

116° Congresso della Società Botanica Italiana

VII INTERNATIONAL PLANT SCIENCE CONFERENCE (IPSC)

ONLINE, 8 - 10 SEPTEMBER 2021



ABSTRACTS

KEYNOTE LECTURES, COMMUNICATIONS, VIDEO ABSTRACTS

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116° Congresso della Società Botanica Italiana onlus

VII INTERNATIONAL PLANT SCIENCE CONFERENCE (IPSC)

Online, 8 - 10 September 2021

Programme

Wednesday 8 September 2021

BRIDGING SESSION BETWEEN THE ITALIAN BOTANICAL SOCIETY AND MEDPALYNOS on platform Clickmeeting

(Chairpersons: A. Chiarucci and A.M. Mercuri)

- 9:00-9:20 Opening of the 116th SBI Congress - announcement of the MedPalynoS closing ceremony
- 9:20-9:50 **Scott Mensing**, Edward Schoolman, Adam Csank, et al., University of Nevada, Reno, USA (30 min)
“The challenge of combining historical archives with paleoenvironmental data to create robust explanations of environmental transformation through time”
- 9:50-10:00 Questions

The 116° Congress of the Italian Botanical Society continues on platform Webex

SYMPOSIUM

“ENVIRONMENTAL AND PRODUCTIVE CHALLENGES IN PLANT CELL BIOLOGY AND BIOTECHNOLOGY”

(Chairpersons: L. Navazio and M.S. Lenucci)

Key words plant cell biology and molecular biology, plant biotechnology, plant growth and differentiation, plant-environment interactions, productive challenges

- 10:00-10:30 • **Salma Balazadeh**, Leiden University, The Netherlands; Max Planck Institute of Molecular Plant Physiology, Potsdam, Germany. (25 + 5 min)
“Mechanisms of thermomemory in plants”

10:30-13:06 Communications

- **Erika Bellini**, Luca Paoli, Stefania Bottega et al. (10 + 2 min)
“New insight on thiol-peptides: are they involved in cadmium extracellular secretion?”
- **Ignacio Ezquer**, Maurizio Di Marzo, Vivian Ebeling Viana et al. (10 + 2 min)
“New insights into the role of cell wall modifications induced by α -XYLOSIDASE1: The impact in seed and fruit size in *Arabidopsis thaliana*”
- **Lavinia Mareri**, Claudia Faleri, Luigi Parrotta et al. (10 + 2 min)
“Insights into the mechanisms of priming and thermotolerance in tobacco pollen”
- **Antonella Muto**, Emanuela Talarico, Ernesto Picardi et al. (10 + 2 min)
“Genome-wide analysis of the H3K27me3 epigenome and transcriptome in the ovule developmental stages during pollination of *Ginkgo biloba* L.”
- **Lorenzo Ferroni**, Andrea Colpo, Alessandra Molinari et al. (10 + 2 min)
“Quantitative assessment of the thylakoid membrane appression in the chloroplast of *Selaginella martensii* Spring (Lycopodiophyta)”

Coffee Break

- **Federica Della Rovere**, Camilla Betti, Laura Fattorini et al. (10 + 2 min)
“Roles of Brassinosteroids on *Arabidopsis thaliana* rooting in the presence of Cadmium”
- **Enrico Cortese**, Alessio G. Settimi, Mattia Franceschi et al. (10 + 2 min)
“Effects of plasma-activated water on signalling pathways underlying plant self-defence responses”

- **Daniela Zuzolo**, Carmine Guarino, Alessia Postiglione et al. (10 + 2 min)
“Overcome the limits of multi-contaminated industrial soils bioremediation: insights from a multi-disciplinary study”
- **Mattia Terzaghi**, Angela Cicatelli, Francesco Guarino et al. (10 + 2 min)
“Soil amendment with compost and biochar in a 50-year old olive grove affects soil enzymatic activity, rhizosphere microbiome and fine root production”
- **Iliaria D’Ippolito**, Alba Mininni, **Adriano Sofo** et al. (10 + 2 min)
“Alteration of the anatomical and morphological structure of kiwifruit roots subjected to soil anoxic conditions”
- **Andrea Crosino**, Ivan Sciascia, Mara Novero et al. (10 + 2 min)
“Digital image analysis to quantify arbuscular mycorrhizal root colonization”
- **Veronica De Micco**, Antonello Bonfante, Giovanna Battipaglia et al. (10 + 2 min)
“Multiscale and multitemporal approach to evaluate resource use efficiency in vineyard towards sustainable cultivation of Greco grapevine: the GREASE Project”
- **Cristina Votta**, Valentina Fiorilli, Jian You Wang et al. (10 + 2 min)
“The effect of zaxinone, a natural metabolite derived from carotenoids, on tomato plants”

