

Transnational Access Report

1. General Information

Project Acronym (ID):	DTBL
Project Title	Drought tolerance of barley landraces
Name of Group Leader	Ernesto Igartua
Name of organization	CSIC, Spanish Council for Scientific Research

2. Duration of access

Begin of the project	End of the project
First day the installation was used	Last day the installation was used
13-05-2014	27-06-2014

3. Project summary (max. 250 words)

The objective was to achieve a good characterization of the response to drought of three very promising barley landrace lines of Spanish origin (SBCC042, SBCC073 and SBCC146), compared to three modern cultivars, Orria, Cierzo and Scarlett.

SBCC042 and SBCC073 outyielded 26 cultivars in a series of field trials at low production sites (1.5 to 3.0 tons/ha) across Spain, and SBCC146 had an outstanding early vigor. High yield of landraces at these field trials was associated with good early vigor. This good performance could be the result of drought tolerance.

These landrace lines are sources of good agronomic ability, which are genetically close to current cultivars, and are very promising for plant breeders. We expected that fine phenotyping of plant growth under drought stress would point at the phenotypic features related with the good agronomic performance. Two of the landrace lines are also the parents of segregating populations that will be tested experimentally in the near future. Therefore, we will explore the possibilities to find out the genetic control of the promising traits discovered in this experiment and their relationship with yield.

6. Main achievements (max. 250 words)

The experiment has revealed a larger growth potential of landraces over checks under no stress. Root and shoot dry weight, leaf area, and tiller number of landraces significantly surpassed those of checks at the control treatment. Landraces total plant dry weight exceeded the checks' by 43%. Orria and Scarlett showed lower values for all growth traits, and only check Cierzo had values close to the landraces'. These were not a homogeneous group, SBCC073 and SBCC146 showed similar plant dry weights at the end of the experiment, but with root growth favored in SBCC073, whereas shoot growth was promoted in SBCC146. SBCC073 also showed the lowest shoot/root ratio. In the drought treatment, however, differences between checks and landraces faded out. Landrace SBCC073 showed better scores of physiological traits (SPAD, chlorophyll fluorescence) than other genotypes, across treatments.

These results confirm the interest of Spanish landraces as donors of distinct traits that may confer enhanced performance under Mediterranean environments. Particularly, early vigor and diversion of assimilates towards root growth are mechanisms that could be consistent with an adaptive response to an environment in which crop emergence depends on autumn rains that evaporate rather rapidly. Consequently, crops should be established fast, ensuring access to the largest volume of soil possible to maximize growth later on in the season. This possible role of root growth, especially in SBCC073, has led us

to think of the possibility of developing specific experiments to search for QTL for early root growth in existing populations, SBCC073xOrria and SBCC073xCierzo.

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

Ridha Boudiar, MSc thesis “Identification of QTL for agronomic traits in a backcross involving a barley landrace”, presented on October 15th (mark of 91, *cum maxima laude*), presents the results of the experiment, and acknowledges the contribution of EPPN. This thesis will be available on request from the IAMZ-UdL.