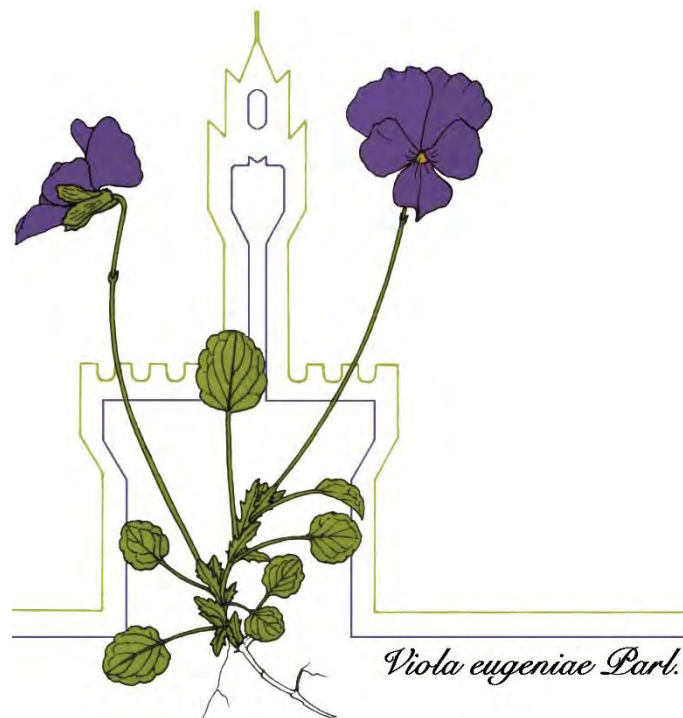


# 117° Congresso della Società Botanica Italiana

VIII INTERNATIONAL PLANT SCIENCE CONFERENCE (IPSC)

BOLOGNA, 7 - 10 SEPTEMBER 2022



## ABSTRACTS

KEYNOTE LECTURES, COMMUNICATIONS, POSTERS

## Scientific Committee

Alessandro Chiarucci (Università di Bologna)  
Presidente  
Stefania Biondi (Università di Bologna)  
Antonella Canini (Università di Roma Tor Vergata)  
Giovanni Cristofolini (Università di Bologna)  
Stefano Del Duca (Università di Bologna)  
Vincenzo De Feo (Università di Fisciano)  
Gianniantonio Domina (Università di Palermo)  
Goffredo Filibeck (Università della Toscana)  
Marta Galloni (Università di Bologna)  
Maria Paola Germanò (Università di Messina)  
Lorenzo Gianguzzi (Università di Palermo)  
Marcello Salvatore Lenucci (Università del Salento)  
Stefano Loppi (Università di Siena)  
Filippo Maggi (Università di Camerino)  
Michela Marignani (Università di Cagliari)  
Lorella Navazio (Università di Padova)  
Fabio Orlandi (Università di Perugia)  
Rossella Pistocchi (Università di Bologna)  
Ferruccio Poli (Università di Bologna)  
Gianni Sacchetti (Università di Ferrara)  
Laura Sadori (Università La Sapienza, Roma)  
Luigi Sanità di Toppi (Università di Pisa)  
Solveig Tosi (Università di Pavia)  
Giuseppe Venturella (Università di Palermo)

## Local Committee

Iris Aloisi (iris.aloisi2@unibo.it)  
Fabiana Antognoni (fabiana.antognoni@unibo.it)  
Stefania Biondi (stefania.biondi@unibo.it)  
Fabrizio Buldrini (fabrizio.buldrini@unibo.it)  
Marco Cantonati (marco.cantonati@unibo.it)  
Davide Cavalletti (davide.cavalletti@unibo.it)  
Alessandro Chiarucci  
(alessandro.chiarucci@unibo.it)  
Stefano Del Duca (stefano.delduca@unibo.it)  
Maura Ferri (maura.ferri@unibo.it)  
Manuela Mandrone  
(manuela.mandrone2@unibo.it)  
Umberto Mossetti (umberto.mossetti@unibo.it)  
Juri Nascimbene (juri.nascimbene@unibo.it)  
Luigi Parrotta (luigi.parrotta@unibo.it)  
Laura Pezzolesi (laura.pezzolesi@unibo.it)  
Rossella Pistocchi (rossella.pistocchi@unibo.it)  
Ferruccio Poli (ferruccio.poli@unibo.it)  
Mirko Salinitro (mirko.salinitro2@unibo.it)  
Annalisa Tassoni (annalisa.tassoni2@unibo.it)  
Alessandra Zambonelli  
(alessandr.zambonelli@unibo.it)

With the patronage of



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

## Sponsor



Koeltz Botanical Books



# INDEX

## Posters

### 3. "BIODIVERSITY: A CHALLENGE FOR NATURE CONSERVATION AND ENVIRONMENTAL MONITORING"

Costanza Baldisserotto, Sara Demaria, Roberta Marchesini, Lorenzo Ferroni, Linda Benetti, Marcello Zanella, Simonetta Pancaldi	Natural microalgae consortia for the removal of nitrogen and phosphorus from urban wastewater streams: the case of the thickening effluent from the wastewater treatment plant of Ferrara	1
Miriam Bazzicalupo, Martino Adamo, Karl J. Duffy, Laura Cornara, Jacopo Calevo	Hybridization does not limit the distribution of the endangered <i>Orchis patens</i>	2
Gianni Bedini, Gianmaria Bonari, Katia Caparelli, Marco D'Antraccoli, David Dolci, Giulio Ferretti, Giovanni Gestri, Giuliano Pacifico, Brunello Pierini, Lorenzo Pinzani, Francesco Roma-Marzio, Lorenzo Peruzzi	Addressing data quality issues of Wikiplantbase #Toscana	3
Simone Eusebio Bergò, Maria Consolata Siniscalco, Elisa Giaccone, Ludovica Oddi, Umberto Morra di Cella	Mapping habitats in Nature 2000 sites in Aosta Valley through photo-interpretation of images from drones and field surveys	4
Giuseppe Bonanno, Martina Orlando-Bonaca	Marine plastic pollution: how significant is the impact on seagrass ecosystems?	5
Federica Bonini, Valentina Ferri, Laura Cencini, Simona Ciancaleoni, Maurizio Conticelli, Francesco Falcinelli, Marco Fratoni, David Grohmann, Marco Maovaz, Maurizio Micucci, Antonella Montanucci, Valeria Negri, Lorenzo Raggi, Giuseppe Ratini, Daniela Gigante	Annex II-IV (Dir. 92/43/EEC) plant species occurring in Umbria region: distribution maps, demographic studies and conservation actions within the LIFE19 IPE/IT/000015 Project	6
Martina Bottoni, Fabrizia Milani, Lorenzo Colombo, Paola Sira Colombo, Claudia Giuliani, Piero Bruschi, Gelsomina Fico	Ethnobotany as an effective tool to preserve biodiversity: the case study of Valmalenco (SO, Italy)	7
Giulia Canali, Cristina Malegori, Paola Malaspina, Rodrigo Rocha de Oliveira, Monica Casale, Paolo Oliveri, Luca di Nuzzo, Renato Benesperi, Juri Nascimbene, Paolo Giordani	NIR hyperspectral imaging: a tool for visualising the spatial distribution of water in non-vascular epiphytic communities	8
Elisa Carrari, Cristina Gasperini, Marco Cabrucci, Ilaria Santi, Federico Selvi	Influence of forest management on microclimate and understorey vegetation in a mixed oak forest	9
Maria Beatrice Castellani, Rossano Bolpagni, Lorenzo Lastrucci, Alice dalla Vecchia, Erika Piaser, Andrea Coppi, Paolo Villa	Analysis of genetic diversity and phenotypic plasticity in <i>Phragmites australis</i> and <i>Nuphar lutea</i> . A case study from Northern and Central Italy	10
Matteo Conti, Michele Lussu, Riccardo Testolin, David Dolci, Nicola Alessi, Piero Zannini	Aggregation of occurrence data in FlorItaly, the portal to the flora of Italy	11
Paola De Giorgi, David Dolci, Daniela Ciccarelli, Gianni Bedini	Using species distribution models to monitor threatened species	12
Niccolò Forin, Simone Marcolini, Elena Palmieri, Sebastiano Nigris, Manlio Speciale, Rosario Schicchi, Barbara Baldan	DNA Barcoding of <i>Cycas</i> collections from the Botanical Gardens of Padova and Palermo	13
Cristina Gasperini, Elisa Carrari, Sanne Govaert, Camille Meeussen, Karen De Pauw, Jan Plue, Pieter Sanczuk, Thomas Vanneste, Pieter Vangansbeke, Giovanni Jacopetti, Pieter De Frenne, Federico Selvi	Edge effects on the realised soil seed bank along microclimatic gradients in temperate European forests	14

Gabriele Gheza, Luca Di Nuzzo, Renato Benesperi, Elisabetta Bianchi, Paolo Giordani, Helmut Mayrhofer, Pier Luigi Nimis, Walter Obermayer, Chiara Vallese, Juri Nascimbene	The challenge of cryptic species for biodiversity conservation: the case study of the morphologically uniform genus <i>Cetrelia</i> in Italy	15
Elisa Giaccone, Martino Adamo, Marco Mucciarelli	Seed germination patterns of segetal species collected in North Western Alps	16
Paolo Giordani, Renato Benesperi, Luca Di Nuzzo, Giulia Canali, Elisabetta Bianchi, Chiara Vallese, Gabriele Gheza, Paola Malaspina, Philipp Porada, Juri Nascimbene	The microclimate from a lichen functional diversity perspective	17
Maurizio Iovane, Giovanna Aronne	Heat treatment during microsporogenesis triggers distally disruption in <i>P. palinuri</i>	18
Valentina Lucia Astrid Laface, Carmelo Maria Musarella, Giovanni Spampinato	Population structure of <i>Salvia ceratophylloides</i> Ard., a very rare endemism of Reggio Calabria (Southern Italy)	19
Lorenzo Lazzaro, Michele Mugnai, Michele Giunti, Fabrizio Bartolini, Giulio Ferretti, Francesca Giannini, Renato Benesperi	Two years of monitoring within the project Life LETSGO GIGLIO: pre-interventions state of the impacts on biodiversity at Giglio Island	20
Valeria Leoni, Luca Giupponi, Alberto Tamburini, Carla Gianoncelli, Annamaria Giorgi	Study of an endemic plant as a resource for mountain agroecosystems: <i>Sanguisorba dodecandra</i> Moretti	21
Silvano Lodetti, Francesco Porro	GLORIA-WALSAT: a new analysis protocol to assess winning and losing alpine plant species in the context of climate change within the international GLORIA network	22
Flaminia Mariani, Emanuele Pelella, Simona Ceschin	Alteration of plant and invertebrate communities in waterbodies dominated by the invasive alien macrophyte <i>Lemna minuta</i> and proposals for its containment	23
Fabrizia Milani, Martina Bottoni, Laura Bardelli, Lorenzo Colombo, Paola Sira Colombo, Piero Bruschi, Claudia Giuliani, Gelsomina Fico	Preventing the loss of biocultural diversity in Valle Imagna (BG, Italy): an Ethnobotanical survey to the rescue	24
Juri Nascimbene, Pier Luigi Nimis, Holger Thüs	Better together? - Freshwater lichens, including three new species in the genera <i>Aspicilia</i> and <i>Verrucaria</i> , associated with <i>Lobothallia hydrocharis</i> (Poelt & Nimis) Sohrabi & Nimis from watercourses of Sardinia	25
Silvia Ongaro, Deborah Isocrono	Lichen communities on <i>Fraxinus</i> in Aosta Valley: conservation issues	26
Tiziana Panichella, Matteo Gentilucci, Federico Maria Tardella, Andrea Catorci	Revisiting seminatural grasslands at Pian Grande di Castelluccio di Norcia to assess patterns of vegetation change	27
Lorenzo Peruzzi, David Dolci, Alessandro Chiarucci	Potential climatic and elevational range shifts in the Italian narrow endemic <i>Bellevalia webbiana</i> (Asparagaceae) under climate change scenarios	28
Lina Podda, Marco Porceddu, Ludovica Dessì, Vanessa Lozano, Giuseppe Brundu, Gianluigi Bacchetta	An overview of invasive <i>Acacia</i> species in the Mediterranean Basin: from germination ecophysiology to monitoring and management plans	29
Rosa Ranalli, Mauro Fois, Marta Galloni, Gianluigi Bacchetta, Giovanna Aronne, Anastasia Stefanaki, Theodora Petanidou, Ziva Fiser	Does floral complexity increase the likelihood of extinction for the Italian flora?	30

Sonia Ravera, Claudia Coccozza, Renato Benesperi, Elisabetta Bianchi, Luca Di Nuzzo	Influence of abiotic factors on tree-level lichen diversity in Mediterranean mountain forests	31
Francesco Rota, Gabriele Casazza, Peter Schönswetter, Camilla Wellstein	Future and past of the endemic alpine plants of the Dolomites: response to future climate change and phylogeography	32
Rosario Schicchi, Anna Geraci, Filippo Amato, Giuseppe Di Noto, Gaetano La Placa, Francesco Sgadari, Roberto Danti	Manual pollinations among individuals of <i>Abies nebrodensis</i> (Madonie, Sicily)	33
Elisabetta Sgarbi, Claudio Brandoli, Mara Politi, Consolata Siniscalco	Study of pollen viability in <i>Corylus avellana</i> cv. Tonda Gentile	34

#### 4. "PLANT SPECIES CONCEPTS IN THE 21TH CENTURY"

Gianniantonio Domina, Giuseppe Venturella, Emilio Di Gristina, Giulio Barone	The Herbarium of Fr. Gioacchino Russo in San Martino delle Scale (Palermo)	35
Giuseppe Emma, Greg M. Walter, James Clark, Delia Terranova, Simon J. Hiscock, Jon R. Bridle, Salvatore Cozzolino, Antonia Cristaudo	Phenotypic plasticity is a potential mechanism for responding to novel environmental conditions	36
Lucrezia Laccetti, Mariachiara Cangemi, Giovanni Scopece	Local adaptation to biotic and abiotic factors in the cliff species <i>Dianthus rupicola</i> : a preliminary study	37
Ilaria Masullo, Salvatore Cozzolino, Maria Rosaria Barone Lumaga, Giovanni Scopece, Donata Cafasso	Components of post mating isolation in a genus of Mediterranean orchids	38
Manuel Tiburtini, Luca Sandroni, Giovanni Astuti, Lorenzo Peruzzi	A comparison of supervised classification models in detecting morphospecies: a case study in the <i>Armeria denticulata</i> complex (Plumbaginaceae)	39

