EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

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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 control by pesticides is often not possible and not durable and raises continued ecological concern. In 2009, the Directive 2009/128/EC was adopted which requires member states to “take all necessary measures to promote low pesticide-input pest management”.

Disease resistant crop varieties constitute the economically and ecologically most viable alternative to pesticides in plant pest control.

The number of resistance genes in major food crops is limited, their action spectrum is often restricted to individual strains of pathogens and they frequently break down rapidly in the field due to rapid pathogen evolution.

The on-going sequencing of pathogen genomes is revolutionizing plant pathology and generates for the first time the insights into the molecular and evolutionary mechanisms of pathogen virulence necessary for knowledge-based breeding and engineering for durable crop resistance.

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.
- Identify new resistance traits and loci in plant germplasm collections.
- 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.

Food and Agriculture (FA)

Participating countries

AT, BA, BE, BG, CH, CY, CZ, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IL, IS, IT, LT, LU, LV, MK, MT, NL, NO, PL, PT, RO, RS, SI, SK, SE, TR, UK

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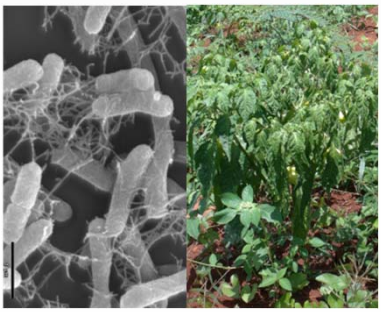

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Working Group activities

Working Group 1 - Pathogen effectors and virulence

- Identification of central effectors of important pathogens on cereals and solanaceous crop plants.
- Establishment of whole genome effector complements of cereal and solanaceous plant pathogens.
- Functional analysis of effector proteins by gain- and loss-of-function analysis.

Working Group 2 – Plant proteins and processes targeted by effectors

- Identification of central host proteins and cellular processes in cereals and solanaceous crop plants that are targets of pathogen effectors.
- Functional analysis of virulence targets in plants.

Working Group 3 - Effector evolution and emergence of new pathotypes

- Investigation of the mechanism underlying effector evolution and diversity in major cereal and solanaceous pathogens.
- Prediction of the agronomical lifespan of resistance genes and host targets.
- Optimized resistance deployment strategies.

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

- Screening of crop germplasm collections and breeding material by effectoromics for broad-spectrum resistance receptors that recognize central effectors.
- Screening for insensitive alleles of central effector targets.
- Generation of immune receptors with extended recognition specificities and insensitive variants of central effector targets.

Industry participation

Vilmorin & Cie,
Chappes, France

HZPC Holland B.V. R&D,
Metslawier, The Netherlands

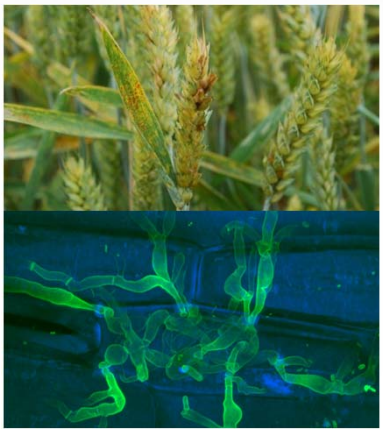
Monsanto Holland B.V.
Bergschenhoek, The Netherlands

Solana Research GmbH
Windeby, Germany

Averis Seeds B.V.,
Valthermond, The Netherlands

Saaten-Union Biotec GmbH,
Leopoldshöhe, Germany

Syngenta,
Sarrians, France



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