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The effects of drought on changes in photosynthesis, hormone levels and grain yield in wheat (*Triticum aestivum L.*)

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Wheat is one of the main crops consumed by humans and it is cultivated in different environments. Under the temperate zone early-summer droughts are increasingly frequent and limit grain yield since they coincide with the grain filling period. There are several physiological traits related to water stress, and scientists make considerable effort to find direct correlations between these parameters and grain yield to facilitate the selection of cultivars for drought tolerance.

Photosynthesis is one of the main metabolic processes determining crop production. Chlorophyll fluorescence is a tool for monitoring the function of the photosynthetic apparatus, changes in response to water stress. The effect of drought on photosynthesis has long been a controversial subject and it is still not clear whether chlorophyll a fluorescence parameters are good indicators for drought sensibility (Flexas et al. 2002). The plant hormone abscisic acid (ABA) plays a major role in plant responses to drought stress, facilitating plant survival (Zahng et al. 2006).

A comparison was made between changes of the parameters mentioned above, in seedling stage under osmotic stress and in reproductive growth phase under soil drought in two Hungarian (*Triticum aestivum* L. cv. MV Emese (resistant) and GK Élet (sensitive)) and two internationally known (*Triticum aestivum* L. cv Plainsman (resistant) and Cappelle Desprez (sensitive)) wheat cultivars.

Our object was to compare the effects of osmotic and drought stress to find correlation between these treatments, and to compare the effects of water deficit on different physiological parameters, hormone levels (ABA and cytokine), grain yield and storage protein content in tolerant and sensitive varieties in the grain filling period. The water status parameters, CO_2 assimilation, chlorophyll *a* (chl*a*) fluorescence, pigment content and hormone levels were determined as a function of the development under osmotic stress in seedling stage (from germination to the 21st day after germination) and under water deficit in the grain filling period (from booting stage to the 24th day after anthesis).

Our results suggest that the photosynthetic parameters measured under osmotic stress are not comparable with those measured in flag leaves in the grain filling period. Different genotypes showed unique diversity in changes of these parameters, but common tendencies between the tolerant or sensitive cultivars were not found.

Pre- and post-anthesis soil drought did not result in characteristic modifications in PS II photochemistry of flag leaves in dark and light-adapted leaves, demonstrating that in this experiment these parameters did not correlate with sensitivity. Plants showed early senescence under water deficit. We found that sensitivity of the generative organs could be responsible for the higher decrease in grain yield. Changes of the ABA levels in the kernels showed a differing tendency: sensitive genotypes maintained high hormone levels, which can be unfavourable for grain growth. The different storage protein fractions of the mature grains were not significantly modified by drought, which confirm earlier results (Panozzo et al. 2001), but the gliadin to glutenin ratio increased significantly in one of the tolerant varieties.

Our results indicate that when the sensitivity of a genotype to drought stress are defined whole plants responses have to be taken into consideration. Responses of the vegetative and generative organs can be different and sensitivity of the generative phase and the fertilization process to water deficit may overwrite the efficient acclimation of vegetative organs.

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Microarray and interaction network based identification of genes involved in germ cell development in *Drosophila melanogaster*

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Embryonic germ cell development of fruit fly *(Drosophila melanogaster)* depends on the germ plasm, the most posterior part of the egg cytoplasm. The germ plasm contains all factors which are necessary to induce germ cell fate. It has a characteristic distribution of proteins and contains a large number of localized RNA species, too (Williamson et al. 1996). Certain gene products being present in germ plasm might play crucial roles in germ cell determination and its subsequent development such as the germ cell migration, the passage through the embryonic midgut, and gonad formation. *Drosophila* is one of the most accepted model organism of germ cell research in the post sequencing era since numerous large Drosophila genomic databases are available for researchers.