SYMPOSIUM

“MEDICINAL PLANT SECONDARY METABOLISM: FROM PLANT-ENVIRONMENT INTERACTIONS TO HEALTH PROPERTIES”

(Chairpersons: L. Menghini and F. Conforti)

Key words medicinal plants, bioactive principles, secondary metabolites, plants and environment, plants and health

15:00-15:30 • **Milen I. Georgiev**, Bulgarian Academy of Sciences, Bulgaria (25 + 5 min)
“Metabolomics: Just Another OMICS or an Ideal Platform for Accelerated Lead Finding?”

15:30-16:42

Communications

- **Iliaria Chiocchio**, Cinzia Sanna, Elisabetta Grillini et al. (10 + 2 min)
“Seasonal variation in the metabolome of *Arbutus unedo* L. leaves collected in different areas of Sardinia (Italy)”
- **Giuliana Donadio**, Valentina Parisi, Valentia Santori et al. (10 + 2 min)
“Antimicrobial activity of extracts, fractions and compounds from leaves of *Psidia punctulata* (DC.) Vatke growing in Saudi Arabia”
- **Valeria Iobbi**, Roméo Arago Dougué Kentsop, Giuliana Donadio (10 + 2 min)
“Abietane diterpenoids from the hairy roots of *Salvia corrugata* Vahl.”
- **Mariangela Marrelli**, Massimo Tacchini, Maria Rosaria Perri et al. (10 + 2 min)
“*Lavandula* spp. from the Pollino Massif: anti-arthritic potential of essential oils and bioactive components”
- **Andrea Mastinu**, Giulia Abate, Leilei Zhang et al. (10 + 2 min)
“Phytochemical analysis and anti-inflammatory activity of different ethanolic phyto-extracts of *Artemisia annua* L.”
- **Eleonora Spinozzi**, Filippo Maggi, Riccardo Petrelli et al. (10 + 2 min)
“A focus on jambù: from the Brazilian folk medicine to the development of novel botanical insecticides”

SYMPOSIUM

“BEYOND DISTRIBUTION DATA OF ALIEN SPECIES: WHAT'S NEXT?”

(Chairperson: G. Brundu)

Key words species distribution models, plant invasions, prevention, management, risk analysis

17:00-17:30 • **Joana R. Vicente**, A.S. Vaz, J. Honrado, Universidade do Porto, Portugal (20 + 10 min)
“Species distribution models in invasion Ecology: challenges and applications”

17:30-18:42

Communications

- **Leopoldo de Simone**, Emanuele Fanfarillo, Tiberio Fiaschi et al. (10 + 2 min)
“Patterns of alien species in a riparian ecosystem of southern Tuscany: is there any news?”
- Francesco Maria Raimondo, Enrico Bajona, **Gianniantonio Domina** et al. (10 + 2 min)
“Xenophytes and anthropogenic vegetation in Sicily: the case of *Opuntia stricta* (Cactaceae) in the protected area of Capo Rama (Terrasini, Palermo)”
- **Flavio Marzialetti** Ludovico Frate, Walter De Simone et al. (10 + 2 min)
“UAV-based mapping of *Acacia saligna* invasions in the Mediterranean coastal dune”
- **Francesco Boscutti**, Elisa Pellegrini, Massimo Buccheri et al. (10 + 2 min)
“From local to landscape disturbances: new perspectives in alien plant invasions across multiple spatial scales”
- **Lorenzo Lazzaro**, Michele Giunti, Giulio Ferretti et al. (10 + 2 min)
“Management of *Carpobrotus* spp. within the Life project LETSGO GIGLIO on Giglio Island (Tuscan Archipelago): control actions and monitoring of flora and vegetation”
- **Luigi Cao Pinna**, Marco Malavasi, Alicia T. R. Acosta et al. (10 + 2 min)
“Plant invasion in Mediterranean Europe, current hotspots and future scenarios”

