Transnational Access Report

1. General Information

Project Acronym (ID):	WHEAT_OSMOTIC_SHOOT
Project Title	Genotype-dependent interactive effects of water and salt stress on wheat growth and productivity under greenhouse conditions
Name of Consortium Leader	Dr Ankica Kondić-Špika
Name of organization	Institute of Field and Vegetable Crops

2. Project summary (max. 250 words)

Every continent is affected by salinized soil and water. Soil salinization is one of the serious forms of soil degradations, which can arise from natural causes and human-mediated activity, such as irrigation in arid and semi-arid regions. Approximately 20% of the irrigated lands in the world are presumably affected by soil salinization. More than 800 million hectares of land throughout the world are salt-affected. This amount accounts for more than 6% of the world's total land area.
Salt tolerance may be defined as sustained growth of plants in a highly saline environment. It is usually assessed either as the percent biomass production in saline versus control conditions or in terms of survival.

The objectives of the proposed research project are:

- To use the HAS-Shoot Stress Diagnostic System to analyze salt tolerance of selected wheat cultivars under well watered and drought conditions.
- To analyze the synergistic effect of salinity and drought stress on wheat growth and development.
- To search for correlation between drought tolerance and salt tolerance in selected wheat cultivars.
- To characterize drought- and salt-induced damage of photosynthetic functions.
- To obtain information on salt tolerance of cultivars originating from different geographical locations (Austria, Azerbaijan, Serbia).

3. Main achievements (max. 250 words)

A general feature of mild to middle level of salt stress (0.2 NaCl/kg soil) was a retardation of water uptake, which was especially pronounced when the relative water content of the soil was kept at 20 %. Green biomass in general was not significantly affected by salt stress under well watered conditions (60 % soil water content). However, when salt was applied together with 20 % soil water the green biomass decreased drastically to ca. 30 % of the well watered no salt control. Total grain yield responded also to a small extent to salt stress under well watered conditions, but decreased to 10-25% of its control value when salt stress was combined with limited water availability. Interestingly the ratio of the grain yield and dry biomass remained practically constant even under the combined effect of salt stress and water limitation, showing that carbon partitioning to grains is not affected specifically by the salt + water stress. The rate on net photosynthesis, measured by CO_2 gas exchange, was also affected most significantly by the combination of salt stress and water limitation. Accumulation of the osmoprotectant proline, was affected only to a small extent by water limitation and salt stress when applied separately, but proline was induced significantly by the combined application of the two stress factors. The various parameters showed large difference among the studied cultivars, and revealed tolerant and sensitive lines. The best performance in total grain yield under salt stress alone was observed in the NS-Avangarda, Gobustan and Tale-38 cultivars, while under water stress alone the Gallio, Balkan and Grymzyl gul-1 showed the highest grain yield. Under conditions of combined water and salt stress the Capo, Tale-38, and NS-40S lines showed the best performance. Grain yield stability was also the highest in the Capo and Tale-38 lines.

4. Publications related to the access granted, acknowledging the support by EC.

A publication covering the shoot and root phenotyping data is in preparation.