Response of *Dactylis glomerata* to low temperature stress

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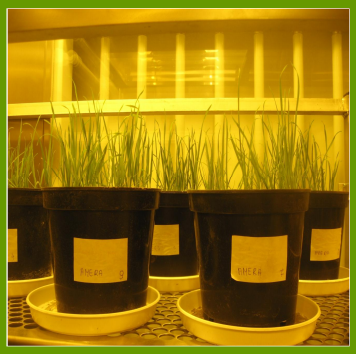
INTRODUCTION

The ability to tolerate low temperatures, especially in early spring, is integral to the survival of *D. glomerata*. Chlorophyll *a* fluorescence measurement is one of physiological parameters exploited as reliable indicator of plant stress tolerance. **The aim of the present study was to investigate the freezing tolerance of two *D. glomerata* varieties differing in earliness and evaluate the use of some physiological features such as chlorophyll content and plant photosynthetic efficiency.**



MATERIALS AND METHODS

The experiment was conducted in controlled growth conditions (Phytotron). Two Polish forage varieties of *D. glomerata,* Amera and Amila, were sown pure in pots. At emergence and tillering phases plants were treated with two levels of low temperature (separately): -5°C and -10°C for 24 hours. **Leaf greenness index** was measured by SPAD-502 Chlorophyll Meter and **chlorophyll *a* fluorescence** by FluorCam 800MF. Measurements were carried out once before (control) and twice after each low temperature treatment (directly and after 48 hours). **The amount of survived shoots** after one week of thermal stress was also registered.

RESULTS

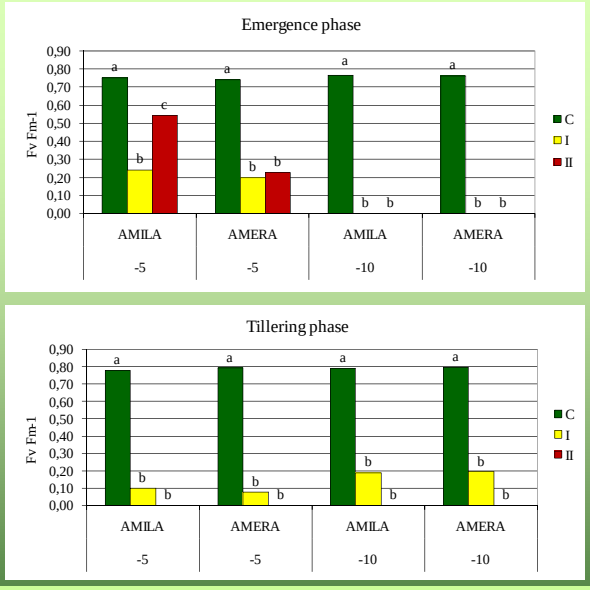


Figure 1. Maximum quantum efficiency of Photosystem II (Fv/Fm) of *D. glomerata* varieties (Amila and Amera) at emergence and tillering phases before (control ï C) and after (I ï directly and II ï after 48 hours) low temperatures (-5°C and -10°C) application.

* Values on diagram (for each set of data) and in column followed with the same letters had no significant differences between them at *P*=0,05 according to Tukeyõs test.

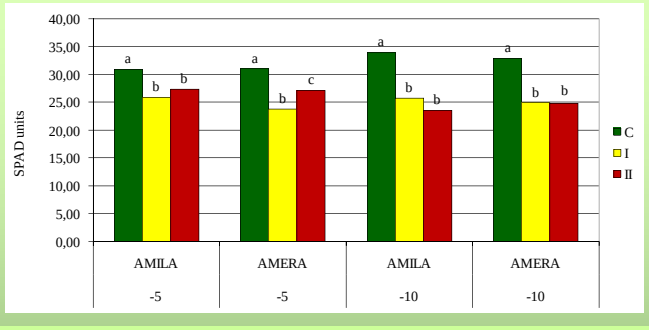


Figure 2. Leaf greenness index (SPAD units) of *D. glomerata* varieties (Amila and Amera) at tillering phase before (control ï C) and after (I ï directly and II ï after 48 hours) low temperatures (-5°C and -10°C) application.

Table 1. Survival of shoots of *D. glomerata* varieties Amila and Amera at emergence and tillering phases one week after low temperature treatments (%).

Variety	-5 °C	-10 °C
Emergence phase		
Amera	7.0 a	0.0 a
Amila	19.4 b	0.0 a
Tillering phase		
Amera	16.6 a	0.0 a
Amila	38.5 b	0.0 a

CONCLUSIONS

- The exposure of both *D. glomerata* varieties to low temperatures caused a decrease in chlorophyll content.
- Higher reduction in the maximum quantum efficiency of Photosystem II (Fv/Fm) than chlorophyll content was observed.
- Photosynthetic apparatus of both varieties was more sensitive to -10°C temperature at emergence growth phase.
- Amila variety proved to be more tolerant to low temperature stress during emergence phase. That is due its better recovery of photosynthetic efficiency from stress after withhold of low temperature application and better survival of its shoots as compared to Amera variety.