

Abstract

Chemical properties of the apoplast and rhizosphere are crucial for plant development and its overall well-being. Apoplast includes space outside the plasma membrane and its content, such as gas, water, and solutes. Changes in apoplast properties significantly influence various processes. One of them is cellular growth – the pH-dependent extension of cell walls. The rhizosphere is the soil environment near and under the influence of roots. It is characterised by abiotic factors like the availability of nutrients and toxic compounds. It is also a space with a high representation of microbiome communities. Plants can significantly influence the chemical properties of both apoplast and rhizosphere to improve their growth conditions. This thesis summarises the most important mechanisms of plants' roots that change these chemical properties, focusing on the model plant *Arabidopsis thaliana*. It shows how and where these mechanisms intersect and in which way they influence each other. Emphasis is placed on the process of growth regulation and mechanisms of increasing nutrient availability.

Keywords: apoplast, rhizosphere, H⁺ATPase, root growth, rhizodeposition, root exudates, nutrients, microbiome