Abstract

Flooding is an important stress factor that influences the growth of plants and their production. Anthropogenic activity is causing gradual changes in the climate, consequently triggering changes in the distribution of precipitation. This leads to the conditions alternating between optimal, draughts, and excessive flooding that the plants have to cope with. The aim of my diploma thesis was to evaluate the consequences of flooding and the subsequent restoration of normal cultivating conditions of two inbred lines of maize (*Zea mays* L.) (2023 and CE704) and their reciprocal hybrids (2023xCE704, CE704x2023) that were exposed to the stress of flooding and subsequent restoration during several phases of their ontogenetic growth. For both the plants exposed to flooding and the subsequent restoration and the plants grown in optimal conditions only, there were several morphologic and physiological parameters, parameters related to the water status, and parameters that determine the extent of the damage done to the cellular structure or characterize the defense mechanisms employed by the plant in reaction to the stress. Flooding of the plants often led to an increase in their transpiration speed, stomatal conductivity, MDA and H2O2 contents, and catalase activity. For other parameters, the flooding usually led to a decrease in their values (the morphological parameters, water usage efficiency, photosynthetic pigments content, photosynthesis speed, and the chlorophyll *a* fluorescence). The return to the normal conditions meant only a partial restoration to the original values for most of the parameters. Individual genotypes showed a significant variability between individual interspecies: in most cases, the parent lineages differed from the hybrids for both the plants exposes to flooding and the plants cultivated in optimal conditions. As far as the morphological and yield parameters go, the hybrids were more sensitive towards flooding than the parents; the photosynthetic parameters, the water status parameters, and the parameters of cellular damage did not show conclusive tendency as for some of them the parent plants were more sensitive and for others the hybrids were more sensitive. Reactions to flooding and the restoration were also different for older and younger plants: in most of the cases, flooding had greater impact on younger plants but, at the same time, younger plants showed faster recovery from the stressful conditions during the subsequent restoration.