PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

16 January 2026, 10 AM, Main meeting room of Di3A

MsTeams link to the public meeting: PUBLIC link PhD Defense Giusi Midolo Università di Catania | Partecipazione alla riunione | Microsoft Teams

International Doctor Candidate

Giusi Midolo

Will discuss his PhD theses titled

VALORISATION OF SICILIAN SHEEP WOOL: AN INTEGRATED METHODOLOGICAL PATHWAY FROM LOCAL RESOURCE TO SUSTAINABLE MATERIALS

Thesis Abstract

In Sicily, the disposal of low-quality sheep wool represents a persistent environmental challenge. Produced annually as an inevitable by-product of sheep farming, this material has little or no market value and is often illegally discarded, leading to ecological and economic concerns. At the same time, wool is a natural, renewable, and recyclable fibre with remarkable thermal and acoustic properties, biodegradability, and mechanical potential. These characteristics make it suitable for innovative uses in the construction sector one of the world's most environmentally impactful industries, responsible for nearly 50% of global CO_2 emissions, 20-50% of energy and resource consumption, and about half of solid waste production. In this context, the valorisation of agricultural residues such as wool is increasingly recognized as a strategic pathway toward sustainable development and circular economy models. This PhD project was designed to explore the reuse of Sicilian sheep wool for innovative green building applications through complementary research phases. First, a GIS-based model was developed to quantify annual wool availability and map the distribution of sheep farms, identifying the most suitable territorial areas for establishing collection centres to enable an efficient supply chain. Second, a systematic literature review examined the state of the art on wool fibres in construction materials, highlighting both their advantages in thermal-acoustic performance and reinforcement capacity, as well as the technological and economic barriers that still limit wider adoption. The third phase focused on experimental testing. Sicilian wool was spun into yarn and assessed for its mechanical performance in both dry from and after impregnation with a bio-based resin. Results revealed that resin impregnation significantly improved mechanical properties, particularly when pre-tensioning was applied during polymerization, which enhanced fibre alignment and structural compaction. These findings confirmed the potential of wool yarn as a reinforcing element in bio-based polymer composites for construction. Finally, a systematic review of Life Cycle Assessment (LCA) studies on wool across livestock, textile, and construction sectors was carried out. This review identified key methodological challenges, such as allocation procedures, system boundaries, and fibre quality, that strongly influence the results. Nevertheless, the evidence consistently indicated that low-quality or recycled wool is associated with lower environmental impacts, reinforcing its role as a sustainable raw material within circular bioeconomy strategies. Overall, this work demonstrates that Sicilian sheep wool, currently regarded as a problematic waste, can be transformed into a valuable renewable resource. By integrating territorial mapping, experimental testing, and environmental assessment, the research establishes a framework for sustainable valorisation, offering new opportunities for green building applications while reducing agricultural waste and its environmental footprint.

Advisors: Prof. Francesca Valenti; Co-advisor: Prof. Simona Maria Carmela Porto

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

26 January 2026, 12 AM, Classroom G

MsTeams link to the public meeting: PUBLIC link_PhD Defense_Emanuela GIUFFRIDA uni Catania | Partecipazione alla riunione | Microsoft Teams

