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book of abstract

Identification of metabolites involved in the cold stress tolerance promoted by psychrotolerant bacteria in plants.

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Cold stress causes serious negative impacts on growth and yield of economically valuable crops. While some plants are adapted to cold environments, crops originating from sub-tropical regions, such as tomato, are more sensitive to cold stress. The efficacy of plant-associated microorganisms to protect plants against cold stress was reported, but scarce information is available on the molecular mechanisms underlying this process. The aim of this project is to understand the physiological mechanisms activated by psychrotolerant bacteria on tomato plants and to identify plant and/or bacterial metabolites and genes responsible for cold stress tolerance. Antarctic plants are a possible understudied source of psychrotolerant endophytic bacteria to be exploited in the plant protection against cold stress and four isolates were selected on a bacterial collection for their ability to promote tomato plant growth at low temperatures. The four bacterial isolates are currently being tested for their ability to stimulate plant physiological responses related to cold stress adaptation. In particular, the content of proline and malondialdehyde (MDA) was previously associated to cold stress in tomato plants and it will be analysed in bacterized and non-bacterized plants exposed to cold stress (7 days at 0°C) and recovery condition (0, 2 and 4 days at 25°C) using two different biochemical assays. Metabolomic and transcriptomic changes will be then analysed in bacterized and non-bacterized plants exposed to cold stress. In particular, amino acids, sugars and sugar alcohols previously associated with cold tolerance will be assessed in bacterized and non-bacterized plants using gas chromatography mass spectrometry (GC-MS) and hydrophobic interaction liquid chromatography (HILIC)-MS. The outcome of this project will provide a deeper knowledge in the mechanisms of cold adaptation enhanced by endophytic bacteria in plants.