



PhD programme in MOUNTAIN ENVIRONMENT AND AGRICULTURE

(Curriculum 1 – Sustainable agricultural production systems)

Research projects and supervisors		
Curriculum 1 Sustainable agricultural production systems		
Title	Supervisor(s)	Curriculum
<p>1. Exploring the potential of rearing insects on locally sourced organic wastes according to a circular economy approach</p> <p>Description - This research initiative explores the potential of using insects to valorize organic waste within the agri-food system of South Tyrol, embracing the principles of a circular economy. Insects offer a promising avenue for transforming large amounts of organic wastes, into a high conversion valuable resource. By rearing insect larvae on locally sourced organic waste substrates, this study aims to produce high-quality protein-rich insect biomass for animal feed and food, and reduce dependency from unsustainable protein sources and chemical fertilizers. The project seeks to answer critical questions regarding optimal growth substrates, attractive substances for insect oviposition, and the nutritional composition of the reared insects. The goal is to provide scalable, environmentally sustainable practices beneficial for both large-scale companies and small producers in achieving agricultural process sustainability and reducing environmental impact. The ideal PhD candidate should possess expertise in entomology, agricultural sciences, waste management, experimental design, data analysis, sustainability and circular economy principles.</p>	Prof. Angeli S.	1
<p>2. Characterization of volatile compounds in plant-insect interactions: towards the development of alternative pest control techniques</p> <p>Description - This research project focuses on the characterization of volatile compounds released by plants during interactions with insects, aiming to develop new control techniques to manage pest insects in a more sustainable way. Understanding the composition and function of these volatile compounds provides valuable insights for the development of ecological and targeted control strategies. The project involves the identification and characterization of volatile compounds involved in plant-insect interactions through advanced analytical techniques, such as gas-chromatography, mass spectrometry and electroantennography. Subsequently, potential applications of these volatile compounds for creating natural insecticides, repellents, or olfactory traps will be explored. The ultimate outcome of the project is to provide practical and innovative solutions for pest control, contributing to biodiversity conservation, crop protection, and the promotion of a more sustainable and resilient agriculture. The ideal PhD</p>	Prof. Angeli S.	1

<p>candidate should have expertise in entomology and agricultural sciences and preferentially some knowledge on plant-insect interactions, advanced analytical techniques (such as gas chromatography, mass spectrometry, and electroantennography), ecological pest management, and development of innovative solution.</p>		
<p>3. The role of semiochemicals in the tritrophic-interaction and the intraspecific communication of <i>Eriosoma lanigerum</i> and <i>Dysaphis plantaginea</i>: exploring new possibilities for the development of sustainable pest control measurements</p> <p>Description - The research project focuses on investigating the role of semiochemicals in the tritrophic interactions involving apple trees, the woolly apple aphid (<i>Eriosoma lanigerum</i>), and the rosy apple aphid (<i>Dysaphis plantaginea</i>). These aphid species are significant pests of apple orchards, causing substantial damage to branches, leaves, and fruits, ultimately reducing yields not only during the initial outbreaks but also in subsequent years. They overwinter either as durable eggs or colonies on apple trees, perpetuating their life cycle and establishing themselves as persistent pests throughout the lifetime of an apple orchard. The pest management relies mainly on synthetic insecticides treatments. During last years a remarkable increase of damages has been registered for the woolly apple aphid, also due to the recent withdrawal or restricted use of certain broad-spectrum insecticides. The study aims to explore how semiochemicals mediate both interspecific and intraspecific communication among these aphid species, their host, the third trophic level (natural parasitoids and predators), with the goal of developing new sustainable pest management strategies for integrated as well as for organic farming. The ideal PhD candidate should possess expertise in aphid ecology, semiochemicals, tritrophic interactions, pest management, and experimental design.</p>	<p>Prof. Angeli S./Dr. S. Schmidt</p>	<p>1 funding Institution: Laimburg</p>
<p>4. Climate change-driven effects on carbon and water fluxes in grapevines and vineyards</p> <p>Description - The PhD student will perform research on carbon and water fluxes at plant and ecosystem level. The PhD student will adopt several methodological approaches including eddy covariance. Candidates should possess a basic knowledge of plant physiology and agrometeorology. Skills in managing sensors, dataloggers and big data are an advantage.</p>	<p>Prof. Andreotti C., Prof. Zanotelli D., Prof. Tagliavini M., Prof. Wohlfahrt G.</p>	<p>1</p>
<p>5. Mitigation strategies in viticulture to cope with climate change-induced multiple abiotic stresses</p> <p>Description - The PhD student will investigate the potential of different mitigation strategies, at soil and canopy level, to contrast the negative effects caused by combines environmental stressors, such as drought, heat and excessive radiation. Candidates should possess a solid knowledge of statistics applied to the agronomic studies and of general plant physiology. He/she should have experience in the measure of plant main physiological indexes,</p>	<p>Prof. Andreotti C., Prof. Zanotelli D., Prof. Tagliavini M., Prof. Wohlfahrt G.</p>	<p>1</p>

<p>and in the evaluation of fruit intrinsic quality. A general knowledge about viticulture is an advantage.</p>		
<p>6. Use of agroecology principles and intercropping to increase sustainability of strawberry cultivation in mountain areas</p> <p>Description - The PhD will investigate the impact of intercropping on strawberry cultivation, both at plant and ecosystem level. The research will be conducted by integrating different methodological approaches including the analysis of nutrients uptake and allocation in the different organs of the primary and secondary crops, the calculation of the water use efficiency of the cropping systems, the effect on soil quality and biodiversity. The general aim will be to provide insight into the potentiality and limitations of the agroecology principles when applied to a highly specialized crop such as strawberry. The candidate should possess a good knowledge about horticulture (berry cultivation) and general plant physiology. He/she should also have good knowledge in statistical procedures for agricultural research (experimental design and data analysis).</p>	<p>Prof. Andreotti C., Dr. Soppelsa S.</p>	<p>1 funding Institution: Laimburg</p>
<p>7. Future agritourism in mountain areas – socio-economic perspectives</p> <p>Description – Agritourism is seen as a sustainable development option for mountain areas. Nevertheless, continuous improvements and innovation are needed to minimize existing negative economic, social and/or environmental impacts. For scientifically exploring novel approaches to a traditional tourism activity, candidates should have an educational background (MSc degree) in economics (agricultural, natural resources, environmental etc), or political or other social sciences with proven knowledge and interest in agricultural and/or environmental topics. Quantitative skills (statistics, econometrics etc.) and knowledge of the production particularities of mountain areas are an advantage. The topic is indicative and can be adapted to the PhD student’s interests and skills.</p>	<p>Prof. Fischer C., Dr. Streifeneder T.</p>	<p>1 Co-funding institution: Eurac Research</p>
<p>8. Sustainable regional and agricultural development strategies for mountain territories</p> <p>Description - Mountain territories are particularly vulnerable to over-development which creates pressures on local communities, wildlife habitats and natural ecosystems. How can future mountain land and resource use be managed more sustainably? For scientifically exploring novel regional, rural and/or agricultural development strategies, candidates should have an educational background (MSc degree) in economics (agricultural, natural resources, environmental etc), or political or other social sciences with proven knowledge and interest in agricultural and/or environmental topics. Quantitative skills (statistics, econometrics etc.) and knowledge of the production particularities of mountain areas are an advantage. The specified PhD topics are indicative and can be adapted to the PhD student’s interests and skills.</p>	<p>Prof. Fischer C., Dr. Streifeneder T.</p>	<p>1 Co-funding institution: Eurac Research</p>