Thursday 9 September 2021

SYMPOSIUM

“IMPORTANCE OF FIELDWORK AND PLANT COLLECTING FOR FLORISTIC AND SYSTEMATIC RESEARCH”

(Chairperson: G. Domina)

Key words Biodiversity, taxonomy, primary data, herbaria

9:00-10:45

Communications

- **Juri Nascimbene**, Renato Benesperi, Elisabetta Bianchi et al. (9 + 1,5 min)
“Don't stop exploring and collecting! Field work and herbaria still play a fundamental role in the analysis of lichen diversity: some case-studies from Italy”
- **Giulia Albani Rocchetti**, Thomas Abeli (9 + 1,5 min)
“Rediscoveries and systematic research bring back 17 European endemics from extinction”
- **Lorenzo Peruzzi**, David Dolci, Brunello Pierini et al. (9 + 1,5 min)
“Climate change and elevational shifts in plant distribution. A case study from the vascular flora of Tuscany across the last century”
- **Gianmarco Tavilla**, Antonia Cristaudo, Gianpietro Giusso del Galdo et al. (9 + 1,5 min)
“*Anthemis messanensis* (Asteraceae) a neglected endemic species: new data on distribution, ecology, and conservation status”
- **Paola De Giorgi**, Antonio Giacò, Giovanni Astuti et al. (9 + 1,5 min)
“An integrated taxonomy approach points towards a single-species hypothesis for *Santolina* (Asteraceae) in Corsica and Sardinia”
- **Zohreh Hosseini**, Flavia Bartoli, Emanuela Cicinelli et al. (9 + 1,5 min)
“Checklist of the archaeological site of Pasargadae, World Heritage Site in Iran”
- **Giulio Barone**, Stephen Mifsud, Gianniantonio Domina (9 + 1,5 min)
“Plant conservation through use: field surveys on four case studies in Sicily and Malta”
- **Jacopo Franzoni**, Giovanni Astuti, Angelino Carta et al. (9 + 1,5 min)
“An integrative approach shows independent local genotype and phenotype variation in *Dianthus virginicus* (Caryophyllaceae)”
- **Anahi Elena Ada Bucchini**, Lisa Brancaleoni, Donata Ricci et al. (9 + 1,5 min)
“The third phase of the project to enhance the Botanical Garden of the University of Urbino: the recovery of the *Herbarium Athenaei Urbinatis*”

- **Emilio Di Gristina**, Alfredo Carratello, Giuseppe Certa et al. (9 + 1,5 min)
“Recovery of historical duplicates of the *Herbarium Siculum* in Palermo”

SYMPOSIUM

“BIODIVERSITY AND CONSERVATION OF BRYOPHYTES”

(Chairperson: M. Puglisi)

Key words checklist, diversity, ecology, red list, threatened species

- 11:00-11:30 • **Marko S. Sabovljević**, Aneta D. Sabovljević, University of Belgrade, Serbia (25 + 5 min)
“Introducing bryophytes to conservation physiology and vice versa”
- 11:30-12:00 • **Rosalina Gabriel**, Cecília Sérgio, Manuela Sim-Sim, University of the Azores, Portugal (25 + 5 min)
“The importance of different habitats for bryophytes: common threats to species living on the Azores Islands (Macaronesia)”

12:00-12:36

Communications

- **Silvia Poponessi**, Michele Aleffi (10 + 2 min)
“New Checklist of the Bryophytes of Italy twelve years apart from the first”
- Marta Puglisi, Francine Valérie Navillod, **Luca Miserere** et al. (10 + 2 min)
“Rare bryophytes of the Alps: monitoring and analysis of the current situation with a focus on the Aosta Valley”
- **Antonio De Agostini**, Annalena Cogoni, Pierluigi Cortis et al. (10 + 2 min)
“Strategies of heavy metal tolerance in metallicolous and non-metallicolous populations of mosses: the role of photoprotective mechanisms”

