Abstract

Flooding-induced hypoxia is one of the significant abiotic stress factors that influence the development of plants. The ongoing climate change leads to changes in the distribution of precipitation, causing excessive droughts followed by torrential rains and, consequently, flooding. Inappropriate agronomic practices and the choice and rotation of the cultivated crops also greatly influence the duration of the drought or flooding. The plants must either be able to adapt to these conditions, or the agricultural production must only select suitable genotypes that are tolerant of these conditions. The aim of this thesis was the comparison of the reaction of 4 genotypes (2023, CE704, 2023xCE704 and CE704x2023) of maize (*Zea mays* L.) grown in flood conditions to which they were exposed at different stages of their ontogenic development, as compared to plants grown under optimal water supply conditions. Various parameters showing the general condition and significant functions of the plants (morphological parameters, plant-water relations parameters, photosynthetic parameters, and cell damage parameters) were measured. Among the plants exposed to flooding, the reactions differed greatly based on the age of the plants. Younger plants showed an increase in transpiration speed values, stomatal conductivity, and the rate of pure photosynthesis due to flooding. The remaining parameters decreased due to the flooding (the amount of H_2O_2, MDA, photosynthetic pigment, and the fluorescence of chlorophyll *a*). In the case of older plants, the flooding caused a decrease in values of most of the monitored parameters. The only exception was found in the parameters indicating cell damage (the amount of H_2O_2 and MDA, catalase activity, and the index of membrane damage). Within the reactions of the plants, intraspecific variability also occurred, depending on the stage of ontogenetic development of the monitored plants and on the cultivation conditions, and varied depending on the monitored parameter.

Key words: flooding, stress, maize, photosynthesis, gas exchange parameters, cell damage, morphology and plant development