#### 5. "PRIMARY AND SECONDARY METABOLITES PRODUCED BY AQUATIC PHOTOTROPHS WITH IMPLICATIONS FOR THE ENVIRONMENT AND BIOECONOMY"

Denise Lenzo, Ana Bartual, Bárbara Úbeda, Eva Zubía, Marina Antonia Colangelo, Andrea Pasteris, Laura Pezzolesi	Effect of a metabolite produced by the invasive macroalga <i>Rugulopteryx okamurae</i> (Phaeophyceae) on unicellular phototrophs	40
---	--	----

#### 6. "URBAN GREEN-SPACE PLANNING AND MANAGEMENT: FROM FUNCTIONAL ASPECTS TO ECOSYSTEM BENEFITS"

Enrico Bajona, Giampiero Musmeci, Francesco Maria Raimondo, Filippo Salerno, Giovanni Zizzo	Botanical studies on the peri-urban system of private historical gardens in the city of Trapani	41
Flavia Bartoli, Arianna Nucera, Giulia Caneva	The past for the future: Botanical analysis of the lost garden of Villa Montalto (Rome) for new green cultural prospective in the city	42
Chiara Calise, Katia Perini, Paola Castellari, Elena Nicosia, Enrica Roccotiello	Microclimatic and Environmental Improvement with Nature-Based Solutions in a Mediterranean City	43
Patrizia Campisi, Elisa Petrotto, Mattia Letizia Marino, Maria Giovanna Dia	School gardens as a resource to be exploited for learning Botany in primary and kindergarten school	44
Emilio Di Gristina, Maria Letizia Gargano, Patrizia Campisi, Vivienne Spadaro, Francesco Maria Raimondo	New plants in the urban green of the city of Palermo (N-Sicily)	45
Elisa Furia, Anna Maria Mercuri, Alessandro Travaglini	First data from a palynological analyses of urban green area pollen in the city of Reggio Emilia	46

Nicola Lothar Herrmann, Umberto Mossetti, Fortunato Fulvio Bitonto, Laura Bortolotti, Giovanna Dante, Annalisa Managlia, Marta Galloni	The Pollinator Garden: an oasis for urban pollinators and a point of reference for pollinator-friends	47
Antonello Prigioniero, Daniela Zuzolo, Ülo Niinemets, Alessia Postiglione, Mariano Mercurio, Francesco Izzo, Marco Trifuoggi, Maria Toscanesi, Pierpaolo Scarano, Maria Tartaglia, Maria Maisto, Maria Antonietta Ranauda, Rosaria Sciarrillo, Carmine Guarino	Role of leaf surface functional traits in sequestration and retention of particulate matter and polycyclic aromatic hydrocarbons in Mediterranean urban forests	48
Chiara Proietti, Fabio Orlandi, Luigia Ruga, Desirée Muscas, Silvia Marrapodi, Aldo Ranfa, Marco Fornaciari	Active citizen involvement in green management through the LIFE CLIVUT project	49
Luigia Ruga, Fabio Orlandi, Chiara Proietti, Aldo Ranfa, Silvia Marrapodi, Marco Fornaciari	The LIFE CLIVUT Project: Citizen Science through Plant Phenology	50
Ilda Vagge, Stefano Bocchi, Valentina Vaglia, Alessio Gosetti Poli, Ambrogio Zanzi	Urban Ecosystem Services assessment: a systemic approach and evaluation framework for Milan	51
<b>7. “TRANSLATING PLANT RESEARCH FROM LAB TO LIFE: CELLULAR, MOLECULAR AND BIOTECHNOLOGICAL APPROACHES FOR A SUSTAINABLE DEVELOPMENT”</b>		
Iris Aloisi, Giovanni Maria Poggi, Simona Corneti, Stefano Del Duca, Francesca Ventura	Differences in gluten protein composition in a historical wheat seed collection: the extent of protein changes in the climate change scenario	52
Chiara Amitrano, Christophe El-Nakhel, Youssef Rouphael, Roberta Paradiso, Rosanna Caputo, Stefania De Pascale, Veronica De Micco	The MICROx2 project: how the morpho-functional traits are needed to define growth requirements of microgreens in Space cultivation systems	53
Fabiana Antognoni, Lorenzo Marincich, Sara Pippozzi, Stefania Biondi, Karina Beatriz Ruiz	Exploring the potential use of quinoa seed by-products as biostimulants in <i>Lactuca sativa</i> L. seedlings	54
Elena Bandoni, Erika Bellini, Silvia Giardini, Carlo Sorce, Carmelina Spanò, Debora Fontanini, Alessandro Saba, Andrea Andreucci, Monica Ruffini Castiglione, Mingai Li, Claudio Varotto, Luigi Sanità di Toppi	Studies on metal homeostasis/detoxification mechanisms in the liverwort <i>Marchantia polymorpha</i>	55
Filippo Binci, Giacomo Rago, Lorella Navazio, Marco Giovannetti	Unravelling the role of <i>Mildew Locus O</i> genes in arbuscular mycorrhizal symbiosis	56
Ilaria Borromeo, Fabio Domenici, Gian Piero Marzano, Cinzia Forni	Horticultural crops response to salt stress: role of seed priming and acclimation	57
Andrea Colpo, Sara Demaria, Marzio Zaccarini, Alessandro Forlani, Elena Marrocchino, Lorenzo Ferroni	In-field assessment of drought stress effect on the photosynthetic apparatus functionality in three different apple tree ( <i>Malus domestica</i> Borkh) rootstocks	58
Ilaria Colzi, Maria Beatrice Castellani, Elisabetta Bianchi, Pierluigi Cortis, Antonio De Agostini, Donatella Fibbi, Marco Dainelli, Andrea Coppi, Cristina Gonnelli	Metallophytes colonizing mine wastes as valuable source for environmental technologies	59
Clara Conte, Mauro Mariotti, Micaela Tiso, Gabriella Fenoglio, Elena Nicosia, Enrica Roccotiello	Towards a Nickel-free tomato production	60
Veronica Conti, Claudio Cantini, Marco Romi, Maria Michela Cesare, Luigi Parrotta, Stefano Del Duca, Giampiero Cai	Distinct tomato cultivars are characterized by a differential pattern of biochemical responses to drought stress	61



Laura Cornara, Andrea Volante, Claudia Turcato, Samuele Voyron, Martino Adamo, Mariangela Girlanda, Miriam Bazzicalupo	Symbiotic vs asymbiotic seed germination of eight terrestrial orchid species included in the LIFEorchids Project	62
Enrico Cortese, Luca Cappellin, Alessandro Galenda, Alessia Famengo, Alessio G. Settimi, Manuele Dabalà, Diego De Stefani, Vanni Antoni, Lorella Navazio	Tuning plant perception of plasma-activated water to foster a more sustainable agriculture	63
Giulia De Angelis, Camilla Badiali, Marco Possenti, Simone D'Angeli, Cleofe Palocci, Laura Chronopoulou, Elisa Brasili, Gabriella Pasqua	Endocytic uptake of biopolymeric PLGA nanoparticles in <i>Arabidopsis thaliana</i> cells and roots	64
Angelo De Paolis, Monica De Caroli, Makarena Rojas, Lorenzo Maria Curci, Gabriella Piro, Gian-Pietro Di Sansebastiano	Arsenic effect on the expression of NIP1.1 in <i>Dittrichia viscosa</i> : looking for a marker for genetic improvement	65
Lorenzo Ferroni, Sara Demaria, Andrea Colpo, Simonetta Pancaldi	Afternoon changes in the structure and function of the gigantic chloroplast of <i>Selaginella martensii</i> Spring	66
Mingai Li, Iuliia Khomenko, Silvia Carlin, Urska Vrhovsek, Franco Biasioli, Claudio Varotto	Similarities and differences of functional landscapes underlying the convergent evolution of monocot and dicot isoprene synthase key residues and their implications for poplar genetic improvement	67
Elisa Maricchiolo, Michele Bellucci, Francesca De Marchis, Daniele Fraternali, Francesco Paolucci, Andrea Zattoni, Barbara Roda, Valentina Marassi, Andrea Pompa	Genetic transformation of plant cells as a possible strategy for the production of bioactive compounds or biopolymers	68
Teresa Mazzarella, Matteo Chialva, Jian You Wang, Cristina Votta, Patrizia Vaccino, Salim Al-Babili, Luisa Lanfranco, Valentina Fiorilli	Role of zaxinone, a novel growth promoting apocarotenoid metabolite, in shaping rice rhizomicrobiota	69
Elisa Ovidi, Valentina Laghezza Masci, Enrica Alicandri, Anna Rita Paolacci, Vittorio Vinciguerra, William Tomassi, Matteo Manni, Stefania Garzoli, Alberto Del Lungo, Antonio Tieziz, Mario Ciaffi, Giuseppe Scarascia-Mugnozza	The globe artichoke landrace "Ortano": bioactive molecules from by-products cultivation	70
Sara Parri, Francesca Cristiana Piritore, Marco Romi, Maria Celeste Pereira Dias, Claudio Cantini, Giampiero Cai	Different physio-molecular mechanisms affect water storage strategy and drought tolerance in olive trees	71
Luigi Parrotta, Claudia Faleri, Cecilia, Del Casino, Laviana Mareri, Iris Aloisi, Gea Guerriero, Jean-Francois. Hausman, Stefano Del Duca, Giampiero Cai	Biochemical and cytological interactions between callose synthase and microtubules in the tobacco pollen tube	72
Valerio Petruccioli, Domenico Rosa, Irene Bavasso, Camilla Badiali, Matilde Benassi, Luca Di Palma, Gabriella Pasqua, Elisa Brasili	Nanotechnology to improve micronutrient uptake in plants	73
Alessia Postiglione, Daniela Zuzolo, Antonello Prigioniero, Maria Tartaglia, Pierpaolo Scarano, Mariantonietta Ranauda, Maria Maisto, Rosaria Sciarillo, Carmine Guarino	<i>Quercus ilex</i> phyllosphere: intra- and interdomain features in urban and natural Mediterranean context	74
Enrica Roccotiello, Sara Romeo, Silvia Priarone, Stefano Rosatto, Mirca Zotti, Mauro Mariotti	Response to metals in the Ni-hyperaccumulator <i>Alyssoides utriculata</i> (L.) Medik. in synergy with bacterial and fungal strains	75



Lisa Rotasperti, Luca Tadini, Matteo Chiara, Cristina Crosatti, Davide Guerra, Andrea Tagliani, Sara Forlani, Ignacio Ezquer, David S. Horner, Peter Jahns, Katarzyna Gajek, Addy García, Roxana Savin, Laura Rossini, Alessandro Tondelli, Agnieszka Janiak, Paolo Pesaresi	The barley mutant <i>happy under the sun 1 (hus1)</i> : An additional contribution to pale green crops	76
Federico Selvi, Iliaria Colzi, Cristina Gonnelli	Does polyploidy enhance plant growth, Ni-accumulation and tolerance in hyperaccumulator plants? Insights from the model species <i>Odontarrhena bertolonii</i> (Brassicaceae)	77
Alessandro Silvestri, William Ledford, Valentina Fiorilli, Cristina Votta, Massimo Turina, Raffaella Balestrini, Hailing Jin, Ignacio Rubio-Somoza, Luisa Lanfranco	Evidence of cross-kingdom RNA interference in the arbuscular mycorrhizal symbiosis	78
Veronica Spinelli, Elisa Brasili, Fabio Sciubba, Andrea Ceci, Ottavia Giampaoli, Alfredo Miccheli, Gabriella Pasqua, Anna Maria Persiani	Fungal-derived biostimulants boosting <i>Cichorium intybus</i> : effects of <i>Chaetomium globosum</i> and <i>Minimedusa polyspora</i> culture filtrates on growth performance and metabolomic traits	79
Carmen Tammone, Ivano Spiniello, Dario Nicola Tangredi, Mattia Terzaghi, Francesco Guarino, Angela Cicutelli, Stefano Castiglione	Study of an innovative semi-idroponic Hybrid-flow Constructed Wetland system for the First Flush Stormwater treatment	80
Maria Tartaglia, Daniela Zuzolo, Alessia Postiglione, Antonello Prigioniero, Pierpaolo Scarano, Rosaria Sciarrillo, Carmine Guarino	Biotechnological combination for co-contaminated soil remediation: focus on tripartite “meta-enzymatic” activity	81
Riccardo Tornese, Miriana Durante, Anna Montefusco, Marcello Lenucci	Application of the response surface methodology for the optimization of supercritical CO <sub>2</sub> extraction of oil from pomegranate marc	82
Alessandra Villani, Benedetta Bottiglione, Linda Mastropasqua, Costantino Paciolla	Changes in some bioactive compounds content and growth rate of <i>Lens culinaris</i> Medik sprouts as affected by LED light intensity and quality	83
Daniela Zuzolo, Antonello Prigioniero, Ülo Niinemets, Alessia Postiglione, Mariano Mercurio, Francesco Izzo, Marco Trifuoggi, Maria Toscanesi, Pierpaolo Scarano, Maria Tartaglia, Maria Antonietta Ranauda, Maria Maisto, Rosaria Sciarrillo, Carmine Guarino	Plant-environment interactions: role of leaf functional traits from PTEs air phytoremediation perspective	84
<b>8. “FUNGI: <math>\alpha</math>-BIODIVERSITY, ECOSYSTEM SERVICES, OPEN SCIENCE”</b>		
Marco Giuseppe Balducci, Jacopo Calevo, Karl Joseph Duffy	Does specificity of interactions with mycorrhizal fungi influence the distribution of the Mediterranean orchid, <i>Orchis italica</i> ?	85
Francesco Dovana, Erica Lumini, Enrico Ercole, Marco Mucciarelli	Soil fungal communities under the rare alpine glacial relict <i>Berardia lanuginosa</i> with particular reference to the presence of endophyte fungi	86
Roberto Giovannini, Andrea Ceci, Veronica Spinelli, Anna Maria Persiani	Fungal diversity for bioremediation: tackling co-contaminations in a decommissioned military site	87
Alessia Marino, Simone Bianchi, Marco Leonardi, Alessandra Zambonelli, Marcello Alecci, Mirco Iotti, Angelo Galante	Quantitative 1 T MRI Post-Harvest Surveying of Tuber Aestivum Ascomata	88
Lidia Nicola, Olumayowa Mary Olowe	Nigerian rhizospheric <i>Trichoderma</i> strains against <i>Fusarium</i> phytopathogens: characterization and in vitro antagonistic potential assessment	89

