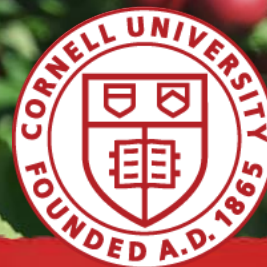


Tree Fruit News

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NY-1 'Snapdragon' Skin Disorders Observed in the Hudson Valley of New York State

Daniel J. Donahue and Sarah E. Elone, CCE Eastern NY Commercial Horticulture Program

'Snapdragon' (termed NY-1 when still on the tree) is a 'Honeycrisp' cross from Dr. Susan Brown's apple breeding program at AgriTech in Geneva, New York. The apple is 80-95% red at harvest, of medium size, with exceptional eating quality. Cornell University entered into an exclusive managed release agreement with a newly formed cooperative of New York State apple producers called Crunch Time Apple Growers (formally New York Apple Growers) in 2010, with the first commercial orchards planted in 2011. Acreage has continued to increase since, and production has increased to the point where refrigerated storage and controlled atmosphere is now necessary to extend the marketing season.

Hudson Valley region 'Honeycrisp' historically suffers from high cullage losses to bitter pit disorder. In 2017 dark, sunken lesions with corky tissue underneath were observed predominantly on the calyx-end of 'Snapdragon' fruit harvested from several Hudson Valley orchards. The symptoms bore a strong similarity to those of bitter pit (BP) in 'Honeycrisp', a 'Snapdragon' parent. Peel mineral

analysis was conducted on both clean and BP fruit, and the following year a study was conducted to further document the incidence and distribution of these symptoms in six NY-1 orchards located in Orange, Ulster, and Columbia Counties of NYS.

Results

Bitter Pit Symptoms Observed in 'Snapdragon'

Insects, disease, and spray chemical phytotoxicity all can result in spots on apples. Bitter pit lesions have certain characteristics that help distinguish this "calcium related disorder" from other maladies. Bitter pit lesions are most often found at the calyx (blossom-end) of the fruit and will have corky tissue



Figure 1 (left): Smaller, angular-shaped bitter pit lesions with a more even distribution across the calyx-end of a 'Snapdragon' apple.

Figure 2 (right): Larger, rounded bitter pit lesions with a more clumped distribution. Photos: S. Elone

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underneath. The dark, sunken spot observed on the surface is the visual manifestation of that corky, dead tissue underneath. However, the lesions can vary considerably in size and shape, while always sunken, they are not always darkened, and their distribution can be clumped together in a group (figure 1), or evenly distributed (figure 2). Bitter pit incidence evaluated after 135 days in refrigerated storage at 36°F, in fruit sampled from six orchards throughout the Hudson Valley ranged from 1 to 25%, with a regional average of 12.5%. We have learned in 'Honeycrisp', peel calcium levels in the calyx-end of the fruit are significantly lower than the stem-end, and that BP fruit tend to have significantly lower calcium levels. Peel mineral analysis of both clean and BP 'Snapdragon' fruit conducted post-storage in 2017 suggests that peel calcium distribution in this variety closely follows that of its 'Honeycrisp' parent (figure 4). Comparing clean fruit and BP fruit, all fruits show reduced calcium in the calyx-end, while BP fruits have lower calcium overall than clean fruits. Potassium and magnesium levels do not vary between the stem and calyx in clean fruit; however, these minerals are found in higher levels in the calyx of BP fruit. Consequently, BP fruit have a K/Ca ratio approximately 3.5 times greater, a characteristic of the BP disorder. In our view, the lesions observed are representative of the bitter pit disorder.

Skin Discoloration Symptoms observed in 'Snapdragon'

Six orchards were sampled in four picks over a three-week period, 50 apples per sample, 200 apples total per orchard block. Fruit were held at 36°F and evaluated for external and internal physiological disorders after 135 days. While apples were evaluated by weekly pick, we are presenting only the averages of all picks in this report. In addition to the expected bitter pit (discussed earlier), we noted the development of several distinct skin disorders, all of which were limited to the skin of the fruit, with no damage to sub-epidermal cortex tissue observed. No internal disorders of any kind were observed after slicing the apples into 1/2" sections.

Incidence (figure 5) of dark brown round blotches centered on lenticels, no flesh corking underneath (figure 6).

Incidence varied from 1 to 13% with an average of 7.1%. The association with lenticels suggests that chemical spray injury could be a factor, although the size and shape of the discoloration is not very typical of spray injury.

Incidence (figure 7) of black indeterminate blotches, not sunken, no flesh corking underneath (figure 8).

Incidence varied from 2.7 to 12.2% with an average of 6.6%. The association with lenticels appears to be less obvious than the dark brown round blotches (DBRB). The incidence of these symptoms was generally associated with DBRB incidence, except for block #3. It may be the case that these symptoms are simply a more severe case of DBRB, but the visual distinction was sufficient to warrant a unique rating.

