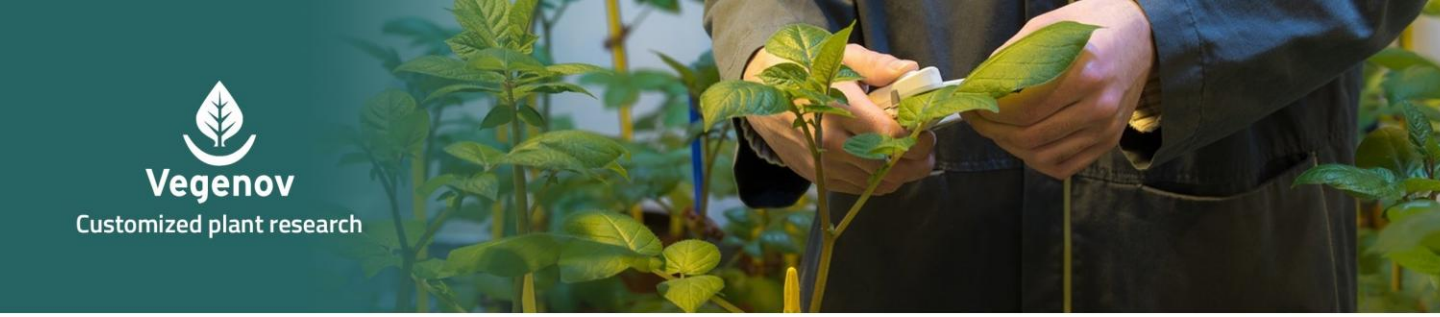


Evaluation of biostimulants, fertilizers and substrates

Product's efficacy and mode of action

Our Vegenov teams have set up a range of tests and tools to evaluate the performance of your products and to understand their mode of action.

Efficacy and mode of action of biostimulants*, fertilizers and substrates

- **Plant growth and quality of harvested products:**
  Phenological stages, biomass, sensory and nutritional quality, …
- **Plant tolerance towards abiotic stresses:**
  Water, thermal and salt stresses, and UVs
  Stress biomarkers, stomatal regulation, …
- **Nutrient availability and nutrient uptake:**
  Nutrient deficiency, bioavailability, marker tracking (stable isotope), …

**Our experiments can be integrated into your homologation file (European CE 2019/1009 certification)*

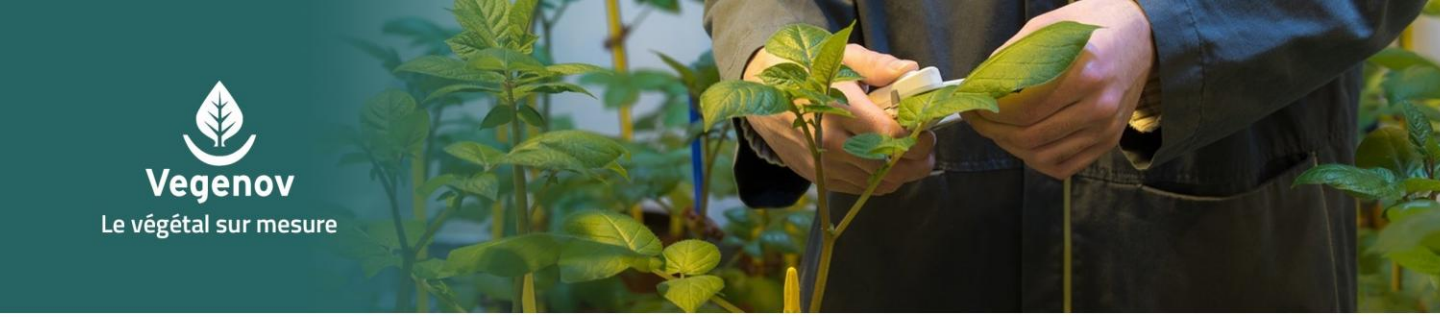
To determine the **optimal conditions of a product's efficacy**, environmental or intrinsic parameters of the crop can be modulated: variety effect, product application mode, crop stage for product application, impact of UVs or leaching, multi-stress interaction effects.

Our main crops of study

Field crops
corn, wheat, potato, rapeseed, rye-grass, pea, …

Vegetables
tomato, lettuce, cucumber , rocket, radish, basil, …

Types of measurements that are carried out by Vegenov are presented on page 2



Several types of analysis are carried out at Vegenov to evaluate biostimulants, fertilizers and substrates.

Assays are performed under controlled conditions to evaluate product efficacy and to understand their mode of action

Types of analysis	Measurements
Plant growth	Germination speed, plant height, stem width, root development and architecture, leaf area, plant growth speed, biomass weight, …
Plant physiological status	➢ On plant: stomatal regulation, water retention capacity, photosynthetic capacity, Near-Infra Red Spectroscopy (NIRS),… ➢ In soil: VWC (Volume Water Content) and conductivity
Molecular analysis	Plant defence gene expression, soil microflora tracking (specific markers or metabarcoding)
Biochemical analysis	➢ On plant: markers of stresses (proline, MDA, ABA), tracking of nitrogen and phosphorus uptake (with stable isotope), … ➢ In soil: pH tracking, enzyme activity (mineralization of nitrogen, carbon, phosphorus,…), ... ➢ On harvested products: quantitative analysis of taste and nutritional components (ex: vitamins, glucosinolates, lycopene), degree Brix, …
Sensory analysis	Panels of tasters for the characterization of harvested product taste, texture, appearance, etc.

Our growing spaces:

- 4 *in vitro* growth chambers
- 12 regulated growth chambers
- 1 500 m² of greenhouses divided into 22 compartments of 20 m² to 150 m²

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