Silvia Perotto, Samuele Voyron, Elena Martino, Stefania Daghino	Metabarcoding of fungal assemblages in the <i>Vaccinium myrtillus</i> endosphere suggests colonization of above-ground plant organs by some ericoid mycorrhizal and DSE fungi	90
Mara Rondolini, Nicola Baldoni, Leonardo Baciarelli Falini, Federica Bonini, Daniela Gigante, Lara Reale, Gilberto Bragato, Domizia Donnini	Monitoring and innovative approaches applied in <i>T. magnatum</i> production areas	91
Michele Vezzola, Tosi Solveig	Exploitation of fungi in biomining	92

## 9. “FROM MEDICINAL PLANTS TO HEALTH PRODUCTS THROUGH SPECIALIZED METABOLISM”

Giulia Abate, Manuela Mandrone, Mariachiara Pucci, Iliara Chiochio, Eileen Mac Sweeney, Emanuela Tirelli, Daniela Uberti, Maurizio Memo Ferruccio Poli, Andrea Mastinu	Different seasonal collections of <i>Ficus carica</i> L. leaves diversely modulates lipid metabolism and adipogenesis in 3T3-L1 adipocytes	93
Rosaria Acquaviva, Barbara Tomasello, Claudia Di Giacomo, Simone Bianchi, Alfonsina La Mantia, Francesco Maria Raimondo, Salvatore Ragusa, Giulia Ciarcià, Giuseppe Antonio Malfa	Phenolic content and potential health promoting properties of <i>Eriobotrya japonica</i> (Thunb.) Lindl. (Rosaceae) extracts	94
Giuseppe Amato, Flavio Polito, Lucia Caputo, Vincenzo De Feo, Florinda Fratianni, Vincenzo Candido, Filomena Nazzaro	Chemical composition, agronomic traits of <i>Allium sativum</i> and <i>Allium ampeloprasum</i> leaves and bulbs, and their action against <i>Listeria monocytogenes</i> and other food pathogens	95
Nadia Benedetto, Maria Ponticelli, Ludovica Lela, Immacolata Faraone, Daniela Russo, Mariapia Moles, Luigi Milella	Effect of <i>Gentiana lutea</i> L. bitter compounds on enteroendocrine secretion as novel strategy against obesity	96
Simone Bianchi, Giuseppe Antonio Malfa, Barbara Tomasello, Claudia Di Giacomo, Alfonsina La Mantia, Francesco Maria Raimondo, Rosaria Acquaviva	Biological activities and phytochemical characterization of <i>Origanum majorana</i> L. (Lamiaceae) aerial parts extract rich in rosmarinic acid	97
Anna Cacciola, Emily Cioni, Marinella De Leo, Maria Paola Germanò, Valeria D’Angelo, Salvatore Mirabile, Nunziatina De Tommasi, Alessandra Braca	Chemical and biological studies of fruit extracts from different Italian varieties of <i>Prunus domestica</i> L. (Rosaceae)	98
Giorgio Cappellucci, Giulia Baini, Federica Vaccaro, Elisabetta Miraldi, Marco Biagi	Ethnobotany and wound healing: from tradition to integrated models for the study of poorly investigated species	99
Lucia Caputo, Francesca Capozzolo, Giuseppe Amato, Vincenzo De Feo, Florinda Fratianni, Giovanni Vivencio, Laura De Martino, Filomena Nazzaro	Chemical composition, antibiofilm, cytotoxic, and anti-acetylcholinesterase activities of <i>Myrtus communis</i> L. leaves essential oil	100
Simonetta Cristina Di Simone, Alessandra Acquaviva, Maria Loreta Libero, Nilofar, Claudio Ferrante, Luigi Menghini	Qualitative Chemical Characterization and Multidisciplinary Biological Investigation of Different Root and Aerial Parts Extracts from <i>Epilobium hirsutum</i>	101
Antonella Di Sotto, Marco Gulli, Alessandra Acquaviva, Massimo Tacchini, Simonetta Cristina Di Simone, Annalisa Chiavaroli, Lucia Recinella, Sheila Leone, Luigi Brunetti, Giustino Orlando, Giancarlo Angeles Flores, Roberto Venanzoni, Paola Angelini, Luigi Menghini, Claudio Ferrante	Valorization of the essential oils from two Italian hemp crops: a phytochemical and pharmacological evaluation	102

Marika Fiorentino, Claudia Gravina, Marialuisa Formato, Simona Piccolella, Assunta Esposito, Severina Pacifico	The microencapsulation of <i>Calendula arvensis</i> florets and leaves: a strategy for bioactive compound's preservation	103
Marialuisa Formato, Maria Tommasina Pecoraro, Simona Piccolella, Severina Pacifico	Nutraceutical perspectives of industrial hemp: focusing on CBDA	104
Claudia Gravina, Marialuisa Formato, Adriano Stinca, Marika Fiorentino, Simona Piccolella, Severina Pacifico, Assunta Esposito	Investigation and valorization of methanolic plant-extract in cosmeceuticals: a case study of <i>Lavandula austroaepennina</i> N.G. Passal., Tundis & Upton	105
Mariarosaria Ingegneri, Antonella Smeriglio, Giuseppina Mandalari, Domenico Trombetta	The almond blanching process generates two interesting waste products to be used in the nutraceutical and cosmeceutical field	106
Alfonsina La Mantia, Rosaria Acquaviva, Barbara Tomasello, Claudia Di Giacomo, Giuseppe Carlo Zimbalatti, Simone Bianchi, Francesco Maria Raimondo, Irina Naletova, Giuseppe Antonio Malfa	Anthocyanins profile and genotoxic activities of <i>Myrtus communis</i> L. (Myrtaceae) berries extract	107
Mariacaterina Lianza, Riccardo Gasparini, Lorenzo Marincich, Giovanni Maria Poggi, Simona Corneti, Iris Aloisi, Fabiana Antognoni	From primitive to modern crops: bioactive compound characterization of fifty durum wheat germplasms from Global Durum wheat Panel (GDP)	108
Maria Maisto, Daniela De Nigris, Daniela Zuzolo, Maria Tartaglia, Maria Antonietta Ranauda, Alessandra Falzarano, Alessia Postiglione, Antonello Prigioniero, Pierpaolo Scarano, Rosaria Sciarrillo, Carmine Guarino	From tradition to ethnopharmacology: a new ethnobotanical approach in the use of antidiabetic medicinal plants in Italy	109
Giuseppe Antonio Malfa, Barbara Tomasello, Claudia Di Giacomo, Alfonsina La Mantia, Simone Bianchi, Francesco Pappalardo, Francesco Maria Raimondo, Rossella Tundis, Rosaria Acquaviva	Wild cardoon [ <i>Cynara cardunculus</i> (L.) subsp. <i>sylvestris</i> Lam. (Asteraceae)] leaves extract, phenolic profile, antioxidant properties and hepatoprotective activities	110
Giulia Mastellone, Arianna Marengo, Gaia Bechis, Barbara Sgorbini, Patrizia Rubiolo, Cecilia Cagliari	Fiber-Type <i>Cannabis sativa</i> L.: Phytochemical Characterization and Biological Activity of the Aerial Parts at Different Growth Stages	111
Luigi Menghini, Alessandra Acquaviva, Simonetta Cristina Di Simone, Antonella Canini, Roberto Braglia, Gabriele Di Marco, Claudia Campana, Paola Angelini, Giancarlo Angeles Flores, Roberto Venanzoni, Maria Loreta Libero, Bruno Tirillini, Gokhan Zengin, Annalisa Chiavaroli, Lucia Recinella, Sheila Leone, Nilofar, Luigi Brunetti, Giustino Orlando, Claudio Ferrante	Phytochemical and biological investigations on the pollen from industrial hemp male inflorescences	112
Hamid Mushtaq, Simona Piccolella, Assunta Esposito, Lorenzo Manti, Severina Pacifico	Radiomodulating effect of an alcoholic extract from leaves <i>Olea europaea</i> L. cv. Caiazzana	113
Vincenzo Musolino, Roberta Macri, Jessica Maiuolo, Antonio Cardamone, Saverio Nucera, Luigi Tucci, Carmine Lupia, Rosamaria Caminiti, Mariangela Marrelli, Vincenzo Mollace	<i>Salvia rosmarinus</i> Spenn. (Lamiaceae) ethanol extract: phytochemical analysis, antioxidant activity and <i>in vitro</i> evaluation of fatty acid accumulation	114
Maria Antonietta Ranauda, Daniela Zuzolo, Maria Tartaglia, Antonello Prigioniero, Pierpaolo Scarano, Alessia Postiglione, Maria Maisto, Alessandra Falzarano, Rossella Clemente, Rosaria Sciarrillo, Carmine Guarino	From the ethnobotanical tradition of Italy to the scientific approach: medicinal plants and functional foods in the treatment and prevention of cardiovascular diseases	115

Cinzia Sanna, Arianna Marengo, Antonio De Agostini, Giovanna Lucia Delogu, Roberta Lai, Patrizia Rubiolo, Benedetta Era, Sonia Floris, Antonella Fais, Francesca Pintus	Antidiabetic potential of <i>Ptilostemon casabonae</i> (L.) Greuter, a little-known Mediterranean plant	116
Pierpaolo Scarano, Antonio Bosco, Antonello Prigioniero, Stefania Iervolino, Daniela Zuzolo, Maria Tartaglia, Alessia Postiglione, Maria Maisto, Maria Antonietta Ranauda, Alessandra Falzarano, Giuseppe Cringoli, Carmine Guarino, Rosaria Sciarrillo	Extraction, characterization, and <i>in vitro</i> evaluation of the anthelmintic efficacy of pasteur plant species for biological control of sheep gastrointestinal nematodes (GIN)	117
Francesco Sgadari, Rosario Schicchi, Natale Badalamenti, Maurizio Bruno	Analysis of Sicilian populations of the genus <i>Capparis</i> L. for the determination of quercetin content	118
Massimo Tacchini, Annalisa Maietti, Alessandro Grandini, Nicola Marchetti, Immacolata Maresca, Gianni Sacchetti, Alessandra Guerrini	<i>Eragrostis tef</i> (Zucc.) Trotter (Poaceae) from Ethiopia, a valuable source of nutrients and dietary flavones	119
Annalisa Tassoni, Mirko Salinitro, Maura Ferri, Stefania Monari	Biochemical characterization of seven Italian medicinal plant species	120
Maria Fernanda Taviano, Federica Davì, Rosaria Acquaviva, Giuseppe Antonio Malfa, Barbara Tomasello, Paola Arena, Salvatore Ragusa, Francesco Cacciola, Yassine Oulad El Majdoub, Luigi Mondello, Natalizia Miceli	Phenolic profile, antioxidant and cytotoxic activity of the phenolic-rich fraction obtained from the leaves of <i>Brassica fruticulosa</i> subsp. <i>fruticulosa</i> (Brassicaceae) grown wild in Sicily	121
Simona Trincia, Giovanni Pigati, Manuela Mandrone, Ilaria Chiochio, Cinzia Sanna, Ferruccio Poli	Metabolomic study of <i>Cynara cardunculus</i> L. collected in two different seasons in Sardinia	122
Federica Vaccaro, Giulia Bainsi, Giorgio Cappellucci, Marco Biagi, Elisabetta Miraldi	Potential of <i>Olea europaea</i> L. leaf extract from Central and Southern Italy in neuronal stress containment	123
Giovanna Valentino, Adriano Stinca, Assunta Esposito, Antonio Fiorentino	A rapid metabolomics-guided identification of potential anticancer specialized metabolites active against drug-resistant cancer cell lines from Asteraceae plants	124
10. FREE TOPIC		
Marta Barberis, Massimo Nepi, Marta Galloni	Make it complex: floral nectar as a multifunctional crossroads	125
Elisabetta Bianchi, Christian Lorenz, Giovanni Poggiali, Giulia Alemanno, Renato Benesperi, John Robert Brucato, Stephen Garland, Jörn Helbert, Andreas Lorek, Alessandro Maturilli, Alessio Papini, Jean-Pierre de Vera, Mickael Baqué	Survivability of <i>Xanthoria parietina</i> in simulated Mars conditions for 30 days	126
Fabrizio Buldrini, Alessandro Alessandrini, Alessandro Chiarucci, Umberto Mossetti, Giovanna Pezzi, Adriano Soldano, Juri Nascimbene	<i>Prodromus Florae Bononiensis ex horto sicco Ulyxis Aldrovandi</i> : a flora ahead of its time from a Renaissance Italian herbarium	127
Simona Ceschin, Neil T.W. Ellwood, Mattia M. Azzella, Flaminia Mariani, Emanuele Pelella	Unusual underwater flowering of <i>Utricularia australis</i> population: a botanical enigma	128
Annalena Cogoni, Daniela Gigante, Silvia Poponessi	Preliminary investigations on Mediterranean temporary ponds: study cases from Sardinia, Corsica, and inland Central Italy	129