Orchard Location	Incidence
1- Columbia County	15.2%
2 - Columbia County	20.9%
3- Ulster County	8.7%
4- Orange County	4.0%
5- Columbia County	25.0%
6- Ulster County	1.0%
Average of all Orchard Blocks	12.5%

Figure 3: Bitter pit incidence in 'Snapdragon' after 135 days in refrigerated storage at 36°F

Snapdragon: Peel Mineral Calcium (ppm)		
Classification	Stem End	Calyx End
Clean Apples	1010	721
Bitter Pit Apples	383	299

Snapdragon: Peel Mineral Potassium (ppm)		
Classification	Stem End	Calyx End
Clean Apples	4029	4094
Bitter Pit Apples	4676	5797

Snapdragon: Peel Mineral Magnesium (ppm)		
Classification	Stem End	Calyx End
Clean Apples	558	547
Bitter Pit Apples	454	657

Snapdragon: Peel Mineral K/Ca Ratio		
Classification	Stem End	Calyx End
Clean Apples	4.0	5.7
Bitter Pit Apples	12.2	19.4

Figure 4: Comparing clean fruit and BP fruit, all fruits show reduced calcium in the calyx-end, while BP fruits have lower calcium overall than clean fruits. Potassium and magnesium levels do not vary between the stem and calyx in clean fruit; however, these minerals are found in higher levels in the calyx of BP fruit. Consequently, BP fruit have a K/Ca ratio approximately 3.5 times greater, a characteristic of the BP disorder.



Figure 5 (left): Dark brown round blotches (DBRB) associated with lenticels, cv 'Snapdragon'.

Figure 6 (right): Incidence by block of dark brown round blotches in select Hudson Valley 'Snapdragon' orchards post-storage in 2018.

Orchard Location	Grand Total
1- Columbia County	7.3%
2 - Columbia County	13.0%
3- Ulster County	10.0%
4- Orange County	1.0%
5- Columbia County	5.0%
6- Ulster County	6.0%
Average of all Orchard Blocks	7.1%

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Incidence (figure 9) of pebbly skin

Difficult to photograph, think of the embossed texture of a football. Incidence was low and consistent from block to block. Possibly the result of dehydration during the 135-day period of refrigerated storage. 'Snapdragon' may require more attention paid to relative humidity levels during storage than other varieties.

Incidence (figure 10) of scarf skin (figure 11).

Wide variation of incidence between blocks, 8.7 to 64%. Interesting to note that excessive canopy density and poor air drainage were characteristics of orchards with higher scarf skin incidence. Research has been underway to evaluate the plant growth regulator *Provide*™ applied in multiple applications post-bloom as a management tactic. We reported on the results of a demonstration trial conducted in 2019 (https://rvpadmin.cce.cornell.edu/pdf/enych_newsletter/pdf473_pdf.pdf) where we did not find any activity. However, others are working on the issue and have seen some positive results.

Summary

The purpose of this article was to document several skin disorders of 'Snapdragon' that we observed over the last several seasons. Causation has not been addressed. There has been some use of calcium sprays during the 2020 season to mitigate bitter pit and *Provide*™ is being evaluated for scarf skin mitigation. Bitter pit symptoms have been observed in fruit at harvest this season, as well as substantial fruit finish variation between orchard blocks. A storage trial is being conducted in the Hudson Valley this season to evaluate the effects of ReTain and Harvista on fruit held in controlled atmosphere and regular storage. Evaluation of the skin disorders discussed in this article will be included in this study.



Orchard Location	Incidence
1- Columbia County	9.5%
2 - Columbia County	12.2%
3- Ulster County	2.7%
4- Orange County	4.0%
5- Columbia County	4.0%
6- Ulster County	5.0%
Average of all Orchard Blocks	6.6%

Figure 7 (left): Black indeterminate blotches (BIB) cv 'Snapdragon'. Figure 8 (right): Incidence by block of black indeterminate blotches (BIB) in select Hudson Valley 'Snapdragon' orchards post-storage in 2018.

Orchard Location	Incidence
1- Columbia County	4.0%
2 - Columbia County	3.4%
3- Ulster County	3.3%
4- Orange County	1.3%
5- Columbia County	4.0%
6- Ulster County	0.0%
Average of all Orchard Blocks	2.8%

Figure 9: Incidence by block of pebbly skin in select Hudson Valley 'Snapdragon' orchards post-storage in 2018.



Orchard Location	Incidence
1- Columbia County	14.5%
2 - Columbia County	12.8%
3- Ulster County	26.0%
4- Orange County	8.7%
5- Columbia County	42.0%
6- Ulster County	64.0%
Average of all Orchard Blocks	24.3%

Figure 10 (left): Scarf skin cv 'Snapdragon'. Figure 11 (right): Incidence by block of scarf skin in select 'Snapdragon' orchards post-storage in 2018.

Mitigating Freezes on Late-Maturing Varieties

Michael Basedow, CCE Eastern NY Commercial Horticulture



A block of WildTwist in the Champlain Valley. This variety is picked about the first week of November in Clinton County.

As new varieties are planted across Eastern New York, some, like EverCrisp and WildTwist, have a very late maturity window, remaining on the trees until late October or early November. These lengthy growing season requirements put these varieties at an elevated risk of being still hanging on the trees when we get our first severe cold snap in the fall, which can lead to fruit damage and storability issues.

So, how cold is too cold for apples, and when should you expect to reach these temperatures in an "average" growing season across the Eastern NY region? While there are many variables influencing when fruit will freeze and quality will be compromised, Dr. Jim Schupp of Penn State University recommends, as a general rough rule of thumb, to **expect some damage to begin when temperatures reach 28°F for four or more hours**. While the exact temperature varies by variety and orchard conditions, expect some fruit freezing to begin at temperatures between 28.5° and 28°.

Figure 1 (next page) shows when temperatures first fell below 28.5° at four weather stations across the greater ENY region between the years 2015 through 2019.

