

# Microsatellite Analysis of Clonality and Individual Heterozygosity in Natural Populations of Aspen *Populus tremula* L.: Identification of Highly Heterozygous Clone

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**Abstract**—Aspen *Populus tremula* L. (Salicaceae) is the fast-growing tree species of environmental and economic value. Aspen is capable of reproduction by both seeds and vegetative means, forming root sprouts. In an adult stand, identification of ramets of one clone among the trees of seed origin based on their morphology is difficult. A panel of 14 microsatellite loci developed for individual identification of aspen was applied for the clonal structure analysis in four natural aspen stands of the European part of Russia: Moscow and Voronezh oblasts, the Mari-El Republic, and the Republic of Tatarstan. In 52 trees from the Moscow sample, 41 multilocus genotypes were identified; in the Voronezh sample, among 30 individuals, 25 different genotypes were detected; and in the sample from Mari-El, 32 trees were represented by 13 genotypes. In the stand from Sabinsky Forestry, Tatarstan, all of the examined 29 trees were represented by a single genotype. The ancestral tree carrier of this genotype which was the most heterozygous (0.929) among all studied aspen individuals (sample mean, 0.598) obviously has spread over a large territory during several cutting and reproduction cycles, currently occupying the area of 2.2 ha. For aspen, usually suffering from Aspen trunk rot, such high viability is evidence of resistance to the main pathogens. The revealed superclone deserves further study with karyological methods and flow cytometry to determine ploidy level and analysis of the growth rate and the quality of wood for possible use in plantation forest production.

**Keywords:** aspen, *Populus tremula*, microsatellite loci, clonal structure, genetic identification, heterozygosity

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