



## UBC APPLE FESTIVAL – 2010

### Exploring Urban Consumer Preferences for Apple Cultivars

**Project Report: Developing Innovative Agri-Products (DIAP)  
Program**

**Sensory Evaluation – Consumer Research  
Dec 10, 2010**

*Margaret Cliff and Kareen Stanich  
Agriculture and Agri-Food Canada  
Pacific Agri-Food Research Centre, Summerland, BC*

Research was conducted 1) to explore the degree-of-liking among metropolitan consumers of different ages, genders, usual apple choice ('sweet' or 'tart') and ethnicities, for three apple cultivars (Ambrosia™, SPA493, Honeycrisp™) and 2) to assist the PARC apple breeding program with cultivar selection and release.

One thousand four hundred sixty-nine consumers (n=1469) identified their age, gender, usual apple choice ('sweet' or 'tart') and ethnic group [**European** (*France, Germany, United Kingdom, etc.*), **Asian** (*China, Hong Kong, Japan, Korea, etc.*), **South Asian** (*India, Pakistan, Sri Lanka, etc.*), **Southeast Asian** (*Cambodia, Indonesia, Malaysia*), **West Asian** (*Afghanistan, Iran, etc.*), **Latin** (*Argentina, Brazil, Chile, Mexico, etc.*), **Other** (*Aboriginal, Arab, Black, Oceanian*)], as well as conducted taste and visual assessments.

### THE TASTE & VISUAL ASSESSMENTS

Consumers evaluated 3 apple slices, one from each cultivar, in random order on paper plates. They rated the degree-of-liking on a 7-point hedonic scale (*dislike highly, dislike moderately, dislike slightly, neither like nor dislike, like slightly, like moderately, like highly*).

Consumers also evaluated the visual appearance of whole apples, against a white background, using the same 7-point hedonic scale.



Statistical analyses were conducted to evaluate the influence of age, gender, usual apple choice and ethnicity on their hedonic (degree-of-liking) scores. Average (mean) scores were compared and significant differences were determined.

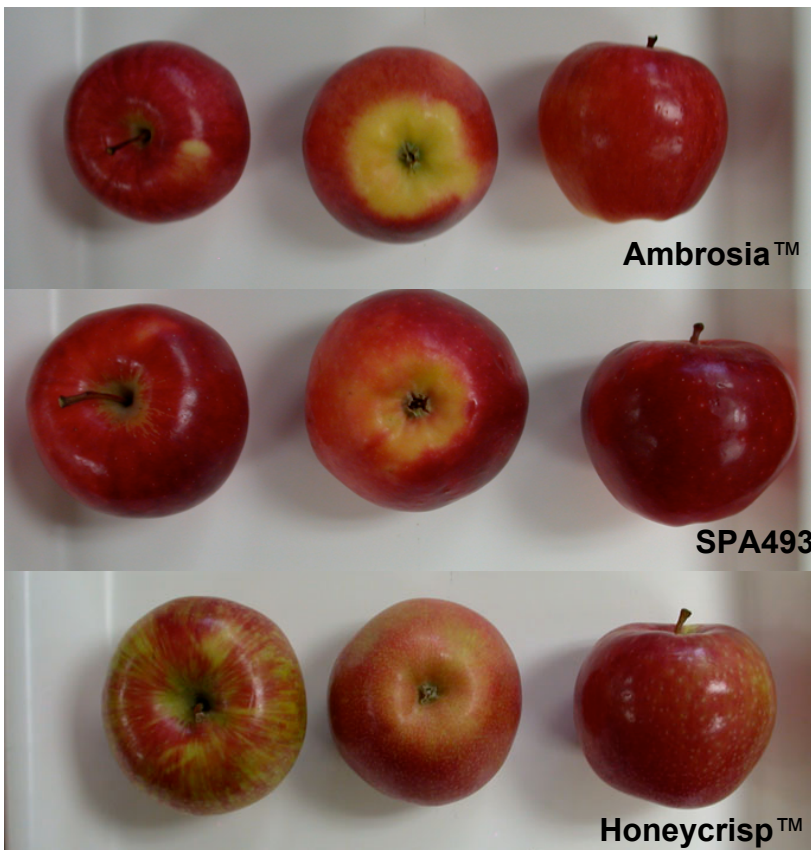
## THE CONSUMERS

A total of 1182 consumers successfully completed the demographic survey, taste and visual assessments. Sixty-one percent described their ethnicity as European, while 29% identified as Asian. Statistical analysis was conducted for the European and Asian sub-groups (n=1078) only, due to insufficient sample sizes on all other ethnic groups. In general consumers' ages were spread evenly across the four age categories (19-29, 30-39, 40-49, ≥50 years-of-age), with 2/3 of the consumers being female.

