Abstract

Breeding of coniferous trees in the Czech Republic is undergoing an important development during last decades, especially thanks to molecular-genetic methods, which refine and simplify mapping of tree genotypes and the selection of superior genotypes. Recently, in the Czech Republic superior genotypes are selected based on forestry parameters (tree height, trunk diameter, and timber quality) what does not always correlate with the ability of a tree to resist abiotic and biotic stresses. Recently, there is an effort to include in the breeding also physiological parameters and select superior genotypes using nonspecific stress indicators, which are able to correspond better to tree fitness than the forestry growth parameters.

The present thesis deals with genotypes of Scots pine (*Pinus sylvestris* L.) growing in seed orchards Doubrava and Silov in the Pilsen region in the Czech Republic. Seed orchards are tree plantations, which serve as a reserve of the genetically valuable reproduction material, they are parts of breeding programs. Pine needles were collected in July 2015 and analyzed for non-specific stress indicators – photosynthetic pigments, phenolics, lignin, cellulose and proline contents and leaf reflectance and fast chlorophyll fluorescence measurements. First objective of the present thesis was to compare physiological parameters of the same genotypes growing in both seed orchards. The seed orchard Doubrava has got a lower content of soil nitrogen and magnesium comparing to the soil of the seed orchard Silov. the second objective of my thesis was to compare a measure of variability in followed parameters for the same and different genotypes in both seed orchards.

Trees in both seed orchards did not exhibit stress conditions, however, values of vegetation indices and fluorescence parameters responded to a lower nutrient accessibility in soil in the Doubrava orchard. It seems that methods of fluorescence and leaf reflectance measurements have higher responsiveness than methods of biochemical analysis. Some physiological parameters had a lower variance in trees of the same genotypes than in trees of different genotypes what refers to a genetic-determined variability in these parameters among genotypes.

The fact, that genetic-determined variability was proved in some of monitored physiological parameters in non-stress conditions, is important for applicability of these parameters in breeding programs of trees. More suitable physiological parameters for breeding seem to be vegetation indeces and fluorescence parameters rather than methods of biochemical analysis because of their responsiveness even in non-stress conditions.