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Growth and Anatomical Responses of Lycopersicon esculentum (Tomatoes) under Microgravity and Normal Gravity Conditions

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Abstract : Microgravity is known to be a major abiotic stress in space which affects plants depending on the duration of exposure. In this work, tomatoes seeds were exposed to long hours of simulated microgravity condition using a one-axis clinostat. The seeds were sown on a 1.5% combination of plant nutrient and agar-agar solidified medium in three Petri dishes. One of the Petri dishes was mounted on the clinostat and allowed to rotate at the speed of 20 rpm for 72 hours, while the others were subjected to the normal gravity vector. The anatomical sections of both clinorotated and normal gravity plants were made after 72 hours and observed using a Phase-contrast digital microscope. The percentage germination, as well as the growth rate of the normal gravity seeds, was higher than the clinorotated ones. The germinated clinorotated roots followed different directions unlike the normal gravity ones which grew towards the direction of gravity vector. The clinostat was able to switch off gravistimulation. Distinct cellular arrangement was observed for tomatoes under normal gravity condition, unlike those of clinorotated ones. The root epidermis and cortex of normal gravity are thicker than the clinorotated ones. This implied that under long-term microgravity influence, plants do alter their anatomical features as a way of adapting to the stress condition.

Keywords : anatomy, clinostat, germination, lycopersicon esculentum, microgravity
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