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Potentially damaging temperatures ranged widely over that five year period. While in some years we do not reach these temperatures until the first or second week of November, we reached them as early as October 17 at the Peru NEWA station in 2015. This would put many of our late-season varieties at risk.

However, keep in mind the daily minimum temperature does not tell the entire story. The hours spent at these low temperatures, along with what the temperatures were as the fruit thawed back out, all impact final fruit quality and storability. While these temperatures were recorded at the weather station, orchard topography also plays a key role during any frost event.

While we hope we do not experience any damaging temperatures throughout the rest of the harvest season, we thought now would be a good time to review how to handle frost damaged fruit. The following article was written by Dr. Jim Schupp of Penn State University, and the original can also be accessed on the Penn State Extension webpage: <https://extension.psu.edu/fruit-harvest-handling-of-frozen-apples>

Fruit Harvest—Handling of Frozen Apples

Dr. James Schupp, Penn State University

Apple fruit will withstand up to 4 hours at 28°F before serious injury occurs. Recovery depends not only on the extent of freezing, but also the rate of thawing.

The fruit tissues of apples have sugar and other constituents that lower the freezing point of fruit below 32°F. The freezing point of fruit varies between varieties and fruit maturity (probably due to differences in sugar content); even so, apples begin to freeze at 28.5 to 28°F. The lower the air temperature and the longer the exposure, the greater is the risk of damage. A general rule is that apple fruit will withstand up to 4 hours at 28°F before serious injury occurs, but it is difficult to give a hard and fast rule to predict injury based upon minimum temperatures and duration, as the recovery depends not only on the extent of freezing, but also the rate of thawing.

During the time that the fruits are frozen, they should not be touched or moved. Handling frozen fruits invariably leads to fatal damage in the form of deep and lasting bruising. One must wait until the fruits have completely thawed before handling them. This likely means waiting several hours after the air temperature has risen above freezing. Slow thawing is actually beneficial for preserving fruit tissue integrity for apples that just had a near-death experience. A fast warming or exposure to direct sunlight will make the damage worse. Bins of fruit that must remain in the orchard overnight during potentially freezing weather should be left where they will be shaded from the morning sun (on the west side of a row, wood line or other tall structure).

While the method is destructive, and not very sophisticated, there is a way to determine if fruit are frozen. Sample some fruits and jab your thumbnail through the skin and into the fruit.

First Fall Minimum Temp Below 28.5°F					
Station	2015	2016	2017	2018	2019
Peru	17-Oct	1-Nov	7-Nov	26-Oct	2-Nov
Crown Point	17-Oct	26-Oct	7-Nov	30-Oct	1-Nov
Clifton Park	18-Oct	27-Oct	8-Nov	26-Oct	8-Nov
Valatie	18-Oct	27-Oct	8-Nov	19-Oct	3-Nov
Marlboro	18-Oct	1-Nov	N/A	12-Nov	8-Nov

Figure 1. First fall day below 28.5 for four ENY weather stations between 2015 through 2019.

Additionally, the recent use of reflective materials and other horticultural practices to further enhance fruit coloring prior to harvest **may** allow growers to pick fruit a few days earlier in some seasons, potentially reducing the risk of late-season frost injury. While additional research on using these materials for this purpose is necessary, recent work using reflective materials by the Lake Ontario Fruit Program is reviewed later in this issue on page 9.

Fruit that are not frozen will "pop" as the skin breaks, and the resulting wound will be juicy. Conversely, fruit that are frozen will give the sensation of sticking your thumbnail into a popsicle, and the wound won't be juicy. The same test can be used to gain some confidence that the fruit have thawed long enough to be harvested or moved.

Fruit that experienced only a mild (~28°F or above) freeze of short duration (less than 4 hours) may recover and be perfectly salable, but should not be considered candidates for long-term storage. Such lots of fruit should be stored separately and pressure tested frequently during storage for evidence of fruit softening. Unacceptable fruit softening is a key indication that the damage is worse than predicted.

Fruit that were fatally frozen will exhibit flesh browning after thawing once the temperature has risen far enough for oxidation to take place. This browning can appear at the skin surface or below, and generally takes ~24 hours to appear, longer if temperatures remain cold. After the apples have warmed enough to exhibit flesh browning, cut fruit open and inspect them. If browning appears, the fruit is obviously unfit for use.

It is also possible for fruit that does not have obvious browning to have serious freeze damage. This fruit will rapidly soften in storage. It is good only for making juice and only if processed right away. Generally speaking in the apple business, your first loss is your best loss: If fruit have been in a freeze event that was too close for comfort, you should consider selling such fruit for juice (and tell your customer about the potential condition of the fruit). If you determine that the fruit are going to be held and sold as fresh, such freeze-event apples should be stored

separately and be pressure tested over several days or weeks to assure if truly sound.

Fruit that were in the orchard during a cold spell with temperatures that dropped below 29°F for more than a brief

time should be managed with caution. Don't be in a hurry to harvest or transport this fruit. Leave the fruit undisturbed until it completely thaws. After the fruit thaws, be honest with yourself about the actual condition and potential value of this fruit. Cut lots of fruit, and if you do decide to keep it, monitor its firmness in storage.