Emilio Corti, Giuseppe Pieraccini, Besiana Nako, Cristina Gonnelli, Alessio Papini, Sara Falsini	Quantitative analysis of secondary metabolites in <i>Eruca sativa</i> under salt stress	130
Marco Dainelli, Sara Falsini, Massimo del Bubba, Lorenzo Venturini, Alessio Papini, Ilaria Colzi, Sandra Ristori, Cristina Gonnelli, Andrea Coppi	Plants do not like it coloured: PET micro/nanoplastics with various colours impact differently on <i>Arabidopsis thaliana</i> growth	131
Marco D'Antraccoli, Francesco Roma-Marzio, Leonardo Cocchi, Nóra Weiger, Lucia Amadei, Giovanni Astuti, Roberta Vangelisti, Lorenzo Peruzzi	Biodiversity informatics and Museums: from the documentation of collections to dissemination at the Botanic Garden and Museum of Pisa	132
Anna D'aria, Giampiero Ciaschetti, Salvatore Cozzolino, Giovanni Scopece	Pollination success of the deceptive orchid <i>Anacamptis morio</i> : benefit from proximity or similarity?	133
Antonio De Agostini, Maitane Juarez, Marina López-Pozo, Javier Martínez-Abaiagar, Encarnación Núñez-Olivera, Unai Artexte, Marco Michelozzi, Gabriele Cencetti, Francesco Loreto, Susanna Pollastri, Daniel Stanton, Annalena Cogoni, Pierluigi Cortis, Alicia V. Perera-Castro, Hong Truong Luu, Buu Thach Le, Thanh Luc Nguyen, José Ignacio García-Plazaola, Antonio Hernandez, Raquel Esteban	Biogenic Volatile Organic Compounds (BVOCs) around the world: does geography shapes BVOCs profiles in bryophytes?	134
Veronica De Micco, Alessia D'Auria, Francesca Petracca, Sara De Francesco, Francesco Niccoli, Simona Altieri, Arturo Pacheco, Antonello Bonfante, Chiara Cirillo, Arturo Erbaggio, Pierpaolo Sirch, Giovanna Battipaglia	Quantitative anatomical traits and stable isotopes in wood rings of Greco grapevine reveal acclimation to environmental variability and cultivation factors: the GREASE Project	135
Mario Di Stefano, Francesca Carruggio, Giuseppe Diego Puglia, Antonia Cristaudo	Plastic germination response of plants living in Mediterranean temporary ponds (3170* habitat)	136
Sara Falsini, Corrado Tani, Valentina Rech, Alessio Papini, Paola Faraoni, Sara Campigli, Luisa Ghelardini, Gianluca Bleve, Domenico Rizzo, Emanuele Marcucci, Ilaria Scarpelli, Lorenzo Drosera, Alessio Gnerucci, Francesco Ranaldi, Francesca Peduto Hand, Guido Marchi, Silvia Schiff	Light and electron microscopy observations of <i>Rhamnus alaternus</i> L. infected by <i>Xylella fastidiosa</i> subsp. <i>multiplex</i>	137
Claudia Giuliani, Martina Bottoni, Fabrizia Milani, Debora Tura, Remo Chiozzotto, Irina Baccichet, Davide Boni, Sergio Cozzaglio, Laura Santagostini, Alessio Papini, Marco Cirilli, Gelsomina Fico	<i>Toscolea</i> project: enhancing the local <i>cultivars</i> of <i>Olea europaea</i> L. in Toscolano Maderno (Brescia, Italy)	138
Luca Giupponi, Valeria Leoni, Marco Zuccolo, Davide Pedrali, Annamaria Giorgi	Functional strategy and leaf shape of <i>Campanula elatinoidea</i> Moretti: results of an intraspecific analysis	139
Isidora Gjata, Costantino Paciolla, Alessandra Villani, Silvana De Leonardis, Franca Tommasi	Effects of several rare earth elements on the growth, photosynthetic pigments, ascorbate content, and lipid peroxidation level of <i>Lemna minor</i> L.	140
Martina Grattacaso, Giulia Canali, Andrea Vannini, Giuseppe Protano, Francesco Nannoni, Vivien De Lucia, Luigi Antonello Di Lella, Stefano Biagiotti, Stefano Loppi	Preliminary results on the geographical traceability of extra virgin olive oil from Valdichiana Senese	141
Greta La Bella, Marta Carboni, Marta Gaia Sperandii, Alicia T.R. Acosta	Drivers of plant community (in)stability on coastal dunes	142

Eleonora Manzo, Justus Müller-Kiefer, Salvatore Tomasello	Competition and allelopathy triggering the exclusion of the native <i>Xanthium strumarium</i> L. by the American <i>X. orientale</i> L.	143
Antonella Muto, Leonardo Bruno, Innocenzo Muzzalupo, Adriana Ada Ceverista Chiappetta, Carsten Muller, Hilary J. Rogers, Maria Beatrice Bitonti, Natasha Damiana Spadafora	Multi-Omic approach to investigate phytochemical and gene expression changes in <i>Prunus persica</i> L. cultivars during post-harvest ripening	144
Massimo Nepi, Claudia Faleri, Emanuele Giordano, Daniele Calabrese, Valeria De Carlo, Massimo Guarnieri, Daniele Giannetti, Donato A. Grasso, Stefano Mancuso	Effect of ants' visits on nectary and nectar chemistry in <i>Prunus avium</i> L.	145
Ludovica Oddi, Mirco Migliavacca, Edoardo Cremonese, Gianluca Filippa, Giorgio Vacchiano, Consolata Siniscalco, Umberto Morra di Cella, Marta Galvagno	Contrasting responses of forest growth and carbon sequestration to heat and drought in the Alps	146
Davide Pedrali, Valeria Leoni, Luca Giupponi, Tiziana Lazzarina Zandrini, Marco Zuccolo, Alessia Maria Bernardi, Annamaria Giorgi	The importance of technical assistance in the return of rye ( <i>Secale Cereale</i> L.) in Camonica Valley (north Italy)	147
Francesca Petracca, Chiara Cirillo, Carmen Arena, Antonello Bonfante, Marco Giulioli, Arturo Erbaggio, Nicola Damiano, Rosanna Caputo, Veronica De Micco	Foliar distribution of basalt dust in Falanghina grapevine modulates leaf anatomical and photosynthetic traits to improve tolerance to drought	148
Francesco Roma-Marzio, Lucia Amadei, Giovanni Astuti, David Dolci, Simonetta Maccioni, Nicoletta Magrini, Federica Pierotti, Roberta Vangelisti, Lorenzo Peruzzi	Digitization of the Herbarium Guadagno. 3. Results from a four-year project	149
Monica Ruffini Castiglione, Carmelina Spanò, Lucia Giorgetti, Lorenza Bellani, Stefania Bottega, Luigi Sanità di Toppi, Simonetta Muccifora	May crops be affected by nanoplastics? Current evidence of nano-polystyrene toxicity, internalization, and translocation in plant tissues	150
Francesco Santi, Fabrizio Buldrini, Alessandro Chiarucci	Towards the application of the Habitats Directive to an EU non-member country: the San Marino case study	151
Gianmarco Tavilla, Alessandro Crisafulli, Arthur Lamoliere, Veronica Ranno, Giulia Bacilliere, Salvatore Cambria, Pietro Minissale, Gianpietro Giusso del Galdo, Saverio Sciandrello	Use of drones for environmental monitoring and rare plants conservation status: a new tool for botanical research	152
Chiara Vallese, Luca Di Nuzzo, Paolo Giordani, Renato Benesperi, Gabriele Gheza, Petra Mair, Daniel Spitale, Juri Nascimbene	Substrate type drives species richness and functional traits of alpine terricolous cryptogam communities in the Alps	153
Jessica Zappa, Paola Torri, Anna Maria Mercuri, Mauro Rottoli, Elisabetta Castiglioni, Michele Bassetti, Elisabetta Mottes	Pollen as a tool to reconstruct environmental transformations and land use: case study from a cult area from the Copper and Bronze Age at Gardolo di Mezzo (TN)	154

**10 = Plastic germination response of plants living in Mediterranean temporary ponds (3170\* habitat)**

Mario Di Stefano<sup>1</sup>, Francesca Carruggio<sup>1</sup>, Giuseppe Diego Puglia<sup>2</sup>, Antonia Cristaudo<sup>1</sup>

<sup>1</sup>Department of Biological, Geological and Environmental Sciences, Germplasm Bank (BGS-CT) University of Catania, Via Empedocle 58, 95128 - Catania, Italy; <sup>2</sup>Consiglio Nazionale delle Ricerche, Istituto per i Sistemi Agricoli e Forestali del Mediterraneo (CNR-ISAFOM) U.O.S. Catania, Via Empedocle 58, 95128 - Catania, Italy

Mediterranean temporary ponds (MTPs) are mostly shallow water bodies, which undergo cycles of flooding and drought according to rainfall seasonality. They have a high conservation value for both their ecological function and high biodiversity richness and are considered as a priority habitat according to the 'Habitats' Directive (3170\* Natura 2000 code). Unfortunately, their status is rapidly declining mainly due to anthropogenic factors such as overgrazing, hydrological perturbations, and climate changes.

Seed germination and dormancy of the plant species living in MTPs are quite poorly investigated, whereas studying their germination behavior may allow to highlight species' plastic potential and possible triggers of vegetation dynamics, further considering the high seasonal variability of these habitats.

In our study, we analyzed and compared the germination patterns of two ephemeral key plants from MTPs: *Ranunculus lateriflorus* DC. and *R. ophioglossifolius* Vill., the latter is reported as vulnerable for the Italian territory (Orsenigo et al., 2021). Both species show a pronounced phenotypic plasticity going successively from an aquatic to a terrestrial morphotype. During their aquatic phase, the plants have long petioles and laminar leaves floating on the water surface, whereas during the terrestrial one they develop self-supporting stems and shorter petioles. Both species produce achenes.

The seeds of the two study species were collected in some MTPs of the Hyblean plateau (south-eastern Sicily, Italy), where rich populations occur. Germination experiments were performed using fresh as well as after-ripened seeds to evaluate the effect of temperature (both constant and alternating regimes), light (light/dark - 12/12 h, and full darkness - 0/24 h), after-ripening (Ar) duration, seed position on the receptacle (if basal or apical), and source population. Seed germination was monitored for 30 days, at the end of which the ungerminated seeds from dark experiments were transferred to optimal conditions (15°C in light/dark; recovery conditions) for two additional weeks.

For both species, light always had an enhancing effect on germination, whereas the dark treatment significantly lowered it. Specifically, regardless of constant or alternating temperature regimes, seeds germinated to a high extent in the light. Moreover, Ar improved final germination percentages (> 90%), widened optimal temperatures including warmer values (25°C and 25/20°C), and increased germination rate. As a whole, these findings provide evidences for the Type 1 non-deep physiological dormancy with conditional dormancy (CD). The seeds coming from low temperatures (5°C, 10°C and 15/10°C) and transferred to recovery conditions were still unable to complete germination, indicating the induction of skotodormancy (Baskin & Baskin, 2014). Conversely, the seeds coming from warmer temperatures ( $\geq 20^\circ\text{C}$ ) showed high germination percentages under recovery conditions, implying that thermoinhibition has established during the imbibition in the dark. In addition, in *R. lateriflorus* basal seeds germinated less and more slowly than apical ones and source population did not influence germination behavior.

Our results suggest that a mixed strategy works in the two *Ranunculus* species to meet MTPs variability. On one hand, seeds plastically germinate over a wide temperature range, possibly enhancing seedlings' establishment opportunities, once CD has been released and the ponds have filled up. On the other hand, the inhibiting effect of darkness together with skotodormancy may allow the establishment of a large soil seed bank that could remain viable and germinable at least until the next favorable season.

Considering the high environmental variability of MTPs and the germination needs highlighted by our experiments, it could be interesting to investigate on how the plant community composition of the study sites could be further affected by delayed and reduced rainfalls as well as increased temperature values that are predicted to occur in the Mediterranean region with the ongoing climate change.



## ELENCO COMPLETO DEGLI ABSTRACT IN ORDINE ALFABETICO

Autori	Titolo	Pagina
Giulia Abate, Manuela Mandrone, Mariachiara Pucci, Ilaria Chiocchio, Eileen Mac Sweeney, Emanuela Tirelli, Daniela Uberti, Maurizio Memo Ferruccio Poli, Andrea Mastinu	Different seasonal collections of <i>Ficus carica</i> L. leaves diversely modulates lipid metabolism and adipogenesis in 3T3-L1 adipocytes	93
Chiara Acquaroli, Nicola Lothar Herrmann, Simone Flaminio, Fortunato Fulvio Bitonto, Elise Maria Keller, Giovanna Dante, Fabrizio Tenna, Marta Galloni	Students 4 pollinators: a citizen science project in urban green areas to teach plant diversity and pollinator conservation to young generations	xxix
Rosaria Acquaviva, Barbara Tomasello, Claudia Di Giacomo, Simone Bianchi, Alfonsina La Mantia, Francesco Maria Raimondo, Salvatore Ragusa, Giulia Ciarcià, Giuseppe Antonio Malfa	Phenolic content and potential health promoting properties of <i>Eriobotrya japonica</i> (Thunb.) Lindl. (Rosaceae) extracts	94
Dirk Carl Albach	The species in the age of phylogenomics - Types, hybrids and convergence	IV
Iris Aloisi, Giovanni Maria Poggi, Simona Corneti, Stefano Del Duca, Francesca Ventura	Differences in gluten protein composition in a historical wheat seed collection: the extent of protein changes in the climate change scenario	52
Giuseppe Amato, Flavio Polito, Lucia Caputo, Vincenzo De Feo, Florinda Fratianni, Vincenzo Candido, Filomena Nazzaro	Chemical composition, agronomic traits of <i>Allium sativum</i> and <i>Allium ampeloprasum</i> leaves and bulbs, and their action against <i>Listeria monocytogenes</i> and other food pathogens	95
Chiara Amitrano, Christophe El-Nakhel, Youssef Rouphael, Roberta Paradiso, Rosanna Caputo, Stefania De Pascale, Veronica De Micco	The MICROx2 project: how the morpho-functional traits are needed to define growth requirements of microgreens in Space cultivation systems	53
Fabiana Antognoni, Lorenzo Marincich, Sara Pipponzi, Stefania Biondi, Karina Beatriz Ruiz	Exploring the potential use of quinoa seed by-products as biostimulants in <i>Lactuca sativa</i> L. seedlings	54
Simona Armeli Minicante, Lucia Bongiorno, Amelia De Lazzari	Bio-based products from Mediterranean seaweeds and their opportunities in the bioeconomy field	xxiv
Silvia Assini, Gabriele Gheza, Juri Nascimbene, Alessandro Chiarucci, Giovanna Pezzi, Matteo Barcella	Restoration of dry-acidic grasslands and heathlands in the western Po Plain (Northern Italy – Life Drylands project)	vi
Camilla Badiali, Valerio Petrucci, Fabio Sciubba, Marzia Beccaccioli, Cleofe Palocci, Laura Chronopoulou, Irene Muratore, Massimo Reverberi, Elisa Brasili, Gabriella Pasqua	Innovative approaches for controlling <i>Botrytis cinerea</i> infections in tomato by using poly (lactic-co-glycolic acid) nanoparticles for the vehiculation of antifungals	xxxix
Simonetta Bagella, Claudia Angiolini, Marco Caccianiga, Daniela Gigante, Giovanni Riviaccio, Franco Angelini, Pierangela Angelini, Laura Casella, Mathew J. Pollayil, Manolo Garabini	Robotic Monitoring of Habitats: good news from the dune front	xiii
Enrico Bajona, Giampiero Musmeci, Francesco Maria Raimondo, Filippo Salerno, Giovanni Zizzo	Botanical studies on the peri-urban system of private historical gardens in the city of Trapani	41
Costanza Baldisserotto, Sara Demaria, Roberta Marchesini, Lorenzo Ferroni, Linda Benetti, Marcello Zanella, Simonetta Pancaldi	Natural microalgae consortia for the removal of nitrogen and phosphorus from urban wastewater streams: the case of the thickening effluent from the wastewater treatment plant of Ferrara	1
Nicola Baldoni, Mara Rondolini, Francesco Prosperi, Leonardo Baciarelli Falini, Maurizio Micheli, Domizia Donnini	Preliminary approach to mycorrhization of micropropagated linden sprouts with <i>Tuber borchii</i>	xliv
Marco Giuseppe Balducci, Jacopo Calevo, Karl Joseph Duffy	Does specificity of interactions with mycorrhizal fungi influence the distribution of the Mediterranean orchid, <i>Orchis italica</i> ?	85