Emanuela Rita Giuffrida

Doctor Europaeus
Candidate

Will discuss his PhD theses titled

NATURE-BASED SOLUTIONS FOR TERRITORIAL SOCIO-ECONOMIC INNOVATION IN THE INNER AREA OF THE SIMETO VALLEY

Thesis Abstract

This doctoral research explores the transformative potential of nature-based solutions in promoting socio-environmental innovation and community resilience in marginal and inner areas, with a particular focus on the Simeto Valley in Sicily, where a pilot area was selected in 2014 within the National Strategy for inner areas framed within the broader debate on territorial marginality and ecological transition, the study adopts a Participatory Action Research approach that integrates spatial analysis, participatory mapping, and both quantitative and qualitative methods to investigate the acceptability and perception of NBS in different both in urban and rural contexts belonging to an area officially identified as marginal by a national cohesion policy due to the difficult access to basic services in the field of healthcare, transport and education The research is structured around three objectives: to assess the perception and acceptance of NBS among local communities and institutional actors; to identify environmental fragilities and potential areas for intervention through multi-criteria analysis and participatory processes; to assess the institutional and governance frameworks that facilitate or hinder the implementation of NBS in inner areas. The results highlight the importance of integrating scientific modeling with local knowledge and participatory tools to promote place-based strategies for risk reduction and ecological regeneration. Despite a general lack of awareness and institutional inertia, the significant interest and creativity of the community, particularly among the younger generations, emerge as a source of hope and action. This thesis contributes to the international debate on climate adaptation and spatial justice, advocating for a more democratic and inclusive approach to environmental governance. Ultimately, it positions NBS not only as ecological tools, but as catalysts for territorial innovation and civic empowerment in fragile and neglected regions.

Advisors: Prof. Teresa Graziano; Co-advisor: Prof. Feliciana Licciardello

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

27 January 2026, 10 AM, , Classroom G

MsTeams link to the public meeting: PUBLIC link meeting PhD defense_Giuseppe VITALE | Partecipazione alla riunione | Microsoft Teams

International Doctor Candidate

Giuseppe Salvatore Vitale

Will discuss his PhD theses titled

AGRONOMIC AND QUALITATIVE ASPECTS OF ORGANIC COTTON CULTIVATION

Thesis Abstract

Cotton, the world's leading natural fiber, underpins an industry valued at 5.68 billion USD. However, its cultivation faces major sustainability challenges due to high water and energy demands, intensive chemical use, and the lack of effective organic defoliants for mechanical harvesting, which currently limits organic cotton to only 0.5% of global production. A literature review identified key agronomic innovations supporting sustainability, including inoculation with arbuscular mycorrhizal fungi, crop rotation, cover cropping, and low-input irrigation strategies. A second review on Life Cycle Assessment in the cotton supply chain revealed that most environmental impacts occur during cultivation - mainly linked to water use, fertilizers, and pesticides - and in the product use phase. Based on these findings, two complementary field studies were carried out in Sicily (Southern Italy). The first, conducted at two sites (Catania and Palermo), assessed two cultivars (Armonia and ST-318) under three irrigation regimes (100%, 70%, and 30% of reference evapotranspiration, ETc), with and without mycorrhizal inoculation. Results showed that microorganism inoculation increased fiber yield (up to 0.99 t ha^{-1}), boll number, and plant height, with stronger effects in soils richer in organic matter. Moderate water deficit (70% ETc) preserved 75–79% of maximum yield while improving water use efficiency (up to 1.43 kg m^{-3}). Armonia displayed greater drought tolerance, whereas ST-318 performed best under full irrigation. The second study, aimed at overcoming the limitation posed by the widespread use of synthetic defoliants, compared pelargonic acid, a rapidly biodegradable compound, with the synthetic defoliant pyraflufen-ethyl and a water control, each applied at three different rates. The experiment, conducted over the 2023–2024 biennium at the Catania University experimental farm, was arranged in a randomized complete block design with three replications. Parameters measured included defoliation efficacy, root diameter, boll number, boll weight, and yield components. Pelargonic acid at 16 L ha^{-1} achieved the highest boll number per plant in 2024, surpassing pyraflufen-ethyl at label rate, while 12 L ha^{-1} improved root diameter over the chemical control. Although pyraflufen-ethyl at 1.5 L ha^{-1} gave the highest boll weight in 2024, pelargonic acid at 18 L ha^{-1} provided comparable defoliation without adverse yield effects. Together, these studies show that combining biologically based soil fertility management, optimized irrigation, and environmentally safe defoliation can foster the revival of cotton cultivation in southern Italy. This low-input, high-efficiency approach aligns with agroecological principles and provides a viable pathway for reintroducing sustainable cotton systems in the Mediterranean environments.

