REGULATION OF FORAGE GRASS GROWTH AND WINTER SURVIVAL IN NORTHERN LATITUDES

Theme III. TRANSFORMATIONAL TECHNOLOGIES AND INNOVATION
Advanced breeding tools/Genetic and genomic technologies
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Summary of the fellowship

Forage grasses are well-adapted for cultivation in Northern climate and they have a huge potential for biomass production. In Finland, approx. 30 % of the arable land is used for forage grass production. Grasses are grown in species mixtures, where the dominating species is timothy (*Phleum pretense L.)* due to its good winter hardiness and yield stability. On the contrary, a higher yielding perennial ryegrass (*Lolium perenne L.)* is more intensively used in Central Europe. Studies on the function of many important regulatory genes,transcriptome analysis and genomic selection have been carried out in perennial ryegrass whereas species that have a significant role in the most Northern agricultural areas, are less studied. Timothy is a cross pollinating species with hexaploid set of chromosomes (2n=6x=42) and it is not a model-crop for any sequencing efforts. However, timothy has interesting adaptive mechanisms to specific day length conditions that are missing in perennial ryegrass. The aim of this fellowship was to increase the understanding on the molecular regulation of growth and winter survival in timothy by analyzing the diversity of expressed alleles in Northern and Southern timothy genotypes. Genotypes were exposed to various lengths of vernalization at different day lengths and the expressed alleles were studied by using SMRT PacBio sequencing. The method has been used successfully in several projects in the host institute and in this project the newest and most efficient molecular techniques were transferred from perennial ryegrass to timothy. Resequencing of cDNA libraries of the Northern genotype is on-going and the fellowship will be completed during spring 2018, when the analysis of the sequencing data takes place at the host institute. The fellowship made the use of efficient molecular techniques possible in timothy as well as opened new funding and collaboration opportunities.