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Manifestations of oxidative stress in sprouts of triticale under condition of short-term exposure of sodium chloride

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Abstract

The stress indices of the triticale sprouts under conditions of short-term sodium chloride salinity (120 mM), which lasted up to 96 hours, were studied. An increase in the hydrogen peroxide content by more than 50% and a two-phase change in the superoxide radical content were detected. The value of peroxide oxidation of lipids first increased more than three times, followed by a decrease and a new increase. In this case, the accumulation of sodium and chlorine ions in the shoots began to change only after 24 hours of the experiment. Cluster analysis of these parameters showed a closer relationship between the active forms of oxygen than with the value of lipid peroxidation as a result of their action.

Changes in the activity of antioxidant protection components have been studied: the content of ascorbic acid and glutathione, the activity of enzymes – catalase, ascorbate peroxidase, glutathione reductase and guaiacol peroxidase. Various changes in the activity of enzymes are shown. A sharp increase in catalase activity was followed by a decrease in this index at the end of the experiment. For other indicators, there was an increase or decrease in activity during the experiment. Cluster analysis of the results obtained showed the closest relationship between the content of glutathione and glutathione reductase, with further inclusion of other enzymes into the cluster. Surprisingly, ascorbic acid entered the system of clusters at the very last.

Cluster analysis of all experimental data showed a close relationship between catalase activity and lipid peroxidation value, peroxide content, glutathione reductase activity and glutathione content.

On the basis of the data obtained, it was concluded that the mechanism of confronting the developing oxidative stress of the triticale seedlings involves the participation, first of all, of catalase and the glutathione-glutathione reductase system, followed by the connection of other components of antioxidant protection studied.

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