Advisors: Prof. Paolo Guarnaccia; Co-advisor: Prof. Sara Lombardo

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

30 January 2026, 10 AM, Classroom E

MsTeams link to the public meeting: PUBLIC link_PhD Defense G LEONARDI | Partecipazione alla riunione | Microsoft Teams

Giuseppa Rosaria Leonardi

Doctor Europaeus Candidate

Will discuss his PhD theses titled

NEW INSIGHTS INTO THE SUSTAINABLE CONTROL OF MAL SECCO DISEASE

Thesis Abstract

Citrus cultivation represents one of the most important industries worldwide, with the Mediterranean countries serving as major citrus producers. Mal secco, caused by *Plenodomus tracheiphilus*, is an economically important fungal vascular disease in citrus-growing countries of the Mediterranean basin. Limited control measures and further restriction on the use of copper led to investigate on alternative sustainable management solutions. The use of biological control agents (BCAs), natural compounds, resistance inducers and new-copper formulations to manage Mal secco has gained significant attention. The need to find sustainable alternatives to copper is particularly emphasised in Sicilian citrus farming, a sector with a leading position in global citrus production. Consequently, research into sustainable strategies is highly encouraged and should explore various possibilities, such as alternative formulations and the investigation and promotion of beneficial microorganisms. In this context, the multidisciplinary research activities of the Ph.D. thesis focused on: (i) identifying alternative biological products able to reduce or phase out copper-base fungicides in citrus farming; (ii) evaluating the effectiveness of biological products through in vitro and in vivo experiments, comparing their efficacy with that of chemical products; (iii) assessing whether application mode could be involved in Trichoderma efficacy in controlling the disease; (iv) understanding the colonization and survival ability over time of microorganisms contained in the effective biological products; (v) assessing the impact of biological products on the plant microbiome. Overall, these findings offer practical applications in the sustainable management of *P. tracheiphilus* by promoting the use of eco-friendly strategies and minimizing the use of fungicides. Alternative products are emerging as promising substitutes for contentious copper-based fungicides in the management of citrus fungal diseases, and as promoters of beneficial plant microbiomes on a large scale. Furthermore, an innovative study approach is proposed, integrating culture-dependent and -independent tools to effectively understanding the colonization and survival ability of BCAs, with the aim of scheduling their potential application in the field. Finally, key information on effects of BCAs on the microbiome composition of citrus plants was uncovered, broadening our limited knowledge in this area.

Advisors: Prof. Dalia Aiello; Co-advisors: Prof. Alessandro Vitale

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

2 February 2026, 5 PM, Classroom G

MsTeams link to the public meeting PUBLIC link PhD Defense Federica Consentino | Partecipazione alla riunione | Microsoft Teams

International Doctor Candidate

Federica Consentino

Will discuss his PhD theses titled

GENERATIONAL RENEWAL IN AGRICULTURE: A MULTI-LEVEL AND MULTI-DIMENSIONAL ANALYSIS

Thesis Abstract

Generational renewal in agriculture is one of the major challenges for European and national policies. The ageing of the farming population and the depopulation of rural areas undermine the resilience of agricultural systems and the sustainability of territories, while agriculture struggles to attract new generations willing to commit in the long term and to promote innovative approaches. This thesis is based on the hypothesis that socio-cultural, economic, and environmental factors intertwine in shaping the decision to pursue a farming career and adopts an integrated and multi-level and multidimensional perspective to analyse the complexity of the phenomenon. The methodological approach combines a systematic literature review, qualitative in-depth interviews, cognitive mapping, and critical policy analysis, thus capturing the personal, social, and institutional dimensions of generational renewal. The findings demonstrate that generational renewal cannot be reduced to economic support or the mere transfer of farms but must be understood as a process where perceptions, identity construction, territorial embeddedness, and governance models interact. The evidence highlights the need for integrated policy strategies that: (i) acknowledge the diversity of young farmers' profiles; (ii) support gradual pathways of entry and consolidation; (iii) strengthen the social recognition of the farming profession; and (iv) foster intra- and intergenerational collaborations for more sustainable socio-economic models.

