Beatrice Berger et al., J Food Process Technol 2017, 8:1(Suppl)
http://dx.doi.org/10.4172/2157-7110.C1.059

Harnessing plant growth-promoting bacteria for sustainable agriculture

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Statement of the Problem: Conserving arable soils is one of the major challenges in agronomy for us and for future generations. Using beneficial native microorganisms such as plant growth-promoting bacteria contributes to sustainability in agricultural systems and helps maintain stable yields and product quality. However, the growth-promoting effects of candidate strains observed in pot trials often disappear under field conditions.

Methodology & Theoretical Orientation: *Kosakonia radicincitans* was isolated from winter wheat; after establishing cultivation of the strain under laboratory conditions, biological atmospheric nitrogen fixing and phytohormone producing ability was demonstrated. Systemic application of *K. radicincitans* on glasshouse-grown plants revealed significant growth-promoting effects on various vegetables and crop plants. We evaluated the plant growth potential of *K. radicincitans* in radish (*Raphanus sativus var. sativus* L.), maize (*Zea mays*) and winter wheat (*Triticum aestivum*) when plants were grown under glasshouse and field conditions.

Findings: Leaf and tuber weights of inoculated radish plants were significantly increased by up to 25%, biomass of maize up to 30% and grain yield gain in winter wheat was demonstrated to be up to 20% after bacterial application under field conditions.

Conclusion & Significance: We demonstrate the capability of *K. radicincitans* to persist in plants and promote plant growth under field conditions. Therefore, *K. radicincitans* is a promising candidate for further processing as a growth-promoting product in sustainable agriculture.

Biography

Beatrice Berger has her expertise in Plant Nutrition and Plant Ecology. She aims to improve the quality and yield of food plants by beneficial bacteria and fungi. Together with Silke Ruppel, she has started to establish the rhizobacteria *Kosakonia radicincitans* as a model organism; she is investigating the interaction of plant-beneficial bacteria to harness *K. radicincitans* for agricultural systems. Her research focuses on "Eco-physiological and molecular aspects of the interaction under abiotic and biotic stresses". The team is complemented by Matthias Becker who is working on the evolution and processing of *K. radicincitans*.

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