

# Potential of new and traditional apple varieties for cider adapted to eastern Canada



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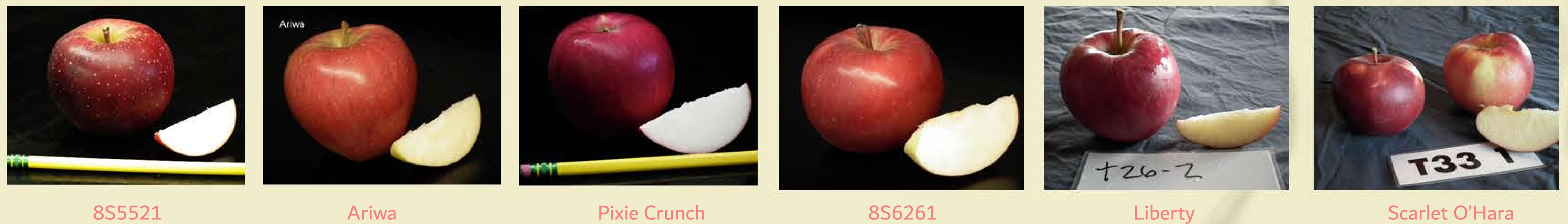
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## Introduction

In eastern Canada, the development of the cider industry has been growing since about ten years. The varieties of apples used to make alcoholic products in Quebec have traditionally been varieties of fruit for fresh market. Cider is usually made by growers who see a way to add value to their fallen or low-quality fruits. However, apple varieties for the production of alcoholic beverages have never been specifically studied in Canada. The choice of variety is largely related to the type of cider that the producer wants to produce. The choice must be based on criteria such as the organoleptic qualities (polyphenols, tannins ...) and according to the desired product and agronomic characteristics (productivity, alternation, tree management, plant protection) (Bauduin 2006; Jolicoeur 2016; Moinet 2009). Thus, the evaluation of apple varieties specifically for the production of cider is necessary for the development of this industry under northeastern conditions. This project aims to implement and evaluate new apple varieties specifically for cider production under our pedoclimatic conditions in eastern Canada.

## Methods

An apple orchard is located on the Frelighsburg Experimental Farm, Quebec, Canada. Six apple varieties were selected for the assessment starting in 2012. The experimental plot includes 7 trees for each variety. Agronomics parameters (cold injury, flowering, yield, productivity, fruit weight...) of several varieties were evaluated during 5 years and monovarietal ciders were made to characterized oenological potential. Chemical analyses were done on cider at the bottling.