Advisors: Prof. Iuri Peri; Co-advisors: Prof. Ruth McAreavey; Prof. Gianluca Brunori

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

3 February 2026, 14 AM, Classroom E

MsTeams link to the public meeting PUBLIC link_PhD Defense LUCA LEOTTA | Partecipazione alla riunione | Microsoft Teams

Luca Giovanni Leotta

Will discuss his PhD theses titled

STRATEGIES TO OVERCOME DROUGHT STRESS IN ORNAMENTAL PLANTS IN MEDITERRANEAN CLIMATE

Thesis Abstract

Drought stress, a consequence of climate change, poses a significant challenge to plant growth and, at times, survival. This issue is especially pronounced in the Mediterranean region, a climate hotspot where the impacts of climate change are particularly severe. This challenge is critical for ornamental plants, especially when used in urban green spaces. On one hand, water availability is often inadequate or entirely absent; on the other, the plants in green infrastructure provide essential ecosystem services that improve the quality of life and well-being in cities. Several solutions exist to alleviate the challenges associated with water scarcity. Selecting the appropriate genotype is undoubtedly a crucial strategy; however, ornamental plants exhibit vast biological diversity, with over 90,000 species used for ornamental purposes. This diversity necessitates a wide range of choices and repeated testing of numerous potentially viable genotypes. In this context, it is essential to identify the response mechanisms of both herbaceous and woody plants to facilitate the efficient and rapid screening of potentially useful genotypes. Additionally, technical solutions, such as biostimulants, may help mitigate the adverse effects of drought stress. In this context, the doctoral thesis examined several preliminary aspects of the issue through two reviews. Specifically, it focused on (i) strategies to enhance the resilience of shrubby plants to abiotic stress and (ii) the selection of plants suitable for green roofs—an infrastructure where the effects of drought stress are particularly pronounced. The potential contribution of certain native shrubs to the sustainability of Mediterranean green spaces was analyzed, along with the morphological, physiological, and biochemical responses of various herbaceous plants subjected to drought stress and subsequent sheltering. The final two trials investigated the application of biostimulants, assessing species-specific effects as well as the influence of treatment timing, dosage, and extraction methods.

Advisors: Prof. Daniela Romano; Co-advisor: Prof. Stefania Toscano

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

9 February 2026, 10 AM, Classroom E

MsTeams link to the public meeting PUBLIC link_PhD Defense Gianluigi Agolino | Partecipazione alla riunione | Microsoft Teams

