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ZeroResidue Project Turns Apple and Wine Waste Into Valuable Resources in South Tyrol

Researchers at Noi Techpark develop new methods to extract useful compounds from agricultural byproducts, advancing the circular economy.

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At the Noi Techpark in Bolzano, Italy, a new research infrastructure is being developed to address the large amounts of waste generated by apple and wine processing. Traditionally, byproducts such as pomace, apple peels, and seeds have been treated as waste. The new initiative, called “ZeroResidue,” aims to transform these agricultural and food industry residues into valuable resources. The project is funded by the European Union and led by the Free University of Bozen-Bolzano and the Laimburg Research Centre.

The main goal of ZeroResidue is to strengthen the circular economy and sustainability in South Tyrol. The project will establish a research and experimentation platform that allows scientists to test and improve methods for upgrading waste materials. This infrastructure is designed to bridge the gap between applied research and potential industrial applications.

Alberto Ceccon, head of the NMR Spectroscopy Laboratory at Laimburg Research Centre, explained that many plant-based residues contain hidden resources such as molecules and compounds of significant interest. He noted that the challenge has not only been recognizing their value but also having a structure in place to turn this knowledge into processing methods and products.

Emanuele Boselli, professor of enology at the Free University of Bozen-Bolzano and coordinator of ZeroResidue, said that the project’s multidisciplinary team wants to demonstrate that agro-food residues can be fully utilized. Unlike traditional approaches that often focus on single byproducts, this project seeks to recover new molecules, ingredients, and materials that support a sustainable circular economy.

Potential applications include extracting compounds from apple blossoms for use in cosmetics, as well as fibers, vitamins, or plant oils that could serve as natural preservatives or colorants in food production. These extracts could also be used to create dietary supplements with health benefits. Additionally, biostimulants for more sustainable agriculture can be produced from plant waste. After extraction processes are completed, any remaining biomass will be used for energy generation to close the recycling loop.

A related ongoing project called “Sustain” provides a concrete example of this approach. Researchers are studying grape pomace—the solid remains after pressing grapes for wine—and extracting polyphenols from it. These compounds are present in higher concentrations in pomace than in grape flesh or wine itself. Polyphenols have shown potential in slowing the progression of neurodegenerative diseases such as Alzheimer’s.

The ZeroResidue project represents a shift in how agricultural waste is viewed and managed in South Tyrol. By developing new technologies and processes at Noi Techpark, researchers hope to create products for use in biomedicine, food production, enology, and cosmetics. The initiative aims to reduce waste while creating economic opportunities based on sustainability and innovation.