

Description of the project for the general public

'STUDIES ON ARABINO GALACTAN PROTEINS (AGPs) AS SIGNIFICANT COMPONENTS OF CELL WALL DURING THE RIPENING PROCESS IN FRUIT'

The physiological processes occurring in fruits are an extremely important issue often addressed by many research groups. The ripening process accompanied by loss of tissue firmness or cell wall degradation during fruit development is still being discussed and unexplained. Most importantly, elucidation of the biochemical basis of phenomena determining the qualitative parameters of fruits is important for food producers and consumers.

The scientific research of the project is focused on arabinogalactan proteins (AGPs) as key components of the cell wall with significant application potential. According to the current state of knowledge, AGPs are regarded as one of the least explored and enigmatic but the most diverse and heterogeneous molecules present in plant tissue.

The aim of the project is to investigate the effect of the presence of arabinogalactan proteins on the fruit cell wall, and more precisely on the distribution of its other components, from cellulose to pectin. The research material will be a model fruit - tomato. Changes in the structure of the cell wall will be observed during the naturally occurring ripening process and in fruits whose development takes place without properly functioning AGPs. Properly modified *Solanum lycopersicum* plants will be prepared by the research team from the Horticultural Genetics and Biotechnology Department from the Mediterranean Agronomic Institute of Chania (Greece).

The next step in the implementation of the planned project will be to carry out immunocytochemical analyzes using molecular probes - specific antibodies. The distribution of individually labelled cell wall components will be imaged using transmission electron microscopy (TEM) and confocal laser microscopy (CLSM). The second part of the project involves learning the molecular and structural features of AGP proteins isolated from naturally ripening fruits and those with a modified ripening process. To this end, molecular biology methods that allow characterization of AGP molecules will be used. The next part of the project combines the functions of AGPs with calcium ions and precisely aims to determine the impact of their migration in the cell wall on the processes of fruit ripening. Using microscopic and spectroscopic methods, distribution changes in calcium ions in naturally ripening fruits compared to tomato fruit developed without proper action of AGPs will be specified.

The use of advanced microscopic techniques, methods of molecular biology, structural biology, as well as *in vivo* and *ex vivo* experiments will allow for comprehensive research on the subject and gaining new knowledge about basic phenomena. In addition, the proposed project is interdisciplinary, and the prospective results will not only expand knowledge in the area of plant cell physiology and biochemistry but also complement the information on the processes of fruit ripening.