

Applying Molecular Diagnostics to improve post harvest fruit quality

N.J.A. Vernooy, Wijk bij Duurstede
 Croppings, Rosmalen, www.croppings.nl,
 Genewister Group, Wageningen, www.genetwister.nl
 Royal Fruitmasters Group, www.fruitmasters.nl

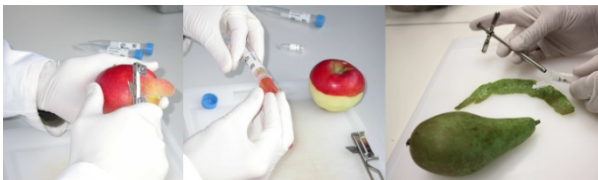


Abstract

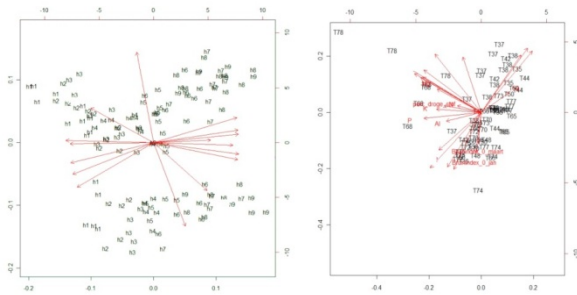
In today's markets fruit quality is an important issue. At the same time the world's fruit prices are under pressure, the market and competition is changing from a local to a global area. Therefore fruit growers, traders and exporters are forced to provide high quality fruit suitable for longer storage. Despite the presence of physiological tests and extensive research, problems still exist in selecting fruit with the right storage/export potential and to control progressive disorders. After years of biotechnological research a new reliable gene diagnostic test for quality prediction and storage prediction for apple and pear that is based on molecular markers has been developed. Many physiological and developmental processes in plants can be monitored through the expression of genes. Changes in these processes are reflected in the expression profiles of many genes representing bio-markers. Presently, markers for internal browning in Apple are identified and markers for several other progressive disorders are pending.

A joint venture between the Royal Fruitmasters Group, the Croppings Group and the Genetwister Group is formed to perform additional research and to implement these test in the fruit markets world-wide and to provide objective and reliable information to the growers and traders for harvest maturity and prediction of storage potential and finally optimal taste.

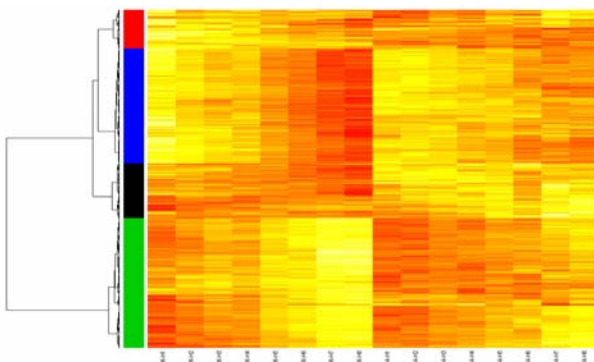
In order to be able to predict optimal harvest quality and development of disorders during storage, the partners in the project looked at gene expression of several apple and pear cultivars. Samples were taken from different orchards during 4 years, and the ripening process was monitored in different years with molecular markers.



Simultaneously physiological parameters like firmness, background colour, starch, sugar, acid and mineral content were monitored. All these parameters were analyzed using statistical methods like principle component analysis (see below).

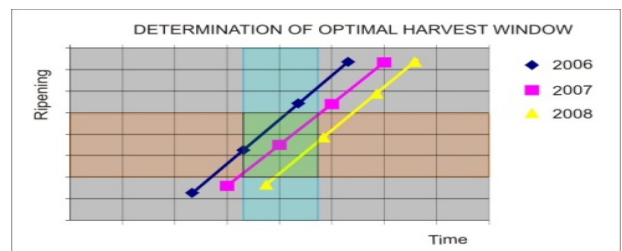


Furthermore, microarray experiments were performed to identify molecular markers, which can be indicative for optimal harvest time determination and early detection of disorders in the fruits. Examples of such profiles are shown below.

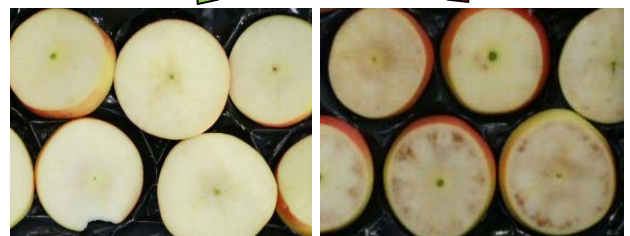
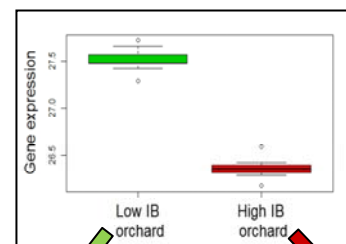


All these data were used in a model to predict the storage potential of fruits.

Several markers were used to determine the optimal harvest window for storage in apple and pear.



A set of markers suitable for the prediction of storage disorders was identified. Disorder tests based on these markers are presently developed. One marker set is already suitable to predict the tendency for internal browning in Kanzi apples (see below)



The partners in this project work together to implement these new technologies into a practical test that can be used in the fruit production chain.



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 The Dutch Ministry of Economic Affairs, Agriculture and Innovation is end responsible for POP2 in The Netherlands.

