annual crop sequences. The diversity of partners (research, experimental stations, technical institutes) and associated forces (growers' development structures, 'chambres d'agriculture') brings all the complementary expertise needed for answering specific short-term questions as well as generic mid-long term expectations.

'GEDUNEM' has been launched in the framework of the INRA metaprogramme SMaCH (Sustainable Management of Crop Health).

Keywords: integrated pest management, root-knot nematodes, crop rotation in vegetable farming, genetic resistance to nematodes, agronomic practices

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