Mario V. Balzan	Mainstreaming nature in urban green space planning and management	VI
Elena Bandoni, Erika Bellini, Silvia Giardini, Carlo Sorce, Carmelina Spanò, Debora Fontanini, Alessandro Saba, Andrea Andreucci, Monica Ruffini Castiglione, Mingai Li, Claudio Varotto, Luigi Sanità di Toppi	Studies on metal homeostasis/detoxification mechanisms in the liverwort <i>Marchantia polymorpha</i>	55
Marta Barberis, Massimo Nepi, Marta Galloni	Make it complex: floral nectar as a multifunctional crossroads	125
Giulio Barone, Emilio Di Gristina, Gianniantonio Domina	On the concept of species in cultivated plants and its consequences in alien species and CWR	xix
Flavia Bartoli, Arianna Nucera, Giulia Caneva	The past for the future: Botanical analysis of the lost garden of Villa Montalto (Rome) for new green cultural prospective in the city	42
Ana Bartual Magro	Allelopathic interactions in the diatom phycospheres: ascertaining the ecological role of polyunsaturated aldehydes in the ocean	V
Miriam Bazzicalupo, Martino Adamo, Karl Joseph. Duffy, Laura Cornara, Jacopo Calevo	Hybridization does not limit the distribution of the endangered <i>Orchis patens</i>	2
Gianni Bedini, Gianmaria Bonari, Katia Caparelli, Marco D'Antraccoli, David Dolci, Giulio Ferretti, Giovanni Gestri, Giuliano Pacifico, Brunello Pierini, Lorenzo Pinzani, Francesco Roma-Marzio, Lorenzo Peruzzi	Addressing data quality issues of Wikiplantbase #Toscana	3
Nadia Benedetto, Maria Ponticelli, Ludovica Lela, Immacolata Faraone, Daniela Russo, Mariapia Moles, Luigi Milella	Effect of <i>Gentiana lutea</i> L. bitter compounds on enteroendocrine secretion as novel strategy against obesity	96
Simone Eusebio Bergò, Maria Consolata Siniscalco, Elisa Giaccone, Ludovica Oddi, Umberto Morra di Cella	Mapping habitats in Nature 2000 sites in Aosta Valley through photo-interpretation of images from drones and field surveys	4
Simone Bianchi, Giuseppe Antonio Malfa, Barbara Tomasello, Claudia Di Giacomo, Alfonsina La Mantia, Francesco Maria Raimondo, Rosaria Acquaviva	Biological activities and phytochemical characterization of <i>Origanum majorana</i> L. (Lamiaceae) aerial parts extract rich in rosmarinic acid	97
Elisabetta Bianchi, Christian Lorenz, Giovanni Poggiali, Giulia Alemanno, Renato Benesperi, John Robert Brucato, Stephen Garland, Jörn Helbert, Andreas Lorek, Alessandro Maturilli, Alessio Papini, Jean-Pierre de Vera, Mickael Baqué	Survivability of <i>Xanthoria parietina</i> in simulated Mars conditions for 30 days	126
Filippo Binci, Giacomo Rago, Lorella Navazio, Marco Giovannetti	Unravelling the role of <i>Mildew Locus O</i> genes in arbuscular mycorrhizal symbiosis	56
Carlo Blasi	New tools of plant ecology and plant sociology to assess, recover and restore the natural capital	I
Giuseppe Bonanno, Martina Orlando-Bonaca	Marine plastic pollution: how significant is the impact on seagrass ecosystems?	5
Federica Bonini, Valentina Ferri, Laura Cencini, Simona Ciancaleoni, Maurizio Conticelli, Francesco Falcinelli, Marco Fratoni, David Grohmann, Marco Maovaz, Maurizio Micucci, Antonella Montanucci, Valeria Negri, Lorenzo Raggi, Giuseppe Ratini, Daniela Gigante	Annex II-IV (Dir. 92/43/EEC) plant species occurring in Umbria region: distribution maps, demographic studies and conservation actions within the LIFE19 IPE/IT/000015 Project	6
Ilaria Borromeo, Fabio Domenici, Gian Piero Marzano, Cinzia Forni	Horticultural crops response to salt stress: role of seed priming and acclimation	57

Martina Bottoni, Fabrizia Milani, Lorenzo Colombo, Paola Sira Colombo, Claudia Giuliani, Piero Bruschi, Gelsomina Fico	Ethnobotany as an effective tool to preserve biodiversity: the case study of Valmalenco (SO, Italy)	7
Fabrizio Buldrini, Alessandro Alessandrini, Alessandro Chiarucci, Umberto Mossetti, Giovanna Pezzi, Adriano Soldano, Juri Nascimbene	<i>Prodromus Florae Bononiensis ex horto sicco Ulyxis Aldrovandi</i> : a flora ahead of its time from a Renaissance Italian herbarium	127
Anna Cacciola, Emily Cioni, Marinella De Leo, Maria Paola Germanò, Valeria D'Angelo, Salvatore Mirabile, Nunziatina De Tommasi, Alessandra Braca	Chemical and biological studies of fruit extracts from different Italian varieties of <i>Prunus domestica</i> L. (Rosaceae)	98
Chiara Calise, Katia Perini, Paola Castellari, Elena Nicosia, Enrica Roccotiello	Microclimatic and Environmental Improvement with Nature-Based Solutions in a Mediterranean City	43
Patrizia Campisi, Elisa Petrotto, Mattia Letizia Marino, Maria Giovanna Dia	School gardens as a resource to be exploited for learning Botany in primary and kindergarten school	44
Giulia Canali, Cristina Malegori, Paola Malaspina, Rodrigo Rocha de Oliveira, Monica Casale, Paolo Oliveri, Luca di Nuzzo, Renato Benesperi, Juri Nascimbene, Paolo Giordani	NIR hyperspectral imaging: a tool for visualising the spatial distribution of water in non-vascular epiphytic communities	8
Marco Canella, Marco Baldin, Simona Bardi, Stefano Borella, Pierpaolo Campostrini, Isabel Cavalli, Vanessa Cazzin, Licurgo Chiorboli, Chiara Dall'Angelo, Francesco Gervasutti, Francesco Marcone, Alessandro Meggiato, Enrico Rinaldi, Francesco Scarton, Valerio Volpe	Project FORESTALL: connecting habitat restoration to social inclusion in the Ramsar site of Valle Averte, southern lagoon of Venice (N-Adriatic Sea)	ii
Giulia Capotorti, Laura Zavattero, Sandro Bonacquisti, Eva Del Vico, Laura Facioni, Duilio Iamónico, Alessandro Montaldi, Simone Valeri	On biodiversity friendly Green Infrastructure planning: contribution of plant ecology to the monitoring and valorization of peri-urban environments in the Metropolitan City of Rome (Mediterranean Italy)	xxvi
Giorgio Cappellucci, Giulia Baini, Federica Vaccaro, Elisabetta Miraldi, Marco Biagi	Ethnobotany and wound healing: from tradition to integrated models for the study of poorly investigated species	99
Lucia Caputo, Francesca Capozzolo, Giuseppe Amato, Vincenzo De Feo, Florinda Fratianni, Giovanni Vivenzio, Laura De Martino, Filomena Nazzaro	Chemical composition, antibiofilm, cytotoxic, and anti-acetylcholinesterase activities of <i>Myrtus communis</i> L. leaves essential oil	100
Elisa Carrari, Cristina Gasperini, Marco Cabrucci, Ilaria Santi, Federico Selvi	Influence of forest management on microclimate and understory vegetation in a mixed oak forest	9
Maria Beatrice Castellani, Rossano Bolpagni, Lorenzo Lastrucci, Alice dalla Vecchia, Erika Piaser, Andrea Coppi, Paolo Villa	Analysis of genetic diversity and phenotypic plasticity in <i>Phragmites australis</i> and <i>Nuphar lutea</i> . A case study from Northern and Central Italy	10
Miris Castello, Alfredo Altobelli, Francesco Liccari, Giovanni Bacaro, Livio Poldini	Vegetation survey and mapping of Lake Doberdò: an analysis for the assessment of habitat conservation status of a disappearing lake of the Classical Karst (North East Italy)	i
Martina Cerri, Sara Cannavò, Alma Costarelli, Agnese Bertoldi, Francesco Paolocci, Stefania Pasqualini, Lara Reale	Disentangling the interaction between rice and <i>Azolla filiculoides</i>	xxxviii
Patrizia Cesaro, Nadia Massa, Daniela Campana, Valeria Todeschini, Elisa Bona, Flavio Anastasia, Roberto Barbato, Guido Lingua	Effects of mycorrhizal inoculation on responses of <i>Solanum lycopersicum</i> in the early stages of the symbiosis	xxxvii
Simona Ceschin, Neil T.W. Ellwood, Mattia M. Azzella, Flaminia Mariani, Emanuele Pelella	Unusual underwater flowering of <i>Utricularia australis</i> population: a botanical enigma	128
Annalena Cogoni, Daniela Gigante, Silvia Poponessi	Preliminary investigations on Mediterranean temporary ponds: study cases from Sardinia, Corsica, and inland Central Italy	129

Andrea Colpo, Sara Demaria, Marzio Zaccarini, Alessandro Forlani, Elena Marrocchino, Lorenzo Ferroni	In-field assessment of drought stress effect on the photosynthetic apparatus functionality in three different apple tree ( <i>Malus domestica</i> Borkh) rootstocks	58
Ilaria Colzi, Maria Beatrice Castellani, Elisabetta Bianchi, Pierluigi Cortis, Antonio De Agostini, Donatella Fibbi, Marco Dainelli, Andrea Coppi, Cristina Gonnelli	Metallophytes colonizing mine wastes as valuable source for environmental technologies	59
Clara Conte, Mauro Mariotti, Micaela Tiso, Gabriella Fenoglio, Elena Nicosia, Enrica Roccotiello	Towards a Nickel-free tomato production	60
Matteo Conti, Michele Lussu, Riccardo Testolin, David Dolci, Nicola Alessi, Piero Zannini	Aggregation of occurrence data in FlorItaly, the portal to the flora of Italy	11
Veronica Conti, Claudio Cantini, Marco Romi, Maria Michela Cesare, Luigi Parrotta, Stefano Del Duca, Giampiero Cai	Distinct tomato cultivars are characterized by a differential pattern of biochemical responses to drought stress	61
Laura Cornara, Andrea Volante, Claudia Turcato, Samuele Voyron, Martino Adamo, Mariangela Girlanda, Miriam Bazzicalupo	Symbiotic vs asymbiotic seed germination of eight terrestrial orchid species included in the LIFEorchids Project	62
Enrico Cortese, Luca Cappellin, Alessandro Galenda, Alessia Famengo, Alessio G. Settimi, Manuele Dabalà, Diego De Stefani, Vanni Antoni, Lorella Navazio	Tuning plant perception of plasma-activated water to foster a more sustainable agriculture	63
Emilio Corti, Giuseppe Pieraccini, Besiana Nako, Cristina Gonnelli, Alessio Papini, Sara Falsini	Quantitative analysis of secondary metabolites in <i>Eruca sativa</i> under salt stress	130
Pierluigi Cortis, Antonio De Agostini, Donatella Cogoni, Annalena Cogoni, Giuseppe Fenu	Seed conservation and development in metallicolous and non-metallicolous orchid populations	vii
Martina D'Agostino, Giulia Albani Rocchetti, Marta Carboni, Rodolfo Gentili, Sandra Citterio, Thomas Abeli	Study of the Italian and French populations of <i>Vicia cusnae</i> (Fabaceae)	xviii
Marco Dainelli, Sara Falsini, Massimo del Bubba, Lorenzo Venturini, Alessio Papini, Ilaria Colzi, Sandra Ristori, Cristina Gonnelli, Andrea Coppi	Plants do not like it coloured: PET micro/nanoplastics with various colours impact differently on <i>Arabidopsis thaliana</i> growth	131
Marco D'Antraccoli, Francesco Roma-Marzio, Leonardo Cocchi, Nóra Weiger, Lucia Amadei, Giovanni Astuti, Roberta Vangelisti, Lorenzo Peruzzi	Biodiversity informatics and Museums: from the documentation of collections to dissemination at the Botanic Garden and Museum of Pisa	132
Anna D'aria, Giampiero Ciaschetti, Salvatore Cozzolino, Giovanni Scopece	Pollination success of the deceptive orchid <i>Anacamptis morio</i> : benefit from proximity or similarity?	133
Antonio De Agostini, Maitane Juarez, Marina López-Pozo, Javier Martínez-Abaigar, Encarnación Núñez-Olivera, Unai Artexte, Marco Michelozzi, Gabriele Cencetti, Francesco Loreto, Susanna Pollastri, Daniel Stanton, Annalena Cogoni, Pierluigi Cortis, Alicia V. Perera-Castro, Hong Truong Luu, Buu Thach Le, Thanh Luc Nguyen, José Ignacio García-Plazaola, Antonio Hernandez, Raquel Esteban	Biogenic Volatile Organic Compounds (BVOCs) around the world: does geography shapes BVOCs profiles in bryophytes?	134
Giulia De Angelis, Camilla Badiali, Marco Possenti, Simone D'Angeli, Cleofe Palocci, Laura Chronopoulou, Elisa Brasili, Gabriella Pasqua	Endocytic uptake of biopolymeric PLGA nanoparticles in <i>Arabidopsis thaliana</i> cells and roots	64
Maria De Benedictis, Antonia Gallo, Pietro Roversi, Angelo Santino	<i>Arabidopsis thaliana</i> tolerance to Cadmium stress is mediated by Endoplasmic Reticulum stress sensing	xxxiii
Paola De Giorgi, David Dolci, Daniela Ciccarelli, Gianni Bedini	Using species distribution models to monitor threatened species	12

