Cell walls provide the structural framework of plants, playing a critical role in their growth and development. Furthermore, it is an integral part of the human diet and a major source of renewal biomass.

The cell wall is a composite of cellulose, hemicellulose and pectin, with the addition of other, non-polysaccharide components like proteins, lipids, enzymes and aromatic compounds. 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% phenolics compounds (on a dry-weight basis). High variability results from different tissue origins. According to the model of plant cell wall, cellulose microfibrils are interlinked with hemicellulose fibrils via hydrogen bonds, whereas pectins form an amorphous matrix. However, the whole picture of interactions between the cellulose and non-cellulosic polysaccharides is still unclear.

Therefore the question arises: **what is the actual nature of the interaction between the individual components of the plant cell wall?**

Plant cell wall is very complex system and *in vivo* studies using plant or plant tissue provide valuable data but are very complicated. The main reason of that is difficulty to study native primary plant cell walls which are of limited size. To avoid this complexity of the native cell wall, *in vitro* studies are conducted to help understand the plant cell wall structure. One of the methods used for the study on model materials is the adsorption technique. This technique is relatively simple but gives a lot of valuable information about the process kinetics and the nature of the interaction between adsorbent and adsorbate. Furthermore, such studies would allow to separate the effect of metabolic processes from the effect of different concentrations of pectin and hemicellulose on cell wall structure and cellulose microfibrils themselves.

Hence, **the aim of the research project is to determine the real nature of the interactions between individual cell wall components by: (1) adsorption studies on the surface of cellulose and (2) analysis of the properties of materials (composites) that are model analogues of plant cell walls.**

The approach proposed in the project will mainly contribute to increase the knowledge of cell wall polysaccharide interactions. In addition, the results of the research could be used in the future to design new biomaterials with unique properties as well as to improve the properties of existing ones (eg modified polysaccharides, composites of lignocellulosic materials). The understanding of the interactions between polysaccharides in plant cell wall could provide important information to the field of biomimetic material design.