

MSc.-Thesis

Genetic diversity among selected populations of reed (*Phragmites australis*) in Kazakhstan

Content:

The genus *Phragmites* contains about seven species, which are found mainly in the tropics and Mediterranean region along rivers and lakes. In the Post-Soviet States, three *Phragmites* species are distributed (Flora of the USSR, 1934); in Kazakhstan one is *Ph. australis* (Cav.) Trin. ex Steud. (Flora of Kazakhstan, 1956). The common reed (*Phragmites australis* (Cav.) Trin. ex Steudel) is a widespread wetland species.

Reed is of ecological importance as habitat (Rodewald-Rudescu, 1974, Ostendorp, 1993, Hawke and Jose, 1996), for shoreline protection (Coops et al., 1996) and nutrient retention (Kovacs et al., 1978, Wolstenholme and Bayes, 1990). Possessing a high biomass production and large adaptive capacity for environmental conditions, it can form large stands in wetlands, floodplains and on sites with accessible groundwater, thereby providing multitude ecosystem services both for humans and for nature. Thus, the reed as a plant having versatile application presents certain value.

According to earlier investigations, reed has several morphological forms depending on the growing conditions, usually of which: *var. isiaca* (Grised.) *Ph. isiaca* (Deb.) Kunth., distinguished by its large size, *var. subuniflora* with recumbent stems, as well as the prickly form - *var. acanthophylla*, which noted by L.F. Demidovskaya at the salt marshes in the Kyzyl - Orda region (Flora of the USSR, 1934; Bykov, 1962; Demidovskaya, Kirichenko, 1964). Morphological differences often are not fixed genetically and vary with environmental conditions.

However, investigations of Kuhl and Neuhaus, (1993), Neuhaus et al., (1993), and Koppitz et al. (1997) on northeastern German reed stands led to believe that reed decline is not only influenced by factors such as eutrophication, mechanical impacts or consumers, but also by the low genetic variability of reed stands. Each *Phragmites* clone has, probably, relatively narrow tolerance limits in relation to its special site conditions. The often described high ecological plasticity of the species *P. australis* (Haslam, 1972, Van der Toorn, 1972, Rodewald-Rudescu, 1974) is, consequently, based on the high number of reed clones. For this reason, it is very important to know how diverse reed stands are, because the higher the genetic diversity within a reed stand, the broader its ecological amplitude may be. This could be one reason for the differing abilities of reed stands to react to changing site conditions and at last for surviving or for dying back.

The thesis will deal with (1) the characterization and (2) the comparison of the genetic diversity of various Kazakhstani reed stands by means of PCR.

Methods:

This thesis will be based on a literature review and further reed plants sampling with taking morphological measurements for further phenotypic and genetic analyses. Therefore, an extended field work campaign in different provinces of Kazakhstan during the summer time is necessary in order to collect the morphological data and samples for genetic analyses. The work will be conducted in close cooperation with the Research Institute of General Genetics and Cytology of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan in the biggest city Almaty.

Requirements:

Good knowledge on Plant Genetics and Physiology, willingness to conduct extended fieldwork in Kazakhstan, good English language skills, statistical software R and Russian language skills are an advantage, but not essential.

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