

were detected for the first time in malting barley cultivated in Umbria. *Fusarium avenaceum* and *F. tricinctum* strains showed the ability to biosynthesize enniatins. *Fusarium sporotrichioides* strains were BEA and NIV producers like *F. poae*, which also biosynthesized low amounts of T-2 toxin. The FIESC strain produced high amounts of equisetin.

BROWN APICAL NECROSIS (BAN) OF WALNUT FRUIT: A CASE OF STUDY OF A COMPLEX FUNGAL DISEASE.

M. Scotton¹, E. Bortolin², A. Fiorin³, A. Belisario⁴. ¹Dipartimento di Agronomia Animali Alimenti Risorse naturali e Ambiente, Università di Padova, Viale dell'Università 16, 35020 Legnaro, Padova, Italy. ²Nogalba, Consorzio Produttori di Noce, 45010 Pettorazza, Rovigo, Italy. ³Il Noceto, Società Consortile s.r.l., 31040 Chiarano, Treviso, Italy. ⁴Consiglio per la Ricerca in Agricoltura e l'analisi dell'economia agraria, Centro di Ricerca per la Patologia Vegetale (CREA-PAV), Via C.G. Bertero, 22 - 00156, Rome, Italy. E-mail: alessandra.belisario@crea.gov.it

Brown apical necrosis (BAN) is a recently described disease affecting English (Persian) walnut fruit. BAN was recorded only in intensively managed walnut orchards and was found to be a disease complex mainly caused by *Fusarium* species, but also *Alternaria alternata* complex is involved. All fungi, associated with this disease are polyphagous and ubiquitous, not specific to walnut. Consequently, BAN occurrence is more strictly dependent on the interaction between pathological features and environmental conditions. Environmental variables influent in modifying disease severity were identified with regression analysis. The highest influence on severity of BAN fruit drop was due to maximum temperature and only subordinately, factors are associated with relative humidity. A significant evidence on BAN was also found for the angle of main wind direction versus tree row orientation, which is associated with the inner orchard ventilation affecting the temperature/humidity conditions. BAN symptoms were fully reproduced with an *in planta* artificial inoculation method set up specifically for this type of complex disease.

MORPHOLOGICAL, MOLECULAR AND BIOLOGICAL APPROACHES TO CHARACTERIZE CITRUS-ASSOCIATED ALTERNARIA SPECIES. F. Garganese¹, L. Schena², M.I. Prigallo², D. Spadaro³, A. De Grassi⁴, A. Ippolito¹, S.M. Sanzani¹.

¹Dipartimento di Scienze del Suolo, della Pianta e degli Alimenti, Università degli Studi Aldo Moro, Bari, Italia. ²Dipartimento di Agraria, Università Mediterranea, Reggio Calabria, Italia. ³Dipartimento di Scienze Agrarie, Forestali e Alimentari, Università degli Studi di Torino, Grugliasco (TO), Italia. ⁴Dipartimento di Bioscienze, Biotecnologie e Biofarmaceutica, Università degli Studi Aldo Moro, Bari, Italia. E-mail: simonamarianna.sanzani@uniba.it

Alternaria brown spot is one of the most important diseases of tangerines and their hybrids. Recently, a disease outbreak in Southern Italy was recorded. A collection of 180 *Alternaria* spp. isolates from citrus fruit and leaves was gathered. Twenty representatives were selected and characterized along with reference strains of *Alternaria*. Morphological characteristics separated *Alternaria* isolates into six morphotypes referable to *A. alternata* (5) and *A. arborescens* (1). Phylogenetic analyses based on endopolygalacturonase (*endopg*) and internal transcribed spacer (ITS), confirmed this finding. A five-gene phylogeny including two anonymous genomic regions (OPA 1-3 and OPA 2-1), and the beta-tubulin gene (β -*tub*), produced a further clustering of *A. alternata* into four clades, being OPA 1-3 region more suitable to highlight intra-species variability. The isolates showed different levels of virulence on leaves and

fruit. In particular, pathogenicity on fruit seemed to be correlated with tissue of isolation and clade. Numerous isolates produced the mycotoxins alternariol (AOH), alternariol monomethyl ether (AME), altenuene (ALT), and tenuazonic acid (TeA). TeA resulted the most abundant. A significant correlation between expression of phytotoxins gene *ACTT1* and pathogenicity on leaves was recorded; whereas, the expression of *pksJ/pksH*, biosynthetic genes of AOH/AME, was related to pathogenicity on fruit. The occurrence of *Alternaria* spp. on citrus fruit and their ability to produce toxins might represent a concern for producers and consumers.

CHARACTERIZATION AND VARIABILITY OF LASIODIPLODIA spp. ASSOCIATED WITH CROWN ROT DISEASE UNDER ORGANIC FARMING OF BANANAS IN THE DOMINICAN REPUBLIC. M.A.M. Kamel^{1,2}, P. Cortesi¹, M. Sarchi¹.

¹Università degli Studi di Milano, Dipartimento di Scienze per gli Alimenti, la Nutrizione e l'Ambiente, Via Celoria 2 - 20133 Milano, Italy. ²Plant Pathology Research Institute, Agricultural Research Center, 9 Gamaa St. - 2619 Giza, Egypt. E-mail: mobamed.kamel@unimi.it

The genus *Lasiodiplodia* has a wide host range including bananas, and *L. theobromae* is one of the main pathogens involved in crown rot disease. This work aims to assess the presence of this pathogen under organic farming conditions, and to study the phenotypic characters and variability of all isolated strains. Approximately 750 ha of organic bananas (Musa AAA, Cavendish) and their packing station, located in the Dominican Republic were investigated. Morphology and cultural characters of 43 strains isolated from crown tissues were examined on different media under different conditions, and then identified based on ITS and β -tubulin gene nucleotide sequences. Pathogenicity of representative strains was evaluated on both fresh and 16 days-after-harvest green bananas. Strain variability was assessed producing fingerprints based on PCR products obtained using three primers designed on nucleotide sequences of mini- and micro-satellites. Thirty-seven strains shared $\geq 99\%$ sequence homology with *L. theobromae*, and six shared $\geq 99\%$ sequence homology with *L. pseudotheobromae*. The latter was isolated only from flowers and crown parts in field and showed high virulence activity. The results obtained suggest complexity of *Lasiodiplodia* populations in the Dominican Republic and an increase of fruit susceptibility during conservation. This is the first report of *L. pseudotheobromae* associated with crown rot symptoms. Some of these pathogenic fungi were also found on decaying leaves of banana plants used as mulching materials in organic farming.

THE FIRST ARBOVIRUS FROM A PHYTOPLASMA INSECT VECTOR. S. Abbà, L. Galetto, M. Vallino, M. Turina, C. Marzachi. IPSP-CNR, Istituto per la Protezione Sostenibile delle Piante, Strada delle Cacce 73 - 10135 Torino, Italy. E-mail: luciana.galetto@ipsp.cnr.it

The leafhopper *Euscelidius variegatus* is an efficient natural vector of chrysanthemum yellows phytoplasma (CY) and a laboratory vector of Flavescence dorée phytoplasma (FD). A 10,616 nucleotide-long contig, highly similar to picorna-like viruses, was identified through RNA-seq in *E. variegatus* and named *Euscelidius variegatus* virus 1 (EVV-1). The virus presence was confirmed by Northern blot and its prevalence determined by RT-PCR: EVV-1 was detected in all the tested insects from an Italian laboratory colony, but absent in two other *E. variegatus* lab colonies from France and California. The whole viral genome was cloned in 11 overlapping fragments and completely re-sequenced by Sanger method. The amino acid