



Food and Agriculture (FA)

Participating countries

AT, BE, CH, CZ, DE, DK, ES, FI, FR, HU, IS, IT, LU, MT, NL, NO, PL, PT, RO, SI, SK, TR, UK

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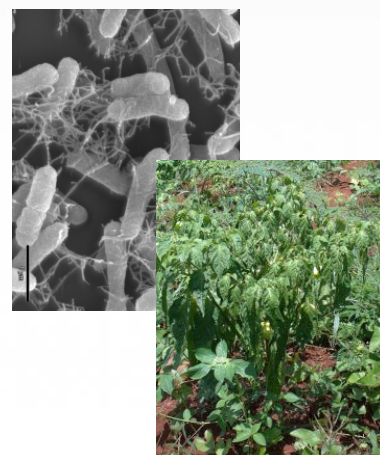
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COST Action no. 1208

Pathogen-informed strategies for sustainable broad-spectrum crop resistance (SUSTAIN)

2013 | 2017

Background

- Plant diseases are a major problem in agriculture. They threaten global food security and cause losses of billions of € to the EU economy.
- Disease resistant crop varieties constitute the economically and ecologically most viable alternative to pesticides in plant pest control.

Objectives

- Exploit latest knowledge on plant immunity and pathogen virulence for the generation of wide spectrum and long-lasting disease resistance in cereals and solanaceous crops.
- Evaluate resistance durability by detailed analysis of pathogen effector proteins in light of their dual role as central players in pathogen virulence and plant resistance.
- Foster transfer of knowledge on plant resistance, effector function and effector evolution from academic research to plant breeders.
- Build a platform for the development of durably resistant crops for Europe and developing countries.

Main Achievements

- 190 participants from 66 research institutions or companies and 26 countries. 40% of the participants are female scientists and 30% are early stage researchers.
- 178 scientific publications in peer reviewed scientific journals and 28 review articles or book chapters published.
- 1st annual conference uniting more than 100 researchers in the field of plant pathogen interaction research and crop resistance breeding.
- 1st TALEN & CRISPR Training School on non-GMO plant genome editing.
- Workshop on cellular dynamics of effector action and recognition.



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Working Group activities

Working Group 1 - Pathogen effectors and virulence

- Genomes of the wheat powdery mildew fungus *Blumeria graminis fsp. tritici* and of the first plant cyst nematode, the potato pathogen *Globodera pallida*, unrevealed.
- Many effectors of the barley and wheat powdery mildew fungus are related to microbial RNases.

Working Group 2 – Plant proteins and processes targeted by effectors

- The plant nucleus is a prime target of effectors from bacterial, oomycete and nematode pathogens.
- Xanthomonas* bacteria control plant gene expression by TAL effectors.
- Fungal effector proteins fool host immunity by outcompeting plant immune receptors.

Working Group 3 - Effector evolution and emergence of new pathotypes

- Multiple mechanisms lead to phoma stem cancer resistance breakdown and are influenced by agronomic practice.
- Adaptation and specialization of effector genes accompanies host jumps in *Phytophthora* species.
- Monitoring of effectors in potato late blight pathogen field populations avoids resistance breakdown and reduces pesticide use.

Working Group 4 - Plant immune receptors and allelic variants of host targets for resistance breeding

- CRISPR and TALEN technology allow GMO-free plant genome engineering.
- Rice with resistance against bacterial blight disease by modification of effector targets in the rice genome.
- Effectoromics allows efficient screening of potato germplasm for late blight resistance.
- Engineering of wheat immune receptors generates extended recognition specificities to the powdery mildew fungus.



Industry participation

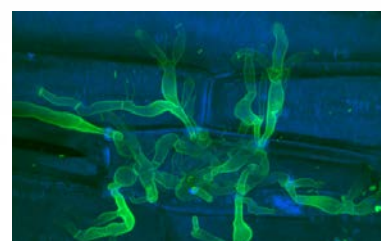
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