ONTARIO APPLE GROWERS

# Annual Report

OCTOBER 31, 2021

ONTARIO APPLE GROWERS

## Vision:

Ontario apples: The first pick for healthy consumers.

## Mission:

To foster a thriving industry and sustainable farms so that consumers can enjoy a wide variety of fresh, locally grown apples.

## Our Work:

We support the success of our members through promotion, advocacy, innovation and collaboration.

*Cover photo supplied by: Farm & Food Care Ontario*

# EIGHTEENTH ANNUAL REPORT OF THE ONTARIO APPLE GROWERS




ONTARIO APPLE GROWERS
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ONTARIO APPLE GROWERS

## 2021 BOARD OF DIRECTORS

**Chair** Cathy McKay ● **Vice Chair** Brian Rideout
Keith Wright ● Chris Hedges ● Joe Van de Gevel ● Brian Gilroy ● Kyle Ardiel ● Art Moyer ● Robert Shuh ● Manus Boonzaier

## GROWER COMMITTEE MEMBERS

Jeremy Veens ● Casey Cleaver ● Kyle Ardiel ● Kara Pate ● Charles Stevens

## ASSOCIATION DELEGATES

Canadian Horticultural Council ● Brian Gilroy & Cathy McKay (alt.)
CHC Apple Working Group ● Brian Gilroy & Kelly Ciceran
Ontario Fruit & Vegetable Growers' Association ● Charles Stevens
President's Council ● Cathy McKay
National Apple Breeding Consortium ● Cathy McKay
Ontario Federation of Agriculture ● Joe Van de Gevel
F.A.R.M.S. - Steve Versteegh
Labour Issues Coordinating Committee ● Brian Rideout
Horticultural Crops Ontario ● Kelly Ciceran
Ontario Fruit and Vegetable Convention ● Kelly Ciceran
Ontario Agricultural Commodity Council ● Kyle Ardiel & Kelly Ciceran

## STAFF

**GENERAL MANAGER** ● Kelly Ciceran
**PROJECT MANAGER*** ● Larissa Osborne
**MARKETING COORDINATOR*** ● Kelle Neufeld
**TREASURER*** ● Maureen Connell
**OFFICE MANAGER*** ● Shelley Sharron
*Shared Staff

# CHAIR'S REPORT

Like others, the apple industry has been deeply affected by the numerous pandemic waves, but despite this, it continues to be vibrant with growers forging ahead. We're still planting new blocks of orchard, trying new technology and looking to the future. It's in our nature when there is so much invested.

Certainly, the world has some head winds coming as we emerge from the pandemic, such as climate change. With hundreds of thousands of trees, tree fruit orchards sequester carbon and create oxygen - it would be wonderful to be recognized as part of the solution. Inflation seems to be developing and food prices are increasing mostly due to increased interest rates, higher input costs, and transportation costs. Our Ontario apples will continue to be an important local source of fresh fruit for consumers and one they can count on.

The crop this season was not large due to several factors; a dry season last year prevented blossom development for this year; some spring frosts reduced the potential crop in some areas, and hail took acreage out of the fresh market stream. We estimate the crop to be down 18% vs. 2020. The quality of the fruit was good, although warm fall temperatures matured the fruit quickly.

Labour issues continue to dominate, and our Board and office spends lots of time on it. This year was complicated – in many ways more so than 2020. With a process in place for Seasonal Ag Workers to come to Canada, we were eager to start the growing season. The rules however kept changing or in some instances were very unclear. Our sincere thanks to OFVGA and OMAFRA for their continued commitment to assisting horticultural producers. One bright spot was their leadership in establishing vaccine clinics for workers arriving at Pearson Airport – this was no small feat. A large percentage of workers are now fully vaccinated, and we are hopeful that they will have no problems coming to Canada and our farms next spring. Day 10/8 testing for workers in isolation was a challenge to say the least. Working with the government appointed lab services who didn't understand agriculture, the ag worker program, nor the logistics of rural Ontario, was maddening at times. Together with OFVGA and other grower groups, we found ways to get done what was needed for the health and safety of our workers. Unfortunately, not all growers were able to access the number of workers that they normally have. After the harvest was over, sending workers home was also more complicated because certain countries require COVID-19 tests prior to departing Canada.

The pandemic has also brought on a further examination of worker housing by governments. The federal government began consultation on worker housing earlier this year, which has historically been provincially regulated and inspected by Public Health Units. We will continue to work with OFVGA and CHC, providing the apple growers input, and will advise when there is new information.

Labour efficiency and productivity have been top-of-mind for apple growers. In early 2021, OMAFRA provided resources to the OAG and the Ontario Tender Fruit Growers to develop an *Innovation and Technology Road Map* for tree fruit growers. This new resource identifies technologies that may help reduce labour costs and/or mitigate the impact of COVID-19 with the goal to increase overall efficiencies in tree fruit orchards. The Road Map information is posted to our website at www.onapples.com.

The OAG would like to thank OFVGA and Farm and Food Care for the development of More than a Migrant Worker initiative, which is supported by a group of Ontario agricultural organizations working together to thank and support our workers who come here each year to help grow the local food that Ontarians enjoy. Please visit the website (www.morethanamigrantworker.ca), follow, and share these important stories on social media.

On behalf of Ontario's apple growers, I would like to thank and acknowledge our many funding partners. The OAG appreciates the funding from Canadian Agricultural Partnership, a federal-provincial-territorial initiative. Thank you also to the Ontario government for their Grassroots Growth Program. We also gratefully acknowledge funding from the Apple Marketers' Association of Ontario (AMAO) and the Ontario Fruit and Vegetable Growers' Association and their continued support of our promotion and research activities.

Thank you to our Board of Directors and the Grower Committee representatives for their continued commitment, participation, and bringing their perspectives to the conversation. Thank you to all our staff, Kelly, Larissa and Kelle for continuing the work be it from your homes during lockdowns or from the office.

Respectfully submitted,

Cathy McKay
Chair

# STRATEGIC PLAN 2020-2025

## VISION

Ontario apples: The first pick for healthy consumers.

## VALUES

Integrity
Collaboration
Leadership
Innovation
Respect
Quality

## MISSION

To foster a thriving industry and sustainable farms so that consumers can enjoy a wide variety of fresh, locally grown apples.

## OUR WORK

We support the success of our members through promotion, advocacy, innovation and collaboration.

## FIVE KEY FOCUS AREAS

**Promotion**
Promote Ontario apples

**Advocacy**
For competitiveness and innovation

**Information**
Keep members informed

**Improve**
Fruit quality and efficiency through research

**Governance**
Effective governance and operations

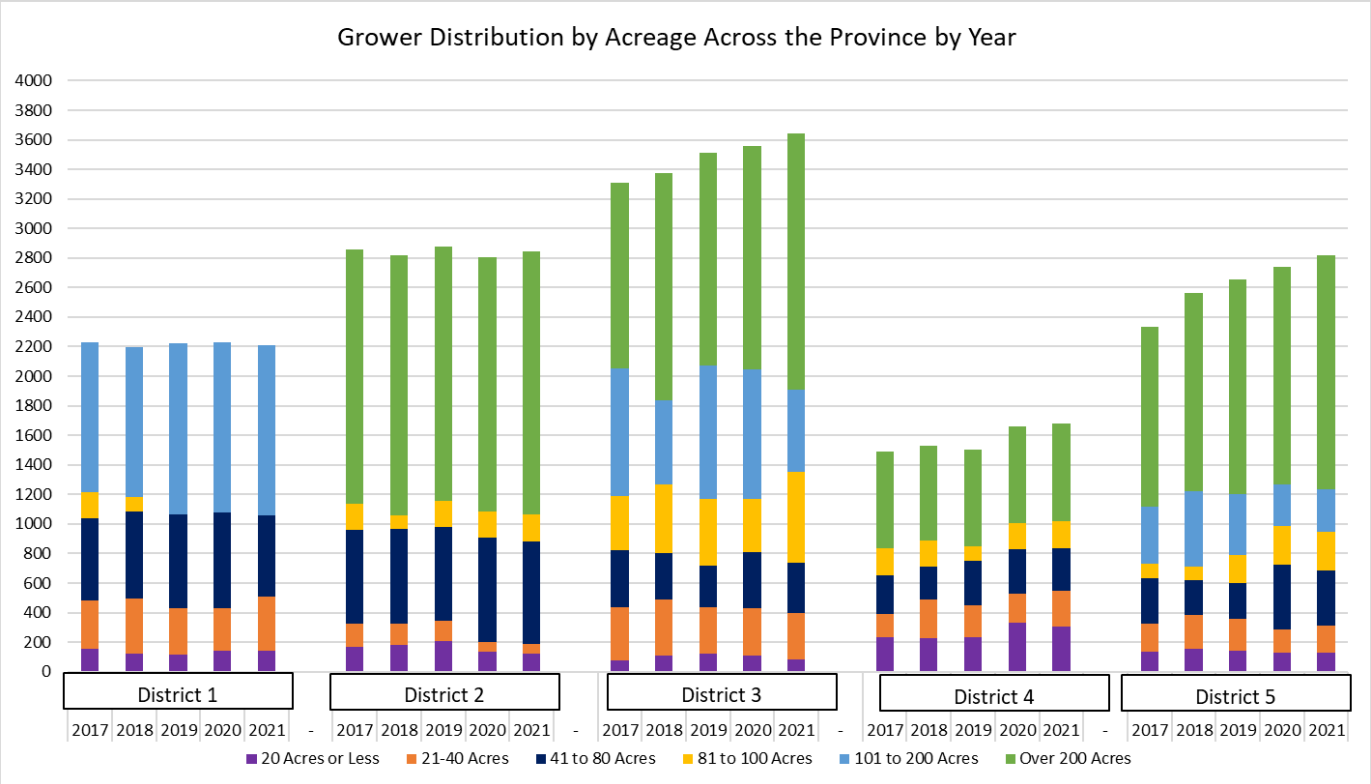
ONTARIO APPLE GROWERS

Proudly representing over 200 Ontario apple grower members

# OAG MEMBERSHIP

| District | Number of Grower Members | District Committee Representatives |
|---|---|---|
| District 1 | 36 | 3 |
| District 2 | 30 | 3 |
| District 3 | 37 | 3 |
| District 4 | 40 | 3 |
| District 5 | 32 | 3 |
| **Total - Members** | **175** | **15** |
| Voluntary Members | 52 | |
| **Total - All Members** | **227** | |

**2017 – 2021 OAG Grower Distribution by Acreage**

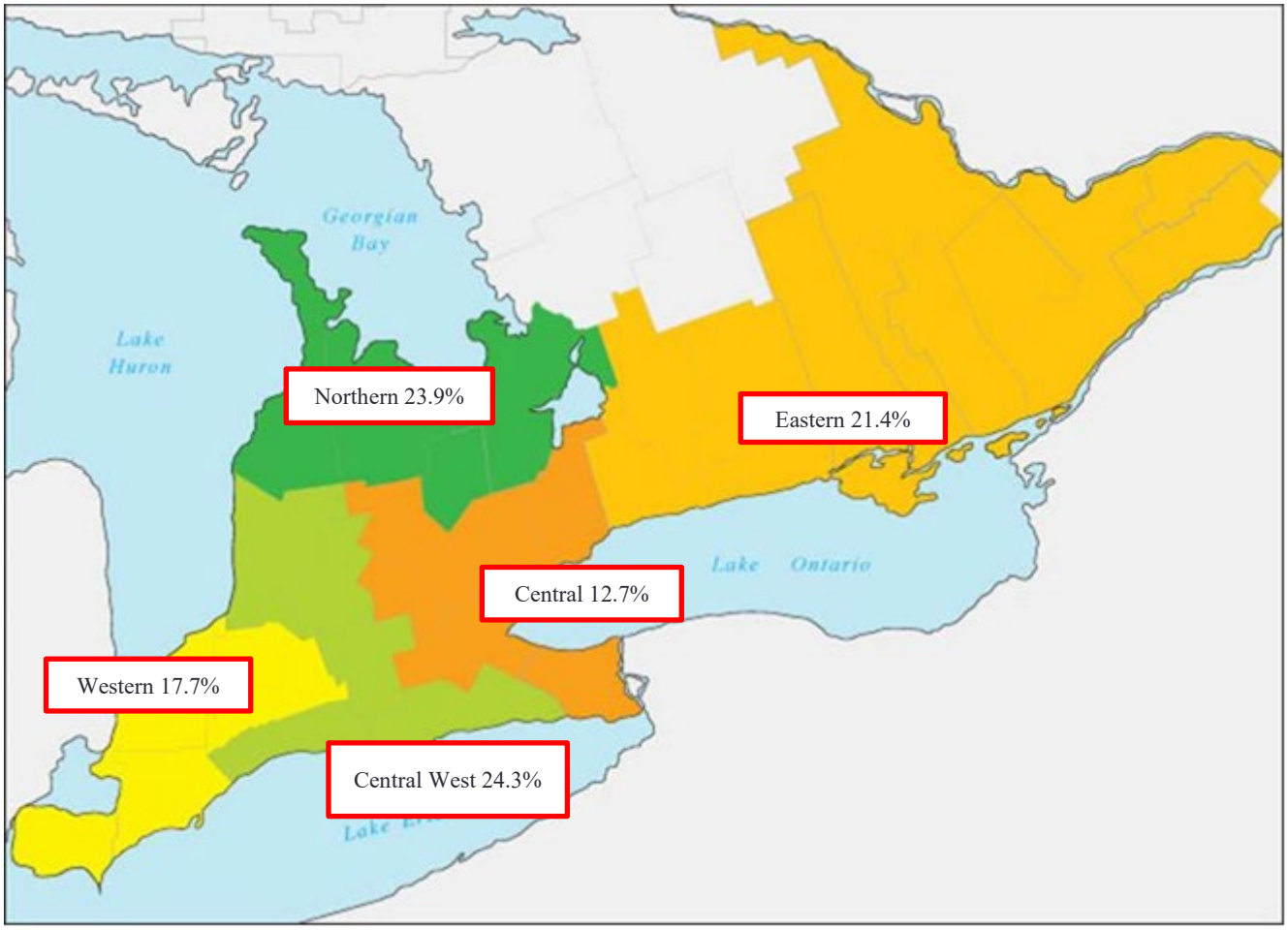


# ACREAGE REVIEW

## Tree Census

Tree census information (as of January 1st, 2021) included in this report is based on Agricorp's GPS mapping and information on total acreage provided by Statistics Canada. Agricorp continues to manage the DMS system in partnership with the OAG. The system provides reports on plantings by age, by variety and by district for all OAG members. Statistics Canada estimated that there is a total of 15,397 bearing and non-bearing acres in Ontario in 2020. The assumption is that the variety mix for the remaining acres is the same as for mapped acreage.