SYMPOSIUM

“A JOURNEY AMONG AQUATIC PHOTOTROPHS: FROM BIODIVERSITY TO APPLICATIONS”

(Chairperson: R. Pistocchi)

Key words floristic studies, biodiversity, algae and environment, biotechnology and application

- 14:00-14:30 • **Javier Cremades Ugarte**, University of A Coruña, Spain (25 + 5 min)
“Marine agronomy as a pillar of the aquaculture with an ecosystem approach in southern Europe”

14:30-15:42

Communications

- **Mara Simonazzi**, Laura Pezzolesi, Franca Guerrini et al. (10 + 2 min)
“Insight into the use of chlorinated oxidants for the removal of cyanobacterial toxins produced by *Microcystis aeruginosa*: good practice for drinking water plants”
- **Simona Armeli Minicante**, Nathan Beda, James T. Melton et al. (10 + 2 min)
“Progress on compiling a DNA barcode inventory of the genus *Ulva* Linnaeus in the Mediterranean Sea”
- **Anna Maria Mannino** (10 + 2 min)
“Bioactive compounds from brown algae inhabiting the north-western Mediterranean Sea”
- **Leone Ermes Romano**, Giovanna Aronne (10 + 2 min)
“The key role of Duckweed (Lemnaceae) in human space flight”
- **Michele Maglie**, María José Ibáñez González, Elvira Navarro López et al. (10 + 2 min)
“Waste-to-value approach: the production of lipids from the microalga *Tisochrysis lutea* using a reject brine”
- **Giulia Santunione**, Alberto Muscio, Elisabetta Sgarbi (10 + 2 min)
“Biodeterioration of surfaces: the development of an experimental protocol involving *Nostoc commune* as pioneer organism”

SYMPOSIUM

“RELEVANT HABITATS NEGLECTED BY THE DIRECTIVE 92/43 EEC: MAY VEGETATION SCIENCE CONTRIBUTE TO THEIR CONSERVATION?”

(Chairperson: G. Giusso Del Galdo)

Key words conservation, Red List of ecosystems, vegetation mapping, vegetation classification, geobotany

16:00-16:30 • **Borja Jiménez-Alfaro**, Universidad de Oviedo, Spain (25 + 5 min)
“Habitat typologies for the conservation of high-mountain Mediterranean vegetation”

16:30-17:30

Communications

- **Michele Dalle Fratte**, Stefano Armiraglio, Marco Caccianiga et al. (10 + 2 min)
“Spatial distribution and conservation status of species-rich *Nardus* grasslands in Lombardy region (Northern Italy)”
- **Simona Casavecchia**, Giampiero Ciaschetti, Daniela Gigante et al. (10 + 2 min)
“Neglected habitats in central Apennines”
- Giovanni Spampinato, **Valeria Tomaselli**, Luigi Forte et al. (10 + 2 min)
“Relevant but neglected habitats by the Directive 92/43 EEC in southern Italy”
- **Riccardo Guarino**, Giuseppe Bazan, Alessandro Crisafulli et al. (10 + 2 min)
“Relevant habitats neglected by the Directive 92/43 EEC: the contribution of Vegetation Science for their reappraisal and protection in Sicily”
- **Mauro Fois**, Gianluigi Bacchetta, Maria Carmela Caria et al. (10 + 2 min)
“Discovering neglected vegetation in Sardinia: from knowledge to conservation”

18:00-19:00 General assembly of the Members of the Italian Botanical Society

Friday 10 September 2021

SYMPOSIUM

“ECOLOGY OF DISTURBANCE EVENTS”

(Chairpersons: C. Wellstein and S. Chelli)

Key words extreme weather events, fire, flooding, large-scale human disturbance, succession

