Abstract

With increasing population and climate change, there has been an increase in efforts to breed more efficient crops. Genetic engineering has opened unprecedented breeding possibilities in developing plants with desired traits. Transgenic crops with better qualities, including resistance to adverse environmental conditions, can contribute to solving problems of hunger and malnutrition in developing countries. Although society perceives genetically modified crops rather negatively, these crops are widely used as feed for livestock and outside Europe also for human nutrition. Because of the complexity of resistance to abiotic stress, the utility of genetic manipulations for the breeding of resistant plants was previously not anticipated. However, it turned out that modification of the stress signalling cascade or transcription factors can lead to success.

This thesis summarizes the possibilities of genetic modification of crops, which may result in better tolerance to cold, and is mainly focused on rice. Part of the work deals with transduction of cold signal, whose modification can also result in increased tolerance to cold. Another part deals with transcription factors that activate expression of low temperature-resistant genes. The greatest attention is paid to CBF/DREB transcription factors that play a key role in cold resistance.

Key words: CBF/DREB, cold tolerance, genetic engineering, rice, transcription factors, transgenic crops