New York Sick Leave Requirement: What We Know, Still Don't Know, and Action Items

Rich Stup, Cornell Cooperative Extension, Agricultural Workforce Development

What We Know

New York State, in the 2020 budget act, mandated annual sick leave on a permanent basis. There is no exemption for farm employers from the sick leave requirement and we expect most farms with hired employees to be affected. The amount and type of sick leave required varies by employer size and income, as follow:

- For employers with 4 or fewer employees and less than \$1 Million in net income: 40 hours of unpaid sick leave per employee
- For employers with 4 or fewer employees and greater than \$1 Million in net income: 40 hours of paid sick leave per employee
- For employers with between 5 and 99 employees: 40 hours of paid sick leave per employee
- For employers with greater than 100 employees: 56 hours of paid sick leave per employee

Note that this is a new requirement for all employers, if you already provide sick leave that meets or exceeds these levels then your policy already meets the requirement. **Employers are not required to provide the sick leave until January 1, 2021 but they are required to begin accruing hours of sick leave for employees on September 30, 2020.**

Accrual and Carryover

Employees can accrue sick time at a rate of no less than 1 hour of sick time per 30 hours worked, or the employer can choose to award all of the sick time upfront at the beginning of the calendar year. If the upfront approach is used the employer is not permitted to reduce or revoke the awarded sick time if the employee ends up working fewer hours during the year than expected. Unused sick time must carry over to the next year but employers with less than 100 employees can limit accrued sick time to 40 hours, and employers with greater than 100 employees can limit it to 56 hours.

Requirements for Your Sick Leave Policy

The new law has detailed requirements about reasons for sick leave that your policy must also meet, including some that you might not expect. According to the law, employers must provide leave:

1. for a mental or physical illness, injury, or health condition of such employee or such employee's family member, regardless of whether such illness, injury, or health condition has been diagnosed or requires medical care at the time that such employee

requests such leave;

2. for the diagnosis, care, or treatment of a mental or physical illness, injury or health condition of, or need for medical diagnosis of, or preventive care for, such employee or such employee's family member; or
3. for an absence from work due to any of the following reasons when the employee or employee's family member has been the victim of domestic violence (...), a family offense, sexual offense, stalking, or human trafficking:
 - a. to obtain services from a domestic violence shelter, rape crisis center, or other services program;
 - b. to participate in safety planning, temporarily or permanently relocate, or take other actions to increase the safety of the employee or employee's family members;
 - c. to meet with an attorney or other social services provider to obtain information and advice on, and prepare for or participate in any criminal or civil proceeding;
 - d. to file a complaint or domestic incident report with law enforcement;
 - e. to meet with a district attorney's office;
 - f. to enroll children in a new school; or
 - g. to take any other actions necessary to ensure the health or safety of the employee or the employee's family member or to protect those who associate or work with the employee.

What We Still Don't Know

In spite of repeated requests by employers, business organizations, accountants, attorneys, and this author, the NYS Department of Labor has not yet provided details about many important questions relevant to farm employers.

- How will net income be calculated? What formula will NYS Department of Labor use?
- What about seasonal farm employees, are they included in the sick leave requirement? How many hours or days must they work each year to be included in the employer's number of employees?

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- Can employers provide a pro-rated amount of sick days upfront to seasonal employees, such as 20 hours for employees who work 5-6 months, or must the hourly accrual of 30:1 be used?
- What about family members who work on the farm as defined in the Farm Laborer Fair Labor Practices Act, is sick leave required for them?
- What about youth workers, employees under age 18, are they included in the sick leave requirement?
- What about different business entities with varying levels of share ownership? Which of those entities will be combined in order to calculate the number of employees?

We will continue to press for answers to these and other relevant questions and will share this information through written releases and employer training when available.

Action Items for Employers

1. Track hours worked for all employees beginning September 30, 2020, if not already doing so. Employers can always go back and credit employees with sick time earned if the number of hours worked is known.
2. Consider adopting modern software and tracking systems to create employee schedules, record hours worked, integrate with payroll, and keep track of sick leave and vacation accrual and usage for all employees.
3. Review your current sick leave policy and update as needed.
4. Train managers and employees about your sick leave policy and any changes that will occur.
5. Stay tuned to the Ag Workforce Journal and other industry newsletters for more information about New York's sick leave requirements.

A Tale of Fire and Ice, or, How Do Drought and Frost Affect Weed Management?

Dr. Lynn Sosnoskie, Cornell AgriTech

Drought Effects on Post-Emergent Herbicides

This summer and fall, orchard managers have been faced with dry periods that have resulted in reduced weed control. Although fewer weed seeds may germinate under drought conditions, weeds that do emerge may be more difficult to manage with post-emergence herbicides. Moisture-stressed weeds are likely to have thicker cuticles (which is the waxy coating on the surface of the leaf), which can inhibit the absorption of foliar-applied products. Additionally, plant architecture can be altered when it is hot and dry (for example, fewer and/or drooping leaves) meaning that herbicide capture and retention may be reduced. When weeds are not actively growing, systemic herbicides, like glyphosate, may not be effectively translocated to their target sites. Although contact herbicides, like paraquat, may be less likely to be affected by dry conditions, herbicide efficacy could be reduced if spray droplets dry rapidly (either in the air or on plant surfaces) and sufficient coverage is not achieved.

Drought Effects on Residual Pre-Emergent Herbicides

In addition to affecting the types and numbers of weeds that germinate and emerge, warm temperatures and reduced soil moisture can also affect the performance of residual herbicides. Without precipitation or irrigation, many soil-applied herbicides cannot be effectively activated; this means being moved into the soil water solution so that they can be taken up by emerging weed seedlings. Some herbicides can be mechanically incorporated, although product distribution may be uneven in dry soils. Additionally, the potential for photo-degradation or volatilization may be increased under hot and dry conditions, resulting in reduced herbicide efficacy and/or unintended off-target movement.

