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## **Combinations of varietal and technical innovations for the sustainable and integrated management of root-knot nematodes: the gedumen project**

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# INNOHORT

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## TOPIC 3 SESSION 2 (Plenary, 11th of June, am)

### Oral Presentations

#### COMBINATIONS OF VARIETAL AND TECHNICAL INNOVATIONS FOR THE SUSTAINABLE AND INTEGRATED MANAGEMENT OF ROOT-KNOT NEMATODES: THE GEDUNEM PROJECT

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The current restrictions on the use of chemical nematicides have contributed to increase root-knot nematodes (RKN) problems in horticultural crops. In this context, plant resistance (R) appears as the most effective method of control, but the restricted number of cultivated vegetable species with RKN R-genes available (tomato, pepper), and the possible occurrence of virulent nematodes able to reproduce on R-plants may constitute a severe threat to this control strategy. To increase the sustainability of the protection, a scientific challenge is to build cropping strategies based on the combination of genetic resistance with cultivation practices (crop rotations including susceptible, resistant, and non-host plants, intercropping management such as "nematicidal" cover crops, solarisation...). The Gedunem project aims at assessing such innovative strategies in a multi-site experimental design including organic and conventional cropping systems in research stations and commercial farms in the South of France. It involves analytical and systemic aspects: (1) impact of agronomic practices on the parasite pressure in the soil and on ecological diversity including other nematode species and pathogens, (2) linkage between the decrease of RKN populations in the soil and increase of R-genes durability, and (3) acceptability assessment of such varietal and technical innovations by farmers. Multidisciplinary approaches are combined to foster synergistic and long-term goals. The diversity of partners combining research and extension agents and associated forces brings all the complementary expertise needed for answering specific short-term questions as well as generic mid- to long-term expectations. First results suggest a strong reduction of RKN infestation rate in the soil (up to 90%) after solarisation (at central rows) or cultivation of sorghum or R-peppers (combining two R-genes) as trap crop green manure. The experimental design also demonstrated a satisfying level of resistance of the R-pepper (high, durable, stable at high temperature) and its effectiveness as trap crop with a good potential of soil colonization by pepper roots. Moreover, the buried dry

matter for R-pepper is equivalent to that of traditionally-used sorghum (30 T/ha). This opens opportunities for breeding in Solanaceae. After 3 years of experiments, these strategies seem to limit the emergence of virulent nematodes on R-crops and increase the non phytoparasitic species (useful saprophagous) in the soil, but these results still have to be confirmed for the long run.

The Gedunem project (2012-2015) is carried out with the financial support from the French INRA métaprogramme SMaCH-Sustainable Management of Crop Health.

**Keywords:** root-knot, nematodes, integrated pest management, crop rotation, resistance gene durability, agronomic practices, sustainable management.