## Ontario Acreage by District




**District Boundaries**

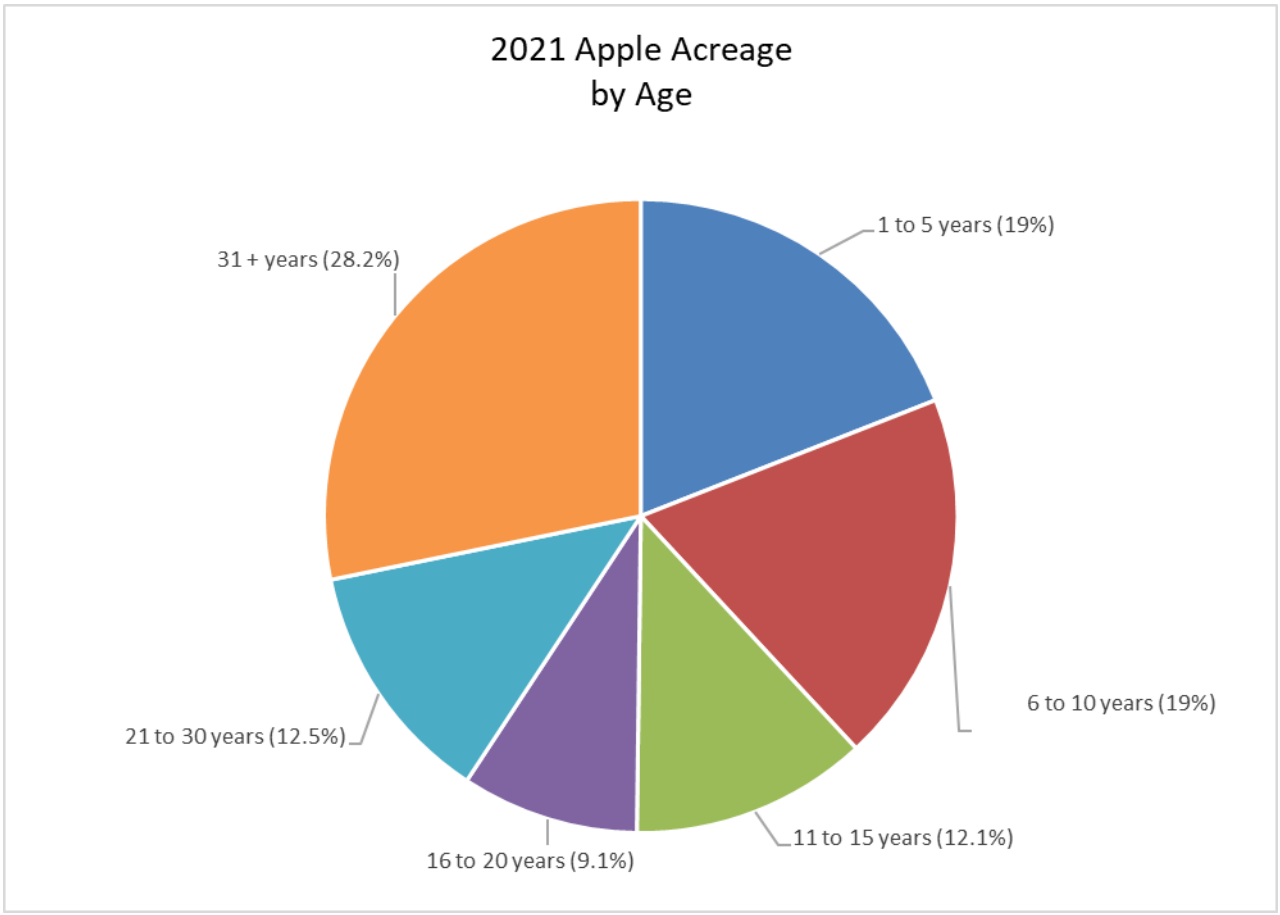
**District 1** *Western* is comprised of the upper-tier municipalities of Essex, Lambton & Middlesex and the single-tier municipality of Chatham-Kent.

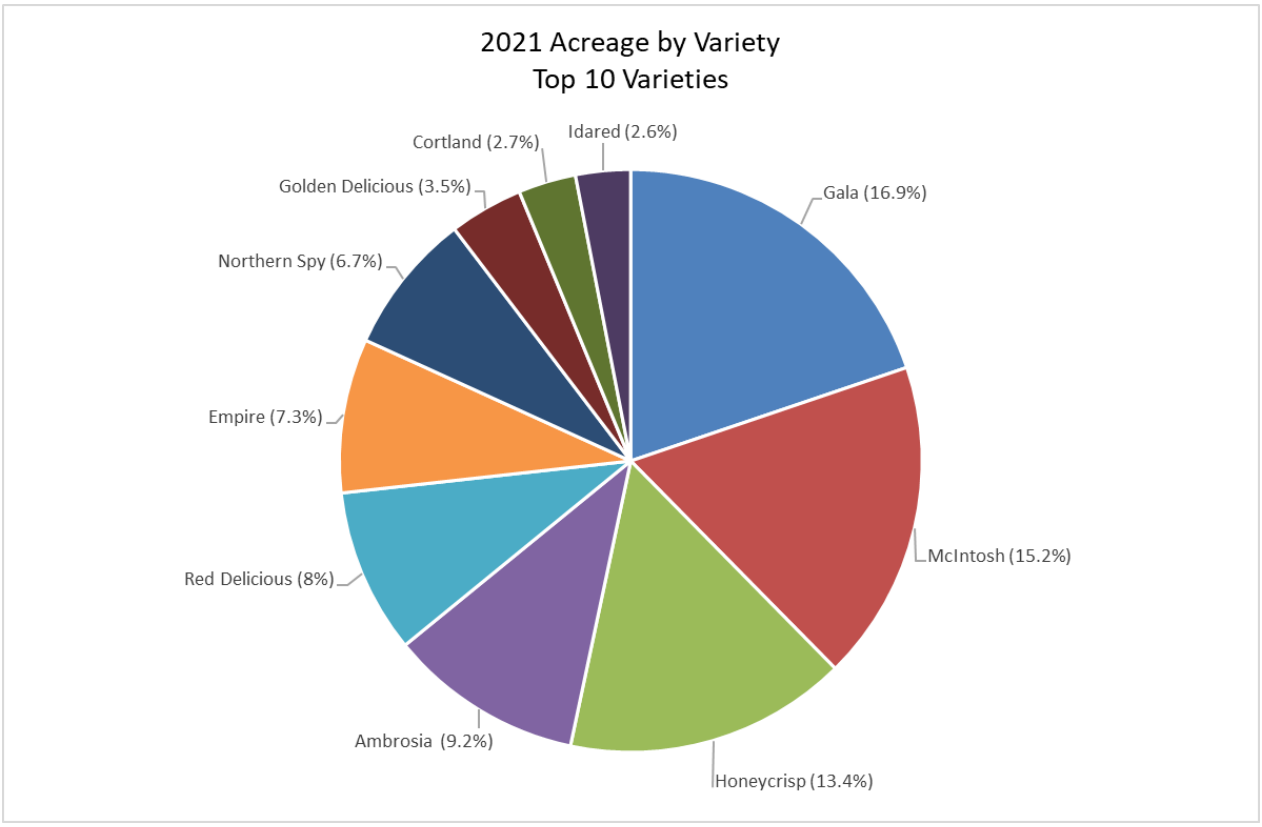
**District 2** *Central West* is comprised of the upper-tier municipalities of Huron, Perth, Oxford & Elgin and the single-tier municipalities of Haldimand and Norfolk.

**District 3** *Northern* is comprised of the upper-tier municipalities of Bruce, Grey, Simcoe and Dufferin.

**District 4** *Central* is comprised of the upper-tier municipalities of Wellington, Peel, York, Halton, Waterloo and Niagara and the single tier-municipalities of Brant, Toronto and Hamilton.

**District 5** *Eastern* is comprised of the upper-tier municipalities of Durham, Northumberland, Peterborough, Frontenac, Hastings, Lannark, Lennox & Addington, Leeds & Grenville, Renfrew & Stormont, Dundas & Glengarry & Prescott & Russell and the single-tier municipalities of Kawartha Lakes, Ottawa and Prince Edward.

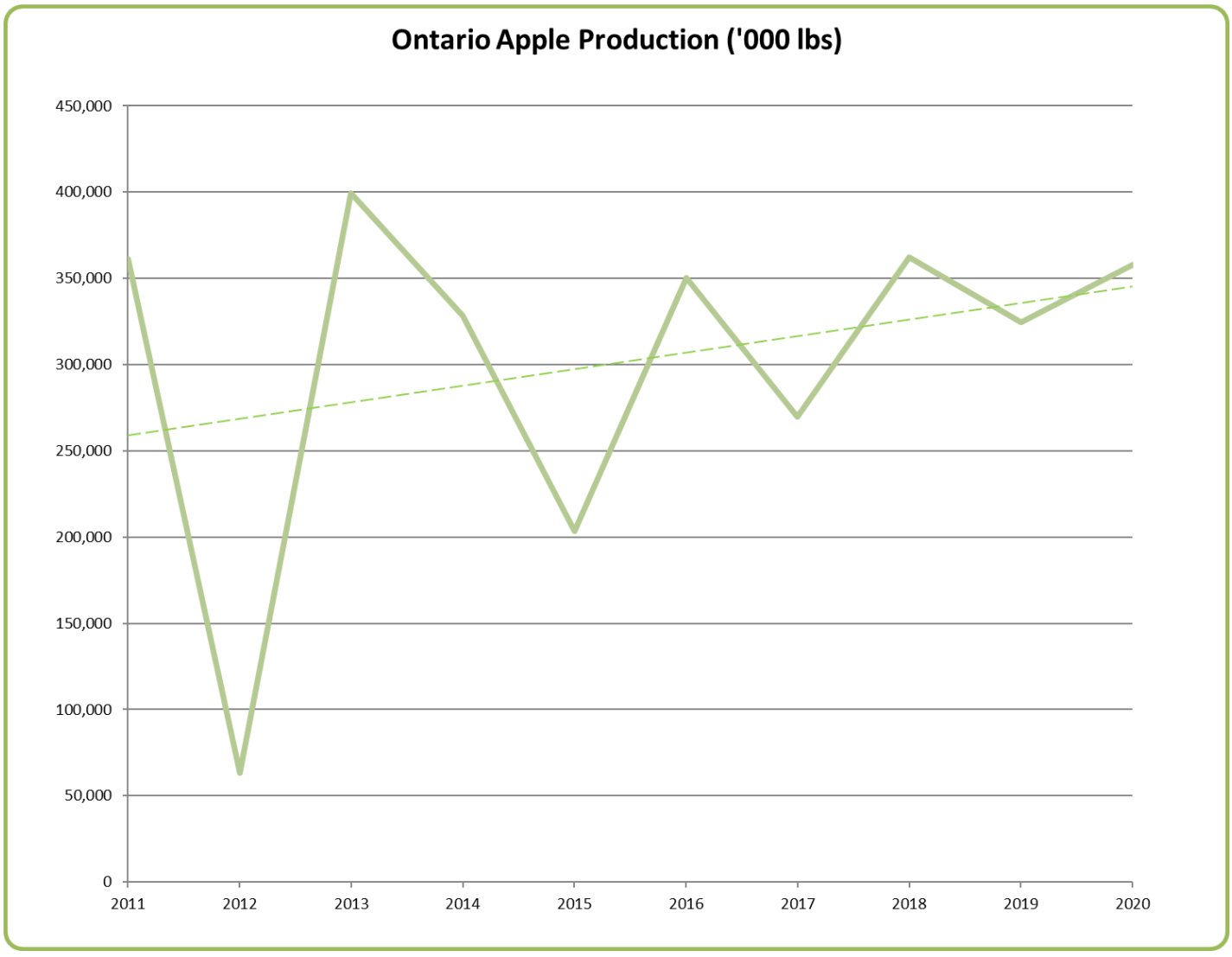

2021 Apple Acreage
by Age
1 to 5 years (19%)
6 to 10 years (19%)
11 to 15 years (12.1%)
16 to 20 years (9.1%)
21 to 30 years (12.5%)
31 + years (28.2%)


2021 Acreage by Variety
Top 10 Varieties
Gala (16.9%)
McIntosh (15.2%)
Honeycrisp (13.4%)
Ambrosia (9.2%)
Red Delicious (8%)
Empire (7.3%)
Northern Spy (6.7%)
Golden Delicious (3.5%)
Cortland (2.7%)
Idared (2.6%)

# APPLE PRODUCTION

| Ontario Apple Production – 2016 TO 2021 | | |
|---|---|---|
| **Years** | **Production ('000 lbs)** | **% Change From Previous Year** |
| 2016 | 350,435 | 72.2% |
| 2017 | 269,513 | -23.1% |
| 2018 | 361,959 | 34.3% |
| 2019 | 324,370 | -10.4% |
| 2020 | 357,813 | 10.3% |
| 2021 estimate* | 281,845 | -18.0% |
| 5 Yr Avg ('17 –'20) | 332,818 | 7.0% |
| | | |