On the Other Side of the Spectrum: Frosts and Herbicide Performance

As we move deep into fall, there is another weather-related concern that may negatively affect weed control efforts: frost. As the season progresses, summer annual weeds will begin to die, and perennial weeds will start to go dormant, limiting the efficacy of some post-emergent herbicide applications. Incidences of frost can further complicate weed control efforts as damage to leaf tissue can inhibit the capture and uptake of herbicides. While the efficacy of proposed chemical control strategies can be affected by the degree of frost injury experienced by the target plants, past weather events are only one part of the weed control equation. Weather for the days following frost events can influence plant vigor and recovery from the initial cold damage. Predicted day- and night-time temperatures will also impact herbicide selection and the speed with which they work; always read herbicide labels to identify the optimum application conditions prior to pesticide treatments.



For the best fall control of perennials, such as Canada thistle, systemic herbicides should go on prior to the first hard frost, while weeds are still green and healthy to maximize their capture and uptake of the active ingredient. This may be difficult in blocks of late maturing varieties where there is a short window of time between harvest and first frost.

CFAP 2—USDA's Way of Giving You a Check to Help with Your Other COVID Expenses Take Them Up On It!

Elizabeth Higgins, CCE Eastern NY Commercial Horticulture

This USDA administration is not creative when it comes to naming programs. So yes, the new CFAP 2 is a totally different program than CFAP 1 (which is also a totally different program than the CFAP food box). If you got a check for CFAP 1, based on your sales in 2020 or unsold 2019 inventory you can still get a check for CFAP 2. Your CFAP 1 payment also does not affect your payment limitation for CFAP 2. Regardless of how much you received, your farm is eligible for up to \$250,000 per entity to a maximum of \$750,000 for a farm with three members that provide at least 400 hours of active labor or management on the farm.

So CFAP 2 is really simple. USDA will give you a percentage of the value of your 2019 specialty crop sales. That's it. The payment is for "income received for sales in the 2019 calendar year". The crop year is immaterial. For example, income received for 2018 apple crop in storage sold in 2019 would count. 2019 apple crop in storage sold in 2020 would not count. Calculating your payment is simple.

Pretty much every crop you sold would count and you don't have to break it out by crop to apply, you just need your sales totals. Payments are only on the value of the raw commodity, not on a value added product, so you would need to take out your cider, juice, pie or other value added sales in your calculation, but could add in the value of the commodity used if you have records to document this.

There are programs for field crops, livestock, and dairy. The calculations for payments for these commodities is different. Christmas trees and maple syrup are also eligible specialty crops, as is honey, and would be included in the specialty crop calculation.

You have until December 11, 2020 to apply. USDA has said that they will not run out of money for this program. However, the application is relatively straight forward and simple so there is no reason to put it off and risk missing this opportunity. You apply at <https://www.farmers.gov/cfap> or contact your local USDA FSA office.

Sales Range	Percent Payment Factor for the Producer's 2019 Sales of Eligible Commodities Falling in the Range
\$0 to \$49,999	10.6%
\$50,000 to \$99,999	9.9%
\$100,000 to \$499,999	9.7%
\$500,000 to \$999,999	9.0%
Sales over \$1 million	8.8%

Three New Cornell Apples that are Available for Testing

Susan Brown and Kevin Maloney, Cornell AgriTech

Cornell apple breeding was pleased to name three new apples in early September. These new apple varieties are products of years of testing and will provide open access to US growers searching to plant something new, but who are hesitant to join a club. We are pleased with NY grower commitment to NY 1 and 2, yet we recognize that not every apple is distinctive enough to be a club, yet they are still excellent apples, which might fit a need.

'Cordera'®: (NY56, US Plant Patent # 30,758, awarded on July 30, 2019). Test tree codes for this variety are HH1502, II1604, and JJ1702.

The new scab-resistant apple variety originated from a controlled pollination made in 1994 between the apple variety 'Honeycrisp' by the advanced breeding selection NY65707-19. The pollen parent, NY65707-19 is a hybrid of 'Spartan' x a sister seedling to 'Liberty'. It has excellent fruit quality and scab resistance.

NY56 is resistant to the fungal pathogen *Venturia inaequalis* (apple scab), with resistance from the *V_f* gene from *Malus floribunda* 821. 'Honeycrisp' also possesses resistance to scab, however NY56 has not been genotyped to determine what genes were transmitted from its 'Honeycrisp' mother.

NY 56 is an attractive, excellent quality scab resistant apple. Fruit quality is superior to most commercially available scab resistant varieties. We did not name another scab resistant apple, until we had one that growers agreed was of good quality. At harvest, fruit are large in size (244 grams), crisp and mild in flavor, with a good balance of sugar (13.2 Brix) and acid (0.7 acidity). NY56 fruits do not have the high acidity, astringency and thick skin common to resistant apples. Fruit color is 20 to 60 % red blush on yellow. The average harvest date is ~ October 3 to 12 in Geneva. At harvest it is 15-16 lbs. pressure and ranges from 13 to 15 brix.

The scion vigor is very low, less than 'Honeycrisp', and similar or lower vigor than NY1. This variety needs to be matched with a higher vigor rootstock to reach optimum potential, such as G.935, or



'Cordera' is an attractive, excellent quality, scab resistant apple.

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a more vigorous rootstock. Leaves often have a similar chlorotic leaf disorder as seen in 'Honeycrisp'.