## Results

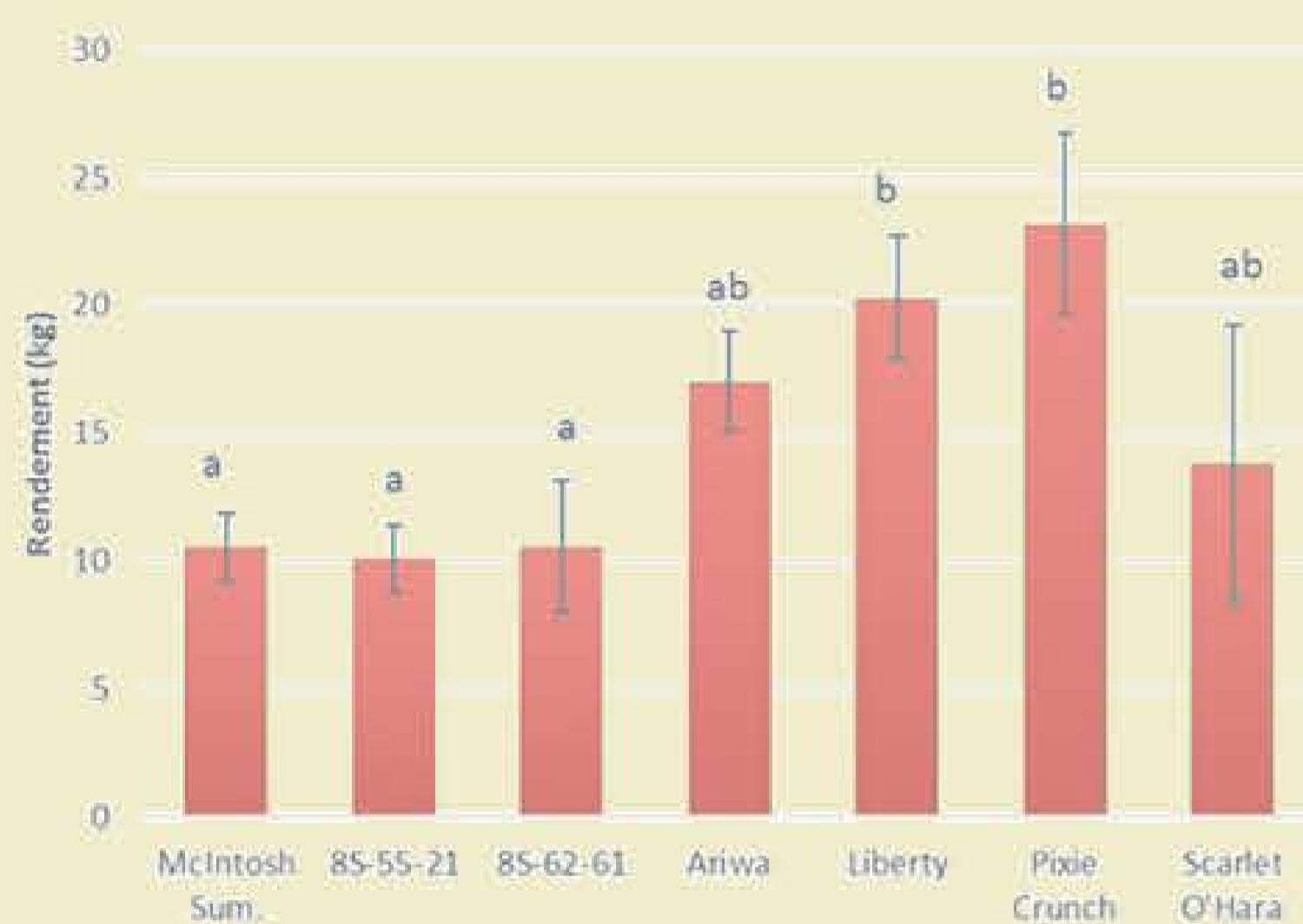


Figure 1: Yield of each variety in 2016

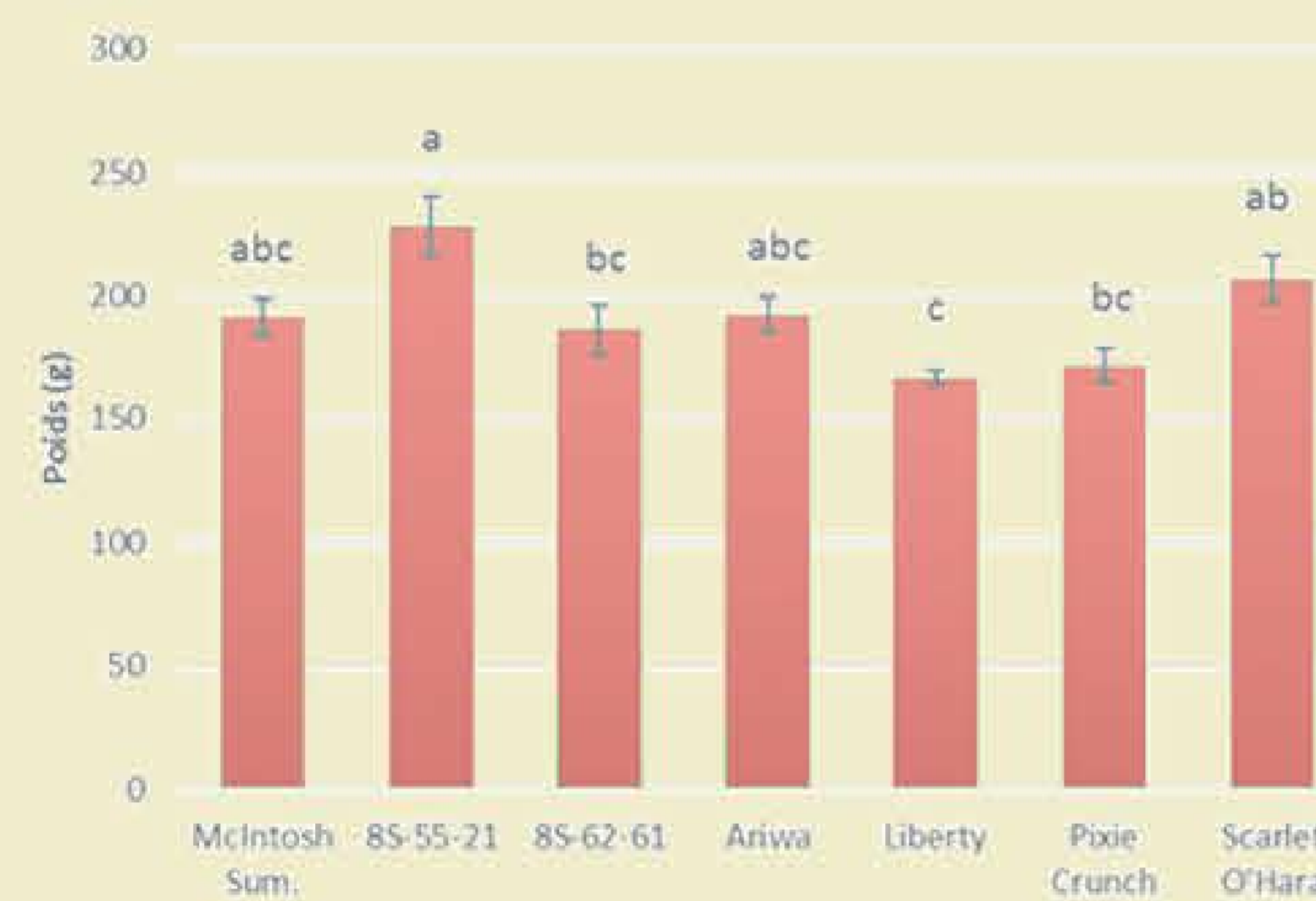


Figure 2: Fruit weight for each variety in 2016

Table I: Chemical analysis of ciders 2016

	M.vol g/cm <sup>3</sup>	Glu+ Fruc g/L	AT g/L H <sub>2</sub> SO <sub>4</sub>	Ac.acét. (volatile) g/L H <sub>2</sub> SO <sub>4</sub>	pH	Ac. maliq. g/L	Ac. lact. g/L
<b>Ariwa</b>	1,0074	23,7	3,90	0,19	3,67	7,06	0,54
<b>8S6261</b>	1,0034	17	2,84	0,12	3,70	5,00	0,01
<b>8S5521</b>	1,0029	18,7	2,60	0,26	3,93	4,93	0,35
<b>Liberty</b>	1,0061	19,6	4,34	0,18	3,46	7,88	0,12
<b>Pixie Crunch</b>	1,0045	19,2	2,12	0,17	3,78	4,91	0,17
<b>Scarlet O'Hara</b>	1,0062	21,8	3,28	0,18	3,53	6,42	0,08

Table II: Sensorial analysis of ciders

Variety	Color	Aroma	Taste	Acidity	Global ranking
<b>Ariwa</b>	Pale yellow	Apple Pear Peach/ apricot Floral	Apple Pear Fruity	Medium	Slight bitterness Little complex / simple <b>Medium/high potential</b> Assembly/ effervescent
<b>8S 62 61</b>	Pale yellow /straw	Apple Pear Fruity	Apple Tropical fruits Pear	Low/ medium	Little complex / simple <b>Medium/high potential</b> Ice cider / assembly
<b>8S 55 21</b>	Medium yellow/ golden	Apple Tropical fruits Peach/ apricot	Apple Peach/ apricot Pear	Low	More tannins Slight bitterness <b>High potential</b> Ice cider / assembly
<b>Liberty</b>	Pale yellow	Apple Tropical fruits Peach/ pear Citrus	Apple pineapple Citrus	Medium	Freshness Little complex Medium potential Effervescent
<b>Pixie Crunch</b>	Medium yellow	Peach Melon Banana Pineapple Apple Pear	Apple Pear Peach Grapefruit	Low	Little complex / simple Medium / low potential Assembly
<b>Scarlet O'Hara</b>	Medium yellow/ pinkish reflection	Apple Peach Herbaceous Floral	Apple Peach Banana	Medium	More astringent Bitterness Average potential Medium / low potential Effervescent

## Discussion

Yield data for the various varieties show that Liberty and Pixie Crunch have higher fruit yields than McIntosh (control), 8S5521 and 8S6261 with a yield of 20 to 23 kg ( $p = 0.02$ ) (Fig. 1). The yields of 8S5521 and 8S6261 are similar to the McIntosh control variety, ranging from 10 to 11 kg.