Eighty-eight percent of Asian consumers identified that they usually ate 'sweet' apples while European consumers identified that they ate both 'sweet' (55%) and 'tart' (45%) apples.

## THE APPLES

Two commercial varieties (Ambrosia™, Honeycrisp™) and one unnamed cultivar (SPA493) from the PARC Apple Breeding Program were evaluated. Fruit quality was matched among cultivars to minimize the influence of condition, maturity and storage. Apples slices (8 slices per apple) were evaluated for the taste assessment; whereas, whole apples were viewed from all angles (stem up, calyx up, side) for the visual appearance assessment, as shown in Figure 1. The visual appearance of the cultivars was as follows: Ambrosia™ was red, striped with a yellow base colour; SPA493 had a red blush, yellow base colour and dominant lenticels; Honeycrisp™ was bi-coloured with a green base colour.



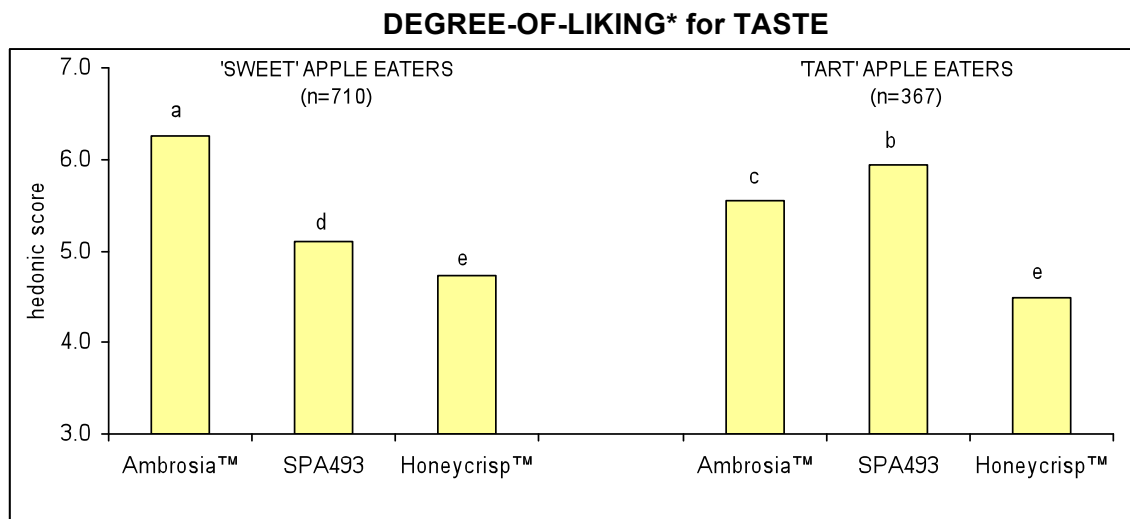
**Fig. 1. Apple presentation for visual assessment.**

## TASTE RESULTS

### 'Sweet' versus 'Tart' Apple Eaters

As shown in Figure 2 consumers who usually ate 'sweet' apples (n=710) gave significantly higher mean scores for the 'sweet' apple (Ambrosia™, mean=6.3) than the other apples (SPA493, mean=5.1; Honeycrisp™ (mean=4.7). Likewise, consumers who usually ate 'tart' apples (n=353) rated the 'tart' apple (SPA493, mean=5.9) significantly higher than the other apples (Ambrosia™, mean=5.5; Honeycrisp™, mean=4.5). Interestingly, 'tart' apple eaters liked 'sweet' apples (Ambrosia™, mean=5.5), more than 'sweet' apple eaters liked 'tart' apples (SPA493, mean=5.1). Both consumer groups rated the neutral apple (Honeycrisp™) least with mean scores of 4.7 and 4.5 for the 'sweet' and 'tart' apples eaters, respectively. Consumers commented that Ambrosia™ was liked for its sweetness, crispness and juiciness while SPA493 was liked for its tartness and crispness. Honeycrisp™ was described as lacking flavour.

