CASE STUDY

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REDUCED PESTICIDE USE WITH NANOPARTICLES

Problem – Challenge

One of the biggest challenges facing agriculture today is the extensive use of fertilizers and pesticides. With an increasing number of products banned or considered dangerous for human and animal health, the need for substitutes is acute. One approach is to stimulate plants' own immune response to pathogen attacks. Silicic acid, which naturally occurs in soil, is known to provoke such responses in plants, and amorphous silica nanoparticles can release this substance in small amounts. With this in mind, Dr. F. Schwab from the Adolphe Merkle Institute (AMI) has developed an environmentally safe nano-agrochemical for the targeted delivery of silicic acid and to stimulate plant defense.

Solution

In a collaboration with the biology department of the University of Fribourg this nano-agrochemical was shown to serve as an inexpensive, highly efficient, safe, and sustainable alternative for plant disease protection. The study was published in the top-ranking journal Nature Nanotechnology.

Starting this year, with support from Innosuisse, the Swiss Innovation Agency, Schwab form AMI and her partners at the University of Applied Sciences and Arts Western Switzerland – Fribourg and the Bern University of Applied Sciences' School of Agricultural, Forest and Food Sciences have been performing field trials and upscaling the production of the nanoparticles.

The AMI is a competence center of the University of Fribourg that focuses on soft nanomaterials. The Institute is composed of four main research groups with complementary expertise: BioNanomaterials, Soft Matter Physics, Biophysics, and Polymer Chemistry & Materials. Additionally, the Institute offers high-quality services for the analysis of nanomaterials through its Swiss NanoAnalytics platform (https://www.ami.swiss/en/nanoanalytics/), which was established by the BioNanomaterials group. The group, coled by Prof. Rothen-Rutishauser and Prof. Fink, focuses on nanoparticle synthesis, characterization, and analysis, as well as the assessment of their interactions with humans and the environment. The group has immense expertise in hazard assessment of nanomaterials, nanoparticle design, characterization, and development for biomedical applications. The group has also developed several representative 3D cellular models to be used in predictive biomedical research.