

# **The change of amyloplasts structure and composition of storage starch in potato minitubers during imitated microgravity**

O. Nedukha, E. **Kordyum**, G. Martyn and E. Schnyukova

Department of Cell Biology and Anatomy, Institute of Botany, Kiev, Ukraine , E-mail cell@svitonline.com

Potato was designated for food production in the controlled ecological life-support system (CELSS), because its tubers as it is known contain starch and significant protein content and are edible food after the long-term storage. We used the cultivation of potato miniplants under influence of long-term horizontal clinorotation (2 rev/min), which imitated microgravity, as a model for the technology of potato food production in the CELSS. The aim of our work was to determine content and composition storage starch as well as amyloplast ultrastructure of storage parenchyma cells in potato minitubers formed under long-term (to 6 weeks) slow horizontal clinorotation (2 rpm). Minitubers developed from axillary buds of potato miniplants growing in the aseptic stationary conditions and under clinorotation. Methods of scanning and transmission electron microscopy were used for the study of surface and ultrastructure of amyloplasts; the biochemical method by Hovenkamp-Hermelink et al. (1988) - for study of starch composition. Some differences were observed in amyloplast structure under clinorotation, namely: increased volume of starch grains in plastid, decreased stroma volume, changed structure of envelope membranes in comparison with the stationary control. Besides, an appearance of fraction of gigantic amyloplasts in central layers of parenchyma was observed under clinorotation after 4 weeks of growth. The total starch content increased and reached to  $219.5 \pm 4.1$  mg/g FW at 6 weeks of clinorotation, it was  $167.5 \pm 5.6$  mg/g FW in the control minitubers. A ratio of amylose/amylopectin also changed under 6 week's clinorotation. The obtained data indicate the changes in starch metabolism under clinorotation. These changes are suggested to cause by both alterations in an activity of starch-synthase and starch-branching enzyme as well as metabolism of endogen phytohormones.