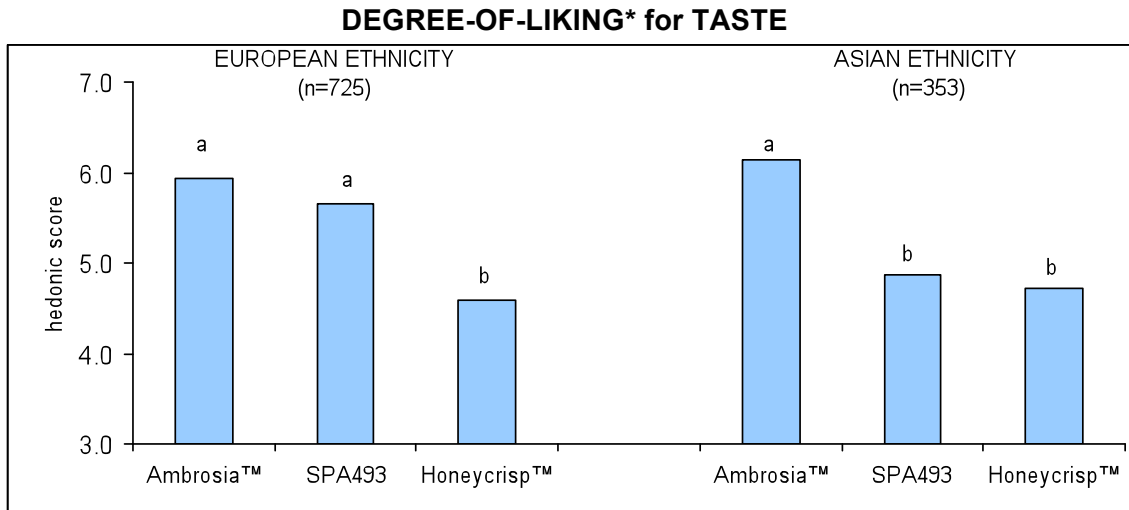
A closer examination of the data revealed that the high hedonic scores were primarily attributed to female consumers of all age groups (data not shown), who scored higher than the male counterparts.



**Fig. 2. Degree-of-liking of apple TASTE for 3 cultivars by consumers' apple choice ('sweet' or 'tart').** \* bar charts with different letters are significantly different.

### European versus Asian Consumers

As seen in Figure 3, European consumers (n=725) like 'sweet' and 'tart' apples similarly as denoted by the lack of statistical difference between the hedonic scores of Ambrosia™ (mean=5.9) and SPA493 (mean=5.7). Whereas, Asian consumers (n=353) preferred the 'sweet' apple over the 'tart' apple as indicated by the high mean score for Ambrosia™ (mean=6.1) compared to that for SPA493 (mean=4.9). This response by Asian consumers is consistent with documented preferences for sweeter food products. Both ethnic groups rated the neutral apple (Honeycrisp™) least, with mean scores of 4.6 and 4.7 for the European and Asian consumers, respectively.



**Fig. 3. Degree-of-liking of apple TASTE for 3 cultivars by consumer ethnicity.**

\*bar charts with different letters are significantly different.