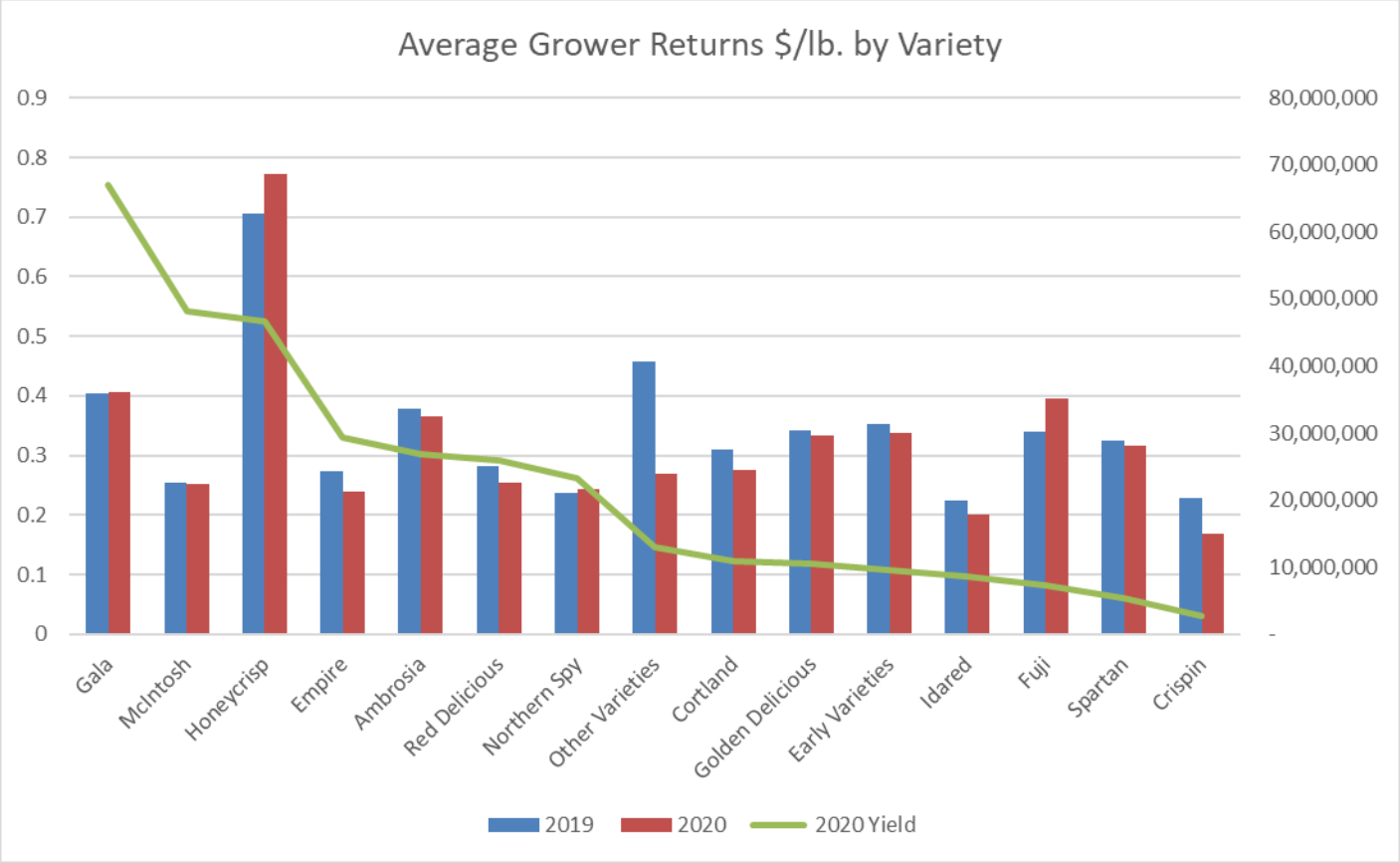
Source: OAG Annual Apple Marketing Survey and Apple Yield Report * November 2021 crop report excludes orchard juice estimated volumes at this time



# MARKETING REVIEW

The results of the 2020 marketing survey include comparative figures from the 2019 year begin on page 12. The survey provides the industry average returns per pound and per bin (820 lbs.) by variety and represents the prices for 100% of the apples in the bin, not just those for the fresh market pack out. With this information, growers and packers can compare their returns with the average. This information also provides valuable information for government programming.

Average Grower Price for fresh apples (page 13) indicates that pricing was only slightly up by $0.012 cents per lb. across all varieties. Notably, the four top returning varieties Honeycrisp, Gala, Fuji, and Ambrosia. Apples continue to be an economical and widely available fresh fruit option for consumers for the 2020/2021 marketing year. Processing apples, and specifically peelers, continued to face large challenges during marketing year given the many waves of the pandemic and resulting lockdowns and restrictions on foodservice and restaurants.




### Flyer Ad and Retail Price Tracking

The OAG tracks apple flyer ad activity at major retail. We record retail chain, variety, pack (bulk or bag), price/lb. and country of origin. This information is shared with the apple packers on a weekly basis. Additionally, this year we have started to receive grocery store information on four varieties from Foodland Ontario representatives. Representatives are recording price, tray or bag and share of shelf.

### Storage Holdings

The OAG continues to collect storage holdings for the industry. Similar information is collected in other apple producing provinces. This information is entered into AAFC's InfoHort system and published on their website.

The OAG summarizes the Canadian data and combines it with similar statistics on the U.S. crop and provides it to the marketers, storage holders and our grower members. The reports are shared in the OAG newsletters and are available on the web site. The OAG thanks all the storage cooperators for their excellent participation.

## APPLE STATISTICS

| ONTARIO APPLE GROWERS<br>NOVEMBER 2021 APPLE YIELD REPORT BY VARIETY | | | | | |
|---|---|---|---|---|---|
| **Variety** | **2019 Production ('000 lbs.)** | **2020 Production ('000 lbs.)** | **2021 Production ('000 lbs.)** | **2021 Production ('000 bushels)** | **% Change 2021 vs. 2020** |
| Other Early Varieties | 9,159 | 9,823 | 7,239 | 172 | -26.3% |
| Ambrosia | 24,384 | 27,670 | 34,231 | 815 | 23.7% |
| Cortland | 13,063 | 11,275 | 7,913 | 188 | -29.8% |
| Crispin/Mutsu | 2,818 | 2,844 | 1,067 | 25 | -62.5% |
| Empire | 30,400 | 30,103 | 22,841 | 544 | -24.1% |
| Fuji | 6,176 | 7,438 | 6,727 | 160 | -9.6% |
| Gala | 58,795 | 69,138 | 70,606 | 1,681 | 2.1% |
| Golden Delicious | 9,725 | 10,785 | 9,112 | 217 | -15.5% |
| Honeycrisp | 29,427 | 48,127 | 34,547 | 823 | -28.2% |
| Idared | 4,138 | 8,568 | 4,459 | 106 | -48.0% |
| McIntosh | 51,781 | 49,264 | 34,475 | 821 | -30.0% |
| Northern Spy | 22,203 | 23,201 | 9,890 | 235 | -57.4% |
| Red Delicious | 28,571 | 26,714 | 26,400 | 629 | -1.2% |
| Spartan | 4,754 | 5,550 | 2,518 | 60 | -54.6% |
| Other Late Varieties | 16,309 | 13,250 | 9,820 | 234 | -25.9% |
| **Total Fresh** | **311,705** | **343,751** | **281,845** | **6,711** | **-18.0%** |

**ONTARIO APPLE PRODUCTION BY UTILIZATION - 2020 CROP YEAR**

**PRODUCTION (LBS.)**

| Variety | Fresh | | Orchard Juice* | | Other Processing | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2020** | 2019 | **2020** | 2019 | **2020** | 2019 | **2020** | 2019 |
| Ambrosia | **26,793,767** | 23,652,686 | | | **23,106** | 95,221 | **26,816,873** | 23,747,907 |
| Cortland | **10,626,656** | 12,350,782 | | | **309,921** | 379,871 | **10,936,577** | 12,730,653 |
| Crispin (Mutsu) | **2,196,044** | 2,282,437 | | | **577,822** | 474,382 | **2,773,866** | 2,756,819 |
| Early Varieties | **9,164,090** | 8,896,001 | | | **367,166** | 24,000 | **9,531,256** | 8,920,001 |
| Empire | **27,092,673** | 28,065,018 | | | **2,148,588** | 1,580,384 | **29,241,261** | 29,645,402 |
| Fuji | **7,208,954** | 6,014,616 | | | **-** | - | **7,208,954** | 6,014,616 |
| Gala | **66,915,399** | 57,050,215 | | | **93,270** | 209,708 | **67,008,669** | 57,259,923 |
| Golden Delicious | **10,408,501** | 9,382,900 | | | **45,466** | 89,679 | **10,453,967** | 9,472,579 |
| Honeycrisp | **46,542,904** | 28,608,873 | | | **103,088** | 48,650 | **46,645,992** | 28,657,523 |
| Idared | **0** | - | | | **8,567,710** | 4,138,124 | **8,567,710** | 4,138,124 |
| McIntosh | **32,407,439** | 37,359,524 | | | **15,824,972** | 13,416,651 | **48,232,411** | 50,776,175 |
| Northern Spy | **0** | - | | | **23,201,456** | 22,203,332 | **23,201,456** | 22,203,332 |
| Red Delicious | **25,700,628** | 27,401,353 | | | **195,419** | 432,725 | **25,896,047** | 27,834,078 |
| Spartan | **3,439,920** | 3,983,127 | | | **2,001,017** | 663,962 | **5,440,937** | 4,647,089 |
| Other Varieties | **8,463,642** | 14,389,382 | | | **4,517,252** | 1,532,239 | **12,980,894** | 15,921,621 |
| Mixed Varieties - Juice** | **-** | - | **14,061,600** | 12,664,718 | **8,814,125** | 6,979,240 | **22,875,725** | 19,643,958 |
| **Total** | **276,960,617** | 259,436,913 | **14,061,600** | 12,664,718 | **66,790,378** | 52,268,168 | **357,812,595** | 324,369,799 |

*Orchard Juice represents apples picked specifically for juice from Ontario orchards.

**Juice production cannot be accurately reported by variety therefore it is reported as a total of mixed varieties.

**ONTARIO APPLE GROWER PRICE PER LB. - 2020 CROP YEAR**

| GROWER PRICE ($/LB) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variety | Net Return/ 820 Lb. Bin | Fresh ($) | | Orchard Juice Processing ($) | | Other Processing ($) | | Average Fresh and Other Processing ($) | |
| | 2020 | 2020 | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 | 2019 |
| Ambrosia | $ 301 | 0.366 | 0.380 | | | 0.186 | 0.299 | 0.366 | 0.379 |
| Cortland | $ 227 | 0.276 | 0.312 | | | 0.231 | 0.229 | 0.275 | 0.310 |
| Crispin (Mutsu) | $ 143 | 0.175 | 0.235 | | | 0.144 | 0.192 | 0.168 | 0.228 |
| Early Varieties | $ 280 | 0.342 | 0.352 | | | 0.230 | 0.211 | 0.338 | 0.352 |
| Empire | $ 196 | 0.240 | 0.278 | | | 0.229 | 0.206 | 0.239 | 0.274 |
| Fuji | $ 324 | 0.395 | 0.339 | | | - | - | 0.395 | 0.339 |
| Gala | $ 332 | 0.405 | 0.404 | | | 0.160 | 0.191 | 0.405 | 0.403 |
| Golden Delicious | $ 274 | 0.335 | 0.343 | | | 0.160 | 0.135 | 0.334 | 0.341 |
| Honeycrisp | $ 635 | 0.774 | 0.706 | | | 0.174 | 0.140 | 0.773 | 0.705 |
| Idared | $ - | - | | | | 0.201 | 0.224 | 0.201 | 0.224 |
| McIntosh | $ 226 | 0.275 | 0.273 | | | 0.205 | 0.200 | 0.252 | 0.254 |
| Northern Spy | $ - | - | - | | | 0.243 | 0.237 | 0.243 | 0.237 |
| Red Delicious | $ 209 | 0.255 | 0.283 | | | 0.205 | 0.204 | 0.254 | 0.282 |
| Spartan | $ 277 | 0.338 | 0.355 | | | 0.278 | 0.143 | 0.316 | 0.325 |
| Other Varieties | $ 259 | 0.315 | 0.484 | | | 0.183 | 0.220 | 0.269 | 0.458 |
| Mixed Varieties - Juice | $ - | - | - | 0.104 | 0.098 | 0.129 | 0.145 | 0.129 | 0.145 |
| **Avg. Grower Price - All Utilization ($/lb)** | $ 335 | 0.409 | 0.393 | 0.104 | 0.098 | 0.207 | 0.199 | 0.355 | 0.343 |
| **Avg. Transaction - All Utilization ($/lb)** | | 0.480 | 0.465 | 0.104 | 0.098 | 0.227 | 0.219 | 0.418 | 0.411 |