Limitations: Fruit rot susceptibility (especially to bitter rot, *Colletotrichum*) is similar to 'Honeycrisp', so NY56 needs a late season fungicide prior to harvest. NY56 is susceptible to powdery mildew, bitter pit, and black rot, but the incidence of these diseases/disorders is low and may lessen with a greater crop load. Initial fruits are very big but lessen with cropping. For postharvest disorders, fruit are susceptible to several disorders, but it should be noted this was under no fungicide sprays or drench prior to storage. This selection should be sold at harvest or stored only until the end of December.

Wegmans organic farm has been testing NY 56 and it has also been tested in Cornell's organic apple trial (citations:)

Agnello, A., Cox, K., Dominguez, L., Francescato, P., Sanahuja, J. L. and Robinson, T. (2015). An insect, disease and weed management program for New York organic apples. *NY Fruit Q*, 23(4), 27-34.

Agnello, A., Cox, K., Lordan, J., Francescato, P. and Robinson, T. (2017). Comparative programs for arthropod, disease and weed management in New York organic apples. *Insects*, 8(3), 96.

Lamb: This scab-resistant apple is named in honor of my predecessor, Dr. Robert Lamb and his family. Cordera is Spanish for lamb. We also appreciate the efforts of Dr. Aldwinckle, Plant Pathology (retired, Professor Emeritus) in screening seedlings for scab resistance.

Bob was dedicated to his family, his wife Barbara, and his three children. Bob was very pleased that his daughter Betsy is an IPM specialist at Cornell's Integrated Pest Management Program. It is fitting that this apple be named in Bob's honor, as it is related to the 'Liberty' apple that he and Herb Aldwinckle named in 1978, followed by their naming 'Freedom' in 1983. Interest in 'Liberty' is seeing a revival, for its use in hard cider and for its resistance to scab and the bacterial pathogen that causes fire blight. This is the third scab-resistant release from Cornell. Former Technician David Terry also deserves credit.

'Firecracker'® (NY 109, UPPP# 31,145, granted December 3, 2019):

Test tree codes are HH1501, II1602 and JJ1701. The parentage includes 'Golden Glory', a semi-spur limb mutation of 'Smoothie'® Golden Delicious', which is a limb mutation of the popular cultivar 'Golden Delicious'. The pollen parent (male parent) is 'NY752' apple tree (unpatented). NY752 is a proprietary advanced breeding selection from Dr. Roger Way's program at Cornell and is also the pollen parent for NY1. The cross was made in 1997 and fruits have been evaluated since first fruiting.

This blush apple has a partially russeted finish and rustic appearance. Fruit examined at harvest time have an average of 15.7°Brix, with a range of 13.1-17.4°Brix. Fruit acidity is 0.82% malic acid as determined by titration. Firmness averages 18.7 pounds pressure (range 15.7-21.8 pounds) as measured with a penetrometer. The high sugar, high acid, and high aroma make the overall fruit quality

unforgettable. The skin contains more flavor than most varieties, which enhances the taste, as does the russet, which are tiny cork cells that provide a slightly nutty flavor.

This selection also makes an excellent varietal hard cider. Average harvest date is ~October 8 to October 16 in Geneva, but can vary with crop load. Limitations: This variety tends to overset and will become biennial if crop load is not controlled annually by thinning. NY109 is susceptible to fire blight (*Erwinia amylovora*) Scion vigor is intermediate.

Cornell Orchard in Ithaca tested this selection with consumers as Selection B, but that sometimes was switched to selection A. Consumers suggested names and described the flavor and NY 109 became a favorite. We tested it at a Cornell dining event, and it baked well, and was enjoyed fresh.

'Pink Luster'®: (NY73, U.S. Plant Patent Application Serial No. 16/602,082,

filed on August 1, 2019). Test tree codes are HH1503, II1603 and JJ1703.

NY73 is a hybrid of two popular commercial varieties, 'Imperial Gala' by 'Honeycrisp' and is an early maturing apple, with large fruit size and an unusually attractive bright pink-red blush, which is rare in NY varieties. The cross was made in 1997.

NY73 is a very large conic apple. The attractive pink blush (over a green/yellow background color) is eye-catching, NY73 has excellent crisp texture and juiciness making it very well suited to retail on-farm sales and you-pick operations. The tree has good vigor and growth habit, making it easy to manage in the orchard. Fruits are sun-sensitive, so blush coverage will range from 20 to 40%.



The high sugar, high acid, and high aroma make the overall fruit quality of 'Firecracker' unforgettable, and makes an excellent varietal hard cider.



'Pink Luster' has excellent crisp texture and juiciness making it very well suited to retail on-farm sales and you-pick operations.

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Maturity at Geneva NY is generally between September 10 to September 20. The range will depend on season and crop load. At harvest fruits are very firm: 18 lbs. pressure, with a range of 15 to 20 pounds -this is exceptionally firm for an early apple. Similar to other early apples, storage life in cold storage is ~2 months. Fruits have 13 brix. In testing at local fairs and with small test groups, NY73 has been extremely well liked by consumers.

Where to Find Them

Growers interested in trialing these varieties can check the [CTL website](#) for a list of nurseries growing them. Nurseries will be added

here as more sign up to offer these varieties. Nurseries interested in obtaining a license should contact Jessica Stein at Cornell Technology and Licensing (jml73@cornell.edu).

