Biotech and Apples – Why they Fit

OKANAGAN SPECIALTY FRUITS
CREATORS OF ARCTIC® APPLES
TRULY NONBROWNING APPLE VARIETIES!
Who is Okanagan Specialty Fruits?

Unique in tree fruit breeding

Founded in 1996 by apple and cherry growers Neal and Louisa Carter

Motivated, highly trained staff

Many shareholders are from the tree fruit industry

Many US and international collaborators

Lab is located in Saskatoon, SK
What is an Arctic® apple?
The first nonbrowning apple

- OSF’s flagship project
- Slices, bruises and juice will not turn brown
What is an Arctic® apple?
The only nonbrowning apple

Any variety can be made nonbrowning – not low browning – TRULY nonbrowning!
What is an Arctic® apple?

Just like any apple tree

Arctic® apple trees behave in the orchard just as conventional trees do - until the fruit is bruised, bitten, or cut...
Why did we develop nonbrowning apples?

Arctic® apples lead the way

- Keep biotechnology an accessible tool for specialty crops
- Other traits in pipeline to keep apples competitive and reduce their environmental footprint
Apple Browning Comparison

Our first two nonbrowning varieties

- Arctic® Golden vs. a conventional Golden Delicious (L)
- Arctic® Granny vs. a conventional Granny Smith (R)
Why did we develop nonbrowning apples?

Increase apple consumption

Overall U.S. Fresh Fruit Consumption

U.S. Apple Consumption

Source: USDA Economic Research Service
Why did we develop nonbrowning apples?

To create a consumption trigger

U.S. Per Capita Consumption (lbs)

Source: USDA Economic Research Service
How’d we do that?

Relatively simple science

In science terms, we have induced RNAi gene silencing targeting the inhibition of apple’s PPO genes.

In non-science terms: we’ve replaced one piece of railway track of a coast-to-coast railway with a slightly different piece of track.
Benefits of Arctic® apples

Benefits all along the Value Chain

1. INCREASE YOUR RETURN
2. IMPROVE QUALITY
3. NEW PRODUCT EXCITEMENT
4. DECREASE SHRINK & INCREASE EYE APPEAL
5. ULTIMATE CONVENIENCE
Benefits of Arctic® apples

Consumer benefits

Likelihood to Buy Arctic® Apples

Most consumers are interested in buying Arctic® apples!
Benefits of Arctic® apples

Freshcut apple processors’ benefits

- Lower production costs of freshcut apples
- Higher quality product with more flavor, less treatment
- Increase use of apples in foodservice
- More apples in more places
Benefits of Arctic® apples

Freshcut consumption trigger

- We surveyed 1,000 apple eaters and educated them about Arctic® apples
- We then asked if they’d prefer to purchase GM apple slices that didn’t use chemicals or treatments to stop browning
Benefits of Arctic® apples

Freshcut consumption trigger

...Over two-thirds agreed they’d be more likely to purchase untreated apple slices
As part of our commitment to transparency, all Arctic apples will be voluntarily labeled...
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>OSF Founded</td>
</tr>
<tr>
<td>2002</td>
<td>Arctic apple science proven</td>
</tr>
<tr>
<td>2003</td>
<td>First field trial planted in Washington State</td>
</tr>
<tr>
<td>2005</td>
<td>Second field trial planted in New York State</td>
</tr>
<tr>
<td>May 2010</td>
<td>Petition for deregulation submitted to the USDA</td>
</tr>
<tr>
<td>May 2011</td>
<td>OSF initiates voluntary consultation with the FDA</td>
</tr>
<tr>
<td>Dec 2011</td>
<td>Petition submitted to the Canadian Food Inspection Agency</td>
</tr>
</tbody>
</table>
Our path to market

The regulatory process

- Rigorous review process through USDA, FDA (U.S.) & CFIA, Health Canada (CDN)
- Over a decade of testing in field trials
- U.S. & Canadian deregulation expected late 2013
Our path to market

Our commercial status

- Grower test blocks planted in 2012 & 2013 in the U.S. and Canada
- Working with growers throughout North America
- Test quantities of fruit expected in stores by 2015
Public Opinion of Ag-Biotech
Educating Consumers

Despite how rigorous the review process is, many consumers believe biotech foods are “untested”.

Huge amounts of unscientific information and scare tactics mislead the public.
Public Opinion of Ag-Biotech

Educating Consumers

- To gain public acceptance, the industry must do a better job of education
- Focus on open communication, transparency & evidence
- The safety of biotech foods is supported by AMA, WHO, UN’s FAO, NAS and every other reputable scientific organization - it’s time the public knew this!
Public Opinion of Ag-Biotech

Our Messages

Arctic® apples are just like all other apples until the fruit is bruised, bitten or cut

Consumer benefit that can drive consumption

Complete supply chain benefits

Safe for consumers and our environment

Our science is straightforward
What’s in the pipeline?

Where’s OSF going with Biotech?

- Arctic® apples a great starting place: consumer trait reducing food waste and allowing apples to be used in more places
- More traits are in the works along with stacked traits offering significant agronomic benefits
- Pipeline includes resistance to apple scab, Fireblight and storage scald
Biotech addresses challenges

- Biotech apples will reduce production costs and pesticide residues.
- Get apples OFF the “Dirty Dozen” list!
- Even organic consumers are upset by the use of antibiotic sprays to fight pests.

### Pesky Pesticides
A USDA survey found samples of various fresh fruits and vegetables contained pesticide residues at the following rates.*

<table>
<thead>
<tr>
<th>Produce</th>
<th>Residue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>98%</td>
</tr>
<tr>
<td>Grapes</td>
<td>97%</td>
</tr>
<tr>
<td>Strawberries</td>
<td>96%</td>
</tr>
<tr>
<td>Cilantro</td>
<td>94%</td>
</tr>
<tr>
<td>Potatoes</td>
<td>92%</td>
</tr>
<tr>
<td>Oranges</td>
<td>92%</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>85%</td>
</tr>
<tr>
<td>Green onions</td>
<td>66%</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>48%</td>
</tr>
<tr>
<td>Lettuce (organic)</td>
<td>20%</td>
</tr>
<tr>
<td>Asparagus</td>
<td>10%</td>
</tr>
<tr>
<td>Sweet corn</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

*After washed in water for 10 seconds
Source: Department of Agriculture, Annual Summary for 2009 (published May 2011)
Okanagan Specialty Fruits Inc. is a dynamic company dedicated to developing new commercial tree fruit varieties that are attractive to consumers and more profitable to producers and retailers. The company is operated and largely owned by tree fruit growers throughout British Columbia’s Okanagan Valley.

For more information, contact:
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