

# **Translational Research in Crops**

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Arthur Beauchet Center for Plant Systems Biology, VIB, B-9052 Gent, Belgium, BE, ...

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**Charlotte De Bruyn** *Department of Plant Biotechnology and Bioinformatics, Ghent University, BE; VIB Center for Plant Systems Biology, BE; Flanders Research Institute for Agriculture, Fisheries and Food (ILVO), BE, ...* 

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**Edgar Demesa-Arevalo** Institute for Developmental Genetics, Heinrich-Heine University, DE; Institute for Plant Genetics, Heinrich-Heine University, DE; Cluster of Excellence on Plant Sciences, Heinrich-Heine University, DE, ...

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Laura Elvira-González Université de Strasbourg, CNRS, IBMP UPR2357, FR, ...

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**Dave Berger** Department of Plant and Soil Sciences, University of Pretoria, ZA; Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, ZA, ...

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**Pablo D. Cárdenas** *Department of Plant and Environmental Sciences / University of Copenhagen, DK, ...* 

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**Gullar Gadimaliyeva** *Plant Breeding Department, University of Bonn, DE, ...* 

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**Christian Hertig** *Leibniz Institute of Plant Genetics and Crop Plant Research (IPK)* Gatersleben, Stadt Seeland, DE, ...

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**Jenny Koukara** Laboratory of Plant and Environmental Biotechnology, Department of Biochemistry and Biotechnology, University of Thessaly, AF, ...

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**Daniel Moser** Institute for Plant Sciences, Cluster of Excellence on Plant Sciences (CEPLAS), DE, ...

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**Christian Hertig** *Leibniz Institute of Plant Genetics and Crop Plant Research (IPK) Gatersleben, Stadt Seeland, DE, ...* 

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Stephen Knight Standard Biotools, NL

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### **Ling Meng** KWS Gateway Research Center, US

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**Gabriela Muller** Centro de Estudios Fotosinteticos y Bioquimicos, Facultad de Ciencias Bioquímicas y Farmacéuticas, University of Rosario, AR, ...

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Michael Muszynski University of Hawaii at Manoa, US, ...

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Lisa Van den Broeck North carolina state university, US, ...

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**Tom Van Hautegem** *Center for Plant Systems Biology, VIB, 9052 Ghent, BE;* Department of Plant Biotechnology and Bioinformatics, Ghent University, 9052 Ghent, *BE, ...* 

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**Su-May Yu** Institute of Molecular Biology/Academia Sinica, TW, ...

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**Wout Vandeputte** UGent Department of Plant Biotechnology and Bioinformatics, BE; VIB Center for Plant Systems Biology, BE, ...

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**Isaia Vardanega** Institute of Developmental Genetics, Heinrich-Heine University, Düsseldorf, DE, ...

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**Ylenia Vittozzi** Department of Plant and Environmental Sciences, University of Copenhagen, 1871 Frederiksberg C, Denmark; , DK; Copenhagen Plant Science Centre, University of Copenhagen, 1871 Frederiksberg C, Denmark, DK; NovoCrops Centre, University of Copenhagen, 1871 Frederiksberg C, Denmark, DK, ...

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**Juliana Yassitepe** Centro de Biologia Molecular e Engenharia Genética, Universidade Estadual de Campinas, BR; Genomics for Climate Change Research Center, BR; Embrapa Agricultura Digital, BR, ...

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**Steven Zwartkruis** Norwegian University of Science and Technology, NO, ...

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# Characterization of the transcriptional signatures associated with resistance and susceptibility to Hemileia vastatrix in the Kawisari coffee hybrid

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Coffee leaf rust (CLR), a disease caused by the biotrophic fungus *Hemileia vastatrix* (*Hv*), is the main threat to the worldwide production of Arabica coffee. The gradual breakdown of resistance in coffee varieties in the last years has highlighted the need for novel sources of resistance to CLR. This work aimed to unveil the cellular and molecular resistance profile of the Kawisari hybrid (*C. arabica* x *C.* liberica), a genotype used as a resistance donor in Arabica breeding programs in India. This coffee genotype was inoculated with two *Hv* races that triggered either resistance or susceptibility. Progress of infection was monitored using light microscopy. Simultaneously, we conducted a time-course RNA-seq characterization of the transcriptional responses. The microscopic studies showed that the post-haustorial resistance of Kawisari was associated with the hypersensitive response, accumulation of phenolic-like compounds and haustorium encasement with callose. The transcriptomic analysis suggest the downregulation of host primary metabolism genes at the early onset of infection, followed later by activation of genes functionally associated with multiple plant defense responses, including salicylic acid and jasmonate hormonal signaling. Resistance was also accompanied by the differential regulation of genes associated with phenylpropanoid metabolism and lignin biosynthesis. Our results, further validated by qPCR, provide important new insight into the molecular mechanisms underpinning resistance against CLR in this coffee genotype.

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