Research and thorough testing are crucial in making a really good apple, but that takes a whole team. Research specialist Kevin Maloney, the Cornell AgriTech Field crew, researchers at Cornell AgriTech and the School of Integrative Plant Science, Cornell Cooperative Extension and the New York apple industry all deserve credit in collaborating to help deliver varieties that support the apple industry.

The Use of Reflective Materials and Other Technologies for Improving Fruit Color on High Value Apple Cultivars in WNY

Mario Miranda Sazo, Craig Kahlke, Mark Wiltberger, Janet van Zoeren, and Elizabeth Tee, CCE Lake Ontario Fruit Program

This article first appeared in the Fruit Notes, Volume 20, Issue 15, and is available online here: https://rvpadmin.cce.cornell.edu/pdf/lof_newsletter/pdf125_pdf.pdf

Reflective Materials (or RMs) have become an effective technology for improving fruit color on high value apple cultivars. Two main materials have been adopted in our region.

- (1) Reflective Fabric (brands include Extenday and Proline), a white cloth, more expensive, reusable material that can be rolled up and used again in subsequent years, with a lifespan of approximately 7 years.
- (2) Reflective Film (including white films and Mylar®, a metallic film), a less expensive non-reusable material.

The basic idea of RMs is to improve the light environment by reflecting light from the ground back up to the trees, especially at the lower part of the canopy, onto high-value apple cultivars. In the last 2-3 years, most of the RMs have been installed the second or third week of August for cultivars to be harvested around Sept. 5-10. In 2020, several growers will be installing fabrics 7-14 days before anticipated harvest for a particular cultivar (early-season, mid-season, and late-season varieties). Reflective Fabrics can be installed with a tractor-mounted implement for unrolling, and attached to wooden posts with bungee cords. Reflective Films can be installed with grower-built roller machines. The learning curve for adoption of RMs has been very fast and collaborative between WNY growers. We envision that a significant amount of acreage will be covered with RMs in 2020 and the following years.

Testing the use of fabrics in two very different fruit coloring seasons:

In 2018 and 2019, the Lake Ontario Fruit region experienced very different and almost opposite conditions for fruit coloring at harvest. In 2018, we had rainy and cloudy weather for approximately 10 weeks that made color on apples very challenging. In 2019, we had one of the most ideal stretches of good weather for excellent fruit color development and the production of high quality fruit.

In 2018, with a more stressful fruit coloring season in WNY, in one of our on-farm studies we measured better results only with a reflective fabric (Extenday) deployed between rows in a Minnieska™ trial. But when we repeated the same study in 2019 with almost ideal weather conditions for fruit coloring, results from both methods (reflective fabrics deployed in the in-row and between row spacings) still improved fruit coloring more than the control trees (without nets and fabrics). In this two-year study, the use of fabric without nets significantly improved color development and a greater amount of fruit were harvested during the first and/or second picks in 2018 and 2019. Control trees always produced more fruit (number of fruit/tree and pounds of fruit/tree) at the end of the picking window in both seasons.

In another on-farm study in 2018, we measured that reflective fabric treatment with Extenday (without hail netting) yielded the highest percentage of Extra Fancy grade fruit for Fuji (a single pick harvest).

Last year we conducted an economic analysis by using some of our results from the 2018 studies. Assuming a seven-year life on the fabric (Extenday), the cost of the material would be \$358/acre. Annual labor costs for installation and removal are approximately \$150/acre. This totals an average annual cost of \$508/acre. A farm-built spool would have a one-time cost of ~\$2,000. Storage in a dry/covered area is also needed. Assuming a yield of 1,000 bushels/acre, with an average return of \$10/bushel:

- 5 % increase in Extra Fancy grade would increase revenue by \$500 /acre
- 10 % increase in Extra Fancy grade would increase revenue by \$1000 /acre
- 15 % increase in Extra Fancy grade would increase revenue by \$1500 /acre
- 20 % increase in Extra Fancy grade would increase revenue by \$2000 /acre

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Some data given by growers showed up to a 20% increase in Extra Fancy grade last year. For more details on this analysis, see https://blogs.cornell.edu/treefruitbusiness/files/2019/08/Reflective-Groundcover-Infographic_05.pdf.

Other technologies to improve fruit color: In addition to the adoption of fabric materials in our region, some innovative WNY apple growers have also conducted leaf pruning (manual) and applied plant growth regulators. A more recent development has been the purchase of pneumatic defoliation machines (prices around US\$40- 45k/machine) for improved fruit coloring by a few WNY fruit growers this season.

Leaf pruning (leaf stripping): Leaf pruning can precisely expose shaded fruit to sunlight for better fruit color before harvest. It is an effective but more expensive technique (US \$700-800/acre, or in some cases as much as US\$1,000/acre). It should be conducted from the base of the tree up to about 6-7ft above the ground (the tops of the trees should not be leaf pruned). We also recommend you stop leaf pruning at least 48 hours before the beginning of a period of hot temperatures. If you cannot wait, and you have the time and labor available for any type of leaf pruning, please consider conducting the pruning only on the east side of the canopy (assuming your rows are oriented North-South), to minimize any potential sunburn issues at the hottest time of the day. A more aggressive leaf pruning would be less detrimental if (1) it is coupled with an effective sunburn spray program, (2) it has at least targeted the east side of the tree rows, (3) it has been applied every 15-20 days, and (4) it was started in the middle or end of June.

A few growers have conducted leaf pruning on both sides of a single row. For this more intensive approach, growers leaf prune both sides of the rows at different timings, pruning first the east side and then the west side, 3-7 days apart. The time interval between leaf pruning for both sides of a single row depends on cultivar, canopy width, crop load distribution, and weather conditions.

