

# Does simulated microgravity affect root cell cycle in tomato? A flow cytometric study on DNA content variations in a "biofortified" tomato "MICROTOM"

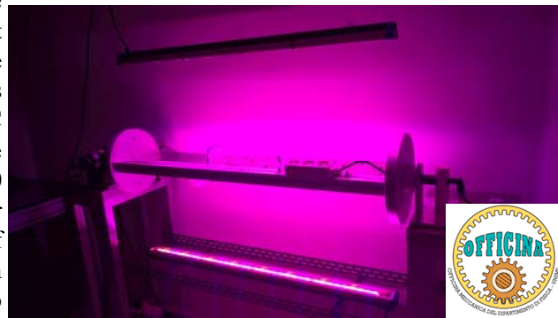
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## ABSTRACT:

In the search for novel plant "ideotypes" to be raised during the long-term missions for space exploration, the MICROTOM tomato cultivar has been engineered for enhanced anthocyanin content by the ectopic expression of a transcriptional factor. Anthocyanins show beneficial effects on the whole cell health by reducing the impact of reactive oxygen species in both plant physiology and human diet. This "concept plant" may exert impact on one side, by contributing in the search of the best-suited vegetable in bioregenerative systems and, on the other, by serving as a biofactory of valuable nutraceuticals. In the attempt to assess the growth pattern in future extra-terrestrial domains, MICROTOM plantlets have been subjected to simulated microgravity conditions (2D-clinostat) and flow cytometry and sorting have been used as an exact cellular sieve to characterize and sorting a number of different nuclei derived from single cell cycle phases. Biparametric analyses of DNA versus FISHIS Total Telomere amount or Total Protein Content and a cytogenetic study have been carried out on FISHIS flow sorted nuclei. This is the first attempt to characterize MICROTOM cell growth on different tissues to validate their genetic stability and tolerance to simulated microgravity condition.

## Clinostat:

A uniaxial clinostat was used to simulate microgravity conditions. The rotatory movement was generated by an asynchronous single phase motor plus a planetary gearbox. Rotation rate was set to 1,7rpm. Growth chamber was set at 26/16°C with 14/10 light/dark cycle and 60% relative humidity. Average photosynthetic flux was 300  $\mu\text{mol}/\text{m}^2\text{s}$  (80% red, 20% with Lumigrow® lumibar led lamps installed at 40 cm from the axis of rotation. Clinostat has been realized in collaboration with the University of Milan, mechanical workshop of the physics department, Prof. Marco Potenza & Prof. Francesco Cavaliere.



## Plant Material:

Seeds from wild type and biofortified MICROTOM plants were surface sterilized and germinated *in vitro* on microgravity and static conditions for 6 weeks. Root tips and leaf tissues were collected and processed for flow molecular cytogenetics.

