«Meristem» Experiment

INFLUENCE OF MICROGRAVITY ON KINETICS AND NUTRITION OF PLANT MERISTEM

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The impact of microgravity on kinetics and nutrition of meristem and reproductive ability of plants in long-term space flight will be studied.

The main objectives are as follows:

— to study patterns of distribution of assimilates and the trophic supply of meristems in altered gravity;

— to study the donor-acceptor connections in plants with C-3 & C-4 -photosynthesis in altered gravity;

— to study the structure and kinetics of root apices;

— to check a possibility of pre-adaptation of plants to long-term space flight;

— to develop modes of correction of morphogenetic abnormalities arising in altered gravity.

The methods of light microscopy, histochemistry, morphometry, photoshooting and chromatography will be used.

Study of these systems in several generations will allow to answer the questions, whether the microgravity has an effect modifying the meristem structure and kinetics, what are the effectiveness and duration of the gravitational memory, and what is the role of microgravity in supply of meristems by assimilation nutrition.

«Starch» Experiment

STRUCTURAL-METABOLIC ASPECTS OF CARBOHYDRATE METABOLISM IN MICROGRAVITY

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Authors propose the use of an ideal model system (potato minitubers) to study carbohydrate metabolism in plants under altered gravity. The following objectives are defined:

— to carry out phenomenological observations of minituber formation both in control and in altered gravity; to obtain data on sizes and forms of minitubers as well as on formation rate;

— to study anatomical organisation of minitubers and ultrastructure of storage parenchyma cells;

— to determine localisation and relative content of calcium in minituber cells;

— to determine localisation and activity of selected enzymes of starch and saccharose synthesis in storage parenchyma cells;

— to study expression of some genes of starch synthesis and hydrolysis enzymes;

— to determine content and quality of starch synthesised in minitubers under the influence of altered gravity.

The methods of light and electron microscopy, cytochemistry, biochemistry and molecular biology will be used.

The obtained data will allow defining structural-functional features of storage parenchyma cell formation in potato minitubers, which is a basis for understanding the mechanisms of changes in carbohydrate metabolism under microgravity.