The Genetic Analysis of Mating System of *Abies alba* Mill. in Natural Populations of Ukrainian Carpathians

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Abstract:

*Silver fir (Abies alba* Mill.) is a type of edificators of Ukrainian Carpathians. Over the past two centuries there was a significant decline in the area occupied by this species, that has affected on the ecological situation in Ukrainian Carpathians. A number of researchers tend to see this as not only the human factor, but the genetic causes. Despite the fact that a silver fir is the anemophilous plant, like the many other members of the family Pinaceae Lindl., it is capable to the self-pollination. The increase of self-pollination in *A. alba* may ultimately contribute to the development of the inbreeding in this species. Therefore the study of mating system of silver fir has the great theoretical and practical interest. The study was performed in four populations of *A. alba* in Ukrainian Carpathians. To estimate the parameters of mating system as genetic markers used isozymes of endosperms and embryos of seeds. The haplotypes of the endosperms and the genotypes of the embryos determined in six polymorphic loci of the four enzyme systems: GOT (Got-3), ADH (Adh-1, Adh-2), EST (Est-2, Est-4), ACP (Acp-3). The single-locus estimations of the proportion of cross-pollination (ts) in the studied populations ranged from 0.436 to 0.578, reaching an average of 0.476 (47.6%). This value is significantly different from the results presented earlier in the literature, according to which the frequency of outcrossing in conifers for single-locus method of estimation ranged from 63% to 99%. The multilocus estimate of the proportion of cross-pollination (tm) was 67% which was less than the lower limit of the values given for members of the family Pinaceae Lindl. (73% - 99%). Thus, in the populations of *A. alba* in Ukrainian Carpathians 48 - 70% of embryos formed as a result of cross-pollination, and the others are the result of self-pollination. In three of the four studied populations the multilocus estimates were significantly different from the corresponding single-locus estimates. The higher values tm compared with ts in the studied populations may indicate about the presence other types of inbreeding than self-fertilization. Overall, obtained results suggest about the relatively high level of self-pollination in populations of silver fir in the Ukrainian Carpathians.

Key Terms: *Abies alba* Mill., mating system, genetic markers, Ukrainian Carpathians