The weight of an apple is higher for varieties 8S5521 and Scarlet O'Hara, where the average fruit has a weight of 210 to 230 g ( $p = 0.0005$ ) (Fig. 2). The cultivars Ariwa, McIntosh (control) and 8S6261 have an intermediate fruit weight ranging from 185 to 192 g, and the lowest fruit weight is noted for Liberty and Pixie Crunch with nearly 170 g.

The varieties 8S6261 and 8S5521 have a lower sugar content, Scarlet O'Hara, Pixie Crunch and Liberty have an intermediate rate and Ariwa has a higher sugar content (Tab I). The Pixie Crunch, 8S6261 and 8S5521 cultivars have the lowest titratable acidity levels while Liberty has the highest acidity with 4.34 g / L ac. tartaric. Color intensity is more important for Ariwa, 8S6261 and Pixie Crunch varieties.

The majority of the ciders had fruity aromas, and the aromas of apples were more present in 2016 than in 2015 (Tab. II). Main aromas of stone fruits (peach, apricot) and pome fruit (apple, pear) are noted for Ariwa, 8S5521, 8S6261 and Liberty, while more tropical fruits (pineapple, banana) for Pixie Crunch. Only the cultivar Scarlet O'Hara had more floral aromas.

We find a taste of fruits including apple, stone and pome fruits for the varieties Ariwa, 8S6261, 8S5521, Pixie Crunch and Scarlet O'Hara, while citrus flavors are noted for the Liberty. (Tab.II)

In general, the varieties under study did not have very high levels of acidity. An interesting level of acidity was noted for Ariwa, Liberty and Scarlet O'Hara. (Tab.II)

Interesting potential is mentioned for the varieties Ariwa, 8S6261 and 8S5521. A particular use for some cultivars has been noted, for example, Ariwa, 8S6261, and Liberty could be used to make blends. (Tab.II)

Some varieties demonstrated an interesting potential as cider and other have some characteristics allowing them to be use in blend. Then, this project proposes new apple varieties specifically for the production of cider in eastern Canada.

## Acknowledgement

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