## VISUAL RESULTS

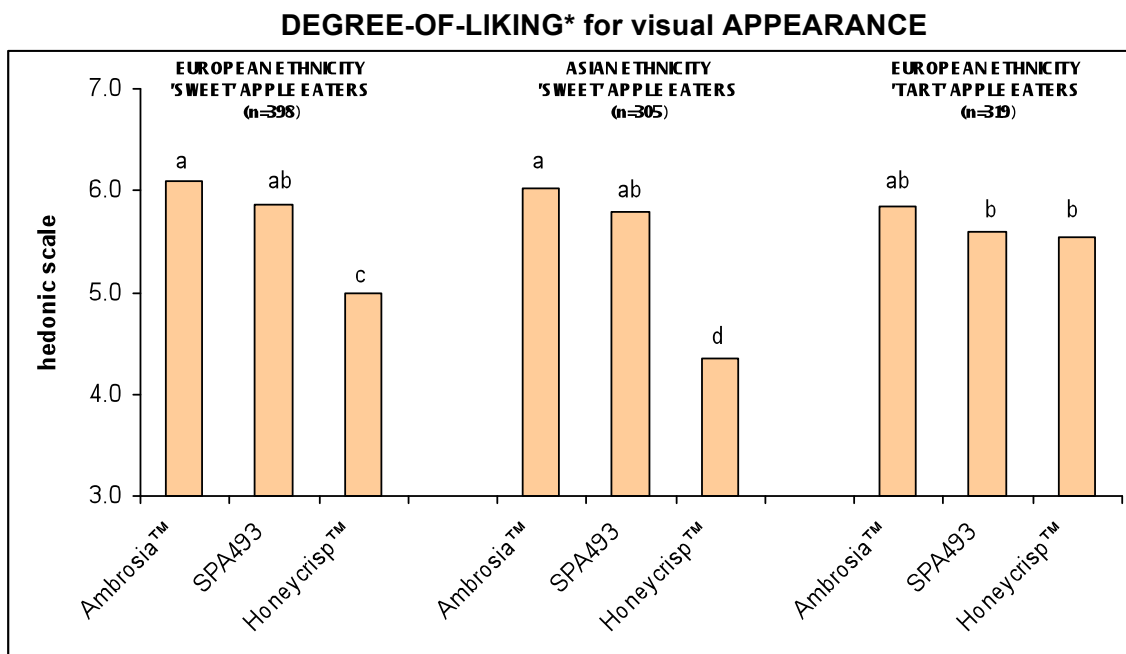
### European and Asian Consumers

In this research (Figure 4), the pattern of response for both Asian (n=305) and European (n=398) 'sweet' apple eaters was similar. The red apples (Ambrosia™, SPA493) scored highest and were not significantly different from one another (Asian, mean= 6.1; European, mean=5.9). Honeycrisp™, the apple with a green background or stripe, was liked least by both ethnic groups. Consumers of Asian ethnicity rated the visual appearance significantly lower (mean=4.3) than consumers of European (mean=5.0) ethnicity.

The lower rating for Honeycrisp™ by 'sweet' apple eaters of both ethnic groups (Figure 4) was attributed to the green background colour (Figure 1), which consumers might have associated with a sour taste.

The pattern for the European 'tart' apple eaters (n=319) was different than all other consumers; these consumers' mean scores were identical for all cultivars. Unfortunately there was insufficient data to draw conclusions about Asian 'tart' apple eaters.

In addition, mean scores for young Asian males (19-29 years-of-age) were lower than all other consumer groups (≥ 30 years-of-age) (data not shown); however, further research would be necessary to verify this trend.



**Fig. 4. Degree-of-liking of apple APPEARANCE for 3 cultivars by consumer ethnicity and apple choice ('sweet' or 'tart').** \* bar charts with different letters are significantly different.

## CONCLUSION

This research successfully evaluated the influence of ethnicity, gender, age and apple choice ('sweet' or 'tart') on hedonic scores for apples by metropolitan consumers. It identified for the first time that 88% of Asian consumers typically selected and ate 'sweet' apples, while European consumers selected and ate both 'sweet' (55%) and 'tart' (45%) apple cultivars.

Predictably the 'sweet' apple eaters of both ethnicities, had significantly higher hedonic taste scores for 'sweet' apples (Ambrosia™) than for 'tart' apples (SPA493). Likewise, 'tart' apple eaters had significantly higher hedonic taste scores for 'tart' apples than 'sweet' apples. Consumer choice is consistent with their stated preference, which plays a role in cultivar liking.

Consumers' ethnic origin also influenced hedonic scores. While Asian and European consumers' taste scores were not significantly different for 'sweet' apples (Ambrosia™), Asian consumers gave significantly lower scores to 'tart' apples (SPA493). This suggested that some cultivars are more appropriately marketed to selected consumers within a metropolitan market.

Both Asian and European 'sweet' apple eaters scored the visual appearance of apples with a green background (Honeycrisp™) lower, than those with a yellow background. This suggested that there is a strong visual bias associating a green background colour with a sour taste.

In conclusion, this research was the first work of its type to document ethnic, age, gender and choice differences among consumers in a metropolitan market. As such,

it will assist industry to understand and more appropriately market apples to their consumers.

## **ACKNOWLEDGEMENTS**

The authors would like to acknowledge funding from *Growing Forward*, via the Developing Innovative Agri-Products (DIAP) Program, and collaboration from the Okanagan Plant Improvement Corporation (PICO). They would also like to thank Mohit Bansal for his assistance with set-up, implementation and data entry, and the assistance of Paul Birzins (DIAP Project Manager) for directing the research and participating in data collection.