Abstract

NH$_4^+$ is one of the major inorganic forms of nitrogen taken up by plant roots from the soil. The response of plants to NH$_4^+$ depends on a number of factors – especially its concentration in the rhizosphere or the availability of other ions such as K$^+$ or NO$_3^-$. In the case of a low nitrogen availability in the rhizosphere, NH$_4^+$ positively affects the growth of the root system. In the NH$_4^+$-rich area of rhizosphere, local stimulation of lateral root branching may occur to enhance effective acquisition of the present nitrogen source. A sensor that perceives NH$_4^+$ and induces this response of root system response is the high affinity ammonium transporter AMT1;3. With excess NH$_4^+$, the growth of the whole plant is inhibited and this phenomenon is called ammonium toxicity syndrome. This syndrome is the result of the interaction of NH$_4^+$ with various processes in the plant and induced K$^+$ deficiency is one of the most important signs of this syndrome. NH$_4^+$ and K$^+$ directly interfere with each other during uptake. NH$_4^+$ enters the plant through K$^+$ channels and also inhibits the expression of the high affinity K$^+$ transporters, thereby significantly reduces its uptake. NH$_4^+$ and K$^+$ interference is one of the main topics that this bachelor thesis focuses on. It also summarizes mechanisms of uptake and assimilation of NH$_4^+$, mechanisms of NH$_4^+$ toxicity and reaction of root system to different NH$_4^+$ concentrations in rhizosphere.

Key words: ammonium nutrition, ammonium toxicity syndrome, potassium nutrition, root systém, NH$_4^+$ and K$^+$ interference