**ONTARIO APPLE GROWER VALUE - 2020 CROP YEAR**

| GROWER VALUE $ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Variety** | **Fresh ($)** | | **Orchard Juice ($)** | | **Other Processing ($)** | | **Total ($)** | |
| | **2020** | 2019 | **2020** | 2019 | **2020** | 2019 | **2020** | 2019 |
| Ambrosia | **9,819,682** | 8,982,246 | | | **4,297** | 28,485 | **9,823,979** | 9,010,731 |
| Cortland | **2,936,539** | 3,856,321 | | | **71,727** | 87,117 | **3,008,267** | 3,943,438 |
| Crispin (Mutsu) | **383,679** | 536,346 | | | **82,946** | 91,285 | **466,624** | 627,631 |
| Early Varieties | **3,133,722** | 3,135,501 | | | **84,340** | 5,054 | **3,218,062** | 3,140,555 |
| Empire | **6,489,861** | 7,807,552 | | | **491,959** | 325,857 | **6,981,820** | 8,133,409 |
| Fuji | **2,848,277** | 2,039,754 | | | **-** | - | **2,848,277** | 2,039,754 |
| Gala | **27,102,768** | 23,031,764 | | | **14,903** | 40,043 | **27,117,671** | 23,071,807 |
| Golden Delicious | **3,482,865** | 3,214,731 | | | **7,268** | 12,062 | **3,490,133** | 3,226,793 |
| Honeycrisp | **36,028,262** | 20,190,311 | | | **17,891** | 6,824 | **36,046,152** | 20,197,134 |
| Idared | **-** | - | | | **1,722,044** | 928,933 | **1,722,044** | 928,933 |
| McIntosh | **8,912,294** | 10,205,039 | | | **3,241,196** | 2,679,208 | **12,153,490** | 12,884,247 |
| Northern Spy | **-** | - | | | **5,645,468** | 5,268,142 | **5,645,468** | 5,268,142 |
| Red Delicious | **6,542,683** | 7,760,483 | | | **40,135** | 88,468 | **6,582,817** | 7,848,951 |
| Spartan | **1,161,501** | 1,413,213 | | | **557,188** | 94,959 | **1,718,689** | 1,508,172 |
| Other Varieties | **2,668,461** | 6,957,540 | | | **828,726** | 336,645 | **3,497,188** | 7,294,186 |
| Mixed Varieties -Juice | **-** | - | **1,457,645** | 1,244,198 | **1,133,844** | 1,012,716 | **2,591,489** | 2,256,915 |
| **Total Grower Value** | **111,510,594** | 99,130,799 | **1,457,645** | 1,244,198 | **13,943,932** | 11,005,800 | **126,912,171** | 111,380,797 |
| **Total Transaction Value** | **132,994,111** | 120,752,868 | **1,457,645** | 1,244,198 | **15,138,146** | 11,439,961 | **149,589,902** | 133,437,027 |

## Ontario Apple Tree Acreage By Variety, By District

| Variety Name | 1 Western | 2 Central West | 3 Northern | 4 Central | 5 Eastern | Total Acreage | 2020 % of Total Crop | 2019 % of Total Crop |
|---|---|---|---|---|---|---|---|---|
| Gala | 512 | 690 | 175 | 394 | 832 | 2,602 | 16.9% | 16.5% |
| McIntosh | 140 | 590 | 1,042 | 155 | 413 | 2,339 | 15.2% | 16.8% |
| Honeycrisp | 298 | 393 | 431 | 279 | 657 | 2,059 | 13.4% | 12.0% |
| Ambrosia | 338 | 311 | 217 | 225 | 323 | 1,414 | 9.2% | 8.3% |
| Red Delicious | 281 | 383 | 64 | 183 | 283 | 1,194 | 7.8% | 8.0% |
| Empire | 239 | 523 | 149 | 82 | 130 | 1,123 | 7.3% | 7.4% |
| Northern Spy | 57 | 297 | 619 | 27 | 28 | 1,028 | 6.7% | 7.0% |
| *Other Cultivars | 109 | 60 | 278 | 96 | 151 | 694 | 4.5% | 4.1% |
| Golden Delicious | 250 | 99 | 6 | 117 | 61 | 532 | 3.5% | 3.5% |
| Cortland | 39 | 75 | 128 | 83 | 98 | 423 | 2.7% | 2.7% |
| Idared | 63 | 83 | 215 | 16 | 29 | 406 | 2.6% | 2.8% |
| Fuji | 133 | 59 | 16 | 38 | 50 | 295 | 1.9% | 1.7% |
| Crispin/Mutsu | 77 | 55 | 20 | 87 | 16 | 255 | 1.7% | 1.8% |
| Spartan | 8 | 27 | 125 | 17 | 36 | 212 | 1.4% | 1.6% |
| Paulared | 35 | 34 | 34 | 24 | 83 | 210 | 1.4% | 1.4% |
| Ginger Gold | 56 | 22 | 11 | 31 | 37 | 157 | 1.0% | 1.0% |
| Mixed | 33 | 6 | 5 | 46 | 36 | 126 | 0.8% | 0.9% |
| Crimson Crisp | 6 | 4 | 73 | 21 | 13 | 116 | 0.8% | 0.7% |
| Jonagold | 32 | 21 | 14 | 23 | 1 | 90 | 0.6% | 0.6% |
| Jerseymac | 11 | 2 | 49 | 3 | 1 | 65 | 0.4% | 0.5% |
| Golden Russet | 15 | 3 | 11 | 8 | 20 | 57 | 0.4% | 0.4% |
| | | | | | | | | |
| **TOTAL** | **2,730** | **3,737** | **3,679** | **1,953** | **3,298** | **15,397** | **100%** | **100%** |

Notes: Includes bearing and non-bearing acreage in Ontario.

Sources: Agricorp/OAG ADaMS DMS System and Statistics Canada, CANSIM Tables

See Ontario Apple Growing Regions section in this annual report for a more detailed description of Districts 1 to 5 above.

*Other Cultivars include: Aurora Golden Gala, Braeburn, Cameo, Cox's Orange Pippin, Creston, Cripps Pink, Dabinett, Earligold, Elstar, Fortune, Goldrush, Granny Smith, Kingston Black, Liberty, Lobo, Lodi, Macoun, Marshall Mac, Mascad De Dieppe, Melba, Michelin, Nicola, Novaspy, Porter's Perfection, Quinte, Red Prince, Rome, Roxbury Russet, Russet, Salish, Shizuka, Silken, Smitten, Snow, Sunrise, Sweet Coppin, Tolman Sweet, Transparent, Tydeman Red, Viking, Vista Bella, Wealthy, Winesap, Yarlington Mill and Zestar!.

## Ontario Apple Tree Acreage By Variety, By Tree Age

| Variety Name | 1 To 5 Years (2016-2020) | 6 To 10 Years (2011-2015) | 11 To 15 Years (2006-2010) | 16 To 20 Years (2001-2005) | 21 To 30 Years (1991-2000) | 31 Years and Over (Pre-1991) | Total Acreage | 2020 % of Total Crop |
|---|---|---|---|---|---|---|---|---|
| Gala | 714 | 1,075 | 287 | 231 | 263 | 32 | 2,602 | 16.9% |
| McIntosh | 104 | 117 | 187 | 231 | 273 | 1,428 | 2,339 | 15.2% |
| Honeycrisp | 852 | 425 | 478 | 255 | 47 | 1 | 2,059 | 13.4% |
| Ambrosia | 628 | 398 | 278 | 109 | 1 | 1 | 1,414 | 9.2% |
| Red Delicious | 123 | 229 | 49 | 61 | 215 | 518 | 1,194 | 7.8% |
| Empire | 12 | 36 | 52 | 78 | 273 | 673 | 1,123 | 7.3% |
| Northern Spy | 5 | 74 | 43 | 70 | 229 | 607 | 1,028 | 6.7% |
| *Other Cultivars | 216 | 93 | 209 | 67 | 45 | 65 | 694 | 4.5% |
| Golden Delicious | 15 | 80 | 80 | 114 | 142 | 102 | 532 | 3.5% |
| Cortland | 47 | 77 | 63 | 35 | 72 | 129 | 423 | 2.7% |
| Idared | 5 | 20 | 3 | 12 | 39 | 328 | 406 | 2.6% |
| Fuji | 100 | 101 | 21 | 19 | 44 | 10 | 295 | 1.9% |
| Crispin/Mutsu | 6 | 21 | 26 | 56 | 74 | 72 | 255 | 1.7% |
| Spartan | 2 | 7 | 7 | 4 | 42 | 150 | 212 | 1.4% |
| Paulared | 23 | 54 | 27 | 5 | 15 | 86 | 210 | 1.4% |
| Ginger Gold | 20 | 27 | 27 | 23 | 59 | 1 | 157 | 1.0% |
| Mixed | 5 | 7 | 14 | 17 | 31 | 51 | 126 | 0.8% |
| Crimson Crisp | 31 | 83 | 2 | - | 0 | - | 116 | 0.8% |
| Jonagold | 13 | 9 | 7 | 4 | 37 | 19 | 90 | 0.6% |
| Jerseymac | 1 | 0 | 1 | 1 | 7 | 55 | 65 | 0.4% |
| Golden Russet | 8 | 2 | 3 | 4 | 19 | 20 | 57 | 0.4% |
| | | | | | | | | |
| **TOTAL** | **2,931** | **2,936** | **1,863** | **1,396** | **1,926** | **4,346** | **15,397** | **100.0%** |

Notes: Includes bearing and non-bearing acreage in Ontario.

Sources: Agricorp/OAG ADaMS DMS System and Statistics Canada, CANSIM Tables

See Ontario Apple Growing Regions section in this annual report for a more detailed description of Districts 1 to 5 above.

*Other Cultivars include: Aurora Golden Gala, Braeburn, Cameo, Cox's Orange Pippin, Creston, Cripps Pink, Dabinett, Earligold, Elstar, Fortune, Goldrush, Granny Smith, Kingston Black, Liberty, Lobo, Lodi, Macoun, Marshall Mac, Mascad De Dieppe, Melba, Michelin, Nicola, Novaspy, Porter's Perfection, Quinte, Red Prince, Rome, Roxbury Russet, Russet, Salish, Shizuka, Silken, Smitten, Snow, Sunrise, Sweet Coppin, Tolman Sweet, Transparent, Tydeman Red, Viking, Vista Bella, Wealthy, Winesap, Yarlington Mill and Zestar!.

**IMPORTS OF FRESH APPLES -2020**

**(KGS)**

| PROVINCE | HONEYCRISP | GALA | GOLDEN DELICIOUS | GRANNY SMITH | IDA RED | MCINTOSH | RED DELICIOUS | UNSPECIFIED | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Alberta | 9,638 | 242,185 | 8,067 | 52,320 | | | 40,549 | 159,793 | 512,552 |
| British Columbia | 1,225,171 | 18,422,190 | 1,557,761 | 8,164,222 | | | 4,883,807 | 24,509,185 | 58,762,336 |
| Manitoba | | 48,359 | 7,940 | 42,275 | | | 12,743 | 28,320 | 139,637 |
| New Brunswick | 70,947 | 4,735 | | 15,618 | 1,467,678 | | | 92,923 | 1,651,901 |
| Nova Scotia | | 401,156 | | 26,103 | 605,705 | | | 80,218 | 1,113,182 |
| Ontario | 910,519 | 22,752,999 | 2,807,800 | 10,984,014 | 11,746 | 19,945 | 4,105,568 | 13,749,066 | 55,341,657 |
| Quebec | 45,837 | 1,218,764 | 178,616 | 3,246,304 | | | 145,360 | 1,762,701 | 6,597,582 |
| Saskatchewan | | 34,704 | 7,999 | 5,114 | | 1,524 | 4,985 | 16,838 | 71,164 |
| **Total By Variety - 2020** | **2,262,112** | **43,125,092** | **4,568,183** | **22,535,970** | **2,085,129** | **21,469** | **9,193,012** | **40,399,044** | **124,190,011** |
| | | | | | | | | | |
| **Prior Year - 2019** | 2,802,905 | 51,076,414 | 5,300,022 | 22,264,571 | 2,066,623 | 142,893 | 12,786,492 | 38,698,390 | 135,138,310 |
| **Variance vs. 2019** | -19% | -16% | -14% | 1% | 1% | -85% | -28% | 4% | -8% |
| **Variance vs. 5 Yr Avg.** | 86% | -20% | -20% | -7% | 84% | -89% | -39% | 8% | -10% |

**IMPORTS - 5 YEAR AVG. 2016-2020**

**(KGS)**

| PROVINCE | HONEYCRISP | GALA | GOLDEN DELICIOUS | GRANNY SMITH | IDA RED | MCINTOSH | RED DELICIOUS | UNSPECIFIED | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Alberta | 5,497 | 282,231 | 23,316 | 105,349 | | 76 | 71,802 | 191,035 | 679,307 |
| British Columbia | 735,292 | 20,206,106 | 1,982,983 | 8,808,685 | 17,437 | 5,036 | 7,145,598 | 20,861,250 | 59,762,387 |
| Manitoba | 329 | 47,040 | 10,316 | 29,452 | | 25,321 | 19,284 | 41,288 | 173,031 |
| New Brunswick | 16,316 | 185,362 | 5,169 | 53,274 | 293,536 | 1,183 | 15,068 | 235,940 | 805,848 |
| Nova Scotia | 4,158 | 383,173 | | 14,390 | 588,119 | | | 412,399 | 1,402,240 |
| Ontario | 444,068 | 30,003,513 | 3,365,454 | 11,635,525 | 218,819 | 58,035 | 7,345,198 | 13,221,394 | 66,292,006 |
| Québec | 11,701 | 2,514,264 | 301,588 | 3,605,049 | 12,902 | 106,664 | 426,510 | 2,360,637 | 9,339,315 |
| Saskatchewan | 889 | 69,729 | 2,731 | 23,785 | | 305 | 3,317 | 87,652 | 188,408 |
| **Total by Variety - 5 Yr Avg.** | **1,218,250** | **53,691,418** | **5,691,558** | **24,275,509** | **1,130,812** | **196,620** | **15,026,778** | **37,411,595** | **138,642,540** |

Note:
Quantity is report in KG
The province denotes the port of entry and may not necessarily reflect the final provincial destination of imported apples.
Source: Statistics Canada

# PROMOTION

The Ontario Apple Growers objectives for this strategic direction are to build consumer preference for Ontario grown apples and enhance knowledge and confidence in how apples are produced to increase public trust.