9:00-10:36

Communications

- **Giulia Capotorti**, Laura Zattero, Riccardo Copiz et al. (10 + 2 min)
“Ecosystems under fire’: assessment of anthropogenic fire threat for compiling the Red List of Ecosystems in Italy”
- **Elisa Carrari**, Patrizio Biagini, Federico Selvi et al. (10 + 2 min)
“Post-fire management and forest type affect species diversity, composition and resprouting during early recovery stages in a Mediterranean vegetation area”
- **Andrea Coppi**, Lorenzo Lazzaro, Federico Selvi et al. (10 + 2 min)
“Plant mortality on ultramafic soils after an intense heat and drought event”
- **Michele Di Musciano**, Walter De Simone, Valter Di Cecco et al. (10 + 2 min)
“Monitoring vegetation dynamics after wildfire events in Mediterranean mountain using satellite data”
- **Giovanni Iacopetti**, Filippo Bussotti, Elisa Carrari et al. (10 + 2 min)
“Understorey changes after an extreme drought event are modulated by overstorey tree species mixtures in thermophilous deciduous forests”
- **Davide Mosanghini**, Giuseppe Oriolo, Francesco Boscutti (10 + 2 min)
“Different ways to success: plant community trajectories along time and a soil moisture gradient in restored wetlands”

- **Ludovica Oddi**, Edoardo Cremonese, Mirco Migliavacca et al. (10 + 2 min)
“European larch growth and CO2 flux responses to heat and drought”
- Marco Vuerich, Paolo Cingano, **Francesco Boscutti** et al. (10 + 2 min)
“Effects of flooding stress on the saltmarsh halophyte *Salicornia fruticosa* (L.) L.: upscaling perspectives”

SYMPOSIUM

“FUNGI AS A TOOL TO FACE THE GREAT SOCIETAL CHALLENGES IN A CHANGING WORLD”

(Chairpersons: S. Tosi and S. Di Piazza)

Key words biodiversity, ecosystem services, bioremediation, circular economy, next generation EU

11:00-12:50

Communications

- **Iliaria Filippi**, Federica Spina, Viktoria Ilieva et al. (8 + 2 min)
“Identification of bioplastic degrading fungi”
- **Andrea Zanellati**, Federica Spina, Luca Rollé et al. (8 + 2 min)
“The potential of fungi to enhance the yields and sustainability of anaerobic digestion”
- **Grazia Cecchi**, Simone Di Piazza, Laura Cutroneo et al. (8 + 2 min)
“Myco-booms application in Port waters for bioremediation of heavy metals: the GEREMIA and QUALI-PORTI projects experience”
- **Andrea Ceci**, Flavia Pinzari, Anna Maria Persiani (8 + 2 min)
“Metabolic responses of soil fungi to the presence of hexachlorocyclohexane isomers”
- **Marta Elisabetta Eleonora Temporiti**, Lidia Nicola, Chiara Daccò et al. (8 + 2 min)
“Screening methods to detect potential bioremediation fungi”
- **Simone Di Piazza**, Michela Mazzoccoli, Grazia Cecchi et al. (8 + 2 min)
“Fungal mining of precious elements from urban mine: the MYRAEE project experience”
- **Francesco Dovana**, Gabriel Moreno, Roberto Para et al. (8 + 2 min)
“The genus *Laccaria*: is it possible to get the correct identification of the different specimens? *Laccaria macrocystidiata*, a case study”
- **Carolina Elena Girometta**, Rebecca Michela Baiguera, Francesco Bracco et al. (8 + 2 min)
“*Fomitiporia punctata* missing: ITS-LSU analysis in Lombardia detects the polyphagous pathogen *F. mediterranea* only”
- **Paola Angelini**, Roberto Maria Pellegrino, Giancarlo Angeles Flores et al. (8 + 2 min)
“Metabolomic profiling and biological activities of *Pleurotus columbinus* Quél. cultivated on different agri-food by-products”
- **Elisa Moscato**, Federica Spina, Iolanda Perugini et al. (8 + 2 min)
“Mycoprotein: a way for a more sustainable food system”
- **Matteo Florio Furno**, D. Ferrero, A. Poli et al. (8 + 2 min)
“The marine mycobiota as a possible bioresources: the fungal biodiversity associated with microplastics”

SYMPOSIUM

“FROM INTRODUCTION TO INVASION: AN ARCHAEOBOTANICAL AND PALYNOLOGICAL STORYTELLING”

(Chairpersons: L. Sadori and A. Travaglini)

Key words archaeophytes, neophytes, pollen, seeds/fruits, public health

14:00-14:30

- **Jordina Belmonte**, University of Barcelona, Spain (20 + 10 min)
“Aerobiology as an alert and control tool in front of invasive plants”

