The cell wall provides shape and structural integrity to the cell, functions as a protective barrier to pathogen invasion and environmental stress. Cellulose, hemicellulose and pectins are the basic building blocks of cell walls. It also consists proteins and phenolic compounds. According to the model of plant cell wall, cellulose macrofibrils are interlinked with hemicellulose fibrils via hydrogen bonds, whereas pectins form an amorphous matrix.

Cell wall matrix polysaccharides, especially pectins, undergo disruption and extensive depolymerization during fruit ripening. These modifications are assumed to be responsible for the decrease in tissue firmness that occurs during ripening.

Reasons of fruit softening and it's connection with structure of plant cell wall is still discussed and not entirely clear.

The main objective of the project is to examine how the structure and spatial distribution of plant cell wall polysaccharides is changing during simulated tomato fruit cell wall degradation.

This aim would be pursued through in vitro experiments. The enzymatic and non-enzymatic hydrolysis of native plant cell walls from immature tomato fruit would be performed. This process will be observed in situ and microscopic and spectral changes and hence anatomical and structural changes will be monitored. Besides, the influence of environmental conditions (e.g. pH or the length of the process) on the enzymatic and non-enzymatic hydrolysis is aimed to be checked in context of cell wall anatomical structure and chemical composition.

Proposed approach allows to better understanding of the phenomena that occur in the plant cell wall during its maturation in the tomato fruit which has become a model species for exploring development processes such as fruit formation and ripening. Also it allows to compare methods of biopolymers localization study in the fruit cell wall: Raman imaging and immunocytochemistry method which is considered as a standard technique for this kind of samples. It is planned to study how spatial distribution of cell wall polysaccharides (mainly pectins) is changing during tomato ripening. It is known that during this process degradation of fruit cell wall is occurred but there is insufficient knowledge to conclude how those changes influence on the spatial deployment of fruit cell wall. Proposed approach will provide micro-scale insight into the fruit cell wall's biochemical structure.

Proposed approach allows a better understanding of the phenomena that occur in the plant cell wall during its maturation in the tomato fruit which has become a model species for exploring fruit development processes. Planned *in vitro* experiments can contribute to a better explanation and understanding of factors affecting cell wall degradation during fruit development. Also it will allow to compare two methods of biopolymers localization in the fruit cell wall: Raman imaging and antibody labeling.