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ALTERED GRAVITY SIMULATION AND RADIATION TO COMPARE PLANT MODEL AND CROP SPECIES ADAPTATION TO SPACEFLIGHT AND MARS-LIKE ENVIRONMENTS

Abstract

In the last fifteen years we have been able to progress in describing the mechanisms Arabidopsis activates in order to deal with altered gravity conditions during early plant development. Not only in terms of cell cycle regulation, cell growth or auxins misexpression, but also in clarifying how to cope with the overlapping stresses imposed by spaceflight and/or simulated microgravity facilities. In addition, not only gravity but other environmental factors as light, are helping in the restoration of the plant developmental plan under low gravity conditions, although the extent of this assertion is still under consideration by the group of scientist analysing the Seedling Growth series of experiments in the ISS. Now, we face a new episode in plant biology efforts in space, and we should include not only our model system but also some crop species in the picture in order to provide solutions to be immediately applicable to the unstoppable efforts to provide Life Support Systems to a long-term manned mission outside Earth. In this regard we would collect all our data, obtained mainly in Arabidopsis and microgravity conditions, and we will reproduce the experiments with crops species, as *Brassica rapa* that it is a common edible plant in Asian countries and it is also well supported by abundant literature and a completely sequenced genome. Also, because we are aware of the synergic effects of suboptimal environmental conditions in microgravity experiments, we will study not only the effects of gravity (and partial gravity) alone, but also in combination with radiation and others possible factors that could reduce (or enhance) the fitness of wildtype and enhanced plants (carrying genes providing additional radiation endurances) exposed to Spaceflight or in a shielded lunar/martian base. The use of Ground Based Facilities in this endeavour, not only for microgravity simulation but also including high capacity centrifuges, at the LDC for hypergravity experiments, or built inside RPM to provide partial gravity environments are those of Mars, is a clear demand of our community and a requirement to provide quality and quantity optimized spaceflight experiments in the next AO.