



„Importance of Genetic Factors on Formation of Forest Stands with High Adaptability and Qualitative Wood Properties”

Activity: „Genetic determination on the wood properties”

goals, objectives, expected final results

Objectives of the research activity:

- 1) assess the differences of wood physical properties among clones based on evaluation of their progenies;
- 2) recommend clones with high wood quality for establishment of short rotation plantations;
- 3) evaluate differences among spruce clones in resistance against negative impact of basidiomycete fungus.

Goals and plans of the research activity

To achieve first objective of the activity: “Assess the differences of wood physical properties among clones based on evaluation of their progenies” following tasks are scheduled:

- a) assess wood density and fiber dimension properties at the central and outer parts of the stem for progenies of various clones of coniferous tree species and to evaluate genetic determination of observed differences;
- b) estimate the proportion of late wood and core wood quantity of sample trees in pine progeny trials;
- c) analyze changes of timber properties with tree age in context of length of rotation period of pine stand;
- d) appraise perspectives of practical application of estimated genetic peculiarities;
- e) register clones with superior wood quality and other properties in “Register of Forest Reproductive Material” for establishment of seed orchards;

To achieve second objective of the activity: “Recommend clones with high wood quality for establishment of short rotation plantations” following tasks are scheduled:

- a) evaluate chemical (content of cellulose, lignine, extractives) and physical (density) wood properties as well as describe anatomical wood characteristics (fiber dimensions, fiber wall thickness) of the spruce and hybrid aspen clones;
- b) analyze the *in situ* location of lignin and quantitative differences of its content in wood of several spruce clones using UV micro spectrophotometer UMSP

80 with scanning program APAMOS (Automatic-Photometric-Analysis of Microscopic Objects by Scanning);

- c) assess the specific consumption of wood, pulp output and physical parameters of fibers: length, width, curvature and roughness, using the “Fiber Tester”;
- d) analyze possibilities to improve plantation-grown wood fiber suitability for industrial processing with means of tree breeding;
- e) register superior clones in “Register of Forest Reproductive Material” for practical use.

To achieve third objective of the activity: “Evaluate differences among spruce clones in resistance against negative impact of basidiomycete fungus” following tasks are scheduled:

- a) carry out wood biodegradation screening tests for superior (based on productivity and other traits) spruce clone for selection of potentially resistant samples;
- b) verify the biological resistance of selected samples against impact of basidiomycete (*Coniophora puteana* BAM Ebw.15, *Poria placenta* FPRL 280, *Gloeophyllum trabeum* BAM Ebw.109, *Coriolus versicolor* CTB 863 A);
- c) recommend selected clones for seed orchards or forest plantations with specific intended end-use of wood.

Expected results of activity

Expected outcomes:

- productive pine, spruce and hybrid aspen clones superior wood quality included into the “Register of Forest Reproductive Material”;
- assessment of potential of breeding work to improve resistance of spruce clones against wood biodegradation;
- inclusion of hybrid aspen and spruce clones with known wood properties into the “Register of Forest Reproductive Material” for establishment of tree-plantations with specific intended end-use of wood;
- results of project covered in scientific publications and reports in scientific conferences as well as in master thesis and undergraduate works.