Doctor Europaeus Candidate

Gianluigi Agolino

Will discuss his PhD theses titled

EXPLOITATION OF PROBIOTIC STRAINS WITH TARGETING CHOLESTEROL REDUCTION FOR THE FORMULATION OF FUNCTIONAL FOODS

Thesis Abstract

The bile salt hydrolase (BSH) activity has emerged as a key probiotic trait linking gut microbiota functionality with host lipid metabolism and cardiovascular health. BSH is an enzyme which catalyzed the deconjugation of bile acids (BAs), which play a pivotal role in maintenance of host cholesterol homeostasis. Lactobacillus species are widely acknowledged as central BSH-active probiotics, by enhancing gastrointestinal strain survivability, as well as contributing to cholesterol-lowering activity. This thesis investigated the genomic, phenotypic, and functional properties of three BSH-positive candidates, *Lacticaseibacillus rhamnosus* VB1, *Lacticaseibacillus rhamnosus* VB4, and *Levilactobacillus brevis* M3R3, from human and food sources. Probiogenomic and phenotypic analyses revealed strainspecific genetic features related to BAs tolerance and deconjugation capacity in all the three investigated strains. Both human isolates *L. rhamnosus* VB1 and VB4 strains carried a single copy of the bsh gene, most likely underpinning their BSH potential. Among them, VB4 exhibited greater resistance to BAs condition and a higher deconjugation ability. Interestingly, VB1 displayed higher bsh expression than VB4 at stationary phase under BAs stress. *L. brevis* M3R3, isolated from sourdough, possessed two distinct bsh genes potentially contributing to BSH activity. This genetic feature supported a strong BAs deconjugation capacity and enhanced adaptability under bile salt conditions. Given its strong role in bile acid (BAs) deconjugation, strain VB4 was further investigated using the in vitro SHIME® model. Culture-dependent analyses confirmed its survival throughout the simulated digestive process. Moreover, gene expression and metabolomic profiling revealed an effective modulation of BA pools during intestinal transit, particularly in the colon phase, where interactions with the resident microbiota amplified the observed changes following VB4 administration. In parallel, functional assays were performed to evaluate the role of the three selected strains in cholesterol metabolism. Data demonstrated their capacity to assimilate cholesterol and to reduce micellar cholesterol uptake by Caco-2 cells, with VB1 showing the strongest adhesion and cholesterol-lowering efficiency, followed by VB4 and M3R3. Overall, these findings identify VB1 and VB4, together with M3R3, as promising BSH-positive strains with cholesterol-lowering potential. Their detailed characterization—through probiogenomic analyses, dynamic gut models, and host-cell assays—provides a solid framework for the development of next-generation probiotics aimed at regulating lipid homeostasis.

Advisors: Prof. Cinzia Lucia Randazzo; Co-advisor: Prof. Cinzia Caggia

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

11 February 2026, 10 AM, Classroom G

MsTeams link to the public meeting PUBLIC Meeting PhD defense FABIOLA PESCE | Partecipazione alla riunione | Microsoft Teams

Doctor Europaeus Candidate

Pesce Fabiola

Will discuss his PhD theses titled

LIQUID NITROGEN AS A SUITABLE ALTERNATIVE TO PISTACHIOS PEELING PROCESS

Thesis Abstract

The growing demand for high-quality, minimally processed foods has driven research into innovative preservation and processing methods that maintain nutritional, sensory, and functional properties while reducing environmental impact. Pistachio (*Pistacia vera* L.), a high-value nut rich in unsaturated fatty acids, proteins, minerals, and bioactive compounds, is particularly sensitive to postharvest handling and processing. Conventional peeling methods, such as blanching, can lead to oxidative deterioration, loss of thermolabile bioactive compounds, and significant water consumption. This doctoral research investigated an innovative peeling method based on the use of liquid nitrogen (LN_2), or cryopeeling, as a sustainable alternative, focusing on its effects on efficiency, kernel quality, and the preservation of phenolic compounds present in the skin. Trials conducted on a commercial pistachio sample and on the PDO Bronte Green Pistachio cultivar demonstrated that LN_2 treatment enabled efficient peeling while maintaining kernel structure, reducing peroxide values by approximately 50% compared to conventional methods, and limiting surface damage. Colorimetric analysis revealed improved chromatic characteristics in both cultivars, with increases in lightness (L*) and greenness (a*), especially in the Bronte variety. Regarding the bioactive profile, LN_2 peeling generally enhanced the retention of phenolic compounds in the skin. In the case of the Bronte pistachio, the total polyphenol content was nearly four times greater, and anthocyanin levels were more than fifteen times greater compared to hot-water treated samples. The antioxidant capacity of the skin was also tripled, highlighting their potential for by-product valorisation. Microstructural and thermal analyses confirmed the preservation of tissue integrity and chemical stability over time, supporting the theoretical advantages of rapid freezing. These findings underline LN_2 cryopeeling as a promising technology for the pistachio industry, offering combined benefits in terms of quality preservation, by-product enhancement, and reduced environmental impact. This work also provides a replicable model for the application of cryogenic technologies to other nuts products.

