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ABSTRACT BOOK 2017

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PP-PU-24 Influence of plant growth-promoting rhizobacteria (PGPR) on the growth and quality of strawberries

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Several studies have shown the benefits of plant growth-promoting rhizobacteria (PGPR) on plant mineral nutrition suggesting their application as biofertilizers. PGPR can stimulate plant growth, increase plant resistance to abiotic and biotic stresses and might thus have a positive effect also on fruit quality.

The aim of this work was therefore to evaluate and compare the effects of beneficial microorganisms, supplied either as pure culture (Azospirillum brasilense) or as a commercial mixture (Effective Microorganisms – EM™), on the growth and quality of strawberry (Fragaria ananassa cv. Elsanta) fruits. Strawberries are in fact among the most popular fruits, because of their unique taste and health benefits for humans, due to a high content of micronutrients, phytochemicals and antioxidants.

Strawberry frigo-plants were hydroponically grown either in a complete nutrient solution, or in a nutrient solution inoculated with A. brasilense or with EM for 10 weeks (Pii et al., 2016). At harvest, biometric parameters, as shoot fresh weight, root fresh weight, and yield parameters, like number of fruits per plant and fruit weight, were recorded.

Growth parameter (e.g. biomass, leaf area) were not affected by the rhizoacteria. Even though PGPR-inoculated plants showed slightly reduced fruit yields in terms of average number of fruits/plant they delivered larger fruits as compared to controls. Fruits obtained from PGPR-inoculated plants had also a higher sweetness index in comparison to control fruits. The content of total phenols showed no significant difference between the different samples, whereas the concentration of flavonoids and flavonols was higher in fruits harvested from A. brasilense-inoculated plants. In addition, PGPRs also influenced the uptake and allocation of nutrients in fruits, in particular increasing the concentration of micronutrients (e.g. Fe).

In conclusion, our results demonstrate that the application of PGPR as biofertilizers might represent a sustainable agricultural practice to improve the nutraceutical value of strawberries, particularly concerning the content of flavonoids and micronutrients.

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PT-PU-25 Ecological role of maytansine is revealed by in situ MALDI-HRMS-imaging of Maytenus senegalensis during the germination process

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MALDI-HRMS-imaging (matrix assisted laser desorption ionization high-resolution mass spectrometry imaging) is an important tool for visualizing, both spatially and temporally, metabolites at the interface of plants and microbes (e.g., endophytes and/or pathogens). Furthermore, the chemical communication between plant-associated microbes can be elucidated at the cellular level. We employed MALDI-HRMS imaging to study the ecological role of maytansine, an important anticancer drug used against breast cancer [1,2]. Since the discovery of maytansine in the 1970s in Celastraceae plants such as Maytenus and Putterlickia species, its role as a chemical defense compound was hypothesized [3]. After more than four decades of discovery of this important antineoplastic drug, we provide a proof-of-concept of ecospecific and tissue-specific production and in situ spatial/temporal distribution of maytansine in Maytenus senegalensis plants. We have used MALDI-HRMS-imaging to visualize the occurrence and spatial/temporal distribution of maytansine in the leaves, stems, and roots of M. senegalensis plants, seeds obtained from the mother plants, through the germination process, and finally to the establishment of new seedlings or daughter plants. The mother plant was devoid of maytansine in all tissues. However, maytansine was produced and distributed in the cotyledons and the endosperm of the seeds with an augmented accretion towards the seed coat. Furthermore, maytansine was always detected in the emerging seedlings, particularly the cortex encompassing the radicle, hypocotyl, and epicotyl. The typical pattern of production and accumulation of maytansine not only in the seeds but also during germination provides evidence that M. senegalensis is ecologically primed to trigger the production of maytansine in vulnerable tissues such as seeds during plant reproduction. By utilizing maytansine as chemical defense compound against predators and/or pathogens, the plant can ensure viability of the seeds and successful germination, thus leading to the next generation of daughter plants with an evolutionary advantage of survival [4].