Effect of Simulated Microgravity on Antioxidant Activity and Total Antioxidants Metabolite Contents of Germinated Triticum astivum Extract

Abuelghanam, Raneem (School: King Abdullah II School for Excellence - Maddaba)
Alshakhanbeh, Lujain (School: King Abdullah II School for Excellence - Maddaba)
Ma'ayah, Malak (School: King Abdullah II School for Excellence - Maddaba)

Purpose: The microgravity environment encountered during space-flight has long been considered to affect plant growth and contents; the goal of our study is to investigate the effect of simulated microgravity on antioxidant activity and total antioxidant metabolites contents of germinated Triticum aestivum extract, compared to the control. Materials and Methods: A 3D- clinostat was used at 4 rotations\ minutes revolving plants three-dimensionally. Seeds of T. aestivum were germinated under gravity and microgravity conditions for 7 days. Appropriate amounts of the powdered plant materials extracted by methanol extraction. The antioxidant activity of extracts was evaluated using hydrogen peroxide and nitric oxide scavenging activity. Quantitative analysis of antioxidative components (total flavonoid, phenolic, and vitamin C contents) was assessed using spectrophotometric method. Results: Improving the root system in wheat will enhance the possibility to tolerate drought conditions. Here we show that the roots are elongated under microgravity conditions in comparison to the control. Free radicals can adversely alter lipids, proteins and DNA and have been implicated in aging and a number of human diseases. Nature has endowed us with protective antioxidant metabolites against free radicals, apart from many dietary components. Here we show that antioxidant metabolites (total flavonoid, phenolic, and vitamin C contents) and antioxidant activity (hydrogen peroxide and nitric oxide scavenging activity) have significantly increased under microgravity conditions in comparison to the control. Conclusions: Our result will be a starting point to study the genetic influence on germinated Triticum aestivum under microgravity conditions

Awards Won:
NASA: Honorable Mention