14:30-15:00

- **Jaromír Beneš**, University of South Bohemia, Czechia (20 + 10 min)
“How archaeobotany contributes to understanding the Holocene plant movement in the Old World”

15:00-15:48

Communications

- **Claudia Moricca**, Francesca Alhaique, Lia Barelli et al. (10 + 2 min)
“New species from the New World: early archaeobotanical and archaeozoological evidence from the Santi Quattro Coronati complex in Rome (Italy)”
- **Alessia Masi**, Fanny Gaveriaux, Lucrezia Masci et al. (10 + 2 min)
“Beech and stone Pine, the Italian landscape modelled by valuable ritual trees”
- **Jordan Palli**, Assunta Florenzano, Alessia Masi et al. (10 + 2 min)
“*Cannabis* pollen records in Italy: when the *taxon* actually entered the Mediterranean?”
- **Alessia D’Agostino**, Gabriele Di Marco, Mauro Rubini et al. (10 + 2 min)
“Environmental implications and evidence of natural products from dental calculi of a Neolithic–Chalcolithic community (central Italy)”

Post-congress

(Chairperson: S. Loppi)

16:00

EVENTO “COMUNICARE LA BOTANICA”

Dopo la recente rivoluzione digitale della comunicazione abbiamo bisogno di cambiare anche il nostro modo di comunicare la botanica: l’evento è dedicato a chi ha interesse a condividere idee ed esperienze per trovare proposte per migliorare la capacità di disseminare i temi della botanica al grande pubblico mantenendo il rigore scientifico, ma allo stesso tempo trovando soluzioni per incuriosire i non-specialisti. Brevi interventi precederanno le discussioni che, auspichiamo, porteranno a proposte e azioni concrete da adottare da parte della SBI per promuovere la diffusione della cultura delle scienze botaniche e delle loro applicazioni.

- **Silvana Munzi**, Università di Lisbona
“Licheni e internet al tempo della pandemia”
- **Gabriele Gheza**, Università di Bologna
“Superare le difficoltà nel comunicare habitat aridi e organismi negletti: il caso Life Drylands”
- **Fabio Attorre**, Università La Sapienza Roma
“L’importanza degli orti botanici tra comunicazione, educazione ambientale e ricerca”
- **Mario De Tullio**, Università di Bari
“The Sound of Science - Suoni per la didattica delle scienze e la comunicazione scientifica”
- **Stefano Martellos**, Università di Trieste
“Comunicazione e Citizen Science: arruolamento e fidelizzazione dei volontari”
- **Giovanni Rivieccio**, Università di Sassari
“Manifestazioni scientifiche e social media: un'occasione da non perdere?”
- **Marco Galaverni**, WWF Italia
“Tra correttezza scientifica e coinvolgimento: nuove sfide della comunicazione scientifica”

Modera le discussioni

- **Marco Gisotti**, Agenzia di studi e comunicazione ambientale Green Factor; Consulente per la Comunicazione del MITE; Docente di Teorie e Linguaggi della Comunicazione Scientifica presso l’Università di Roma Tor Vergata

Conclusioni

- **Gianni Bedini**, Università di Pisa
- **Mario De Tullio**, Università di Bari
- **Michela Marignani**, Università di Cagliari

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Alteration of the anatomical and morphological structure of kiwifruit roots subjected to soil anoxic conditions

Ilaria D'Ippolito¹, Alba Mininni¹, Bartolomeo Dichio¹, Giovanni Scillitani², Maria Mastrodonato², Evangelos Xylogiannis³, Adriano Sofo¹

¹Department of European and Mediterranean Cultures: Architecture, Environment, Cultural Heritage, University of Basilicata, Via Lanera 20, 75100 Matera, Italy; ²Department of Biology, University of Bari, Via Orabona 4, 70126 Bari, Italy; ³Zespri Fresh Produce Italy Srl. Via delle Margherite 121, 04011 Aprilia (LT), Italy