It was a certainly a different year in terms of marketing as we had to forgo some of our tried-and-true promotional activities and pivot to a fully digital program due to the cancellation of many in-person events. Thankfully, OAG was able to secure Grassroots Growth funding to assist in executing a unique and comprehensive plan which included:

## Food Blogger Program

### Apple Pen Pals

Three influencers and three Ontario apple growers were paired as virtual "pen pals". The pairs corresponded for weeks and the information they learned from each other was shared on social media during Ontario Agriculture Week in October 2020.

### Ontario Apples @ Home

10 influencers were sent key industry information and 4 different varieties of Ontario apples (pictured below right). The apples were taste tested live on video with family members and ultimately a winner was chosen. Viewers were encouraged to try this activity at home with their families and share on social too.

## Advertising

### Media Appearances

CHCH TV (Hamilton) and GLOBAL TV (Kingston) segments aired September 10th and 28th, 2020 - Better for You Baking with Ontario Apples. Registered dieticians Shannon Crocker and Carol Harrison created and shared an apple-based muffin top cookie recipe, shown 3 ways, while sharing key messaging about how to find Ontario apples in stores and cook with them at home.

### TV Commercials

Commercials aired from mid-January to March on CHCH Primetime, Rogers TV (Breakfast Television, City News, CityLine), CTV daytime programming, and CP24 News, encouraging consumers to look for the Foodland logo and buy Ontario apples this winter.

### Radio Tags

Audio from TV commercials was repurposed and used in radio tags targeted at GTHA, Niagara, London, Kitchener, Ottawa, and Durham. In total, nearly 1,200 tags played over 12 weeks on 12 stations throughout the day Monday to Sunday.

## Print & Digital Media

### Condo Nest

Five second video spots ran daily on 130 screens in condominiums throughout the GTA from September to March advising that Ontario apples were available in stores nearly year-round. A full-page advertorial and recipe feature were also placed in the September/October (plus cover mention), November/December and January/February issues of Condo Nest magazine with 100,000 copies distributed monthly.

### Horizon Media

Five second video spots ran on 150 screens in GTA condos during the month of March, plus the 5,000 square foot wrap around billboard in Dundas Square for the first week. A full-page advertorial for Nutrition Month was also placed in the February/March issue of Horizon Food & Drink magazine.


### Social Media

This year we gained followers across all our social networks with the largest increase seen on our Instagram and YouTube channels, a similar trend to 2020. As of May 2021, we had:

- ✓ Facebook – 11,226 followers
- ✓ Instagram - 2,358 followers
- ✓ Twitter – 3,047 followers
- ✓ YouTube – 2,800 views

Select posts were 'boosted' to a targeted audience with 129,000 impressions captured:

- ✓ Economic Impact Video – 99,000 impressions
- ✓ Winter Availability Video – 19,000 impressions
- ✓ Grower Profile – 11,000 impressions

## Produce Made Simple Partnership

### Apple Charcuterie Contest

Produce Made Simple ambassadors developed instructional videos to show followers how to make a beautiful charcuterie board using Ontario apples as a main feature. Followers were then encouraged to enter a contest where they showed off their homemade boards tagging OAG and using hashtag #ONappleAday. These posts had 248K impressions and nearly 4,000 engagements (likes, shares, comments, etc.). The winner was sent apple picking with 3 friends this fall.

### Facebook LIVE Cooking Demos

Two influencers were selected to perform recipe demonstrations on Facebook LIVE. Andrea Buckett made an Apple Curried Chicken Salad and followed up with an Apple Cake dessert. Lisa Le (Viet Vegan) made Apple Pie Pancakes for Sunday brunch.

Throughout the video influencers were chatting with participants about Ontario apples and offering insights on how and why they use them whenever possible. In total, there were 2,100 live views, 150K impressions, and over 300 engagements

## Foodland Ontario Activities


### Radio Tags

- Ontario Apples were advertised on 196 stations during the weeks of September 7, October 5, October 19, and March 15

### Television Appearances

- Ontario apples were showcased August to December in 7 television appearances, reaching an audience of 45,900 Ontario consumers
- Editorial value of $164,400

### Print Articles

Foodland Ontario's recipe releases and newsletter "Fresh Perspectives" encourage more than 450 print/online and broadcast media outlets to write and talk about fresh Ontario food. Apples were featured in the Autumn 2020 issue (Indian Pork Burger with Apple Pear Chutney; Maple Apple Upside-down Cake), Winter 2020-21 issue (Apple Crumb Spiced Muffins; Apple Pie French Toast; Pork Medallions with Rosemary Apple Sauce; Maple, Apple, and Carrot Layered Cake; Apple Cheesecake Pizza) and Spring 2021 issue (Apple Cinnamon Walnut Scones and Hot Apple Sundaes).

**Website and Calendar**

Approximately 100 recipes that include Ontario apples can be found on the Foodland Ontario website. Apples were also featured in the 2020 Calendar in January in the Apple Pie French Toast recipe and in the Availability Guide. 250,000 English and 2,500 French copies were distributed at grocery retailers, farmers' markets, and on-farm markets.


**Retailer Display Contest**

Fall 2020 Apple Retail Display Contest ran from September 1st to November 14th with 275 entries received.

**Social Media**

- ✓ Facebook – posts in relation to Ontario Apples reached approximately 179,903 users and initiated over 4,018 engagements
- ✓ Instagram – posts in relation to Ontario Apples generated 153,888 impressions and 4,573 engagements
- ✓ Twitter – tweets in relation to Ontario Apples gathered 21,487 impressions and 499 engagements
- ✓ Pinterest – posts in relation to Ontario Apples generated 1,509 impressions and 59 engagements

Foodland Ontario also engaged in paid social media on Facebook/Instagram/Twitter with targeted ads generating 2.8 million impressions. Number of ads featuring apples:

- ✓ 10 in January
- ✓ 18 in February
- ✓ 14 in March
- ✓ 2 in April

The provincial government leveraged Foodland Ontario's strong relationship with the public to reassure consumers during the pandemic with messaging about Ontario's strong agri-food system, how to shop safely, not to hoard or stockpile groceries, and to support local businesses.

OAG thanks Foodland Ontario and Produce Made Simple for their ongoing partnerships and promotion of Ontario Apples. Follow along on social media @OntarioApples and #ONappleAday.

## ADVOCATING FOR COMPETITIVENESS AND INNOVATION

The Ontario Apple Growers objectives for this strategic direction are to:

- ✓ Advocate to maintain and improve access to crop protection tools to ensure grower competitiveness and sustainability
- ✓ Ensure growers have a reliable access to a qualified workforce
- ✓ Improve effectiveness of Business Risk Management (BRM) programs to help growers manage risks and stimulate industry growth
- ✓ Reduce regulatory overload on growers

### AgriStability

AgriStability covers margin declines caused by any combination of production losses, adverse market conditions or increased costs. If a producer's margin falls below 70% of their recent average, AgriStability helps to offset the difference. The following table shows Apple AgriStability Program participation and payments. Reporting is done by sector and can fluctuate year to year, as the annual sector determination is based on program-year reported income. Sector determination (apple, G&O, cattle, etc.) is based on income at or greater than 50% of total reported income in the program year. This means that an "apple" producer could be reported as a grain and oilseed producer (for example) if their apple income is less than 50% of their total reported income.

**AgriStability Apple Statistics**

(As of October 26, 2021)

| Year | Processed | Payments | Total $ | Average |
|---|---|---|---|---|
| 2020 | 85 | 10 | $ 228,811 | $ 22,881 |
| 2019 | 135 | 20 | $ 495,060 | $ 24,753 |
| 2018 | 29 | 8 | $ 136,410 | $ 17,051 |
| 2017 | 146 | 28 | $ 1,134,188 | $ 40,507 |
| 2016 | 159 | 27 | $ 621,918 | $ 23,034 |
| 2015 | 180 | 21 | $ 1,300,909 | $ 61,948 |
| 2014 | 193 | 53 | $ 1,579,291 | $ 29,798 |
| 2013 | 183 | 30 | $ 1,197,289 | $ 3,910 |
| 2012 | 208 | 89 | $ 2,343,273 | $ 26,389 |
| 2011 | 212 | 44 | $ 1,534,914 | $ 34,884 |

Note: Processing statistics represent files processed as of October 26, 2020. Potential for additional Apple file processing and payments is possible as processing for 2020 continues.

## Agri-Insurance (Production Insurance)

Production Insurance covers production losses and yield reductions caused by insured perils. Growers can choose the type and level of coverage that best meets their needs. The OAG communicates to government the needs and ensure a production insurance plan that is responsive to the changing needs of the Ontario apple sector.

**Apple Crop Insurance, 2012 – 2021**
**(As of November 4, 2021)**

| Year | Accounts | Liability ($000's) | Total Premiums* ($000's) | Grower Share of Premiums ($000's) | Total Claims** ($000's) |
|---|---|---|---|---|---|
| 2021 | 139 | $ 85,382 | $ 12,035 | $ 6,325 | unknown |
| 2020 | 140 | $ 75,619 | $ 10,195 | $ 5,344 | $ 5,234 |
| 2019 | 137 | $ 69,503 | $ 9,863 | $ 5,170 | $ 6,384 |
| 2018 | 135 | $ 62,202 | $ 9,292 | $ 4,811 | $ 4,569 |
| 2017 | 134 | $ 58,628 | $ 8,038 | $ 4,211 | $ 12,654 |
| 2016 | 142 | $ 49,843 | $ 8,632 | $ 4,516 | $ 2,835 |
| 2015 | 140 | $ 45,427 | $ 7,077 | $ 3,432 | $ 13,735 |
| 2014 | 143 | $ 41,128 | $ 7,868 | $ 4,112 | $ 2,828 |
| 2013 | 144 | $ 33,755 | $ 7,053 | $ 3,675 | $ 4,632 |
| 2012 | 140 | $ 34,866 | $ 3,482 | $ 1,528 | $ 26,858 |
| **5-year average** (2016 - 2020) | **138** | **$ 63,159** | **$ 9,204** | **$ 4,810** | **$ 6,335** |

* Total grower and government premiums

**Claims data refers to approved claims only

## AgriInvest

AgriInvest is an additional business risk management program that producers can use to either cover small income declines or support other investments. Each year, producers can deposit up to 100% of their Allowable Net Sales (ANS) with the first 1% matched by governments. The limit on matching government contributions is $10,000 per year. ANS are the net sales of most primary agricultural commodities. Producers can withdraw funds at any time.

## Self-Directed Risk Management (SDRM)

Ontario's Risk Management Program (RMP) helps producers manage risks beyond their control, like fluctuating costs and market prices. Under the RMP plan for edible horticulture, producers deposit funds into self-directed risk management (SDRM) accounts and the deposit is matched by the government to help mitigate risk associated with farm business.

Agricorp sends personalized participation forms along with the Handbook (for new participants) and the Rates, Dates and Updates Information Sheet to eligible producers in September. The participant handbook and information sheet work together to provide all the information you need to participate in SDRM.

The Ontario government has announced an increase in available funding for the Risk Management Program (RMP), from $100 million to $150 million, starting with the 2020 program year. RMP helps farmers manage risks beyond their control, like fluctuating costs and market prices.

### Commodity Loan Program (CLP) & Advance Payments Program (APP)

Apple growers currently have access to two government cash advance programs through Agricultural Credit Corporation. Both programs are available to all apple growers in Ontario.

The **Commodity Loan Program (CLP)** is a provincial government cash advance program that provides up to $750,000 of available financing at bank prime rate. The program begins October of each year, and advances are required to be paid the following year in September (24 months). Producers must utilize production insurance to participate.

The **Advance Payments Program (APP)** is a federal government cash advance program that provides up to $1,000,000 in available financing to producers with the first $100,000 interest free and the balance at the bank prime rate. Apple growers can access this program starting April 1st of each year based on anticipated production using either Production Insurance or AgriStability insurance. After October 1st of each year, security may be based on inventory on hand, without the Production Insurance or AgriStability requirement.

The application process can be completed by the producer by simply contacting Agricultural Credit Corporation office and completing the application over the phone with one of their trained staff. Producers who are interested in applying or have questions regarding either program can contact the ACC office for further information at 1-888-278-8807 or by visiting www.agcreditcorp.ca for details and updates.

## KEEPING MEMBERS INFORMED

Communications to the membership was increased again this year given the ever-changing landscape. While our newsletters were sent to the members, either by email or regular mail, there was an increase in email communication informing and sharing information about the pandemic and impacts to the horticulture sector. The OAG also continued to distribute OMAFRA's *Orchard Network Newsletter* four times a year.

The OAG web site continues to provide a lot of information. A Covid-19 Resources page continued to be updated as needed and is accessible under the "Grower" section. Additional information including newsletters, industry statistics and information are always available here as well. OAG members can log into this at any time with their grower number. There is also a Classifieds section on the Grower section of the website.

### Worker Health & Safety

In partnership with Ontario Tender Fruit and Fresh Grape Growers, we developed an Infection Control and Prevention Policy for members in 2020 and this was updated in 2021. This document is an addendum to the previously provided Health and Safety Modules for the sector. The documents are developed by Worker Safety & Prevention Services (WSPS) with funding from the Government of Ontario.

### Pick-Your-Own Covid-19 Guidelines

The guidance document for Pick-Your-Own apple operations was updated in June for members. The document is available on the OAG Covid-19 resources web page.

### Ontario Tree Fruit Technology & Innovation Roadmap


A new resource was developed in partnership with OMAFRA to identify technologies that may help reduce labour costs/mitigate the impact of COVID-19 and increase overall efficiencies on tree fruit farms in Ontario. The information learned from research and discussions with growers and industry stakeholders is available on our website. There is a main report with all the information or one can view individual fact sheets on each of the technologies.

### CropTracker

The web-based system CropTracker is available to Ontario Apple Growers members as an online system providing a comprehensive tool for growers. Developed especially for the fruit and vegetable industry, the Canadian-made crop management software platform is used by growers, associations, and cooperators of all sizes. The platform schedules and tracks crop protection use, harvest data, cuts operational costs associated with creating GAP reports and auditing, enhances traceability, and provides data so operators can make more informed decisions.

