

High Performance Roses: a new impulse for garden roses by molecular marker technology (2009 – 2013)

Pheno Geno Roses completed a 4 years TTI project, co-financed by 2 trading companies involved in the trade of garden roses: Frank Coenders Rozen and the Regional Cooperative of Rose Growers.

To date, breeding in garden roses relies mostly on classical breeding. The aim of this project was to enable marker-assisted breeding (MAB) in this auto-tetraploid crop, starting with two essential traits for the booming Central- and Eastern-European markets: winter hardiness and recurrent flowering. Sufficient levels of these traits are known to exist in Canadian cultivars and wild East European germplasm, while winter hardiness is insufficient in Western European cultivars.

As the current rose breeding is empiric and little is known on garden rose genetics, the aim of the Hyper-rose project was to provide insight into garden rose diversity and differentiation, develop new methods for quantification of allele dosage in tetraploid cultivars, and develop new strategies for generating highly polymorphic SSR markers from transcriptomic sequences. Parallel, the mapping population was made by crossing European and Canadian cultivars and their progeny was exposed to low temperature under controlled (cold chambers) and uncontrolled (trial field) conditions.

All these findings enabled creation of a high-density genetic map using SSR and SNP markers and detecting QTLs for winter hardiness. As a final outcome, a set of markers enable to distinguish susceptible from for winter hardy cultivars in an early stage (few set of leaves) were proposed, which will help avoid long trial field testing (which depends on the climate) and shorten the breeding period.

These results will give a competitive advantage in the breeding of new cultivars, evident from the larger market share in segments with higher prices for involved companies.

This project was conducted at WUR-Plant Breeding, represented by dr Rene Smulders and dr Paul Arens, as well as Pheno Geno's R&D Manager Mirjana Vukosavljev Olujić who completed her PhD thesis on this project.