

The application of statistical methods to indicators of triticale photosynthesis under chloride stress

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Abstract

The paper presents the results of a study of the relationship between photosynthesis indicators of triticale shoots under conditions of short-term NaCl stress. For this, the principal component analysis (PCA) and cluster analysis were used. It was established that the characteristics of photosynthesis form three groups: (1) carbonic anhydrase and electron transport, (2) chlorophyll and carotenoids, (3) photosynthesis intensity. The correlation coefficients between the indicators are 0.85 and 0.97 for the first two groups, respectively. Using the cluster analysis method has led to similar results. Further analysis of the data with PCA for the characteristics of photosynthesis and oxidative stress showed that the indicators can also be combined into three groups: (1) stomatal conductivity, chlorine and sodium, (2) chlorophyll and carotenoids, (3) photosynthesis intensity and Rubisco activity. For physiological and biochemical parameters, the highest correlation coefficients were as follows: electron transport – lipid peroxidation (0.98), chlorophyll – carotenoids (0.97), carbonic anhydrase – LPO (0.86), carbonic anhydrase – electron transport (0.85), electron transport – hydrogen peroxide (0.63), LPO – hydrogen peroxide (0.62). The cluster analysis method suggests a close relationship between electron transport and the accumulation of hydrogen peroxide, carbonic anhydrase and lipid peroxidation. Based on the results obtained, conclusions are drawn about the close relationship between the activity of carbonic anhydrase and electron transport, and the magnitude of lipid peroxidation under experimental conditions, which, however, requires direct experimental evidence of such connections.

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