FIELD CHARACTERIZATION OF MAIZE NEAR-ISOGENIC HYBRIDS DIFFERING FOR *ROOT-ABA1*, A QTL INFLUENCING ROOT LODGING AND ABA CONCENTRATION

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In the mapping population derived from Os420 x IABO78, two lines differing widely in the concentration of leaf ABA concentration (L-ABA) under a broad range of water regimes, 16 QTLs were identified for L-ABA (TAG, 1998; 97: 744-755). A major QTL near *csu133* on bin 2.04 accounted for 32% of the total variability for L-ABA. At this QTL, Os420 and IABO78 carry the allele increasing (+) and decreasing (-) L-ABA, respectively. The cause-effect relationships between quantitatively inherited traits can be accurately investigated through the evaluation of congenic strains (e.g.,NILs, BDLs) sharing the same genetic background and differing only for the parental alleles at the target QTL affecting one of the traits in question. The isogenization of a QTL in more than one genetic background provides the opportunity for evaluating the QTL in an otherwise hybrid background, an important prerequisite for appropriately testing QTL effects for traits, such as yield, affected by inbreeding depression.

Our objectives were to investigate the effects of the QTL near *csu133* on L-ABA, grain yield and other important morpho-physiological traits. Two pairs of (+/+ ) and (-/-) Os420 BDLs and two pairs of (+/+ ) and (-/-) IABO78 BDLs for the QTL on bin 2.04 were obtained by a marker assisted backcross programme. The four Os420 BDLs were factorially crossed to the four IABO78 BDLs, thus producing 16 near-isogenic hybrids (NIHs); these NIHs were tested in 2002 and 2003 adopting two irrigation volumes of ca. 40 or to 120% of the estimated evapotranspiration after accounting for rainfall. A RCBD with four replicates was adopted.

The QTL significantly affected L-ABA, stomatal conductance (SC), root lodging and kernel weight but not grain yield. The mean value of the heterozygous NIHs (+/-) did not differ significantly from the mean value of the homozygous (+/+ ) and (-/-) NIHs, indicating that the QTL effect is prevalingly additive. The lack of a significant effect on grain yield may have been caused by the differences in root lodging, which likely affected grain yield and may have counterbalanced the negative effects that a higher accumulation of ABA is expected to have on kernel number and, hence, grain yield as shown in previous work (Landi et al., 2001). These results thus indicated that the QTL effect on L-ABA is confirmed in a hybrid background and also revealed its associated effects on SC and root lodging. The agronomic relevance of the chromosome region near *csu133* was also documented in Lo964 × Lo1016 (PMB, 2002; 48: 697-712) and other genetic backgrounds (for a review, see Tuberosa et al., 2003), an encouraging finding for attempting the positional cloning of the gene/s responsible for this QTL.