

**FINE GENETIC CHARACTERIZATION OF THE *Co* LOCUS
RESPONSIBLE FOR THE COLUMNAR HABIT IN APPLE (*MALUS X
DOMESTICA* BORKH.)**

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In apple breeding programmes tree architecture is considered an important trait, because it influences fruit quality, planting density, production and labour requirements. Tree architecture can be controlled by pruning and using size-controlling rootstocks, but natural tree forms resulting in small and narrow trees could be desirable to assure a uniform light penetration, high density planting and a reduction of pruning interventions. The columnar growth habit in apple presents all these desirable traits, as it is characterized by short internodes, a thick stem and reduced plant height and branching. The columnar habit seems to be controlled by a single dominant gene (*Co*), even if minor modifier genes can segregate depending of the genetic background. The *Co* gene has been reported to map on the apple linkage group 10 and molecular markers for this character have been developed. To increase the *Co* genetic map resolution, we searched for SSR-type repetitive sequences linked to the *Co* locus, by screening the Golden Delicious genome sequence made available by the sequencing project in progress at FEM-IASMA. Three segregating populations for a total of 370 individuals derived from different crosses (“Golden x Wijcik”, “Goldrush x Wijcik” and “Galaxy x Wijcik”) were used in the first part of the work to develop ten new SSR markers closely linked to *Co*. This enabled us to narrow down the region of interest to about 800 kb. A new segregating population of 419 individuals was then developed and screened searching for recombinants within the region in analysis and three were found. As the new population is composed by one year-old seedlings, only a putative phenotype could be assigned to each individual. According to these phenotypes the genomic region carrying the *co* gene was reduced to 340 kb. Within this region putative candidate genes possibly controlling the columnar phenotype have been highlighted.