Marinella De Leo, Valentina Parisi, Valentina Santoro, Giuliana Donadio, Maria Laura Bellone, Alessandra Braca, Fabrizio Dal Piaz, Nunziatina De Tommasi	Exploring <i>Punica granatum</i> L. peels from different Southern Italian varieties for their potential healthy value	xlvii
Ylenia De Luca, Niklaus Zemp, Antonia Cristaudo, Simone Fior, Alex Widmer, Salvatore Cozzolino, Donata Cafasso	Development of molecular markers for rapid sex screening in <i>Cycas revoluta</i> and in <i>Ginkgo biloba</i>	xxxix
Veronica De Micco, Alessia D'Auria, Francesca Petracca, Sara De Francesco, Francesco Niccoli, Simona Altieri, Arturo Pacheco, Antonello Bonfante, Chiara Cirillo, Arturo Erbaggio, Pierpaolo Sirch, Giovanna Battipaglia	Quantitative anatomical traits and stable isotopes in wood rings of Greco grapevine reveal acclimation to environmental variability and cultivation factors: the GREASE Project	135
Angelo De Paolis, Monica De Caroli, Makarena Rojas, Lorenzo Maria Curci, Gabriella Piro, Gian-Pietro Di Sansebastiano	Arsenic effect on the expression of NIP1.1 in <i>Dittrichia viscosa</i> : looking for a marker for genetic improvement	65
Emilio Di Gristina, Maria Letizia Gargano, Patrizia Campisi, Vivienne Spadaro, Francesco Maria Raimondo	New plants in the urban green of the city of Palermo (N-Sicily)	45
Simone Di Piazza, Grazia Cecchi, Paolo Vassallo, Chiara Paoli, Maurizio Bazzano, Mirca Zotti	Truffle and ecosystem services: the hidden potential of the Ligurian countryside	xlii
Simonetta Cristina Di Simone, Alessandra Acquaviva, Maria Loreta Libero, Nilofar, Claudio Ferrante, Luigi Menghini	Qualitative Chemical Characterization and Multidisciplinary Biological Investigation of Different Root and Aerial Parts Extracts from <i>Epilobium hirsutum</i>	101
Antonella Di Sotto, Marco Gulli, Alessandra Acquaviva, Massimo Tacchini, Simonetta Cristina Di Simone, Annalisa Chiavaroli, Lucia Recinella, Sheila Leone, Luigi Brunetti, Giustino Orlando, Giancarlo Angeles Flores, Roberto Venanzoni, Paola Angelini, Luigi Menghini, Claudio Ferrante	Valorization of the essential oils from two Italian hemp crops: a phytochemical and pharmacological evaluation	102
Mario Di Stefano, Francesca Carruggio, Giuseppe Diego Puglia, Antonia Cristaudo	Plastic germination response of plants living in Mediterranean temporary ponds (3170* habitat)	136
David Dolci, Alessandro Chiarucci, Lorenzo Peruzzi	Identification of multi-species suitable areas for assisted colonization under climate change scenarios	xii
Gianniantonio Domina, Giuseppe Venturella, Emilio Di Gristina, Giulio Barone	The Herbarium of Fr. Gioacchino Russo in San Martino delle Scale (Palermo)	35
Francesco Dovana, Erica Lumini, Enrico Ercole, Marco Mucciarelli	Soil fungal communities under the rare alpine glacial relict <i>Berardia lanuginosa</i> with particular reference to the presence of endophyte fungi	86
Rasmus Ejrnæs, Camilla Fløjgaard, Christopher Sandom, Pil Birkefelt Møller Pedersen, Jens-Christian Svenning	The restoration of natural plant communities – disturbing baselines and even more disturbing animals	II
Giuseppe Emma, Greg M. Walter, James Clark, Delia Terranova, Simon J. Hiscock, Jon R. Bridle, Salvatore Cozzolino, Antonia Cristaudo	Phenotypic plasticity is a potential mechanism for responding to novel environmental conditions	36
Sara Falsini, Corrado Tani, Valentina Rech, Alessio Papini, Paola Faraoni, Sara Campigli, Luisa Ghelardini, Gianluca Bleve, Domenico Rizzo, Emanuele Marcucci, Ilaria Scarpelli, Lorenzo Drosera, Alessio Gnerucci, Francesco Ranaldi, Francesca Peduto Hand, Guido Marchi, Silvia Schiff	Light and electron microscopy observations of <i>Rhamnus alaternus</i> L. infected by <i>Xylella fastidiosa</i> subsp. <i>multiplex</i>	137
Sergio Enrico Favero-Longo, Enrica Matteucci, Maria Giuseppina Ruggiero	Rock drawings in Valle Camonica: Monitoring lichen diversity and the efficacy of biodeterioration control towards a joint conservation of the cultural and natural heritage	xiv

Marta Ferrati, Giovanni Benelli, Roman Pavela, Eleonora Spinozzi, Giulia Bonacucina, Diego Romano Perinelli, Riccardo Petrelli, Filippo Maggi	Development of a highly stable <i>Carlina acaulis</i> essential oil nanoemulsion for managing agricultural pests	xlv
Lorenzo Ferroni, Sara Demaria, Andrea Colpo, Simonetta Pancaldi	Afternoon changes in the structure and function of the gigantic chloroplast of <i>Selaginella martensii</i> Spring	66
Marika Fiorentino, Claudia Gravina, Marialuisa Formato, Simona Piccolella, Assunta Esposito, Severina Pacifico	The microencapsulation of <i>Calendula arvensis</i> florets and leaves: a strategy for bioactive compound's preservation	103
Niccolò Forin, Simone Marcolini, Elena Palmieri, Sebastiano Nigris, Manlio Speciale, Rosario Schicchi, Barbara Baldan	DNA Barcoding of <i>Cycas</i> collections from the Botanical Gardens of Padova and Palermo	13
Marialuisa Formato, Maria Tommasina Pecoraro, Simona Piccolella, Severina Pacifico	Nutraceutical perspectives of industrial hemp: focusing on CBDA	104
Marco Fornaciari, Federico Rossi, Chiara Proietti, Mirko Filippini, Desirée Muscas, Beatrice Castellani, Luigia Ruga, Fabio Orlandi	Multiple ecosystem benefits of urban green-space: 2 case studies	xxviii
Jacopo Franzoni, Giovanni Astuti, Gianluigi Bacchetta, Liliana Bernardo, Cristian Brullo, Fabio Conti, Gianniantonio Domina, Duilio Iamonico, Lucia Varaldo, Hirzi Luqman, Ivana Rešetnik, Alex Widmer, Simone Fior, Lorenzo Peruzzi	Preliminary genetic analyses of central Mediterranean taxa in the <i>Dianthus virgineus</i> complex (Caryophyllaceae) suggest taxonomic inflation	xv
Elisa Furia, Anna Maria Mercuri, Alessandro Travaglini	First data from a palynological analyses of urban green area pollen in the city of Reggio Emilia	46
Cristina Gasperini, Elisa Carrari, Sanne Govaert, Camille Meeussen, Karen De Pauw, Jan Plue, Pieter Sanczuk, Thomas Vanneste, Pieter Vangansbeke, Giovanni Jacopetti, Pieter De Frenne, Federico Selvi	Edge effects on the realised soil seed bank along microclimatic gradients in temperate European forests	14
Gabriele Gheza, Luca Di Nuzzo, Renato Benesperi, Elisabetta Bianchi, Paolo Giordani, Helmut Mayrhofer, Pier Luigi Nimis, Walter Obermayer, Chiara Vallese, Juri Nascimbene	The challenge of cryptic species for biodiversity conservation: the case study of the morphologically uniform genus <i>Cetrelia</i> in Italy	15
Elisa Giaccone, Martino Adamo, Marco Mucciarelli	Seed germination patterns of segetal species collected in North Western Alps	16
Antonio Giacò, Lucia Varaldo, Gabriele Casazza, Daniele De Luca, Paolo Caputo, Marco Sarigu, Gianluigi Bacchetta, Llorenç Sáez, Lorenzo Peruzzi	An integrative taxonomic study of <i>Santolina</i> (Asteraceae) from southern France and north-eastern Spain	xvi
Paolo Giordani, Renato Benesperi, Luca Di Nuzzo, Giulia Canali, Elisabetta Bianchi, Chiara Vallese, Gabriele Gheza, Paola Malaspina, Philipp Porada, Juri Nascimbene	The microclimate from a lichen functional diversity perspective	17
Marco Giovannetti, Arianna Capparotto, Daniele Castelli, Stanislav Kopriva, Gabriel Schaaf, Wolfgang Busch	Leveraging plant natural variation to investigate root phosphate homeostasis	xxxvi
Roberto Giovannini, Andrea Ceci, Veronica Spinelli, Anna Maria Persiani	Fungal diversity for bioremediation: tackling co-contaminations in a decommissioned military site	87
Claudia Giuliani, Martina Bottoni, Fabrizia Milani, Debora Tura, Remo Chiozzotto, Irina Baccichet, Davide Boni, Sergio Cozzaglio, Laura Santagostini, Alessio Papini, Marco Cirilli, Gelsomina Fico	<i>Toscolea</i> project: enhancing the local <i>cultivars</i> of <i>Olea europaea</i> L. in Toscolano Maderno (Brescia, Italy)	138
Luca Giupponi, Valeria Leoni, Marco Zuccolo, Davide Pedrali, Annamaria Giorgi	Functional strategy and leaf shape of <i>Campanula elatinoidea</i> Moretti: results of an intraspecific analysis	139

Isidora Gjata, Costantino Paciolla, Alessandra Villani, Silvana De Leonardis, Franca Tommasi	Effects of several rare earth elements on the growth, photosynthetic pigments, ascorbate content, and lipid peroxidation level of <i>Lemna minor</i> L.	140
Benedetta Gori, Carla Lambertini, Alessandra Zambonelli	Riparian vegetation management along artificial channels: first effects on plant community ecology of “Life Green4Blue”	viii
Martina Grattacaso, Giulia Canali, Andrea Vannini, Giuseppe Protano, Francesco Nannoni, Vivien De Lucia, Luigi Antonello Di Lella, Stefano Biagiotti, Stefano Loppi	Preliminary results on the geographical traceability of extra virgin olive oil from Valdichiana Senese	141
Claudia Gravina, Marialuisa Formato, Adriano Stinca, Marika Fiorentino, Simona Piccolella, Severina Pacifico, Assunta Esposito	Investigation and valorization of methanolic plant-extract in cosmeceuticals: a case study of <i>Lavandula austroalpennina</i> N.G. Passal., Tundis & Upson	105
Nicola Lothar Herrmann, Umberto Mossetti, Fortunato Fulvio Bitonto, Laura Bortolotti, Giovanna Dante, Annalisa Managlia, Marta Galloni	The Pollinator Garden: an oasis for urban pollinators and a point of reference for pollinator-friends	47
Mariarosaria Ingegneri, Antonella Smeriglio, Giuseppina Mandalari, Domenico Trombetta	The almond blanching process generates two interesting waste products to be used in the nutraceutical and cosmeceutical field	106
Maurizio Iovane, Giovanna Aronne	Heat treatment during microsporogenesis triggers distyly disruption in <i>P. palinuri</i>	18
Greta La Bella, Marta Carboni, Marta Gaia Sperandii, Alicia T.R. Acosta	Drivers of plant community (in)stability on coastal dunes	142
Alfonsina La Mantia, Rosaria Acquaviva, Barbara Tomasello, Claudia Di Giacomo, Giuseppe Carlo Zimbalatti, Simone Bianchi, Francesco Maria Raimondo, Irina Naletova, Giuseppe Antonio Malfa	Anthocyanins profile and genotoxic activities of <i>Myrtus communis</i> L. (Myrtaceae) berries extract	107
Lucrezia Laccetti, Mariachiara Cangemi, Giovanni Scopece	Local adaptation to biotic and abiotic factors in the cliff species <i>Dianthus rupicola</i> : a preliminary study	37
Valentina Lucia Astrid Laface, Carmelo Maria Musarella, Giovanni Spampinato	Population structure of <i>Salvia ceratophylloides</i> Ard., a very rare endemism of Reggio Calabria (Southern Italy)	19
Lorenzo Lazzaro, Michele Mugnai, Michele Giunti, Fabrizio Bartolini, Giulio Ferretti, Francesca Giannini, Renato Benesperi	Two years of monitoring within the project Life LETSGO GIGLIO: pre-interventions state of the impacts on biodiversity at Giglio Island	20
Denise Lenzo, Ana Bartual, Bárbara Úbeda, Eva Zubía, Marina Antonia Colangelo, Andrea Pasteris, Laura Pezzolesi	Effect of a metabolite produced by the invasive macroalga <i>Rugulopteryx okamurae</i> (Phaeophyceae) on unicellular phototrophs	40
Valeria Leoni, Luca Giupponi, Alberto Tamburini, Carla Gianoncelli, Annamaria Giorgi	Study of an endemic plant as a resource for mountain agroecosystems: <i>Sanguisorba dodecandra</i> Moretti	21
Mingai Li, Iuliia Khomenko, Silvia Carlin, Urska Vrhovsek, Franco Biasioli, Claudio Varotto	Similarities and differences of functional landscapes underlying the convergent evolution of monocot and dicot isoprene synthase key residues and their implications for poplar genetic improvement	67
Mariacaterina Lianza, Riccardo Gasparini, Lorenzo Marincich, Giovanni Maria Poggi, Simona Corneti, Iris Aloisi, Fabiana Antognoni	From primitive to modern crops: bioactive compound characterization of fifty durum wheat germplasms from Global Durum wheat Panel (GDP)	108
Silvano Lodetti, Francesco Porro	GLORIA-WALSAT: a new analysis protocol to assess winning and losing alpine plant species in the context of climate change within the international GLORIA network	22



