

Non-Browning Apple Varieties

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Okanagan Specialty Fruits is a privately owned technology company based in Summerland, B.C., Canada. Largely owned by orchardists and tree fruit industry participants we are seeking to use advanced molecular biology tools to breed new apple varieties. These tools include genomics, bioinformatics, tissue culture, genetic engineering and other recently developed tools to “Precision Breed” new tree fruit varieties. The company’s current platform project is the development of new non-browning apple varieties.

Our non-browning apple project is driven by the opportunity to introduce a trait that may act as a consumption trigger for apples. Currently apples have not benefited widely from the rapid growth of the “fresh-cut” produce industry due to the fact that apples, when cut or damaged, oxidize and go brown. Various antioxidant solutions have been developed to reduce enzymatic browning; however, these are costly and have some off-flavouring affects. Okanagan Specialty Fruits (“OSF”) has developed apple varieties that do not go brown by silencing the enzyme that drives the browning reaction in apples. This enzyme, Polyphenol oxidase (“PPO”), has been switched off, and without it the apple does not turn brown.

The company believes that non-browning apple varieties will provide benefits to growers, packers, retailers and consumers, plus others along the value-chain. For example, a non-browning apple will have less superficial scuff marks and finger bruises from harvest and post-harvest handling; it is less prone to scuff marks when packing; and will have less superficial marking and shrinkage at the retail level. Another major benefit of this trait is that it will make the production of fresh-cut apple slices easier, less costly and with less off-flavouring. This will provide benefits to processors and the food service industry.

Currently our activities have yielded non-browning apples of many popular varieties (Gala, Fuji, Golden, Granny, etc.). These have undergone 5 years of field testing and the apple trees have proven to behave as expected, like normal apple trees. The fruit has been vigorously tested and no non-target response has been identified. The apples grow and eat like their parents; they just do not go brown. The company is now building the data sets required so we can proceed with deregulating these varieties through the USDA and the FDA.

In closing, we would like to emphasize that these non-browning apples are produced through genetic engineering and will have significant regulatory oversight and company stewardship; however, the techniques being used in their development represents a new generation of plant breeding technology. We have developed a novel approach that allows us to very precisely silence an existing apple gene without introducing new genes into the plant. Recently this approach has been termed cisgenics (cis=same, genics=gene, giving a meaning of “same genes”).

This cisgenic approach is not to be confused with “transgenics”; which, although now common in crop breeding, introduces foreign genes into the plant (Herbicide resistance, pesticide resistance, etc.). OSF’s cisgenic approach has delivered a non-browning apple with no foreign genes and will be used to introduce other new traits in the future.