

## **Investigation of the effects of different non-microbial biostimulants on primary and secondary metabolism of strawberry (*Fragaria x ananassa*) in organic farming**

The need to research innovative and sustainable agronomic practices able to improve the production and functional quality of products are pushing the entire agricultural sector towards the use of biostimulants. In this direction, our work compared the effects of three different non-microbial biostimulants (plant-derived protein hydrolysate, algae extract and tropical plant extract) and an untreated control on the yield and quality of organically grown strawberries (*Fragaria x ananassa*; cultivar Sabrina). Compared to the control condition, all biostimulants resulted in an improvement of photosynthetic performance, but only the plants treated with the plant-derived protein hydrolysate recorded a higher fresh marketable yield. A presumed mechanism involved in the increase in yield achieved could be attributed to the improved availability and uptake of essential macro- and micronutrients. The application of the seaweed extract resulted in a significant increase in total phenolics and ABTS antioxidant activity, measured by Q Extractive Orbitrap LC-MS/MS and UV-VIS spectrophotometer, respectively, thus contributing to the improved functional quality of the fruit. With regard to the total soluble solids content (°Brix), only the biostimulant based on tropical plant extracts resulted in significant differences. In summary, the results of our study show how the different nature of the biostimulants, due to a substantial difference in content and composition, determines different responses ranging from primary to secondary metabolism.

*Keywords:* Nutrient use efficiency; sustainable agriculture; plant-derived protein hydrolysate; phenolic profile; seaweed extracts