PILLAR 6. GENETICS OF FRUIT QUALITY AND IMPLEMENTATION OF BETTER FRUITS CULTIVARS INTRODUCTION

The objectives of this Pillar are achieved by 3 approaches to each of which a special WP is dedicated:

WP6.1 - Study of the Genetics of Fruit Quality and Health Properties (*GENFRUIT)*
WP6.2 - Development of safe and efficient transgenic techniques applicable to sustainable quality-fruit production (*TRANSFRUIT)*
WP6.3 – Consumer driven implementation of new varieties (non GMO) across different environments. (*NEWFRUIT)*

GENFRUIT will improve our **genetic knowledge on fruit quality**. During the first 18 months, progenies from peach, apricot and apple will be saturated with markers and characterized for the major fruit quality/health parameters. The study of trait/marker co-segregation will allow the discovery of genomic regions that contain genes responsible for the variability observed. Candidate genes for fruit quality traits will be validated and their allelic variation assessed. Novel methods will be developed for the measurement of flesh texture, a key character for consumer acceptance. Allergy genes will be identified and positioned on genetic maps and then allelic constitution of these genes will be assessed for some low and high allergenic cultivars. Marker assisted breeding for fruit quality and safety is initiated by directed crossing and selection by molecular markers.
All tasks of this WP will start within the first six months of the project (see Gantt chart) and **eleven deliverables** are listed. However, data of at least two seasons are needed to perform genetic analysis with an acceptable level of accuracy, and most deliverables will occur during the 24-36 month period. ***GENFRUIT*** is organized into 6 Tasks.
The overall objective of ***TRANSFRUIT*** is **to propose innovative gene transfer strategies** which minimize risks and contribute to a better acceptability of transgenic fruits in Europe. During the first 18 months, methodological work will be engaged simultaneously in the four tasks (see Gantt chart). Research will be in progress for development of alternative gene transfer methods without antibiotic resistance genes on pear and apple, and major steps of development of a marker-free plant production system in apple will be achieved. A constitutive promoter from apple will be characterized and the first steps of identification of apple fruit specific promoters will be performed. Transgenic apple and pears expressing transgenes of interest under the control of pathogen-inducible promoters will be produced. The presence of P-DNA sequences in the apple genome will be determined, and the first steps of validation of systemic-acquired silencing system will be developed. Scab resistance in a transgenic apple field trial will be monitored during the first year and the first steps of allergen expression studies in *Vf* over-expressing transgenic apple will be achieved.
All tasks of *TRANSFRUIT* will start within the first year of the project, and 12 out of 14 actions will be started. **Twenty six deliverables** are listed from 6 to 18 months. For each of the 4 tasks, various strategies are tested simultaneously. In this way, should one of the proposed strategies prove too difficult to develop on woody plant species from the first results, research efforts of the 4 partners will concentrate on the other strategies.
The overall objective of ***NEWFRUIT*** is to evaluate how the **availability of new high quality eating apple and peach/nectarine varieties** can increase fruit consumption. During the first 18 months, a set of common procedures will be elaborated for use by all partners to carry out fruit variety consumer tests. Europe will

be segmented in 5 geographical regions for testing consumer preferences according to the fruit varieties ; a subsequent map will be proposed and main trends about fruit choice and specific tastes will be raised. A specific task will be devoted to organically grown disease and pest resistance new apple varieties. Two SMEs will be involved in this WP ; NOVADI(F) and CIV(I) are famous nurserymen companies contributing in Europe to the release of innovative varieties and to the production of scion trees of very high quality. The WP will benefit from their experience of nurserymen and growers ; they will contribute to the consumer tests (Task 6.3.2). This WP is organized into 4 tasks ; they will be initiated during the first year and will end up after 24 months, except Task 6.3.1 delivering the common procedures of sensory analysis within 6 months.