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Antioxidant responses of wheat seedlings under waterlogging stress

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Wheat is one of the most important crops in the world, one of the main sources of calories and proteins for many people of different cultures. But wheat is a very sensitive cereal to waterlogging stress (root oxygen deprivation). The effects of flooding makes dramatic influence on wheat plants: depress photosynthesis and respiration, reduce growth, development and finally yield. The object of this study was to identify waterlogging-tolerant cultivars of bread wheat original Latvian selection. Five wheat cultivars were tested under aerobic and root-anaerobic conditions to determine antioxidant activity - the mechanisms that protect cellular homeostasis from oxidative damages, occurred during stress. The experiment was carried in the climatic chambers under controlled environmental conditions: T=22°C, H=70%, 12 h photoperiod, light condition 600 μmol m^{-2} s^{-1}. Soil environment for experimental group of 10-days seedlings were water saturated during 14 days. To observe the dynamic of antioxidant activity in different parts of first leaf (basal, middle and apical parts), the measurements were performed three times on the first, seventh and 14th day of root flooding. The antioxidant responses of wheat cultivars were investigated in methanol extracts spectrophotometrically: total content of phenolic compounds, the 2,2-diphenyl-1-picrylhydrazyl(DPPH), 2,2′-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) free radical scavenging capacity and ferric reducing antioxidant power (FRAP). The various responses to waterlogging were detected in the parts of first leaf, because of the different physiological conditions and genetic capabilities. However, an elevation of antioxidant activity correlated with duration of stress treatment in all wheat cultivars.

Biography

Alina Kulbachna has completed her Master's degree from the Daugavpils University and start PhD studies in Institute of Life Sciences and Technologies at Daugavpils University, Latvia in 2017. Also she works in Scientific Laboratory of Biochemistry at Riga Stradins University, Riga, Latvia. Her research focusses on relationships between oxygen deprivation stress and oxidative stress in wheat plants, differing in their tolerance to hypoxia, using a range of biochemical, molecular biology and genetics approaches.

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