

## Agroecology Living Lab for apple orchards, South Tyrol (Italy)

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### Abstract

*The Living Lab approach is a new way to find practically feasible and scientifically tested solutions for pressing challenges. In collaboration with stakeholders in South Tyrol, an agroecology living lab is started in the Vinschgau/Venosta Valley to implement agroecological measures in apple orchards. Together with farmers, cooperatives, consultants and biologists reliable improvements to enhance agroecology and particularly biodiversity in orchards will be developed through participatory research. The activities are part of the project AGRECO4CAST, which fosters agroecological transitions in permanent cropping systems.*

**Keywords:** agroecology, living lab, biodiversity, apple orchards, South Tyrol

### Introduction

Agroecosystem living labs were introduced to promote the faster adoption of innovations aimed at making agriculture more sustainable and resilient. (McPhee et al. 2021). According to the European Network of Living Labs (ENoLL), living labs are user-centered, open innovation 'ecosystems' which are based on co-creation approach and integrate research in real life communities and settings. In the Vinschgau/Venosta Valley, South Tyrol a Living Lab is set up to find solutions for improving biodiversity in apple orchards. The Living Lab area called 'Schneewinkel' is about 70 hectares large and includes 40 farmers, both organic farms as well as farms using integrated production. Former projects have already investigated in how to improve biodiversity of apple orchards and showed the importance of involving farmers and other stakeholders throughout the entire process (Penvern et al. 2019). The Living Lab approach aims to meet this requirement of including all relevant stakeholders and will be used to identify existing measures and previously unknown measures to promote agroecology and particularly biodiversity in the defined project area. The measures are tested for practical suitability and, at the same time, their effectiveness is assessed, with the help of monitoring data.

### Material and Methods

The project AGRECO4CAST employs a participatory research design to collaboratively develop strategies for fostering agroecology in apple orchards, in Vinschgau/Venosta Valley. In the first phase, a series of stakeholder interviews and workshops are conducted to engage apple farmers, cooperatives, agricultural consultants, and researchers. These activities are designed to elicit experiential knowledge, identify current challenges, and co-generate potential agroecological practices relevant to apple production systems.

In the beginning, face to face interviews were conducted, including all farms in the living lab area, intended to explain the project goals and to collect the participants attitude towards biodiversity. The interviews were held by the project partners EURAC Research together with VIP (association of Val Venosta producers of fruit and vegetables). After identifying the overall relationship of farms regarding biodiversity, a workshop with stakeholders will be held to identify the most promising biodiversity measures for practical implementation as well as their practical limitations.

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In order to measure the current situation in the orchards and the impact of future measures on biodiversity, the project partner Eurac Research defined organism groups (vascular plants, mosses and lichens, birds, bats, locusts, butterflies, coleoptera, hemiptera, arachnids, etc.) and surveys the number of different species occurring in the orchards of the project area. Influences on the landscape level are measured, and the heterogeneity of the surrounding landscape is also included in the survey. (Hilpold et al. 2025)

Additionally, the most promising biodiversity measures for local conditions as identified during the previous steps will be tested in field trials using both biodiversity and agronomic assessments, as already successfully shown in other projects (Krismann et al. 2022). Initial findings from the face-to-face interviews conducted by the project partners and information gathered from participating stakeholders indicate that the highest potential for implementation lies in seed mixtures and flower strips as well as anchor plants (i.e. shrubs at the beginning of the tree rows). After further consultation with the key stakeholders, these measures will most likely be tested in the field trials.

In the second phase, the qualitative insights and ideas collected during the participatory process are integrated with quantitative datasets, including local weather data, soil data, agronomic and economic indicators as well as data on biodiversity. These combined inputs build the basis for constructing exploratory scenarios and strategies for the transition to agroecological management.

In the final phase, the resulting scenarios and proposed strategies are presented back to the stakeholders in follow-up workshops. These sessions serve to validate the model outputs, assess their practical relevance, and refine strategies to ensure feasibility and applicability under real orchard conditions.

During the project a catalogue of agroecological measures will be developed, including a valuation of their positive and negative impacts on the apple orchards and their feasibility. To address the economic component of agroecology, business models are being co-designed with stakeholders to optimise synergies and minimise trade-offs when implementing biodiversity measures. Stakeholder participation will ensure that the strategies are practical and aligned with their needs. The goal is to create actionable strategies that improve the resilience and sustainability of the apple orchards.

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