In partnership with the Ontario Tender Fruit Growers, we have helped develop modules to integrate aggregate data collection and reports. For example, Form 1s, storage holdings, yield estimates and marketing information will be submitted electronically. The development of this enterprise system will speed up data collection and dissemination of information which will greatly benefit the activities undertaken by the OAG.

### Fire Blight Risk Maps

Fire blight is a very devastating bacterial disease of apple and pears. The models available (Maryblyt and Cougar Blight) are intended to be site specific. However, many apple growers have indicated time constraint challenges in collecting and entering environmental data daily into the models to determine fire blight infection risk during bloom.

The 7-day weather forecast data from 72 sites, representing most counties in southern and eastern Ontario where apples are grown, was put into the Cougar Blight model, and updated 3 times per week during apple blossom time April 16 - June 7, 2021. Regional risks were developed into animated maps that were posted on the ONfruit blog and the link was emailed to OAG members.

A recap of the year can be found on ONfruit at http://www.onfruit.ca/fire-blight-map. Overall, Cougar Blight infection risk potential was high to extreme for most areas of the province from May 18 – June 1 - 7, 2021. The OAG sincerely thanks and acknowledges Kristy Grigg-McGuffin, OMAFRA Horticulture IPM Specialist and Jade Lo, OMAFRA Summer Student for delivering this valuable service to the Ontario apple growers in 2021.

### Cost of Establishment and Production

The OAG will be working with OMAFRA specialist in early 2022 to update this document. The last update was in 2019 using 2018 costs and reflects current management practices being used by apple growers today. The COP provides information for both high-density and medium-density planting systems.

### Ontario Young Apple Farmers

Since 2014, the Ontario Young Apple Farmers group has been bringing together new and young apple farmers in Ontario as a way for them to network and learn from each other. The group continues to grow with over 60 members. The group continues to use a text/chat group to continue their conversation and learn from each other daily.

## IMPROVING FRUIT QUALITY AND ORCHARD EFFICIENCY

### Research and Development

The OAG has secured more than $450,000 in research grant funding this year while providing $58,664 in grower seed funding to additional projects. Each year, the Research Committee meets with research extension staff to review minor use priorities and discuss research project results and proposals. Our research priorities are as follows:

**1. <u>Technology, Mechanization, Automation & Efficiencies</u>**

Increased production efficiencies using the latest technologies and precision agriculture that take into consideration the economic viability for apple growers. Research could include:

- Labour efficiencies
- Pest management and crop protection efficiencies
- Weather risk efficiencies
- Water use efficiencies
- Modelling (for example, Ontario solutions using existing models for crop load management and integrated pest management)
- Remote sensing, software development and robotics
- Technology in storage and packing efficiencies
- Orchard design

**2. <u>Sustainable Practices</u>**

Optimizing sustainable cropping practices for conventional or organic production according to variety and climatic conditions. Research could include:

- Crop load management
- Training systems
- Carbon capture
- Irrigation
- Fertigation
- Soil management
- Nutrition

**3. Maximizing Quality & Minimizing Losses**

Crop maturity management and post-harvest storage conditions and treatment strategies with the goal of delivering a larger percentage of high-quality fruit for the fresh market. Research could include:

- Post-harvest research developing storage regimes for in-demand varieties
- Optimal harvest management and timing
- Strategies to reduce storage disorders

**4. Variety & Rootstock Development and Evaluation**

Variety and rootstocks development and selection according to consumer preferences and their performance in the different regions with the goal of achieving greater market share. Research could include:

- New variety breeding and evaluation
- Scion and Rootstock evaluation (i.e., winter hardiness, drought efficiency)
- Genomics
- Consumer preference studies

The following is a synopsis of the many research projects that the Ontario Apple Growers has either managed or provided support (financially or in-kind).

**Improving outcomes for Ontario apple producers though precision agriculture and labour efficiency strategies – Dr. John Cline, University of Guelph, Erika DeBrouwer, and John Molenhuis, OMAFRA, C. Bakker and L. Reis, University of Guelph**

A three-year University of Guelph/OMAFRA Alliance project funded in part by the OAG, was initiated in 2020 to investigate advanced precision crop load management strategies and mechanical pruning in Ontario apple orchards. The overall aim of the project is to increase orchard fruit quality and efficiency and decrease the need for manual hand thinning and pruning.

There are three components of the research:

A. Crop load management
    a. Compare and validate crop load management models in development or not in use in Canada (Carbohydrate Model, Pollen Growth Tube Model and model called BrevisSmart in development by ADAMA).
    b. Evaluating the pollen tube growth model developed and used in the USA
    c. Determine the effect of chemical thinning on uniformity (variation) in fruit size distribution
B. Exploring the benefits of mechanical hedging
    a. Measure the cost-benefit analysis of mechanical hedging on labour savings
    b. Measure apple tree response to mechanical hedging at different timings in combination with dormant hand pruning on tree health
    c. Perform a cost-benefit analysis of hedging in the winter and summer for the purpose of reducing labour, increasing light penetration (summer), and increasing bud formation (summer).

**Experiment 1.1: Response of Gala apples trees to timing of mechanical pruning/hedging on fruit quality, production, size distribution, vegetative growth and return bloom**

A high-density tall-spindle block of Brookfield Gala/M.9 trees spaced 0.9 x 3.0 m planted in 2017 will be

used for this experiment. Over the winter of 2019/20, trees were pruned when dormant using a mechanical hedger. The pruning bar was maintained vertically to ensure a uniform canopy width between the top and bottom of the tree. The top cutting bar will be kept 30 cm above the top wire to maintain a tree height of 2.80 m. Trees will be hedged at 30, 60 and 90 days after bloom and when dormant. Touch up dormant pruning to remove dead and diseased wood, low lying limbs, vertical limbs, and vigorous shoots (with a diameter > 50% of their attending branch) will be performed as necessary. This process will be repeated yearly for the life of the project. Tree canopy width, crop load, time to prune and notes on ease of management and suitability for mechanization will be made. In addition, shoot extension growth, fruit size distribution, mean fruit size, total yield and marketable yield, fruit colour, fruit quality, current season vegetative growth, pruning weights, and return bloom will be measured.

Data will be collected on the labour hours used manually for each pruning session, labour hours used by mechanical hedger for each pruning session, fuel/maintenance used for mechanical hedger at each pruning session, and observations on tree and fruit condition for each method. Cost analysis will be performed in consideration of increases in available cash due to factors such as increased fruit size, production and quality, reduction in cash outflow in labour savings, added cash outflow from mechanical hedger operating and ownership costs, and decreases in available cash due to factors such as tree and fruit damage, reduced yield, or quality.

**Experiment 2.1: Efficacy and timing of chemically thinning apples with the metamitron**

A three-year investigation on the efficacy of metamitron, a new thinning compound in development by Adama Canada Ltd. will be evaluate on Gala or Ambrosia trees. The primary goal will be to evaluate different rates, timings, of metamitron and use of a surfactant on thinning efficacy and to compare these with hand thinned and 6-BA and carbaryl controls. Trees will be assessed for fruit set, yield, weight, tree growth, commercial size distribution and return bloom.

**Experiment 2.2: Efficacy and timing of thinning apples with the new compound 1-ACC**

A three-year investigation will investigate the efficacy of 1-ACC, a new thinning compound in development by Valent BioSciences. The primary goal will be to evaluate different rates, timings, of 1-ACC on thinning efficacy and to compare these with hand thinned and 6-BA and carbaryl controls. Trees will be assessed for fruit set, yield, weight, tree growth, commercial size distribution and return bloom.

**Experiment 2.3: Evaluating available fruit thinning models (Malusim, BreviSmart and Pollen Growth Tube Model) to assist with timing and rates of chemical fruitlet thinners and blossom thinners.**

**2.3.1 Efficacy of using Malusim and BreviSmart to determine the rate of chemical thinner**

This experiment will be conducted at the Simcoe Research station and grower sites to evaluate the Malusim and BreviSmart fruitlet chemical thinning online models. The Malusim model runs on the NEWA platform (available via Cornell University) and thus far we are continuing to seek their approval to link into this network. The BreviSmart fruitlet model is available for research evaluation and is being optimized by Adama. It is our understanding the model will become available when Brevis registered in Canada.

**2.3.2 Efficacy of a Pollen Tube Growth Model to determine timing of blossom thinner application**

Beginning in 2020, a blossom thinning experiment was conducted on Brookfield Gala trees at the Simcoe Research Station to explore the efficacy of thinning with lime ATS and lime sulphur with and without post-bloom sprays of carbaryl combined with 6-B. Application timing was determined using a pollen tube growth model (PTGM) developed in the United States. Trees will be assessed for thinning efficacy, crop

load, fruit size and yield, commercial size distribution and return bloom. Preliminary observations indicate blossom thinning treatments are effective in reducing crop load and increasing fruit size.

### 2.3.3. Pilot testing of Malusim and Pollen Tube Growth Model (PTGM) predictive models with Ontario Apple Growers Producers

Subject to reaching an agreement with the University of Guelph and NEWA, data collected in real-time from Onset weather stations in 3 to 5 Ontario orchards will be used to assess the benefits of using the Malusim and PTGM models to growers. The tree fruit specialist will coordinate with growers how to use the output from the models and their experience in using the models to improve precision thinning strategies, and the likelihood of broader industry adoption. Despite attempts to engage NEWA, no substantive progress has been made with Cornell University in accessing these models on the NEWA website using real-time and forecasted Ontario weather.

### Incidence, timing of infection, and management of bitter rot in Ontario - Asifa Munawar, Stephen Reynolds, Cathy Bakker, Vivian Adams, Mary Ruth MacDonald and Katarina Jordan, University of Guelph, Kristy Grigg-McGuffin, and Katie Goldenhar, OMAFRA

Bitter rot, caused by *Colletotrichum fioriniae* is an emerging disease in Ontario. Before 2010, the disease was mostly documented in the southern USA, Central, and South America. The fungus can live asymptomatically in apple fruit before inducing visible symptoms. This mechanism of infection leads to the sudden appearance of symptoms, especially in storage. The cryptic nature of this pathogen makes it challenging to control since the timing of fruit infection is not known under Ontario conditions and few effective fungicides are registered in Canada. There are also reports from the USA of developing fungicide resistance in *Colletotrichum* isolates.

The objectives of the project are to determine:

1. Incidence of bitter rot in Ontario orchards,
2. Timing of fruit infection,
3. Sensitivity of isolates to currently registered fungicides, and
4. Efficacy of different fungicides to better manage the disease.

In 2020, the work was carried out on objectives 1, 2, and 3 of this project.

Objective 1, fifteen apple orchards were scouted from September to November 2020 for visible symptoms of bitter rot on fruit. The incidence of bitter rot was primarily recorded on the cultivars Empire and Ambrosia. In the absence of any of these cultivars in the study orchard, the cultivar Honeycrisp or Gala was selected. In each study orchard, 100 asymptomatic fruit (10 fruit per tree) per cultivar was collected for post-harvest analysis. The cumulative incidence of the disease was calculated using the number of trees infected both in the field and storage for each cultivar. The cumulative incidence of bitter rot was low to medium in the 2020 crop season. Empire had the highest incidence of infection followed by Ambrosia, Honeycrisp, and Gala. District 2 had the highest incidence of infection on all cultivars surveyed followed by Districts 1, 5, 3, and 4.

Objective 2, the timing of fruit infection was studied by weekly inoculation starting from early fruit set (fruit size 5mm) and the weekly collection of asymptomatic apple fruit from the selected orchard. Inoculum presence in the orchard was measured by collecting fungal conidia in rainwater. Weather data of the study orchard was collected to determine the periods of infection risk of the disease using the HOBO

weather station. The results indicated that apple fruit can become infected at any stage of fruit development. The symptoms may or may not appear in the field depending upon the fruit size, inoculum presence in the orchard, and favorable weather conditions. The symptoms were observed in the field starting from fruit size 32 mm and at post-harvest. This work was repeated in 2021 and data is currently being analyzed.

Objective 3, 36 bitter rot isolates were tested for their sensitivity to pyraclostrobin (active ingredient in Pristine and Merivon fungicides), and 27 isolates were tested for their sensitivity to the commercial fungicide, Captan using mycelial growth assays. The fungus was found to be sensitive to pyraclostrobin at low concentrations (<0.1ug/ml). The commercial fungicide Captan was able to inhibit 50 % of mycelial growth at <100ug/ml. This indicated both these products should still be effective for Ontario growers to use in their orchard. However, this conclusion is based on preliminary results. Testing of more isolates may change the outcomes.

The project is funded by the Ontario Agri-Food and Innovation Alliance with support from the Ontario Apple Growers.

**Rapid Apple Decline Research Update - Jonathan Griffiths and Oualid Ellouz, AAFC**

Despite setbacks due to the COVID-19 pandemic, multiple pathogens and biotic issues associated with Sudden Apple Decline (SAD) have been identified in the final year of the project. *Diaporthe eres*, *Diplodia seriata, Cytospora leucostoma* and other less commonly isolated species were identified in diseased trees. When inoculated into healthy trees, all these fungi can produce apple decline-like symptoms including branch die off and cankers on branches and trunks. *D. eres was* isolated in Nova Scotia, Ontario and British Columbia apple orchards exhibiting SAD. However, *D. seriata and C. leucostoma* were isolated only in Ontario and British Columbia. These fungal pathogens likely contribute to tree death and decline.

In Ontario, multiple viruses have been identified in Ontario which include Apple stem pitting virus, Apple luteovirus 1, and Apple rubbery wood virus 1 and 2. Additional viruses have been identified, but none seem to be specifically associated with tree decline. A novel species of virus infecting apples has been putatively identified in BC; however, further research is being conducted. To understand the pathology of this relatively novel virus, an infectious clone of Apple luteovirus 1 has been developed.
Ambrosia beetle populations were monitored in 2019 and 2021. The most abundant species appears to be black stem borer, an invasive species that can attack healthy trees. The abundance and pathogenicity of all pathogens identified in this study vary with year and location.

