Bio-effectors from waste materials as growth promoters for tomato plants, an agronomic and metabolomic study

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In organic farming, where nutrient management is constrained and sustainability is claimed, bio-effectors pave their way. Considering selected bio-effectors, this study integrates metabolomics to agronomy in depicting induced relevant phenomena. Extracts of three agro-industrial wastes (Lemon processing residues, Fennel processing residues and Brewer's spent grain) are being investigated as sources of bio-effectors for the third trial consequently. Corresponding individual and mixture aqueous extracts are assessed for their synergistic and/or single agronomic and qualitative performances on soil-grown tomato, compared to both a control and humic acid treatments. A metabolomic profiling of tomato fruits via the Proton Nuclear Magnetic Resonance (NMR) spectroscopy, as holistic indicator of fruit quality and extract-induced responses, complements crop productivity and organoleptic/nutritional qualitative analyses. Results are expected to show mainly an enhancement of the fruit qualitative traits, and to confirm partly the previous results of better crop productivity and metabolism enhancement. Waste-derived bio-effectors could be, accordingly, demonstrated as potential candidates of plant-enhancing substances.

Keywords: bio-effectors, organic farming, agro-industrial wastes, nuclear magnetic resonance (NMR), tomato.