Development of hypo-allergenic apples: silencing of the major allergen Mal d 1 gene in "Elstar" apple and the effect of grafting - DTU Orbit (10/12/2018)

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Many people who are allergic to birch pollen are also allergic to apple fruit, due to cross-allergenicity. Since apples are the most extensively consumed fruit in Europe, it is highly relevant to develop a hypo-allergenic apple. Apples with significantly reduced levels of the allergen, Mal d 1, may allow many apple allergics to eat them without an allergic reaction. We are currently collaborating to develop a hypo-allergenic apple within the European Integrated Research Project, ISAFRUIT (www.isafruit.org). Hypo-allergenic apple plants (Malus x domestica Borkh., 'Elstar') with decreased levels of Mal d 1 mRNA were produced by RNA interference (RNAi) technology. Ten genetically modified (GM) apple lines were selected. In vitro plantlets were first transferred to a greenhouse, then grafted onto wild-type M.9 rootstock to promote the development of fruit-producing trees. Levels of Mal d 7 gene silencing were measured repeatedly by quantitative real-time PCR. Compared to leaf samples from wild-type 'Elstar', two GM lines showed modest levels of gene silencing (up to 250-fold), whereas the other eight GM lines were significantly silenced (up to 10,000-fold) in Mal d 1 gene expression. These levels of silencing were unaffected by grafting, and have been stable over more than 3 years, and throughout all developmental stages.

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