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Application of principal component analysis to the indicators of water exchange of triticale shoots under NaCl stress

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Abstract

The results of the study of the water regime characteristics (without and taking into account the indicators of oxidative stress) of triticale shoots under conditions of short-term NaCl stress were analyzed with the principal component analysis (PCA). It is shown that the water content is the most stable indicator of triticale shoots under experimental conditions. The results of the analysis led to the conclusion that its value is not determined by the value of stomatal conductivity and/or transpiration. Determination of the correlation coefficients between the studied characteristics yielded negative values between the water content and other indicators of the water regime, as well as oxidative stress, except for the value of lipid peroxidation (LPO) (0.67). Despite the closest relationship between the water content and the osmotic potential according to the results of cluster analysis, the correlation between them was negative (-0.76). This can be explained by different physiological and biochemical mechanisms that support each of these indicators. It is also shown that manifestations of oxidative stress are closely related to the osmotic potential and water content. In this case, the formation of a first-order cluster was observed between the content of water and hydrogen peroxide. This is not unexpected, but the correlation coefficient between them was only 0.018. This value can be interpreted in such a way that water is needed for the formation of hydrogen peroxide, but their quantitative ratio (water : hydrogen peroxide) in the shoots of triticale is significantly different. The inclusion in the analysis of the results of the accumulation of salt ions showed a closer relationship between the increase in the content of salt ions and the change in transpiration, stomatal conductivity and the content of proline than with the water content in the shoots of triticale under experimental conditions.

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