EO-03

The switch to flowering: genes involved in flower induction of the apple cultivar 'pinova' and the role of the flowering gene *MdFT*

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Meristems in apple have to pass two developmental phases before they can produce flowers: the vegetative and the reproductive phase change. Meristems of seedlings finish the juvenility and reach the adult stage during the vegetative phase change. Then flower induction activates the reproductive phase change and vegetative meristems change to reproductive meristems. These processes are of high economical importance in fruit production as well as in fruit tree breeding. Accelerated phase changes result in precocious flowering which is an important breeding goal. In the previous ten years several genes of apple were identified which are homologous/orthologous to flowering genes of *Arabidopsis thaliana*. In relation to results obtained in *A. thaliana* we realized mRNA expression analyses for selected apple genes which are potential canditates to be involed in the vegetative and/or reproductive phase change.

The flowering genes *MdCOL1*, *MdCOL2*, *MdFT*, *AFL1*, *AFL2*, *MdMADS5*, *MdTFL1-1* and *MdTFL1-2* were isolated from genomic DNA of the apple cv. 'Pinova'. Based on the obtained sequences, Real-time PCR protocols were established for these genes as well as for *MdMADS2* and *MdSOC1*. Using these protocols we found that the mRNA expression of *MdFT*, *AFL2* and *MdTFL1* in one-year-old apple seedlings of 'Braeburn' x 'Pisaxa' was low in old leaves and drastically increased in younger leaves next to the shoot apex. Furthermore, we showed that in adult apple trees meristems of terminal buds chanced to the reproductive phase at the end of May. It was shown that *AFL1*, *AFL2*, *MdMADS2*, *MdFT*, *MdSOC1* and *MdTFL1* were involved in this process.

Based on the recently published results that *FT* from *A. thaliana* seems to be the long searched florigen, we examined the function of the apple homologous gene *MdFT*. We produced transgenic *A. thaliana* and apple lines which over-expressed *MdFT* under the control of *CaMV 35S* and the phloem specific promoter *Suc2*, respectively. Preliminary results indicate that the transgenic A. thaliana showed an accelerated flowering. The effect of transgenic over-expressed *MdFT* on other flowering genes of apple was examined using Real-time PCR.

EO-04

A new addition to the buffet

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Today, we are seeing more fresh-cut fruit and vegetables being consumed as people seek to replace unhealthy snacks foods with healthier fruits and vegetables. Fresh-cut produce has been available since the 1980's with fresh-cut carrots leading the way; but thus far, fresh-cut fruit has been limited to melons and berries and other fruits that did not suffer enzymatic browning, with the quintessential apple lagging behind in the marketplace. Fresh-cut apple products cannot be prepared without antioxidant treatments that contribute significantly to the cost of the end products and can result in some off-flavoring. Okanagan Specialty Fruits has pioneered the development of the first truly non-browning apple varieties. Down regulation of the multi-gene PPO family through expression of a single chimeric PPO suppression gene results in marked decrease in total PPO Activity and confers a non-browning phenotype. Four years of field testing has confirmed the stability and function of the non-browning trait. Now, Okanagan Specialty Fruits in conjunction with commercial and academic collaborators are developing an improved commercial platform for delivery of minimally modified non-browning apple varieties. Future apple varieties will incorporate all the benefits of the non-browning trait and will be delivered on a platform