# Abstract

The potato (*Solanum tuberosum*) is one of the most important crops in the world. Tubers form during morphogenic process called tuberization, which timing is controlled by a complex regulatory network involving both environmental conditions and internal factors. For the study of this process, model genotype of subspecies *S. t. andigena* is mostly used. It requires a short photoperiod. Vast majority of cultivated potatos are of spieces *S. t. tuberosum* that tuberize even under long-day conditions. Regulation of tuber initiation involves the action of endogenous factors, mainly phytohormones, carbohydrates and specific mobile signals, including BEL transcriptional factors – StBEL5, StBEL11 and StBEL29 – which transcripts are produced in leaves and transported into stolons. StBEL5 stimulates tuberization, whereas StBEL11 and -29 suppress it.

The aim of this thesis was to contribute to understanding the role of StBEL11 in the regulation of tuberization by characterization of mutants with decreased *StBEL11* levels. A sub-objective was to derive of transgenic lines *S. t. andigena* with decreased *StBEL11* levels using a construct with part of *StBEL11* coding region in antisense orientation under 35S CaMV promotor. I was able to derive forty two stable transgenic lines, which are prepared for *StBEL11* transcript levels determinations. Another sub-objective was to evaluate effect of decreased *StBEL11* level on photosynthetic parameters, carbohydrate balance and growth characteristics. For this sub-objective I used previosly derived independent transgenic lines of *S. t. tuberosum* cv. Kamýk with decreased *StBEL11* levels exhibiting enhanced tuberization potential (Zounková DP, 2019). Transgenic lines exhibited increased photosynthetic pigments levels and particularly increased net photosynthesis rates. Non-structural carbohydrat levels and their distribution throughout the plant did not differ significantly. Surprisingly, in transgenic lines with increased photosynthesis rates, I found a decrease in both shoot (S) and root (R) fresh weight. Nevertheless, the R/S ratio was increased in transgenic lines, indicating enhanced assimilate allocation to belowground organs. Leaf number, stem length and thickness were not altered, but the transgenic lines showed less leaf area. To confirm the changes in biomass distribution between above- and below-ground organs, suitable culture conditions need to be found to achieve comprehensive growth characteristics including stolon biomass and morphology.



**Key words:** *Solanum tuberosum*, tuberization, BEL TF, StBEL11, net photosynthesis rate, carbohydrate balance