While multiple pathogens associated with SAD have been identified, none seem to be present in all instances of the disease. These same pathogens have also been isolated from symptom free trees. Furthermore, field and greenhouse-based trials conducted in ON and BC show no correlation between herbicide applications and presence of SAD symptoms. Since there are no common pathogens in all cases of SAD, it is not possible at this point in time to identify a singular causative agent. However, detailed examinations of growing conditions and tree physiology indicate that decline is often associated with drought stress conditions and/or dramatic changes in weather and climatic conditions. In summary, multiple field observations and focused plant pathology research studies have contributed to the consensus opinion that there are multiple and possibly interacting factors that contribute to tree decline problems and the contributing factors may vary with year and location. Future research should focus in identifying the combinations of factors that are closely associated with decline within a growing season.

## Harvest Quality Vision (HQV) and Streamlined Connectivity Tech for Ontario Fruit Trees – Matt Deir, Dragonfly IT, Kathryn Carter, Wendy McFadden-Smith, Erika DeBrouwer and Kristy Grigg-McGuffin, OMAFRA

Ontario Apple Growers (OAG) and the Ontario Tender Fruit Growers partnered with DragonFly IT to research, pilot, and demonstrate 3 new CropTracker features that have the potential to greatly improve harvest efficiency, inventory management, production quality, promotion planning, marketability, and sales of tree fruit in Ontario. Objectives include:

**1) Scanning Trees for Crop Load Detection**
The project will formulate industry requirement specifications in Ontario for crop load detection, conduct dual process crop load estimate tests, further develop, and optimize Harvest Quality Vision (HQV) technology to scan trees for crop load based on established specific requirements and conduct validity/accuracy tests. HQV technology will be further developed, based on Ontario industry requirements, to detect the number and size of fruit production on trees.

**2) Scanning Fruit for Defect Detection**
The project will formulate industry requirement specs in Ontario for crop defect detection in the bin, further develop and optimize HQV technology to scan for fruit defects based on established specification requirements and conduct validity/accuracy tests. HQV technology will not only detect size and colour with a high degree of accuracy; but will incorporate artificial intelligence to identify defects on fruit in the bin, providing growers with reports and statistics on the number of defects on picked fruit in bins prior to packing.

**3) Seamless Internet Connectivity - "Off-line Mode"**
The project will formulate industry requirement specs in Ontario to establish which key modules require the "off-line mode" feature, develop the off-line mode feature based on established specs and test the processing and accuracy of data flow using this new feature. Key modules will see an improvement in "ease of use", efficiencies gained and in accessibility for all users.

The OAG would like to sincerely thank and acknowledge the assistance of OMAFRA staff Kathryn Carter (including her summer students Wynne Reichheld and Celina Simonnet), Erika DeBrouwer, Wendy McFadden-Smith, and Kristy Grigg-McGuffin for providing many hours of technical support and expertise to this project.

## Automated Fire Blight Detection and Digitization for Apple and Tender Fruit – Dr. Medhat Moussa, Cole Terry, and Matthew Veres, University of Guelph, Kristy Grigg-McGuffin, and Wendy McFadden-Smith, OMAFRA

This project objective is to develop automated systems for the detection of fire blight. This system will be part of an automated farm digital library (AFDL) that will include precise information on every tree in an orchard. The proposed system will enable inspecting *every tree* at a frequency of 1 – 2 times/week or even higher. The results will be digitized in the AFDL, enabling comparison over time with IPM strategies and labour utilization.

The focus of the work performed this summer was data collection (imaging of blossom and shoot blight infection) and initial algorithm development. Over the course of the summer data was collected from 4

orchards in Niagara and Norfolk regions. Each orchard was visited bi-weekly by OMAFRA specialists, who flagged all instances of fire blight in pre-determined set of rows. Our research team visited each field after the flagging was complete and captured images of each tree that that was flagged. Six images were captured of each tree, three from each side of the tree. Each orchard was imaged 5 times over the course of 10 weeks.

The images were visually tagged to identify the type of tree and location in the field. The images were then organized and stored digitally in file structure for further processing. This process allowed us to collect images of infected trees over the course of the summer and capture how the disease progressed over each of the two-week intervals. Roughly 6700 images were collected following this procedure.


Images containing fire blight were then labelled to identify which pixels in each image showed the disease. Preliminary machine learning algorithms were trained using these labelled images to identify instances of fire blight present in the images. Further training and algorithm refinement is currently ongoing to improve the results.

The initial data collection was performed manually using a point and shoot SLR camera and tripod. A new data collection system is being built based to automate more of the imaging procedure and improve the accuracy of tree identification and localization. Color spectrums beyond the visual spectrum will also be included in the new data collection system to further enhance range of data available for early or pre-symptom detection.

**Early Alert of Airborne Fungal Disease and the Determination of Fungicide Resistance in Several Southern Ontario Horticultural Crops using Air Sampling Monitoring – Michael Selah, Spornado Inc., Dr. Wendy McFadden-Smith, Erica Pate, and Kristy Grigg-McGuffin, OMAFRA**

The purpose of this project is to develop molecular tests for the rapid detection of crop disease pathogens in the air and the molecular identification of fungicide resistant alleles in pathogenic spores. These diagnostic tests will provide information to growers that will allow them to better choose and time their pesticide use, and thereby reduce it. Knowing when primary inoculum is available could reduce the number of fungicide applications required. Information on fungicide resistance would provide early detection of a shift in the pathogen population from primarily susceptible to resistant would assist growers in making decisions regarding fungicide selection and improve the quality of the fruit produced. The

diseases targeted in the project will be powdery mildew in grapes, anthracnose in strawberries and apple scab in apples.

**Using Genetic Tests to Confirm Herbicide Resistant Weeds – Kristen Obeid, OMAFRA Weed Management Specialist, Horticulture**

Since 2016, this project has created 19 genetic quick tests (more in progress) to assist in identifying herbicide resistance in 14 weed species and confirmed 121 new cases of herbicide resistance in Ontario crops. These tests deliver a diagnostic and a recommendation to the grower within the same growing season. Traditional resistance testing in the greenhouse can take from three months to a year to get results back to growers. Now, leaf tissue instead of seed is collected. DNA is extracted from the leaf tissue to determine if there is a change in the sequencing resulting in a mutation making the plant resistant.

Tests have been developed to differentiate between Brassica and Amaranthus (pigweed) species. Tests differentiating pigweed species have been instrumental in confirming new cases of waterhemp in Ontario, Manitoba, and Quebec. Once confirmed, the waterhemp is tested for Groups 2, 5, 9 and 14 resistances.

Tests were developed this year for Groups 2, 5 and 7 resistant giant ragweed, Group 9 resistant Italian ryegrass, Group 9 resistant common ragweed, as well as Group 14 resistant green pigweed. A new mutation conferring resistance to Groups 5 and 7 was found in green pigweed. Does response experiments will be completed to verify these genetic test results.

The most significant trend is the number of fields with multiple resistant species:

- Common ragweed resistant to herbicide Groups 2 and 5 in pumpkins and 2, 5 and 7 in soybeans and sunflowers.
- Redroot and green pigweed resistant to herbicide groups 2 and 5 in tomatoes
- Redroot and green pigweed resistant to herbicide Groups 5 and 7 in carrots and potatoes
- Waterhemp resistant to herbicide Groups 2, 5, 9 and 14 in asparagus, peppers, corn, soybeans, and white beans.

Another significant trend is the increased documentation of Canada fleabane resistant to glyphosate (Group 9) in apples, grapes, blueberries, strawberries, carrots, onions, and pumpkins.

Testing is now being completed in Ontario by Harvest Genomics: www.harvestgenomics.ca.

This testing has been instrumental in documenting new cases of herbicide resistant weeds. In 2021, 96% of the fields tested in Ontario were resistant to at least one herbicide group. Once confirmed producers were provided the resistance profile enabling a change in management to mitigate spread. Producers, agri-business, and consultants that participated in the project were pleased with the timely results, welcomed the in-season management recommendations, and highly value this service.

There are many more undocumented cases of herbicide resistant weeds in Canada. The resistance mechanism is unknown for most of them. The major concern is their distribution and economic impact for producers. Knowing where resistant biotypes are located will improve management and maintain the longevity of our crop protection tools.

Project partners, along with the OAG, include AAFC, AAFC-PMC, Bayer CropScience Inc., FMC Canada, FVGO, MAPAQ, OFVGA, OPVG, and Syngenta Canada Inc.

### Canadian Tree Fruit Products Development – Erin Wallich, Summerland Varieties Corporation, Erika DeBrouwer, OMAFRA, Leslie Huffman, and Maureen Balsillie

The Grower Testing project is led by the British Columbia Fruit Growers' Association (BCFGA) in partnership with Ontario Apple Growers (OAG), Summerland Varieties Corp. (SVC), Scotian Gold and the Québec-based consortium, Le réseau d'essai de cultivars et de porte-greffes de pommiers (RECUPOM).

The partners work with the apple breeding staff at Agriculture and Agri-Food Canada's Summerland Research and Development Centre (Summerland RDC) in Summerland, BC to test promising new apple selections under a range of growing conditions. The project receives funding through the Agri-Science Program and will continue for another 4 years with funding from the federal government and all the partners, including those mentioned above plus Vineland Research and Innovation Centre (Vineland).

For more than 10 years, 10 grower-cooperators across the province planted advanced selections of apple breeder's selections to evaluate for suitability for various climatic regions and markets in Ontario. Each cooperator was provided with the trees and asked to plant a supported system. The OAG would like to thank our cooperators for the time and expertise that they have provided to this project.

Below is a chart of the plantings:

| Year | Sites | Selections |
|---|---|---|
| 2012 | 11 | 7 (AAFC/SVC) |
| 2015 | 11 | 5 (4 AAFC/SVC<br>+ Evangeline AAFC/NB) |
| 2016 | 10 (2 new,<br>3 declined) | 4 (3 AAFC/SVC<br>+ 1 from U Minnesota) |
| 2018 | 2 larger plots | 4 best from 2012-2015 |
| | 7 (to date) | 7 new (2 from VRIC,<br>4 from AAFC/SVC,<br>1 from AAFC Ontario test plots (2000)) |
| 2019 | 10 | 1 (AAFC/SVC) |
| 2021 | 10<br>8 | 5 (AAFC/SVC)<br>9 (Star Fruit/France) |

### 2021 Apple Breeding Program Update - Rachael LeBlanc, Vineland Research and Innovation Centre

Breeding apples with high consumer appeal continues to be the focus of the breeding program. Approximately 33,000 unique seedling trees have been created and planted at Vineland since 2011, with 3,600 of those being planted in 2021. Parents used to create new seedlings are selected based on their consumer appeal such as texture and flavour along with storage attributes and disease

tolerance/resistance. All Test 1 (T1) selections undergo three seasons of fruiting while being considered for advancement to Test 2 (T2).

To bring further efficiency to the program, this year the Vineland breeding team implemented a new laboratory test, a "molecular marker", for key aroma biochemicals contributing to apple flavour. This marker is used at the seedling stage so we can begin selecting for flavour before the seedlings are even planted in the T1 block. Use of this marker will enrich our population with apples containing aroma attributes that consumers find desirable. Vineland believes these aroma markers will be a distinguishing characteristic of the breeding program that will give us an edge in the marketplace.

The breeding team advanced 20 selections from the T1 to the T2 stage at Vineland, bringing the total number of advanced selections to 75. The T2 stage consists of 8 trees per selection grafted onto M9 rootstock. Every year, fruit from T2 trees is evaluated by our trained sensory panel to help determine which selections will be advanced for further commercial grower testing.

A very exciting development this year was the planting of three T2 selections at five farms across Ontario (one in each growing district). This is the start of our Test 3 (T3) evaluation phase. Data will be collected including agronomic traits, pest and disease tolerance and fruit quality data. The goal is to identify the selections that are the best suited for growing in all of Ontario's growing districts.

Additional T3 trees will be available each year and more test sites will be added in Ontario and across Canada in the coming years. Any growers interested in planting test trees should contact Rachael LeBlanc at rachael.leblanc@vinelandresearch.com.

This research is supported by Ontario Apple Growers through the Agriculture and Agri-Food Canada AgriScience Program and the Ontario Ministry of Agriculture, Food and Rural Affairs-University of Guelph Partnership Program.

**Impact of climate change on insects: OBLR and heat waves - Shelley Adamo, Dalhousie University, Suzanne Blatt, AAFC, Russell Easy, Acadia University, Raymond Spiteri, University of Saskatchewan**

The Canadian climate is experiencing climate change with warmer temperatures, including heat waves, during the growing season. Insects in the more northern part of their range may not be adapted to these increased temperatures and will express this in a few ways. Insects may thermo-regulate by increasing their movement within the habitat thus increasing their potential for predation or desiccation. They may also be more susceptible to pesticides such as DiPel (Bt) or Altacor. Current research is showing some insects to be more susceptible to some classes of pesticides and less susceptible to other classes of pesticides. Using the oblique-banded leafroller (OBLR) as a model insect, the project has the following objectives:

1. To observe OBLR instars on apple trees during heat waves for any thermo-regulation behaviors
2. Using incubators, evaluate the impact of heat waves on 3rd instar OBLR development, survival, and response at the molecular level (immune and detoxification pathways)
3. Using incubators, evaluate the impact of heat waves on OBLR development, survival, and response at the molecular level (immune and detoxification pathways) when exposed to pesticides (heat wave exposure to occur before, during and after the pesticide application, and pesticides to be applied at 5 different rates). Pesticides to be studied: DiPel (Bt), Altacor and Confirm.
4. Validate laboratory observations by applying products to caged OBLR on apple trees during heat waves
5. Develop an App to guide growers on what rate and when to apply these products in relation to heat waves for best efficacy

This NSERC Alliance funded project was awarded in March 2021. Drs. Adamo, Blatt and Easy identified a student to conduct the work associated with Objectives 1 and 2 and were anticipating starting in May. Due to COVID-19 and the lock-down in Nova Scotia, the student was only able to access the field site (AAFC Kentville) and conduct observations from May through July. In early August the student had access to the AAFC Kentville labs and started the incubator studies. The first round of experiments is now complete, and the molecular evaluations are underway. There is a graduate student anticipated to continue working on this project starting January 2022.

