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Linking genetics, physiology and modelling to gain insight in peach fruit quality

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The peach (*Prunus persica*) is native from China. It is a model species for genomics studies in the genus *Prunus* thanks to a relatively small genome (~290Mb), a high quality genome sequence, a rather short juvenility and easy hybridization. The new challenges linked to the development of sustainable agriculture that respects environment, consumer health and adapted to climate change, encourages developing orchards with high economic and environmental performance, and producing fruit with good organoleptic and nutritional quality.

In this context, our activities focus on quality and pest and disease resistances and run from research to development. The important collection of genetic resources of *Prunus* species maintained at INRA open avenues in research and offer many opportunities for scientific collaboration. It represents a jewel for GWAS studies and a source of genitors to create progenies segregating for multiple traits.

Besides classical approaches of quantitative genetics, we develop a multi-disciplinary challenging approach involving ecophysiology, genetics and computer-based modelling. The aim is to strengthen the integration effort of the genetic control in operating models at different levels of biological organization. We studied the metabolism of fruit sugars from a metabolic, enzymatic and genetic point of view, to design a metabolic model and incorporate all the information obtained at the different levels of scale. Such integrated model is then attended to be used to design 'ideotypes' through optimization approaches.