

## COMBINING POLYPLOIDY AND PARTHENO-CARPY TO ENSURE GENE CONTAINMENT AND PROMOTE THE COEXISTENCE OF CONVENTIONAL AND GM CROPS

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In a tomato production field, near-sterile variants appear spontaneously as diploid (21%), triploid (68%), tetraploid (5%) or aneuploid (6%) plants. The first artificial triploid (3x) was obtained by Jørgensen in 1928 by crossing 4x with 2x strains; with the same procedure few others were produced later on. Triploid plants showed features that were intermediate between diploids and tetraploids and exhibited a pollen and ovule fertility that was reduced to 5 and 15% of the diploid, respectively. Seed set was also extremely low (1-2% of the diploid), even when the triploid was hand-pollinated with 2x pollen. Triploid plants were therefore practically unfruitful, due to the high gametic and zygotic sterility. Differently, tetraploid plants showed a satisfying fruit set, but fruits were highly variable in size due to the low and variable number of seeds.

Recently, in our lab, the first fruitful tomato triploid plants were synthesized by crossing 4x with 2x somaclones. The synthesis of 3x plants was achieved in both a wild-type (cv Chico III genetic background) and a near-isogenic line carrying the parthenocarp allele *parthenocarpic fruit (pat)*. In addition to parthenocarp, the *pat* mutation shows reduced pollen production and ovule viability. In this work, data about pollen and seed fertility of the two near-isogenic (*pat* and wild-type) series of 2x, 3x and 4x plants are reported. The triploid parthenocarpic plants produced a reduced amount of pollen with very low viability; however, they resulted very fruitful although the fruits were completely seedless. Therefore, in addition to preventing gene flow by pollen, parthenocarpic triploids avoid the contamination of soil with plenty of seeds as it happens in open field during mechanical harvest of conventional processing tomato cultivars. Taken together, such properties make 3x parthenocarpic plants a truly innovative breeding material, suitable to permit the coexistence of transgenic and conventional tomato cultivations and crop rotation.