Advisors: Prof. Rosa Palmeri; Co-advisor: Prof. Lucia Parafati

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

12 February 2026, 11 AM, Classroom K

MsTeams link to the public meeting PUBLIC meeting PhD defense Valeria Ereddia | Partecipazione alla riunione | Microsoft Teams

Valeria Ereddia

International Doctor Candidate

Will discuss his PhD theses titled

CROSSING AND NGTS FOR BREEDING IN SICILIAN GRAPEVINE VARIETIES

Thesis Abstract

Grapevine (*Vitis vinifera* L.) is a perennial fruit crop of high economic and cultural relevance, particularly in Sicily. A major challenge for viticulture is the diffusion of diseases such as powdery and downy mildew, whose management has traditionally relied on chemical control. Consequently, enhancing genetic resistance in grapevine varieties represents the most sustainable long-term strategy for disease management. This thesis focuses on six of the most important Sicilian grapevine varieties, three white-skinned ('Carricante', 'Catarratto', 'Grillo') and three red-skinned ('Frappato', 'Nerello mascalese', 'Nero d'Avola'), as part of a project funded by the Istituto Regionale del Vino e dell'Olio (IRVO) of the Sicilian Region, in collaboration with the University of Catania and the 'Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria - Viticoltura ed Enologia' (CREA-VE). Two complementary strategies were selected to pursue resistance improvement: crossing and genome editing through the CRISPR/Cas9 system. Crossing was performed over three years between the selected varieties and resistant hybrids previously developed by CREA-VE. The progeny was analysed through Marker Assisted Selection (MAS) to identify the presence of resistance loci, allowing early screening at the seedling stage. Powdery mildew tolerance was confirmed through in vitro bioassays. On the other hand, before applying a genome editing approach, it is crucial to establish a reliable in vitro protocol, particularly for obtaining embryogenic calluses and for the regeneration of whole plants. In this study, stamen and pistils were cultured in vitro, taking into account different variables such as the pollen developmental stage and two different induction media. Protocols for protoplast isolation and regeneration were also developed to enable CRISPR/Cas9 editing. Genome editing was performed to knock-out susceptibility genes of the Mildew Locus O (MLO) family, which are negative regulators of resistance to powdery mildew. We applied the CRISPR/Cas9 system using geminivirus-derived replicons to produce transgene-free edited plants. Editing experiments were performed targeting MLO3, MLO7 and MLO13/17 in both embryos and isolated protoplasts. Editing events were first evaluated by monitoring of Green Fluorescent Protein (GFP) expression, followed by molecular screening and sequencing. This thesis represents the first report of a research project aimed at developing Sicilian grapevine varieties with improved resistance traits. Both strategies were carefully evaluated, highlighting their successes as well as the potential challenges, and the results obtained are highly promising for enhancing the value of these genotypes as key germplasm resources for viticulture and oenology in Sicily.

Advisors: Prof. Alessandra Gentile; Co-advisors: Prof. Elisabetta Nicolosi, Prof. Chiara Catalano

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

18 February 2026, 9 AM, Classroom G

MsTeams link to the public meeting PUBLIC meeting Phd Defense Giuseppe Bonfante | Partecipazione alla riunione | Microsoft Teams

Doctor Europaeus Candidate

Giuseppe Bonfante

Will discuss his PhD theses titled

FROM MICROALGAL BIOMASS TO BIOACTIVE INPUTS: SCALABLE PRODUCTION, GREEN EXTRACTION AND SUSTAINABLE BIOTECHNOLOGICAL APPLICATIONS

