

in response to non-lethal concentrations of citronellol.

Innovative approaches in plant disease diagnosis and management

Establishment of specific molecular diagnostic tests for *Gnomoniopsis smithogilvyi* (syn. *castanea*) and *Cryphonectria parasitica*. M. CONTI¹, J. CROVADORE¹, B. COCHARD¹, R. CHABLAIS¹, J.B. MEYER², M. JERMINT³, F. LEFORT¹. ¹*Plants and Pathogens Group, Institute Land Nature Environment, hepia, University of Applied Sciences and Arts Western Switzerland (HES-SO), 150 route de Presinge, 1254 Jussy, Switzerland.* ²*Unit Biodiversity and Conservation Biology, Swiss Federal Research Institute WSL, Zürcherstrasse 111, 8903 Birmensdorf, Switzerland.* ³*Agroscope, Cadenazzo Research Centre, A Ramêl 18, 6593 Cadenazzo, Switzerland. E-mail: francois.lefort@hesge.ch*

Two fungi cause chestnut tree diseases in Switzerland: *Cryphonectria parasitica*, the endemic chestnut canker agent, and *Gnomoniopsis smithogilvyi*, an endophytic fungus, recently identified in Europe and Switzerland as the main agent of chestnut fruit brown rot, also causing chestnut canker. *Gnomoniopsis smithogilvyi* causes high plant mortality in young chestnut nurseries and orchards. Presence of these fungi was evaluated in plant material used for the multiplication of six of chestnut varieties in Ticino, using specific molecular diagnostic tests developed for both species. All sequences available in GenBank for the internal transcript spacer (ITS) of the ribosomal DNA, the elongation factor 1-alpha (EF1a) gene and the beta-tubulin gene (TUBB), were collected for these two fungi. Significant differences between *G. smithogilvyi*, *Gnomoniopsis spp.* and *C. parasitica* were sought. After analysing 164 ITS, 90 EF1a and 45 TUBB sequences, only the TUBB gene sequences showed any significant differences between the species. Specific PCR primers for each species were then designed from the TUBB sequences alignment. *In silico* analyses with BLAST (GenBank) confirmed the strict specificity of these primers. The two primer pairs were then tested with DNA extracted from previously characterised isolates of *G. smithogilvyi* and *C. parasitica* from Ticino, Wallis and Geneva, from roots and stems of germinated chestnuts or leaves of chestnut trees. These tests showed great robustness,

and provide a tool to indicate the phytosanitary status of propagation material, especially for the endophyte *G. smithogilvyi*.

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Does resistance to *Plasmopara viticola* in grapevine influence infectivity of sporangia? F. BOVE, T. CAFFI, V. ROSSI. *Department of Sustainable Crop Production, Diprove, Università Cattolica del Sacro Cuore, Via E. Parmense 84, 29122 Piacenza, Italy. E-mail: federica.bove@unicatt.it*

Partial plant resistance impacts on different epidemiological components of pathogens, which modify dynamics of disease epidemics. In *Plasmopara viticola*, the causal agent of grapevine downy mildew, different morphological characteristics have been observed between sporangia originated from lesions on susceptible and resistant hosts. This study evaluated whether, in addition to morphological modifications, partial host resistance can affect the infectivity of *P. viticola* sporangia, i.e., their ability to cause infection. Artificial inoculation experiments were performed between 2014 and 2016. A population of *P. viticola* sampled from susceptible vineyards was used for artificial inoculations on leaf discs of cv. Merlot and of fifteen grape breeding lines showing partial resistance, conferred by one or more *Rpv loci*. The sporangia produced on lesions originating on the susceptible and resistant varieties were then re-inoculated on leaf discs of cv. Merlot at three different vine growth stages (shoot elongation, full flowering, ripening of berries), and the infection efficiency was evaluated as the proportion of inoculation sites showing disease symptoms. There were no significant differences for the infection efficiency of sporangia produced on the different host varieties.

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Development of DDct Real Time RT-qPCR for the detection of *Onion yellow dwarf virus*. A. TIBER-

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Onion yellow dwarf virus (OYDV, genus *Potyvirus*), an aphid stylet-borne virus, was identified in Italy in 1993, and in the Italian onion variety 'Rossa di Tropea' in 2005. First investigations for OYDV were performed using serology, whereas, more recently, a specific RT-PCR test was used to examine the incidence of the virus in 'Rossa di Tropea', in bulb and seed production cycles. The correlation was assessed between OYDV infection and nutraceutical compounds in 'Rossa di Tropea', and a specific Real Time RT-qPCR assay was developed for OYDV. Specificity has been evaluated by including no target viruses related to OYDV and/or viruses generally found in onion. Analytical sensitivity was determined using ten-fold dilution series in crude extracts, either from leaf or bulb samples derived from field trials and from surveys carried out in Calabria (Southern Italy). The analytical sensitivity was directly compared with ELISA and end point RT-PCR, and allowed detection of the virus up to the dilution limit of 1×10^{-6} for leaves and 1×10^{-5} for bulbs. A DDcT Real Time RT-qPCR assay was performed using the 5.8S rDNA gene as reference to normalize the relative quantification data. This assay allowed investigation of the modulation of virus titre in the OYDV - 'Rossa di Tropea' pathosystem.

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Cytogenomic analyses reveal nuclear content variation along the life cycles of the Pucciniales (rust fungi). T. RIBEIRO¹, C. FEITEIRA¹, S. TAVARES^{1,2,3}, A.P. RAMOS¹, M. MONTEIRO⁴, M. COELHO⁵, M.C. SILVA^{1,2}, J. LOUREIRO⁶, L. MORAIS-CECÍLIO and P. TALHINHAS^{1,2}. ¹LEAF-Linking Landscape, Environment, Agriculture and Food, Instituto Superior de Agronomia, Universidade de Lisboa. Tapada da Ajuda, 1349-017 Lisboa, Portugal. ²Centro de Investigação das

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Rust fungi (Basidiomycota, Pucciniales) are biotrophic plant pathogens with complex life cycles (up to five spore types). The urediniosporic infection cycle is frequently the most important for pathogen dissemination, as the only stage capable of multiple uninterrupted repetition. The cell nuclear content of rust fungi is thought to follow that of other Basidiomycota, with haploid nuclei throughout the life cycle, only becoming diploid upon karyogamy in telia and immediately returning to the haploid state as meiosis takes place leading to the formation of basidiospores. The presence of 1C, 2C and a low proportion of 4C nuclei was recently detected in different stages of the urediniosporic cycle of several rust fungi, using genome size quantification techniques. These results suggest the presence of diploid nuclei that supposedly only occur in teliospores, compatible with the occurrence of karyogamy and meiosis prior to urediniospore formation, although endopolyploidy or other parasexuality phenomena cannot be ruled out. This unexpected phenomenon may be transversal to the Pucciniales, since it has been detected in over 60 rust species, with no apparent phylogenetic structural forms.

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A diagnostic microarray for the multiplex characterization of strains of the *Ralstonia solanacearum* species complex. G. CELLIER¹, S. ARRIBAT², F. CHIROLEU², P. PRIOR³, I. ROBENE². ¹Tropical Pests and Diseases unit, Plant Health Laboratory, ANSES,