

## POSSIBILITIES TO INCREASE STRESS TOLERANCE OF WHEAT

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**Abstract:** Agricultural production is limited primarily by environmental stresses among those the most important is water deficiency. The safety of wheat production requires the propagation of drought tolerant cultivars. Hybridization between related species makes it possible to transfer desirable traits from one species into another. Barley - known to have good drought tolerance - is a potential gene source for wheat improvement. Lines developed from wheat/barley hybrids were investigated to determine how the added barley chromosomes (segments) influence drought tolerance in wheat. Data were obtained for anthesis- and maturity date, plant height, root/shoot ratio and components of grain yield. On the basis of our data new lines with valuable agronomic traits can be selected which could be used in wheat breeding programs—and consequently in wheat production.

**Keywords:** wheat-barley translocation, addition, substitution lines, drought tolerance

### Introduction

Agricultural production is limited primarily by environmental stresses among those the most important is water deficiency. The efficient use of water stored in soil has special significance. Annual precipitation in Hungary will not be more in the future and its unfavorable spatial and time distribution will even be less favorable (Várallyay, 2008).

The primary approach for alleviation of environmental stresses focused on modification of the environment. These are, however, expensive and effective only in the short run, contemporaneously loading the environment. Economic and ecological constraints make the approach of genetic improvement of stress tolerance a viable alternative. Differences were found between genotypes regarding their tolerance to environmental stress, allowing selection to be made for better tolerance (Balla et al., 2006). Limited soil moisture influences nutrient availability for plants. Pepó and Balogh (2008) found that advantageous water supply decreased the optimum nutrient level of the cultivars.

Hybridization between related species makes it possible to transfer desirable traits from one species into another. Barley - known to have good drought tolerance - is a potential gene source for wheat improvement. The introgression of barley (*Hordeum vulgare* L.) chromosome segments into wheat (*Triticum aestivum* L.) may result in the transfer of new, useful traits, such as earliness, tolerance of drought and soil salinity or various traits for specific nutritional quality into wheat. Since the first successful hybridization between wheat and barley (Kruse 1973) only a few wheat-barley translocation and substitution lines have been developed (Islam and Shepherd 1992; Koba et al. 1997; Molnár-Láng et al. 2000a.) and were investigated regarding cytogenetic characteristics and fertility (D. Nagy et al. 2002; Szakács and Molnár-Láng, 2007.). Even less information is available on the ability of barley chromosomes to compensate for wheat chromosomes regarding agronomically important characteristics and there is no information available on the behaviour of wheat-barley derivatives grown on the field.