# Deciphering the pepper-pathogen-environment interactions to reduce pesticide use and cope with climate change

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Session:

# CLIMATE CHANGE RESILIENCE – BREEDING FOR BIOTIC AND ABIOTIC STRESS RESISTANCE

## Keynote talk 4

# TITLE: DECIPHERING THE PEPPER-PATHOGEN-ENVIRONMENT INTERACTIONS TO REDUCE PESTICIDE USE AND COPE WITH CLIMATE CHANGE

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**Abstract:** Occurrence and severity of plant diseases are the result of tripartite interactions between the host plant, the pest or pathogen, and the environmental conditions. Management practices can affect the edges of this disease triangle for a wide variety of pests and pathogens causing significant yield losses in pepper crops (*Capsicum annuum* L.). Regarding the host plant, biparental progeny analyses and genome-wide association studies were conducted to identify genomic regions and candidate genes involved in plant immunity to a set of diseases as well as immunity durability traits. To uncover the factors of pathogen adaptation, the evolutionary potential of *Phytophthora capsici* and Potato Virus Y (PVY) is being characterized using pepper lines contrasted for alleles at resistance quantitative trait loci (QTLs). Mutational events responsible for evolution of pathogen virulence and fitness changes are being identified. Studying the influence of the host plant on the gene expression of *P. capsici* led to the identification of an RxLR effector that partially triggers quantitative resistance. With respect to the environment, the effects of temperature variation on immunity to *P. capsici* and PVY were assessed in a core collection of pepper, and QTLs affecting quantitative estimators of immunity robustness were identified. The genetic architectures of immunity, durability and robustness of immunity in various environments will be examined, to highlight key genomic regions for sustainable crop health, aimed at reducing pesticide use and coping with climate change.