

The most important goal of the project is the analysis of the influence of clonality and dioeciousness on the growth rate, climatic reaction and spatial structure of the white poplar.

The white poplar occurs naturally in Europe, Asia and North Africa. It is a species naturally associated with riparian forest, but is also common in landscape transformed by human. The white poplar is a tree that grows up to 35 m in height. It is a dioecious, wind-pollinated and wind-dispersed plant.

The phenomenon of vegetative reproduction (clonality) is very common in plants. For clonal plants we define ramet, which refers any offspring that arise from the parent plant as a result of vegetative reproduction. In the case of the white poplar, these are root suckers. Each ramet may be potentially independent of the parent for growth and reproduction and may be considered as an individual. The collection of all ramets from the parent plant forms the genet (clone). Dioeciousness (unisexualism) means that male and female individuals are separated. It is a relatively rare sexual reproductive system in plants, because it is reported among only ca. 6% of plant species. The consequence of dioeciousness may be the occurrence of different life strategies in both sexes, differences in growth rate, stress sensitivity or gender preferences in relation to the habitat conditions that gives rise the phenomenon called spatial segregation of sexes.

Knowledge of the ecological consequences of clonality among woody species is not sufficient, and our understanding of gender consequences of clonality in dioecious species is even more limited. The planned research is therefore original study and has the character of basic research carried out in order to gain new knowledge about the biological base of phenomena and observable facts.

In our research, we assume that clonally reproducing individuals (ramets that form unique genetic clone) will have a higher growth rate than singletons, i.e. single individuals not represented by a larger number of ramets. The reason may be that clonal plants can share resources between ramets and have "division of labor" strategy and/or a ramet strategy of limiting investment in generative structures (flowers and fruits) implying redirection of resources to growth. Additionally, we will check whether female and male individuals differ in their growth response in interaction with clonality. We assume that females invest more resources in generative reproduction and males in growth and clonal reproduction. At the same time, female individuals should be more sensitive to stress related to the climate (e.g. droughts, floods, low temperatures). Therefore, we expect the occurrence of spatial segregation of sexes, within which female individuals may be situated in rich in nutrients and water habitat (e.g. lower situated), and male individuals in higher locations, facilitating their pollen spread.

To achieve the research goals, we will use genetic analyzes to check each individual (ramet) for belonging to a specific genet. We will analyze the growth rate and the influence of the climate by examining the tree-ring width using the dendrochronological methodology and historical climate data. Possibilities of spatial segregation of male and female individuals will be investigated with statistical methods used in population genetics and ecology.