**Optimized Multi-Task Netting Systems for Next Generation Orchards - Gérald Chouinard, IRDA**

This project will run from 2020 until 2025 with the objective to help the Canadian apple industry cope with labour and pesticide challenges. By using exclusion netting, narrow fruiting walls, and mechanized operations, it will be possible to implement an integrated system of precision farming that will facilitate the production of high-quality fruits, continue to reduce pesticide use, and protect crops from climactic extremes such as hail.

Netting structures have been designed and ordered in 2020 and installed in 2021 in the experimental orchard of the Research and Development Institute for the Agri-environment (irda.qc.ca). This project will:

- Measure the effects of mechanical pruning on apple trees trained as a narrow fruiting wall orchard system suitable for mechanized pruning and harvesting
- Measure the effects of multi-task exclusion systems on insecticide, fungicide and herbicide use, protection from climatic events such as hail and frost, and fruit quality.
- Investigate the performance of single-leader trees vs multi-leader trees

Project partners along with the Ontario Apple Growers include Agriculture Agri-Food Canada, British Columbia Fruit Growers Association, New Brunswick Fruit Growers, Nova Scotia Fruit Growers Association, Les Producteurs de Pomme du Quebec, Imaflex Inc., and Artes Politecnica.

## Canadian Agri-Science Cluster for Horticulture 3

The following two industry-driven projects, which were common throughout the collaborating provinces, are being investigated with funding from the Canadian Agri-Science Cluster for Horticulture 3 with total funding of $1.3 million over 5 years (2018 to 2023). These projects are generously funded through the Canadian Agri-Science Cluster for Horticulture 3, in cooperation with Agriculture and Agri-Food Canada's AgriScience Program, a Canadian Agricultural Partnership initiative, the Canadian Horticultural Council and industry contributors. The OAG would also like to recognize and thank the Apple Marketer's Association of Ontario (AMAO) for their funding contribution.

### Optimizing Storage and Postharvest Practices to Reduce Apple Loss and Improve Quality – Dr. Jennifer DeEll, OMAFRA

Data from 2020-21 season are currently being analyzed and summarized. Updates from 2019-20 storage season follow.

**Objective 1. Optimize postharvest practices and storage regimes for rising cultivars**

1.1. Three temperature regimes for six 'Honeycrisp' orchards with varying susceptibility to bitter pit were evaluated for the 2019 storage season. In addition, in collaboration with Dr. Chris Watkins from Cornell University, along with research colleagues in Maine, Maryland, Michigan, Pennsylvania, and Washington state, a Passive Method and the Genomics Approach were evaluated to predict bitter pit in 'Honeycrisp' apples. These predictions methods were not consistent among regions or orchards and the data continues to be analyzed in detail. The temperature regimes with a Passive Method to predict bitter pit in seven 'Honeycrisp' orchards was further being evaluated in Ontario for the 2020- 21 season.

1.2. Six storage temperature regimes for 'Honeycrisp' apples from Quebec were evaluated during the 2019 storage season. Interrupting air storage at 3 or 0.5o C after 1 month with 1 day at room temperature did not significantly reduce soft scald incidence. However, this interruption increased lenticel breakdown and rot development. Further storage temperature combinations were investigated in the 2020-21 season.

1.3. Delayed controlled atmosphere (CA) storage in combination with postharvest 1-MCP or diphenylamine (DPA) treatment were evaluated in 'Honeycrisp' apples. After 6 months of storage at 3o C, there was very little disorder development (1% or less) and there were no significant differences among treatments. 1-MCP-treated fruit had significantly higher soluble solids concentration (~0.5%) and malic acid content (~10%) than those from other treatments. Varying treatment combinations were evaluated in the 2020-21 season.

1.4. 'Cortland' apples from Quebec were treated one to three times postharvest with 1-MCP and held in CA storage at 0.5 or 3o C. After 8 months of storage, apples held at 0.5o C developed substantially more internal browning than those held at 3o C (19-26% vs. <1% respectively). More than one application of 1-MCP had little additional effect. This was investigated further in the 2020 – 2021 season.

**Objective 2. Evaluate new low oxygen storage and dynamic regimes to reduce apple loss**

**2.1.** Postharvest 1-MCP treatments before or after storage were evaluated for 'Ambrosia' apples in combination with low oxygen storage (1.7 vs <1% $O_2$) at 0.5$^o$C. Low oxygen at <1% was based on fruit respiration measurements using dynamic SafePod$_{TM}$ technology. After 8 months of storage, apples held in <1% $O_2$ (low of 0.4%) had significantly less internal browning than those held in 1.7% $O_2$. Furthermore, 1-MCP treatment at harvest time resulted in higher incidence of browning (12%), compared to fruit not treated or those with 1-MCP after storage (2.5 and 1.4%, respectively). There was little significant difference in fruit firmness among treatments.

**2.2.** Postharvest 1-MCP treatment before or after storage was also evaluated for 'Honeycrisp' apples in combination with low oxygen (3 vs ~1% $O_2$) at 3$^o$C. Low oxygen at ~1% was based on fruit respiration measurements using dynamic SafePod$_{TM}$ technology. After 8 months of storage, there was low oxygen injury in apples from both $O_2$ regimes, although 1-MCP treatment appeared to slightly reduce it. Purpling skin discoloration and flesh browning were the major symptoms. This is currently being investigated further.

**2.3.** 'Gala' apples with or without preharvest 1-MCP application (Harvista$_{TM}$) were treated with or without postharvest 1-MCP (SmartFresh$_{TM}$) before or after CA storage with low oxygen (1.5 vs 0.6% $O_2$) at 0.5$^o$C. After 8 months of storage, apples held in 0.6% $O_2$ had less internal browning than those held in 1.5 $O_2$ (0-7% vs 7-13%, respectively). Preharvest 1-MCP spray slightly reduced the development of internal browning during storage, while postharvest 1-MCP had no significant effect.

**Objective 3. Investigate new technology for harvest management and fruit maturity**

3.1. Orchard spray trials using different rates of 1-MCP, and various application timings were investigated for a second year. Cultivars included 'McIntosh', 'Honeycrisp', 'Gala', and 'Ambrosia'. Complete rows of 30+ trees were sprayed for each replicate within each treatment combination per cultivar. There were comparisons of full versus half rates of 1-MCP, or split application timings using two low rates, and some late applications after commercial harvest had begun. Results corroborate some conclusions from the 2018-19 season, in that preharvest 1-MCP reduced fruit drop and therefore, improved fruit color and size with reduced number of harvests; led to less variability in fruit ethylene production at harvest time and therefore, more effective postharvest 1-MCP treatments; improved firmness and acidity retention after harvest; increased susceptibility to CO2 injury and other stress-related disorders; resulted in less senescent-related disorders; could delay red color development in 'Gala', 'Ambrosia', and 'Honeycrisp' (1-MCP rate and application timing dependent); slowed starch degradation and narrowed range of starch values in 'Gala', as well as reduced stem-end cracking and internal browning in 'Gala'; and reduced soft scald in 'Honeycrisp'.

3.2. Collaboration with research colleagues at the University of Minnesota and University of Maine, to investigate the use of Delta Absorbance measurements (IAD from) for evaluating 'Honeycrisp' maturity and associated storage disorders, was concluded and a scientific paper completed. There were regional inconsistencies and changes in IAD patterns among harvest times, indicating that single IAD standards should not be used to assess fruit maturity in different areas and growers should only use IAD data as one of several methods (i.e., starch index, ground color) to judge 'Honeycrisp' fruit maturity. Due to the results of this collaboration, numerous DA measurements that we collected from 'Honeycrisp', 'Gala', and 'Ambrosia' during other trials over several years are currently being pooled together and analyzed for seasonal consistency and relationships with other maturity indices.

Postharvest research is conducted at the OAG Storage Lab located at Norfolk Fruit Growers' Association in Simcoe, Ontario. This facility continues to benefit the Canadian apple industry. The sector greatly appreciates the cooperation of the Norfolk Fruit Growers' Association and Dr. Jennifer DeEll, OMAFRA

Fresh Market Quality Specialist – Hort Crops in ensuring that the lab is fully utilized on research that assists with the maximization of fruit quality while minimizing losses.

**Sustainable Control Practices for Apple Pests in Canada Project Lead and participants - Suzanne Blatt, Jean-Philippe Parent, Justin Renkema and Gaetan Bourgeois (AAFC), Michelle Cortens (Perennia), Garth Nickerson (NB Ministry of Agriculture), Joanne Driscoll (PEI Hort Association), Hannah Fraser and Kristy Grigg-McGuffin (OMAFRA), Susannah Acheampong and Tracy Hueppelsheuser (BCMA), Daniel Cormier and Gerald Chouinard (IRDA)**

While the five main apple-growing provinces (Ontario, Quebec, British Columbia, Nova Scotia, and New Brunswick) experience insect pest pressure to varying degrees, there are some species of common concern including apple maggot, apple leaf curling midge and leafrollers such as eye spotted budmoth and oblique-banded leaf roller. Control of these pests is critical for the apple industry to remain competitive in a global market where differing regulations often provide other countries with a competitive edge. Deregistration of pesticides throughout Canada is driving the need for alternative and effective management strategies for many of these species.

Objectives of this project are to:

1. Develop improved control methods for apple maggot through determination of the number of sprays required to effect control with currently available products,
2. Further understanding of apple leaf-curling midge phenology and refine a recently developed degree day model, and
3. Investigate the utility of host volatiles for mass capture of multiple species of leafroller.

Recent progress:
Objective 1 – this objective was completed in 2019. Results showed that all four commercially available insecticides (Exirel, Imidan, Assail, Calypso) need to be applied at the label rate and as many times as indicated on the label. While individual years may have shown some potential to reduce the number of sprays for some products, this was not repeatable across years or sites.

Objective 2 – the final collection of data for this objective occurred during 2020. COVID-19 impacted data collection from only Nova Scotia where the first flight was not completely captured, but all other provinces were able to provide complete data sets. Degree day models for each of the 3 generations were developed and shared with collaborators to share with industry in spring 2021. Model validation was completed in Ontario in 2021 and analysis is in progress.

Objective 3 – host volatiles were tested for efficacy against lesser apple worm, eye spotted budmoth, red-banded leafroller, fruit tree leafroller, variegated leafroller and tufted apple budmoth, in Ontario and Quebec orchards in 2021. All sites/provinces have now tested these host volatiles and a global analysis of these data are in progress. In Nova Scotia and British Columbia, these host volatiles were used to evaluate their potential for mass trapping. Analysis of this data is also in progress.

## Acknowledgements

The Ontario Apple Growers acknowledges and thanks the support of our many funding partners. Canadian Agriculture Partnership is a federal-provincial-territorial initiative.

# NATIONAL REPORTS

## CANADAGAP REPORT

CanadaGAP® is a food safety program for companies that produce, pack, repack, store, wholesale and broker fresh fruits and vegetables. The program is designed to help implement effective food safety procedures within fresh produce operations. Apple growers, packers and wholesalers across Canada have been active participants in the program since 2009. In Ontario, just over 100 apple growers and packers are CanadaGAP-certified.

The past two years have brought unprecedented challenges to the horticultural industry. Many sectors of the economy were profoundly disrupted by the global coronavirus (COVID-19) pandemic, not least the food industry, and producers of fresh fruits and vegetables. CanadaGAP and its partner Certification Bodies worked to be responsive in adapting to the shifting landscape facing operations that continue to need food safety certification during these difficult times. Some program adjustments made in 2020 were continued where possible into 2021:

- Postponement of audits and extensions of CanadaGAP certificates for up to six months, when audits could not proceed as planned
- Modified procedures to allow for CanadaGAP audits to be performed using partially remote auditing methods, to reduce the auditor's time on-site
- Regular updates with all stakeholders.

2021 also proved a challenging year for operations maintaining compliance with increasingly stringent food safety expectations. CanadaGAP underwent re-benchmarking to the Global Food Safety Initiative (GFSI) requirements over the course of 2020-2021, and as a result introduced several changes to the program that raised the bar on operations seeking to achieve certification. In spring 2021, operations needing GFSI-recognized certificates (Options B, C, and D) to satisfy their customer requirements, had to address all non-conformities raised during the audit before they could be certified. Corrective action plans became more commonplace among CanadaGAP program participants. In the fall, new requirements came into effect relative to how unannounced audits work. This change was made because the GFSI definition of "unannounced" became stricter, entailing no prior notice to the program participant of the date or time of the auditor's arrival. Further detailed information about the changes made to 2021 requirements is available on the CanadaGAP website at www.canadagap.ca.

As 2021 winds down, CanadaGAP is undergoing a 40-month review of its Government Recognition. To maintain recognition for the program, CFIA and interested provincial governments undertake a comprehensive review to ensure that the food safety standard remains technically sound, and that CanadaGAP and its delivery agents are operating the program in accordance with government requirements. The review is expected to conclude towards the end of the year.

CanadaGAP does not expect to publish an update to the Food Safety Manuals in 2022, although a few changes are in the works for the CanadaGAP Audit Checklist. For more information about CanadaGAP, please visit the program website at www.canadagap.ca. The CanadaGAP Annual Report for 2021 will be posted and available on the website in December.