Maria Maisto, Daniela De Nigris, Daniela Zuzolo, Maria Tartaglia, Maria Antonietta Ranauda, Alessandra Falzarano, Alessia Postiglione, Antonello Prigioniero, Pierpaolo Scarano, Rosaria Sciarrillo, Carmine Guarino	From tradition to ethnopharmacology: a new ethnobotanical approach in the use of antidiabetic medicinal plants in Italy	109
Paola Malaspina, Cristina Danna, Laura Cornara, Pierluca Aicardi, Sheridan Lois Woo, Marina Papaiani, Flavio Polito, Vincenzo De Feo	Characterization of <i>Eucalyptus cinerea</i> and <i>E. nicholii</i> by-products for agricultural applications	xxxii
Giuseppe Antonio Malfa, Barbara Tomasello, Claudia Di Giacomo, Alfonsina La Mantia, Simone Bianchi, Francesco Pappalardo, Francesco Maria Raimondo, Rossella Tundis, Rosaria Acquaviva	Wild cardoon [ <i>Cynara cardunculus</i> (L.) subsp. <i>sylvestris</i> Lam. (Asteraceae)] leaves extract, phenolic profile, antioxidant properties and hepatoprotective activities	110
Eleonora Manzo, Justus Müller-Kiefer, Salvatore Tomasello	Competition and allelopathy triggering the exclusion of the native <i>Xanthium strumarium</i> L. by the American <i>X. orientale</i> L.	143
Eleonora Manzo, Salvatore Tomasello	Integrative taxonomy in the 21st century. An example from the intricate plant genus <i>Xanthium</i> (Ambrosinae, Asteraceae)	xvii
Flaminia Mariani, Emanuele Pelella, Simona Ceschin	Alteration of plant and invertebrate communities in waterbodies dominated by the invasive alien macrophyte <i>Lemna minuta</i> and proposals for its containment	23
Elisa Maricchiolo, Michele Bellucci, Francesca De Marchis, Daniele Fraternali, Francesco Paolucci, Andrea Zattoni, Barbara Roda, Valentina Marassi, Andrea Pompa	Genetic transformation of plant cells as a possible strategy for the production of bioactive compounds or biopolymers	68
Lorenzo Marincich, Margherita Bellucci, Mariacaterina Lianza, Roberto Gregori, Stefano Tartarini, Roberto Mandrioli, Fabiana Antognoni	Red-fleshed apple: polyphenol profile characterization, antioxidant activity evaluation and development of a green extraction method for anthocyanins recovery	xlvi
Alessia Marino, Simone Bianchi, Marco Leonardi, Alessandra Zambonelli, Marcello Alecci, Mirco Iotti, Angelo Galante	Quantitative 1 T MRI Post-Harvest Surveying of Tuber <i>Aestivum</i> Ascomata	88
Stefano Martellos, Pier Luigi Nimis, Matteo Conti, Juri Nascimbene	Digitization and geolocation of specimens from Italian lichen herbaria	xi
Alessia Masi, Cristiano Vignola, Lucrezia Masci, Jordan Palli, Gianluca Piovesan, Adam Izdebski, Laura Sadori	Rewilding vs. cultivation, what plants can tell us about demography after pandemics	ix
Giulia Mastellone, Arianna Marengo, Gaia Bechis, Barbara Sgorbini, Patrizia Rubiolo, Cecilia Cagliero	Fiber-Type <i>Cannabis sativa</i> L.: Phytochemical Characterization and Biological Activity of the Aerial Parts at Different Growth Stages	111
Ilaria Masullo, Salvatore Cozzolino, Maria Rosaria Barone Lumaga, Giovanni Scopece, Donata Cafasso	Components of post mating isolation in a genus of Mediterranean orchids	38
Milena Masullo, Zahra Sadeghi, Antonietta Cerulli, Stefania Marzocco, Mahdi Moridi Farimani, Sonia Piacente	<i>Perovskia artemisioides</i> Boiss roots as source of diterpene constituents with <i>in vitro</i> anti-inflammatory activity	xlvi
Teresa Mazzarella, Matteo Chialva, Jian You Wang, Cristina Votta, Patrizia Vaccino, Salim Al-Babili, Luisa Lanfranco, Valentina Fiorilli	Role of zaxinone, a novel growth promoting apocarotenoid metabolite, in shaping rice rhizomicrobiota	69

Luigi Menghini, Alessandra Acquaviva, Simonetta Cristina Di Simone, Antonella Canini, Roberto Braglia, Gabriele Di Marco, Claudia Campana, Paola Angelini, Giancarlo Angeles Flores, Roberto Venanzoni, Maria Loreta Libero, Bruno Tirillini, Gokhan Zengin, Annalisa Chiavaroli, Lucia Recinella, Sheila Leone, Nilofar, Luigi Brunetti, Giustino Orlando, Claudio Ferrante	Phytochemical and biological investigations on the pollen from industrial hemp male inflorescences	112
Fabrizia Milani, Martina Bottoni, Laura Bardelli, Lorenzo Colombo, Paola Sira Colombo, Piero Bruschi, Claudia Giuliani, Gelsomina Fico	Preventing the loss of biocultural diversity in Valle Imagna (BG, Italy): an Ethnobotanical survey to the rescue	24
Pietro Minissale, Salvatore Cambria, Fabio Cilea, Gianpietro Giusso del Galdo, Gianmarco Tavilla, Giovanni Spampinato, Saverio Sciandrello	Plant conservation and restoration in the coastal wetlands of Sicily: the case studies of the Natura 2000 sites "Saline di Priolo" and "Pantano Ponterio"	v
Sofia Montanari, Mirko Salinitro, Annalisa Tassoni	Root growth response to localized selenium enrichment in soil: a comparison between hyperaccumulator and non-accumulator species	xxx
Tomas Morosinotto, Francesca Bucci, Alessandra Bellan	Algae biomass as sustainable source of protein and lipids	xxii
Gregory M. Mueller	Building on interactions between the professional and non-professional mycological communities to advance fungal conservation	VIII
Carmelo Maria Musarella, Silvio Bagnato, Giuseppe Bombino, Pasquale Antonio Marziliano, Giuseppe Modica, Andrea Rosario Proto, Giovanni Spampinato	Urban green infrastructures design for the ecological and landscape restoration: the case of the Metropolitan City of Reggio Calabria (South Italy)	iv
Hamid Mushtaq, Simona Piccolella, Assunta Esposito, Lorenzo Manti, Severina Pacifico	Radiomodulating effect of an alcoholic extract from leaves <i>Olea europaea</i> L. cv. Caiazzana	113
Vincenzo Musolino, Roberta Macri, Jessica Maiuolo, Antonio Cardamone, Saverio Nucera, Luigi Tucci, Carmine Lupia, Rosamaria Caminiti, Mariangela Marrelli, Vincenzo Mollace	<i>Salvia rosmarinus</i> Spenn. (Lamiaceae) ethanol extract: phytochemical analysis, antioxidant activity and <i>in vitro</i> evaluation of fatty acid accumulation	114
Antonella Muto, Leonardo Bruno, Innocenzo Muzzalupo, Adriana Ada Ceverista Chiappetta, Carsten Muller, Hilary J. Rogers, Maria Beatrice Bitonti, Natasha Damiana Spadafora	Multi-Omic approach to investigate phytochemical and gene expression changes in <i>Prunus persica</i> L. cultivars during post-harvest ripening	144
Juri Nascimbene, Pier Luigi Nimis, Holger Thüs	Better together? - Freshwater lichens, including three new species in the genera <i>Aspicilia</i> and <i>Verrucaria</i> , associated with <i>Lobothallia hydrocharis</i> (Poelt & Nimis) Sohrabi & Nimis from watercourses of Sardinia	25
Massimo Nepi, Claudia Faleri, Emanuele Giordano, Daniele Calabrese, Valeria De Carlo, Massimo Guarnieri, Daniele Giannetti, Donato A. Grasso, Stefano Mancuso	Effect of ants' visits on nectary and nectar chemistry in <i>Prunus avium</i> L.	145
Lidia Nicola, Olumayowa Mary Olowe	Nigerian rhizospheric <i>Trichoderma</i> strains against <i>Fusarium</i> phytopathogens: characterization and <i>in vitro</i> antagonistic potential assessment	89
Ludovica Oddi, Mirco Migliavacca, Edoardo Cremonese, Gianluca Filippa, Giorgio Vacchiano, Consolata Siniscalco, Umberto Morra di Cella, Marta Galvagno	Contrasting responses of forest growth and carbon sequestration to heat and drought in the Alps	146
Gianmaria Oliva, Giovanni Vigliotta, Mattia Terzaghi, Angela Cicutelli, Francesco Guarino, Stefano Castiglione	Effect of Plant Growth-Promoting Rhizobacteria on maize seedlings cultivated on saline soil: changes in root morphologies and amelioration of saline stress response	xxxiv

Silvia Ongaro, Deborah Isocrono	Lichen communities on <i>Fraxinus</i> in Aosta Valley: conservation issues	26
Elisa Ovidi, Valentina Laghezza Masci, Enrica Alicandri, Anna Rita Paolacci, Vittorio Vinciguerra, William Tomassi, Matteo Manni, Stefania Garzoli, Alberto Del Lungo, Antonio Tieziz, Mario Ciaffi, Giuseppe Scarascia-Mugnozza	The globe artichoke landrace “Ortano”: bioactive molecules from by-products cultivation	70
Tiziana Panichella, Matteo Gentilucci, Federico Maria Tardella, Andrea Catorci	Revisiting seminatural grasslands at Pian Grande di Castelluccio di Norcia to assess patterns of vegetation change	27
Sara Parri, Francesca Cristiana Piritore, Marco Romi, Maria Celeste Pereira Dias, Claudio Cantini, Giampiero Cai	Different physio-molecular mechanisms affect water storage strategy and drought tolerance in olive trees	71
Luigi Parrotta, Claudia Faleri, Cecilia, Del Casino, Laviania Mareri, Iris Aloisi, Gea Guerriero, Jean-Francois. Hausman, Stefano Del Duca, Giampiero Cai	Biochemical and cytological interactions between callose synthase and microtubules in the tobacco pollen tube	72
Davide Pedrali, Valeria Leoni, Luca Giupponi, Tiziana Lazzarina Zandrini, Marco Zuccolo, Alessia Maria Bernardi, Annamaria Giorgi	The importance of technical assistance in the return of rye ( <i>Secale Cereale</i> L.) in Camonica Valley (north Italy)	147
Claudia Perini, Irene Mazza, Elena Salerni	The Fungal communities of Sieneze “biancana	xl
Silvia Perotto, Samuele Voyron, Elena Martino, Stefania Daghino	Metabarcoding of fungal assemblages in the <i>Vaccinium myrtillus</i> endosphere suggests colonization of above-ground plant organs by some ericoid mycorrhizal and DSE fungi	90
Lorenzo Peruzzi, David Dolci, Alessandro Chiarucci	Potential climatic and elevational range shifts in the Italian narrow endemic <i>Bellevalia webbiana</i> (Asparagaceae) under climate change scenarios	28
Francesca Petracca, Chiara Cirillo, Carmen Arena, Antonello Bonfante, Marco Giulioli, Arturo Erbaggio, Nicola Damiano, Rosanna Caputo, Veronica De Micco	Foliar distribution of basalt dust in Falanghina grapevine modulates leaf anatomical and photosynthetic traits to improve tolerance to drought	148
Valerio Petruccelli, Domenico Rosa, Irene Bavasso, Camilla Badiali, Matilde Benassi, Luca Di Palma, Gabriella Pasqua, Elisa Brasili	Nanotechnology to improve micronutrient uptake in plants	73
Marta Pianta, Mariasole Calbi, Alexandre Changenet, Jens Joschinski, Anne Mimet, Wolfgang Weisser, Enrica Roccotiello	Plant functional groups and vegetation dynamics within urban ecosystems: the ECOLOPES’ project approach	xxv
Lina Podda, Marco Porceddu, Ludovica Dessi, Vanessa Lozano, Giuseppe Brundu, Gianluigi Bacchetta	An overview of invasive <i>Acacia</i> species in the Mediterranean Basin: from germination ecophysiology to monitoring and management plans	29
Zoë A. Popper	A wall of opportunities: from adaptation to exploitation	VII
Alessia Postiglione, Daniela Zuzolo, Antonello Prigioniero, Maria Tartaglia, Pierpaolo Scarano, Mariantonietta Ranauda, Maria Maisto, Rosaria Sciarillo, Carmine Guarino	<i>Quercus ilex</i> phyllosphere: intra- and interdomain features in urban and natural Mediterranean context	74
Antonello Prigioniero, Daniela Zuzolo, Ülo Niinemets, Alessia Postiglione, Mariano Mercurio, Francesco Izzo, Marco Trifuoggi, Maria Toscanesi, Pierpaolo Scarano, Maria Tartaglia, Maria Maisto, Maria Antonietta Ranauda, Rosaria Sciarillo, Carmine Guarino	Role of leaf surface functional traits in sequestration and retention of particulate matter and polycyclic aromatic hydrocarbons in Mediterranean urban forests	48
Chiara Proietti, Fabio Orlandi, Luigia Ruga, Desirée Muscas, Silvia Marrapodi, Aldo Ranfa, Marco Fornaciari	Active citizen involvement in green management through the LIFE CLIVUT project	49

