

On the interrelation of water exchange and photosynthesis in triticale sprouts with short-term action of sodium chloride

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Abstract

The interrelation between the indices of water exchange and photosynthesis in sprouts of triticale (xTriticosecale) was studied with the cluster analysis method under conditions of short-term exposure of sodium-chloride. It was shown that the physiological and biochemical indices studied during the confrontation with salt stress significantly changed or exhibited extreme values by approximately 24 hours of the experiment, despite the fact that an increase in the content of salt ions in sprouts was observed only to 48 hours of the experiment. The least sensitive indicators were the content of water and proline. The values of the osmotic potential and intensity of transpiration changed already by 12 hours in the experiment. Also by this time, a decrease in stomatal conductance of leaves, the intensity of photosynthesis, the activity of enzymes of the carboxylation phase, but an increase in the activity of carbonic anhydrase were observed. By 24 hours the content of the main photosynthetic pigments decreased several times, but the speed of electronic transport increased. For the first time, the relationship between the intensity of transpiration and proline content, the parameters of water exchange and photosynthetic assimilation of carbon dioxide, electronic transport, and activity of carbonic anhydrase is quantitatively confirmed. It is concluded that a number of responses to the appearance of sodium chloride in seedlings of triticale occurs much earlier than salt ions penetrate the shoots of plants. For this reason, the change in the photosynthetic index is of an indirect nature, which can be explained through the inclusion of mechanisms of adaptive reactions caused by an increase in the number of active forms of oxygen and phytohormones due to a primary sharp decrease in the cell turgor in the shoot growth zone.

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