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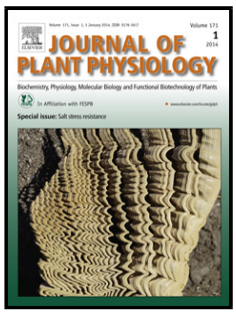

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Authors: Anna Bilska-Kos, Piotr Panek, Anna Szulc-Głaz, Piotr Ochodzki, Aneta Cisło, Jacek Zebrowski

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Chilling-induced physiological, anatomical and biochemical responses in the leaves of Miscanthus × giganteus and maize (Zea mays L.).

Anna Bilska-Kos[ab*], Piotr Panek[b], Anna Szulc-Głaz[b], Piotr Ochodzki[c], Aneta Cisło[b], Jacek Zebrowski[b]

Anna Bilska-Kos

[a]Department of Plant Biochemistry and Physiology, Plant Breeding and Acclimatization Institute - National Research Institute, Radzików, 05-870 Błonie, Poland, a.bilska@ihar.edu.pl

[b]Department of Plant Physiology, Faculty of Biotechnology, University of Rzeszow, Aleja Rejtana 16c, 35-959 Rzeszow, Poland.

[*]corresponding author

Piotr Panek, Anna Szulc-Głaz, Aneta Cisło, Jacek Zebrowski

[b]Department of Plant Physiology, Faculty of Biotechnology, University of Rzeszow, Aleja Rejtana 16c, 35-959 Rzeszow, Poland.

Piotr Ochodzki

[c]Department of Plant Pathology, Plant Breeding and Acclimatization Institute – National Research Institute, Radzików, 05-870 Błonie, Poland.

Abstract

Miscanthus × giganteus and Zea mays, closely-related C_4 grasses, originated from warm climates react differently to low temperature. To investigate the response to cold (12-14°C) in these species, the photosynthetic and anatomical parameters as well as biochemical properties of the cell wall were studied. The research was performed using M. giganteus (MG) and two Z. mays lines differentiated for chilling-sensitivity: chilling-tolerant (Zm-T) and chilling-sensitive (Zm-S). The chilled plants of Zm-S line demonstrated strong inhibition of net CO_2 assimilation and a clear decrease in F'_v/F'_m, F_v/F_m and ϕ_{PSII}, while in MG and Zm-T plants these parameters were almost unchanged. The anatomical studies revealed that MG plants had thinner leaves, epidermis and mesophyll cell layer as well as thicker cell walls in the comparison to both maize lines. Cold led to an increase in leaf thickness and mesophyll cell layer thickness in the Zm-T