Rosa Ranalli, Mauro Fois, Marta Galloni, Gianluigi Bacchetta, Giovanna Aronne, Anastasia Stefanaki, Theodora Petanidou, Ziva Fiser	Does floral complexity increase the likelihood of extinction for the Italian flora?	30
Maria Antonietta Ranauda, Daniela Zuzolo, Maria Tartaglia, Antonello Prigioniero, Pierpaolo Scarano, Alessia Postiglione, Maria Maisto, Alessandra Falzarano, Rossella Clemente, Rosaria Sciarrillo, Carmine Guarino	From the ethnobotanical tradition of Italy to the scientific approach: medicinal plants and functional foods in the treatment and prevention of cardiovascular diseases	115
Sonia Ravera, Claudia Coccozza, Renato Benesperi, Elisabetta Bianchi, Luca Di Nuzzo	Influence of abiotic factors on tree-level lichen diversity in Mediterranean mountain forests	31
Enrica Roccotiello, Sara Romeo, Silvia Priarone, Stefano Rosatto, Mirca Zotti, Mauro Mariotti	Response to metals in the Ni-hyperaccumulator <i>Alyssoides utriculata</i> (L.) Medik. in synergy with bacterial and fungal strains	75
Francesco Roma-Marzio, Lucia Amadei, Giovanni Astuti, David Dolci, Simonetta Maccioni, Nicoletta Magrini, Federica Pierotti, Roberta Vangelisti, Lorenzo Peruzzi	Digitization of the Herbarium Guadagno. 3. Results from a four-year project	149
Mara Rondolini, Nicola Baldoni, Leonardo Baciarelli Falini, Federica Bonini, Daniela Gigante, Lara Reale, Gilberto Bragato, Domizia Donnini	Monitoring and innovative approaches applied in <i>T. magnatum</i> production areas	91
Francesco Rota, Gabriele Casazza, Peter Schönschwetter, Camilla Wellstein	Future and past of the endemic alpine plants of the Dolomites: response to future climate change and phylogeography	32
Lisa Rotasperti, Luca Tadini, Matteo Chiara, Cristina Crosatti, Davide Guerra, Andrea Tagliani, Sara Forlani, Ignacio Ezquer, David S. Horner, Peter Jahns, Katarzyna Gajek, Addy García, Roxana Savin, Laura Rossini, Alessandro Tondelli, Agnieszka Janiak, Paolo Pesaresi	The barley mutant <i>happy under the sun 1 (hus1)</i> : An additional contribution to pale green crops	76
Monica Ruffini Castiglione, Carmelina Spanò, Lucia Giorgetti, Lorenza Bellani, Stefania Bottega, Luigi Sanità di Toppi, Simonetta Muccifora	May crops be affected by nanoplastics? Current evidence of nano-polystyrene toxicity, internalization, and translocation in plant tissues	150
Luigia Ruga, Fabio Orlandi, Chiara Proietti, Aldo Ranfa, Silvia Marrapodi, Marco Fornaciari	The LIFE CLIVUT Project: Citizen Science through Plant Phenology	50
Francesco Maria Sabatini, Borja Jiménez-Alfaro, Ute Jandt, Milan Chytrý, Richard Field, Michael Kessler, Jonathan Lenoir, Franziska Schrodte, Susan K. Wisser, Helge Bruelheide, the sPlot Consortium	Global patterns of vascular plant alpha diversity	x
Juha-Pekka Salminen	Plant tannin analytics and its importance to understanding tannin bioactivity	IX
Cinzia Sanna, Arianna Marengo, Antonio De Agostini, Giovanna Lucia Delogu, Roberta Lai, Patrizia Rubiolo, Benedetta Era, Sonia Floris, Antonella Fais, Francesca Pintus	Antidiabetic potential of <i>Ptilostemon casabonae</i> (L.) Greuter, a little-known Mediterranean plant	116
Francesco Santi, Fabrizio Buldrini, Alessandro Chiarucci	Towards the application of the Habitats Directive to an EU non-member country: the San Marino case study	151
Giulia Santunione, Alice Barbieri, Elisabetta Sgarbi	Analysis of particulate matter (PM) trapped by four different shrub species in an urban forest: quantification and characterization	xxvii
Saverio Savio, Riccardo Turchi, Debora Paris, Marianna Carbone, Letizia Ciavatta, Katia Aquilano, Carlo Rodolfo, Roberta Congestri	Biorefining the diatom <i>Staurosirella pinnata</i> for drug discovery	xx

Pierpaolo Scarano, Antonio Bosco, Antonello Prigioniero, Stefania Iervolino, Daniela Zuzolo, Maria Tartaglia, Alessia Postiglione, Maria Maisto, Maria Antonietta Ranauda, Alessandra Falzarano, Giuseppe Cringoli, Carmine Guarino, Rosaria Sciarrillo	Extraction, characterization, and <i>in vitro</i> evaluation of the anthelmintic efficacy of pasteur plant species for biological control of sheep gastrointestinal nematodes (GIN)	117
Rosario Schicchi, Anna Geraci, Filippo Amato, Giuseppe Di Noto, Gaetano La Placa, Francesco Sgadari, Roberto Danti	Manual pollinations among individuals of <i>Abies nebrodensis</i> (Madonie, Sicily)	33
Federico Selvi, Ilaria Colzi, Cristina Gonnelli	Does polyploidy enhance plant growth, Ni-accumulation and tolerance in hyperaccumulator plants? Insights from the model species <i>Odontarrhena bertolonii</i> (Brassicaceae)	77
Francesco Sgadari, Rosario Schicchi, Natale Badalamenti, Maurizio Bruno	Analysis of Sicilian populations of the genus <i>Capparis</i> L. for the determination of quercetin content	118
Elisabetta Sgarbi, Claudio Brandoli, Mara Politi, Consolata Siniscalco	Study of pollen viability in <i>Corylus avellana</i> cv. Tonda Gentile	34
Alessandro Silvestri, William Ledford, Valentina Fiorilli, Cristina Votta, Massimo Turina, Raffaella Balestrini, Hailing Jin, Ignacio Rubio-Somoza, Luisa Lanfranco	Evidence of cross-kingdom RNA interference in the arbuscular mycorrhizal symbiosis	78
Mara Simonazzi, Laura Pezolesi, Tânia K Shishido, David P. Fewer, Rossella Pistocchi	Unveiling new potential toxic metabolites from cyanobacteria through genome mining: a case study from an Italian drinking water reservoir	xxi
Antonella Smeriglio, Cristina Danna, Miriam Bazzicalupo, Mariarosaria Ingegneri, Bruno Burlando, Domenico Trombetta, Laura Cornara	The phytochemical profile of leaf and rizhome of <i>Peucedanum ostruthium</i> (L.) W. D. J. Koch influences the antioxidant, anti-inflammatory, and wound healing properties of this medicinal plant	xlix
Damiano Spagnuolo, Viviana Bressi, Antonio Manghisi, Maria Azzarà, Maria Teresa Chiofalo, Claudia Espro, Giuseppa Genovese, Marina Morabito, Patrizia Trifilò	Influence of aqueous phase from hydrothermal carbonization (AHL) of <i>Sargassum muticum</i> (Phaeophyceae) on germination and growth of <i>Phaseolus vulgaris</i> (Fabaceae)	xxiii
Federica Spina, Viktoria Ilieva, Davide Ferrero, Giovanni Di Benedetto, Iolanda Perugini, Pierangiola Bracco, Marco Zanetti, Giovanna Cristina Varese	Exploiting the fungal community against plastic polymers	xlii
Veronica Spinelli, Elisa Brasili, Fabio Sciubba, Andrea Ceci, Ottavia Giampaoli, Alfredo Miccheli, Gabriella Pasqua, Anna Maria Persiani	Fungal-derived biostimulants boosting <i>Cichorium intybus</i> : effects of <i>Chaetomium globosum</i> and <i>Minimedusa polyspora</i> culture filtrates on growth performance and metabolomic traits	79
Chiara Suanno, Elisa Tonoli, Enzo Fornari, Maria Pia Savoca, Iris Aloisi, Luigi Parrotta, Claudia Faleri, Giampiero Cai, Elisabetta Verderio-Edwards, Stefano Del Duca	Pollensomes cargo and markers in <i>Actinidia chinensis</i> Planch.	xxxv
Massimo Tacchini, Annalisa Maietti, Alessandro Grandini, Nicola Marchetti, Immacolata Maresca, Gianni Sacchetti, Alessandra Guerrini	<i>Eragrostis tef</i> (Zucc.) Trotter (Poaceae) from Ethiopia, a valuable source of nutrients and dietary flavones	119
Carmen Tammone, Ivano Spiniello, Dario Nicola Tangredi, Mattia Terzaghi, Francesco Guarino, Angela Cicatelli, Stefano Castiglione	Study of an innovative semi-idroponic Hybrid-flow Constructed Wetland system for the First Flush Stormwater treatment	80
Maria Tartaglia, Daniela Zuzolo, Alessia Postiglione, Antonello Prigioniero, Pierpaolo Scarano, Rosaria Sciarrillo, Carmine Guarino	Biotechnological combination for co-contaminated soil remediation: focus on tripartite “meta-enzymatic” activity	81
Annalisa Tassoni, Mirko Salinitro, Maura Ferri, Stefania Monari	Biochemical characterization of seven Italian medicinal plant species	120

Maria Fernanda Taviano, Federica Davi, Rosaria Acquaviva, Giuseppe Antonio Malfa, Barbara Tomasello, Paola Arena, Salvatore Ragusa, Francesco Cacciola, Yassine Oulad El Majdoub, Luigi Mondello, Natalizia Miceli	Phenolic profile, antioxidant and cytotoxic activity of the phenolic-rich fraction obtained from the leaves of <i>Brassica fruticulosa</i> subsp. <i>fruticulosa</i> (Brassicaceae) grown wild in Sicily	121
Gianmarco Tavilla, Alessandro Crisafulli, Arthur Lamoliere, Veronica Ranno, Giulia Bacilliere, Salvatore Cambria, Pietro Minissale, Gianpietro Giusso del Galdo, Saverio Sciandrello	Use of drones for environmental monitoring and rare plants conservation status: a new tool for botanical research	152
Marta Elisabetta Eleonora Temporiti, Lidia Nicola, Solveig Tosi	The influence of plastic pollution on soil fungal biodiversity	xli
Giulio Tesei, Paride D'Ottavio, Mattia Di Silvestri, Demetra Giovagnoli, Diego Giulietti, Debora Solforati, Laura Trozzo, Matteo Francioni, Marco Bianchini, Giuliano Bonanomi, Marina Allegrezza	The landscape of Central Apennine wooded grasslands: space-time dynamisms and future perspectives	iii
Manuel Tiburtini, Luca Sandroni, Giovanni Astuti, Lorenzo Peruzzi	A comparison of supervised classification models in detecting morphospecies: a case study in the <i>Armeria denticulata</i> complex (Plumbaginaceae)	39
Riccardo Tornese, Miriana Durante, Anna Montefusco, Marcello Lenucci	Application of the response surface methodology for the optimization of supercritical CO <sub>2</sub> extraction of oil from pomegranate marc	82
Simona Trincia, Giovanni Pigati, Manuela Mandrone, Ilaria Chioocchio, Cinzia Sanna, Ferruccio Poli	Metabolomic study of <i>Cynara cardunculus</i> L. collected in two different seasons in Sardinia	122
Federica Vaccaro, Giulia Bainsi, Giorgio Cappellucci, Marco Biagi, Elisabetta Miraldi	Potential of <i>Olea europaea</i> L. leaf extract from Central and Southern Italy in neuronal stress containment	123
Ilda Vagge, Stefano Bocchi, Valentina Vaglia, Alessio Gosetti Poli, Ambrogio Zanzi	Urban Ecosystem Services assessment: a systemic approach and evaluation framework for Milan	51
Giovanna Valentino, Adriano Stinca, Assunta Esposito, Antonio Fiorentino	A rapid metabolomics-guided identification of potential anticancer specialized metabolites active against drug-resistant cancer cell lines from Asteraceae plants	124
Chiara Vallese, Luca Di Nuzzo, Paolo Giordani, Renato Benesperi, Gabriele Gheza, Petra Mair, Daniel Spitale, Juri Nascimbene	Substrate type drives species richness and functional traits of alpine terricolous cryptogam communities in the Alps	153
Michele Vezzola, Tosi Solveig	Exploitation of fungi in biomining	92
Alessandra Villani, Benedetta Bottiglione, Linda Mastropasqua, Costantino Paciolla	Changes in some bioactive compounds content and growth rate of <i>Lens culinaris</i> Medik sprouts as affected by LED light intensity and quality	83
Bettina Weber	Cryptogamic communities: their biodiversity, functionality, and roles in global biogeochemical cycling in times of global change	III
Jessica Zappa, Paola Torri, Anna Maria Mercuri, Mauro Rottoli, Elisabetta Castiglioni, Michele Bassetti, Elisabetta Mottes	Pollen as a tool to reconstruct environmental transformations and land use: case study from a cult area from the Copper and Bronze Age at Gardolo di Mezzo (TN)	154
Daniela Zuzolo, Antonello Prigioniero, Ülo Niinemets, Alessia Postiglione, Mariano Mercurio, Francesco Izzo, Marco Trifuoggi, Maria Toscanesi, Pierpaolo Scarano, Maria Tartaglia, Maria Antonietta Ranauda, Maria Maisto, Rosaria Sciarrillo, Carmine Guarino	Plant-environment interactions: role of leaf functional traits from PTEs air phytoremediation perspective	84