

Meeting abstract

Effect of UV-B radiation on some cereals

Oleg B Blum*, Svitlana A Gorobets and Anastasia A Blum

Address: M. M. Gryshko National Botanical Garden, Natl. Acad. of Sciences of Ukraine, Kyiv, Ukraine

Email: Oleg B Blum* - blum@cbg.freenet.kiev.ua

* Corresponding author

from Cell Biology of Nitric Oxide and Cell Death in Plants
Yalta, Ukraine, 8–11 September 2004

Published: 31 May 2005

BMC Plant Biology 2005, 5(Suppl 1):S4 doi:10.1186/1471-2229-5-S1-S4

An influence of low and high doses of UV-B radiation (280–320 nm from special luminescent lamp TL 20 W/12 RS) on cereals (barley, oat and winter wheat) was investigated.

Plants were cultivated in a greenhouse, and then were displayed under a lamp in a bushing out phase during 4, 8, 12, 24 and 72 h of continuous irradiation on the distance 20 cm. The flux of UV-B irradiation under these conditions was 5.7 wt/m². Doses which received plants was 19.6 kal/cm², 39.2 kal/cm² 58.8 kal/cm² 117.6 kal/cm² and 352.8 kal/cm² respectively. Characteristics of plant response to irradiation were: changes in pigment systems (chlorophylls and carotenoids), changes in the content of phenolic substances, and changes of peroxidase activity also.

It was shown that barley is the most sensitive and winter wheat is the most tolerant to UV-B. However, high doses of radiation caused strong growth inhibition during vegetation period and biomass loss in winter wheat, too. Significant reduction of content of main photosynthetic pigments (chlorophylls *a* and *b*) as well as carotenoids in leaves of tested plants as a result of intensive exposure to UV-B irradiation was established. An increasing of carotenoids content in winter wheat at UV-B irradiation can be considered as adaptive and protective reaction preventing from photodestruction of chlorophylls. An elevation of carotenoids in barley during irradiation in contrast to winter wheat was not observed, that testifies to absence protective and adaptive reaction of the given type in this plant species.

Comparison the data on the contents of phenolic substances in leaves of summer barley with winter wheat and oat at UV-B radiation has shown that the amount of these

substances in plants of winter wheat increased weakly in comparison with oat and especially in comparison with summer barley. It allows to assume that increased synthesis of phenolic substances during exposure to UV-B radiation with dose 58.8 kal/cm² (12 h of irradiation) and especially with dose 117.6 kal/cm² (24 h of irradiation) testifies to stressful condition for barley plants. Respectively, increasing of phenolic substances content can be considered as one of protective reactions in UV-sensitive plants.

Increased peroxidase activity under the influence of low UV-B doses testifies to stressful condition and protective processes in tested plant (barley). The reduction of peroxidase activity immediately after exposure to excessively high dose UV-B radiation (225.2 kal/cm²) during 48 h is the evidence of already non-irreversible damages in test plants.