

The new

ISAFRUIT

(Increasing fruit consumption through a trans-disciplinary approach delivering high quality produce from environmentally friendly, sustainable production methods)

EUROPEAN PROJECT

OBJECTIVE

ISAFRUIT

is an **integrated project** aimed at **increasing fruit consumption** with the goal to **improve health** of the European citizens.

The fruit species used as models are **apple** and **peaches/nectarines** with some activity on a few other species if special reasons justify it.

COORDINATOR:

Ole CALLESEN

Danish Institute of Agricultural Sciences

62 PARTNERS from 16 COUNTRIES

39 Public Organisations (11 Primary Participants)

21 Small or Medium Enterprises

2 Organisations from Third Countries

EU CONTRIBUTION: 13.800.000 €

PERIOD: 2006-2009

ISAFRUIT is built on 7 pillars

Pillar 1: Consumer driven and responsive supply chain.

Pillar 2: Fruit and human health.

Pillar 3: Improved appeal and nutritional value of processed fruit.

Pillar 4: Quality, safety and sustainability – Improved postharvest chain management.

Pillar 5: Quality, safety and sustainability – Improved preharvest chain.

Pillar 6: Genetics of fruit quality and implementation of better fruit cultivars. Coordinator Yves Lespinasse (INRA-Angers)

Pillar 7: Knowledge management

RTD Pillar 6. Genetics of fruit quality and Implementation of better fruit cultivars.

This Pillar aims to increase **fruit quality** and **safety**, **better availability** and **raise consumer consciousness** by improving our understanding of the **Genetic bases of quality**, by increasing **acceptability of GMOs** and implementing **new high quality varieties** meeting the preference of consumers.

WP 6.1 GENFRUIT is to set the genetic basis of fruit quality by mapping the major genes and QTLs involved.
Coordinator **P. Arús**

WP 6.2 TRANSFRUIT aims to develop safer, more acceptable transformation methods. Coordinator **E. Chevreau**

WP 6.3 NEWFRUIT will evaluate how new, high quality varieties can increase fruit consumption. Coord. **J. Bonany**

PARTNERS of WP6.1/GENEFRUIT

CSIC-IRTA- Cabrils, Spain

INRA- Avignon, France

INRA-Angers, France

INRA-Nantes, France

INRA-Bordeaux, France

PRI-Wageningen, The Netherlands

UNIBO-Bologna, Italy

BAZ-IOZ-Dresden, Germany

HortResearch-New Zealand

P. Arús

J.-M. Audergon

F. Laurens, C.-E. Durel

M. Lahaye

E. Dirlewanger

E. van de Weg

S. Sansavini, S. Tartarini

F. Dunemann

R. Harker

TASK1: Identification and mapping of candidate genes for fruit quality in saturated maps of peach and apricot

- Complete the map of four populations with SSRs from the reference map (>500 mapped):

'Ferjalou Jalusia' x 'Fantasia' F2

'Summergrand' x *P. davidiana* BC2

'Goldrich' x 'Moniquí' F1

'Lito' x B081604311 F1

N>120; One marker each 15 cM or less

- Identification of DNA sequences possibly related with fruit quality characters and mapping (100) in the *Prunus* reference map by "bin mapping".

TASK2. Identification and characterisation of the most relevant cell wall components of apple texture: application for QTL analysis in apple and validation of methodologies on apricot and peach

Search for methods to distinguish texture based on:

- a) physical destructive or non destructive methods of fruits
- b) tissue and particle architecture analysis
- c) cell wall chemical structure studies

Use of the most informative methods for QTL analysis in apple

Applications in peach and apricot

TASK 3. QTL analysis of fruit quality

Analysis of:

- c) MNR profiles of fruit juice (including sugars and organic acids)
- b) Polyphenolic profile using HPLC,
- c) field measurements (maturity date, fruit weight, refractometric index, acidity and flesh firmness).
 - Using the populations and the maps developed in TASK 1
 - Comparisons of positions of genes/QTLs in peach, apricot, apple

TASK4. Analysis of allergenicity genes in apple and peach

Search for alleles responsible for high and low *Mal d 1* Allergenicity in apple for 18 *Mal d 1* loci. The relevance of these alleles will be validated by:

- (5) the testing of cultivars and breeding progenies with known allergenicity (WP2.3) with allele specific markers, and
- (2) the testing on patients of recombinant *Mal d 1* proteins.

Use of gene sequences of another type of apple (*Mal d 4*) and peach (LTP, known to cause the allergenicity of peach skin) allergens to develop markers and establish their positions on the maps of peach and apple.

TASK5 : Allelic diversity of Candidate Genes and QTLs for fruit quality.

APPLE

- Search for alleles of 20 validated CGs in 50 genotypes
- Assessment of functional allelic diversity of one validated CG, by phenotyping 50 additional accessions.
- Use of these 20 CGs to compare with the phenotypes of progenies (150-200) of two new apple (resistant) accessions, for a broad sample of fruit quality characters.

PEACH

- Association analysis of 5 CGs which collocate with genes/QTLs, using 200 phenotyped cvs.

TASK6 : Marker-assisted breeding (MAB) in apple

To select the most promising individual genotypes in 3 progenies (N=600 individuals each), within their first year of growth, using markers for 8-9 genomic regions containing genes/QTLs of disease resistance/fruit quality using markers developed in previous projects.

In addition,

the project is a good opportunity to:

- a) Maintain and expand the **already established collaborations** among European groups.
- b) Joins for the first time in a project **apple and *Prunus*** research groups.
- c) Collaboration in a much **broader scale** (economists, physicians, post-harvest specialists, etc.) may prove synergistic.