

APPROACHES TO IMPROVE FIRMNESS IN TOMATO LANDRACES BY GENOME EDITING

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Landraces are genotypes with a territorial importance, linked to the traditions and the cultural heritage of local communities. Moreover, these local varieties play an important role in preserving agrobiodiversity. However, most of them lack in those aspects required by modern agricultural and market needs. Biotechnological approaches, like Genome Editing techniques, can be useful tools in improving this material without compromising their genetic background and unique features. Softening is an important step in the ripening process of fleshy fruits and plays a pivotal role in determining the post-harvest quality of a product, being responsible not only for the palatability of the fruits but also for their shelf-life and market value. Here, three tomato landraces from Lazio with flattened-ribbed fruit (Scatolone di Bolsena, Spagnoletta di Gaeta e Formia, Pantano di Ardea) and one from Campania with elongate fruit (San Marzano) have been addressed to improve their fruit firmness and shelf-life. Tomato Microtom plants have also been used in the experiments. Two target genes, one encoding for a Pectate Lyase enzyme (*PL*) and one encoding for a Lateral Organ Boundaries transcription factor (*LOB1*) have been chosen. To proceed with the genetic transformation, the selected accessions have been tested for their regeneration capacity. Each genotype could regenerate *in vitro* and survive the *in vivo* transfer of rooted shoots. Spagnoletta showed the best results with a regeneration rate of 312%. Transformed plants of the Microtom and Scatolone genotypes, with *PL* construct and *LOB1* construct respectively, were obtained, and forwarded to validation. In addition, the landraces were characterized, in field trials

carried out for two years, for their fruit firmness and shelf-life, using a commercial hybrid as a control.