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MARKER-ASSISTED BACKCROSSING FOR INTROGRESSION OF THE SALTOL LOCUS CONFERRING SALT STRESS TOLERANCE IN RICE

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Climate change represents a threat to rice cultivation since it provokes soil salinization. Rice is the most sensitive cereal to salt stress. The H2020 project NEURICE (New Commercial EUropean Rice) aimed at identifying and introducing genetic variation in European rice varieties to obtain commercial varieties tolerant to salinity. The positive effect of the Saltol QTL, located on chromosome 1 of the *indica* ssp. of rice, in keeping the Na/K homeostasis, is well known. The aim of the work was to introgress this QTL from the *indica* donor IR64-Saltol into two *japonica* Italian elite varieties (Onice and Vialone Nano). The introgression scheme was based on a marker-assisted backcross (MABC) method that involved an initial cross, three backcrosses (BC) and two selfing generations. During the backcrosses, the scheme was coupled to an embryo rescue (ER) technique to fasten the process. Both, the foreground and the background selections relied on SNP-based KASP markers. A foreground selection was carried out on F1 and BCnF1 to identify heterozygous plants for Saltol and on BC3F2 to identify homozygous plants for the Saltol region. From BC1F1 onward, a set of 96 evenly distributed KASPar markers was used to identify individuals with the best recovery of the recurrent parent. In BC1F1, the background selection allowed identification of lines with a range of recovery percentage (RP%) of 46-72% and 45-61% for Onice and Vialone Nano backcrosses, respectively. In the second backcross, selected lines showed a RP range of 75-90% and 73-89% respectively for Onice and Vialone Nano, while after the third back-cross the selected lines showed a remarkable RP (carrier chromosome excluded) of 91.30-98.55% and 92.75-98.55% in Onice and Vialone Nano backcrosses, respectively. After the background selection, BC3F2 were genotyped for identification of homozygous lines at Saltol locus and selected lines were further subjected to background selection for the identification of the lines with highest RP% and field evaluated for the morphological features of the recurrent parents. In conclusion, the present work represents a practical example of MABC application combined with embryo rescue that allowed in less than three years the introgression of a salt tolerance locus from a different spp. and therefore to boost the selection processes aiming at increasing rice tolerance to abiotic stresses.