Italy, the third largest producers of kiwifruit producing in the world, has lost 10% of its production in recent years because of the spread of the Kiwifruit Vine Decline Syndrome (KVDS / moria), which leads to a gradual deterioration of the plant that starts from the roots. KVDS symptoms have been observed in different areas and have often been associated with water stagnation and anoxic soil conditions, resulting in root rot. Kiwifruit is a species adapted to hot-humid environments and requires large amounts of water. At the same time, it is also extremely sensitive to waterlogging, whose deleterious effects can arise if a rapid drainage of excess water does not occur in the soil, with the consequent establishment of anoxic conditions in the soil. Kiwifruit roots, and in particular meristems, have a high oxygen consumption and are therefore more sensitive to anoxia. Therefore, at low oxygen concentrations, they are the first tissues to be damaged. Early symptoms associated with KVDS are root browning, disappearance of absorbent roots, morphological and anatomical alterations, and tissue rupture and decomposition, resulting in blockage of xylem vessels, followed by late symptoms, such as leaf necrosis, shoot wilting and, in its acute phase, plant death. Unfortunately, the causes of KVDS are still unknown. On this basis, an experimentation was started in a kiwifruit orchard (*Actinidia chinensis* (A. Chev.) CF Liang & AR Ferguson, 1984, var. *deliciosa*) affected by KVDS and located in Latina (Lazio Region, Italy), in order to investigate the potential causes and suggest solutions to counter this physiopathy. Root samples from healthy plants were collected and compared with samples from plants with KVDS. Macroscopically, the roots affected by KVDS were rotting and with reddish sections, showing a loss of rhizodermis and cortical parenchyma (Fig. 1). For microscopic analysis, the roots were fixed in 10% formalin, dehydrated in alcohol, cleared and finally embedded in paraffin. Each individual sample was sectioned into 5 μm thick sections and stained with Safranin-Fast Green (Fig. 2) and PAS (Fig. 3) for light microscopy, or prepared for fluorescence microscopy (Fig. 4). Damage to the root system was observed, with tissue breakdown and decomposition, rhizodermis flaking, cortical area with loss of cell turgor, initial decay of the stele, and clear detachment of the cortex from the central conducting tissues. In the control samples, the roots exhibited a 13 μm thick rhizodermis and a mean parenchymatous cell size of 44.5 μm , unlike the KVDS sample, where the rhizodermis was 8.3 μm thick and the average cell size 34.7 μm . Waterlogging and the resulting decrease in oxygen around the roots had a negative, rapid and significant effect on the physiological state and on kiwifruit growth. To ensure optimal growth of kiwifruit plants, innovative soil management will be applied to reduce compaction and increase aeration.

With the support of the Zespri Innovation project "Water and soil management of G3 in Italy" Gi21020.



Fig.1. (a) Control and (b) KVDS roots.

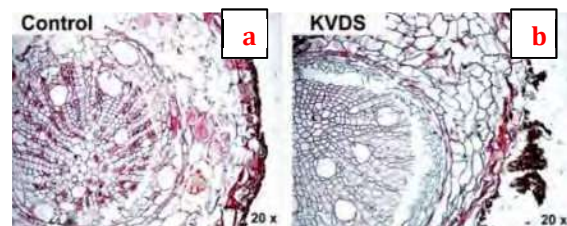


Fig. 2. Cross section of (a) control and (b) KVDS roots (Safranin-Fast green stain)

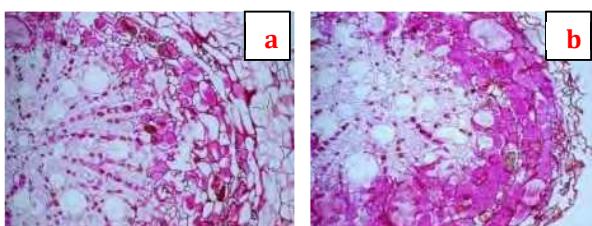


Fig. 3. Cross section of (a) control and KVDS roots (PAS stain).

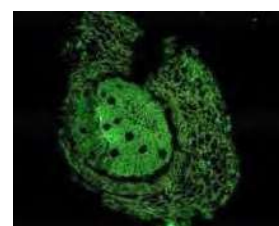


Fig. 4. Root affected by KVDS in fluorescence.

https://drive.google.com/file/d/14voXR_R7MCZWGCDCbrcPq51G5PUuipmB/view?usp=sharing