Plant cell wall together with its polysaccharide components is unique Nature creation. It has many functions in plant organisms such as providing the structural framework of plants, playing a crucial role in their growth and development, it is barrier during biotic and abiotic stress. That's why it possess exceptional physico-chemical properties which additionally are being adjust during life of plant. Generally, the primary cell wall is composed of approximately 15-40% cellulose, 20-30% hemicellulose and 30-50% pectins, with up to 8% structural proteins, up to 5% minerals and 2% phenolic compounds (on a dry-weight basis). Furthermore, it is an integral part of the human diet, a major source of renewal biomass, source of compounds used in paper or food industry.

The unique properties of cell wall is a result of its composite structure. According to the model of plant cell wall, cellulose microfibrils are interlinked with hemicellulose fibrils via hydrogen bonds, whereas pectins form an amorphous matrix. The structural properties of plant cell wall polymers have been the subject of many studies and have been largely defined. However, the whole picture of interactions between the cellulose and non-cellulosic polysaccharides is still unclear. **The project responds to the following questions in this area: how the acetylation degree of matrix polysaccharides change during fruit development and on-tree ripening; how degree of acetylation influences the ability of matrix polysaccharides to bind to cellulose microfibrils and in result how it alters mechanical properties and microstructure of plant tissue. The mechanical properties of cell wall have influence on the fruit texture, which is important indicator of consumer acceptability.**

The apple fruit was chose as a model of fruit development and on-tree ripening, and as it is climacteric fruit also changes in acetylation degree of polysaccharides will be monitored during postharvest cold-room storage. Additionally, as plant cell wall is very complex system and *in vivo* studies of interaction between plant polysaccharides are very complicated if not impossible the model studies will be conducted to help understand the plant cell wall structure. One of the methods used for the study on model materials is the adsorption technique, which give view of interaction between non-cellulosic polysaccharides with altered acetylation degree and cellulose. The second will be obtaining model cell wall composite in form of film based on cellulose and non-cellulosic polysaccharides with altered acetylation degree to study their mechanical properties.

The final results of project will help to fill in gaps in picture of plant cell wall structure and its function in fruit development and ripening.