



## **The European project Hi.D.R.A.S. - High-quality Disease Apples for a Sustainable Agriculture : An innovative multidisciplinary approach project to breed high-quality disease resistant apples**

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**The European project Hi.D.R.A.S. - High-quality Disease Resistant Apples for a Sustainable Agriculture An innovative multidisciplinary approach project to breed high-quality disease resistant apples.**

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The European project HiDRAS is a collaborative effort between 11 European groups from 8 different countries aiming at the identification of genetic factors controlling apple fruit quality. A part of the project is also devoted to apple fruit disease resistance (scab and powdery-mildew). HiDRAS aims at the development of approaches for tagging useful genes for fruit quality in existing cultivars, breeding selections and small, genetically related families present in breeding programs. HiDRAS also aims at the identification of a large spectrum of alleles of these genes. The strategy is based on an innovative approach denoted as PBA (Pedigree Based Analysis). It includes the analysis of related cultivars, breeding selections and small progenies to detect chromosomal regions containing fruit quality controlling genes. It explores the power of highly polymorphic markers (SSRs) in following the segregation of specific chromosomal segments along the family trees and in the progenies to identify the loci controlling complex traits (QTL). To follow these objectives, new software programs are built up to fully exploit genotypic, phenotypic, and pedigree data. A large number of new SSR markers, together with markers from fruit-quality-related genes, are currently developed and an apple genetic map with evenly distributed markers will be constructed to guarantee complete genome coverage and efficient QTL analyses. Moreover, cDNA microarrays containing a large number of fruit-specific expressed genes are currently generated and will be used to identify genes involved in fruit quality. The cDNA sequences correspond to various fruit developmental stages. The information available from other model species will also be exploited during the course of the project. The apple orthologues of CNR and FRUITFULL will be mapped with respect to established QTLs for fruit texture. Those genes have been proven to play important roles in Tomato and Arabidopsis in controlling fruit development and ripening. Part of the project is devoted to investigate consumer's needs to identify the quality parameters that determine the success of a new apple variety in different European countries. Last but not least an apple data repository is under development to collect and share data among HiDRAS participants. Initially the database access will be limited but later it will be opened to the scientific community and it will constitute a reference point for all apple breeders and molecular biologist. The original and well concerted multidisciplinary approach, including apple breeding, genetics, molecular biology, statistics and bioinformatics, will ensure the achievement of the project objectives.