Thesis Abstract

The transition toward sustainable agriculture requires innovative inputs capable of improving crop performance while reducing reliance on synthetic agrochemicals. Microalgae represent a promising biological platform, owing to their capacity to generate biomass under diverse conditions and to biosynthesize a wide range of metabolites with agronomic relevance. This doctoral research aimed to explore the biotechnological and agronomic potential of microalgal biomass, with a focus on scalable cultivation, green extraction protocols, and functional assessment of derived products. *Chlorella vulgaris* CCAP 211/19 was cultivated at laboratory, pilot, and industrial scale, achieving biomass productivities up to 0.16 g/L/day in closed photobioreactors. Biomass recovery was optimized through centrifugation and concentration strategies, providing sufficient material for downstream applications. Extracts were obtained via ultrasound-assisted alkaline lysis both at laboratory and industrial level and subsequently tested in germination bioassays and agronomic trials on zucchini. A clear dose–response effect emerged: high concentrations (1:10) were phytotoxic, while diluted extracts (1:1000–1:10000) enhanced germination and root elongation. In tunnel experiments, repeated foliar and root applications promoted plant growth, chlorophyll accumulation, and increased enzymatic activities linked to nitrogen assimilation and secondary metabolism, confirming the biostimulant role of microalgal extracts. In parallel, a green protocol for fatty acid recovery was established using sustainable solvents (ethyl acetate and 2-methyltetrahydrofuran). The method was optimized on *Nannochloropsis* spp. and extended to *Chlorella vulgaris* and *Aurantiochytrium*, yielding fatty acid profiles enriched in omega-3 and omega-6 polyunsaturated fatty acids. Comparisons with conventional extraction approaches demonstrated comparable or superior efficiency, with reduced environmental impact. Overall, this work provides an integrated assessment of microalgal biomass production, extract valorisation, and application in crop systems. The findings support the dual role of microalgae as sources of biostimulants and nutritionally valuable fatty acids, aligning with circular bioeconomy principles and the European Green Deal.

Advisors: Prof. Andrea Baglieri; Co-advisors: Prof. Iuri Peri; Dr: Mimmo Scollo

PhD course in Agricultural, Food and Environmental science

Thesis Defenses XXXVIII Cycle

25 February 2026, 10 AM, Classroom K

MsTeams link to the public meeting PUBLIC meeting PhD defense Giulio Cascone | Partecipazione alla riunione | Microsoft Teams

Doctor Europaeus Candidate

Giulio Cascone

Will discuss his PhD theses titled

LIVING LABS AND BIO-DISTRICTS AS DRIVERS OF SUSTAINABLE RURAL DEVELOPMENT: EVIDENCE FROM THE CALATINO INNER AREA

Thesis Abstract

Rural inner areas face long-standing socio-economic and environmental challenges, including depopulation, land abandonment, and limited access to innovation and services. However, these territories also offer significant opportunities to activate sustainable development processes based on local resources, community engagement, and agroecological principles. This PhD thesis investigates how participatory and territorial approaches—specifically Living Labs and Bio-Districts—can support the agroecological transition and promote inclusive rural development. The study focuses on the SNAI area of Calatino (Sicily, Italy) as an empirical case and builds upon a combination of qualitative and quantitative methodologies. The research is articulated in four scientific contributions. The first is a systematic review of the international literature on Living Labs in the agri-food sector, providing a conceptual framework and mapping their application in rural contexts. The second contribution consists of a territorial analysis and stakeholder engagement process using the Living Lab methodology to co-design a Bio-District in the Calatino area. The third article applies an extended Theory of Planned Behavior (TPB) to analyze the willingness of local organic farmers to join a potential Bio-District, identifying the psychological and institutional factors that influence their intention. Finally, the fourth contribution presents a choice experiment conducted among Sicilian consumers to assess their willingness to pay (WTP) for agroecological products certified by the Bio-District, with a focus on the effect of social identity labeling on consumer preferences. The findings provide new empirical evidence on the enabling conditions for participatory agroecological transition in marginal rural areas. They highlight the role of Living Labs in supporting stakeholder co-creation processes, the relevance of trust and perceived utility for farmers' engagement in territorial initiatives, and the effectiveness of social identity cues in stimulating sustainable consumption patterns. By combining behavioral insights with territorial analysis, this thesis offers theoretical and practical contributions to the design of policies and governance models for sustainable rural development.

Advisors: Prof. Paolo Guarnaccia; Co-advisor: Prof. Giuseppe Timpanaro