Summary

This PhD is based on four published papers, whose common aim is the investigation of the role of microtubules in the response of plant cells to abiotic stress. Two abiotic stresses were studied that represent important limiting factors for crop productivity on acid soils that comprise 40% of arable land in the world (in case of aluminum toxicity) and areas of the temperate climate zones (in case of cold stress). In published papers, the dynamics of plant microtubules during stress response was studied, with special interest in the most early phases of stress influence. It has been suggested that considering very rapid changes of the microtubular cytoskeleton during early phases of the stress response, microtubules could play a role in the transduction of signals triggered by the stress of Al ions and low temperature. Recent results available in the literature confirm this hypothesis. Therefore, signalization during both stresses seems to have one common important characteristic: interphase cortical microtubules as elements mediating transduction of signals from the plasma membrane and as modulators of Ca^{2+} channels or regulators of downstream effects at the same time.

Further, we have reported about the incidence of cold-induced plant tubulin in the interphase nucleus. The discovery of cold-induced nuclear tubulin enabled us to build a hypothesis that the transport of tubulin through the nuclear envelope occurs during the cell cycle that might be functionally relevant for the dynamic changes in the nuclear envelope at the beginning and the end of the mitosis. The dynamics of plant tubulin during the cell cycle progression, the role of potential NESes and the potential role of nuclear tubulin in signalization will be further studied, with special emphasis on in vivo visualization techniques.