

Biostimulants have been used agronomically for hundreds of years. Native American Indians composted plant and animal materials into their soils. After the breakdown of these biomasses, the plant growth promoting substances, such as proteins, vitamins, and carbohydrates, were released.

The term "plant biostimulant" has been in use since at least 1997. Yet today, there is still no single, globally accepted definition for legal purposes. According to The European Biostimulant Industry Council (EBIC) "Plant biostimulants contain substance(s) and/or micro-organisms whose function when applied to plants or the rhizosphere is to stimulate natural processes to enhance/benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress, and crop quality". Because the overuse of chemical pesticides and fertilizers can negatively impact soil productivity, horticulturists now look to organic compounds to bring soils back into balance, and improve plant health.

Biostimulants should never be considered as replacements for sound fertility and disease-management programs. Biostimulants optimize plant health and vigour, while allowing them to withstand and survive environmental and biological stresses, such as extreme temperatures, drought, traffic or fluctuations in soil fertility. It could be said that biostimulants are the plant managers' "insurance policy", but in fact they are essential elements that show their true worth during unfavourable weather conditions.

Plants are essential for feeding the world, not only because of the nutrients they provide but also because they produce an enormous variety of secondary metabolites, such as phenolic compounds, terpenes, and alkaloids, with roles in various biological processes related to resistance to stresses. During the past few years, the main goal of agriculture has been to increase yield in order to provide the food that is needed by a growing world population.

Our scientific research is focused on developing innovative extracts, based on biomasses that have not yet been used in crop cultivation.

The research includes the following objectives:

1. Biomass: characteristics and preparation for production of biostimulants
2. Extracts: development of production method, characteristics of obtained biostimulants
3. Evaluation of the impact of extracts on *Arabidopsis thaliana* under standard condition and during abiotic stress in pot tests
4. Assessment of the mechanism of action of botanical extracts tested at the gene level

The main aim of this project is to investigate the potential of using natural raw materials that have not yet been used for the production of biostimulants. Ultrasound-assisted extraction will be used to prepare innovative prototypes. The expected result is to generate products that will show beneficial effects on plant growth, development, nutritional quality, and make plants more resistant to abiotic stress.