Leaf removal machines: Last year WA growers were introduced for the first time to leaf removal machines that used air pressure to blow leaves for improved fruit coloring. Two machines were used at the orchard demos: one developed by German company Fruit Tec and the other developed by Italian company Olmi. Wine grape growers have used pneumatic defoliation for canopy control for years, but the bursts of air generated by those machines were not powerful enough to be effective in apple orchards, where the leaves have a stronger attachment. This year, a few WNY growers decided to invest in modern leaf removal machines to guarantee fruit coloring on high value apple cultivars. Removing leaves a few days before anticipated harvest can help to speed up the coloring process. Preliminary work done in WA orchards last year showed promising results by removing leaves in the season at pre-harvest. The machines can be used up to 3 weeks before harvest, depending on variety and conditions, but more often it should be used closer to harvest, 5-10 days out. Leaf removal for Minnieiska™ and Gala should be done around 5-8 days before harvest. Pneumatic machines for leaf removal are a lot faster than humans with hand

pruners and can cover an orchard in just 2-3 hours or less. There will be a lot more investigation and learning about the specific timings for pneumatic defoliation for important NY apple cultivars under our weather conditions this fall season. Stay tuned!

Plant growth regulators: The use of plant growth regulators (PGRs) is the only chemical method described in this short article. There are currently 2 options which have been successful in trials conducted by Dr. Robinson at Cornell AgriTech. For an in-depth discussion of the use of PGRs this harvest season, see the previous issue of Fruit Notes (Vol 20 Issue 14, Aug 13, 2020).

Ethrel (300ppm) improves fruit color if applied 1 week before harvest but stimulates ripening and excessive drop 10 days after application. If NAA is mixed with Ethrel then drop can be delayed 10 days, but if the fruit is not harvested on time then excessive drop will occur.

Blush is a plant growth regulator featuring a jasmonate PGR (active ingredient prohydrojasmon PDJ). Dr. Robinson found modest but significant improvement in red color when Blush is applied twice (3 weeks and 1 week before harvest of Honeycrisp). Its response was improved by combining with Stimplex (an algae extract that has low levels of hormones). Also the response was improved by waiting for application until fruit are entering maturation (DA meter reading of 1.25).

Summary

- There has been a rapid adoption of reflective materials (mostly Extenday and similar heavier, longer-lasting fabrics) in WNY in the last 3 years.
- Leaf pruning is also effective for enhancing fruit coloring but it can be very expensive.
- Early WNY adopters will be able to tell if the leaf removal machines will eliminate the need for reflective fabric and the extra cost and labor for installation/removal, along with the associated need for storage (Extenday) or waste with fabrics (Mylar®).
- Maximum fruit coloring improvements will be achieved in modern, narrow, mechanically-pruned orchards by using one of the above technologies, or a combination.

Acknowledgements: We would like to thank Tom and Alison DeMarree, Chris Whipple, and Ted Furber for their collaboration in the reflective and netting studies conducted in 2018 and 2019. Funding was provided by the NY Apple Research and Development Program.

Remote Produce Safety Alliance Growers Training

November 10th, 11th & 12th, 12:30pm-3:30pm

Online via Zoom

Register online here: https://pub.cce.cornell.edu/event_registration/main/events_landing.cfm?event=2020remotepsatraining_203

Join Virtual PSA Trainers on November 10th-12, 2020, from 12:30-3:30pm each day via Zoom to gain your required food safety training by the Food Safety Modernization Act and many 3rd party food safety audits, such as Good Agricultural Practices (GAPs).

PSA Trainers will spend approximately seven hours of instruction time covering content contained in the area of worker health, hygiene, soil amendments, wildlife, agricultural water, post-harvest handling and sanitation, along with how to develop a Farm Food Safety Plan.

Activities and interaction time among peers will also occur each day to meet the requirements from AFDO and the Produce Safety Alliance related to attendee engagement.

Each participant farm will receive a manual. The manual includes curriculum module slides and slide notes divided by tabs with learning objectives. Additionally, references, a glossary, and FSMA-specific information is included. Registration is required by November 1st in order to ensure each farm receives the manual prior to the course beginning.

All participants that attended the entire course (all 7 modules) are eligible to receive a certificate from AFDO (Association of Food and Drug Officials) that verifies they completed the training course. As this is a remote delivered course, participant engagement and attendance will be monitored by trainers throughout the three days of training. This includes the need for access to high-speed reliable internet, a webcam turned on the entire 3 days during the sessions, and a computer/laptop to participate in the Zoom sessions. Attendees will ONLY be eligible for an AFDO certificate of course completion if they attend and participate in all sessions.

Registration is at a cost of \$30/farm. Please be advised that refunds are not available. Registration is required by November 1st to ensure that mailing of manuals can occur in a timely fashion and that farms will receive them prior to the start of the training on November 10th.

If you are uncertain whether the course is for you, you are welcome to contact Laura Biasillo at lw257@cornell.edu or (607) 584-5007.

Northeast SARE open Farmer Grant Program, submissions due November 17!

<https://northeast.sare.org/grants/get-a-grant/farmer-grant-program/>

Farmer Grants are for commercial producers who have an innovative idea they want to test using a field trial, on-farm demonstration, marketing initiative, or other technique.

Farmer Grant projects should seek new knowledge other farmers can use and address questions that are directly linked to improved profits, better stewardship, and stronger rural communities.



UPCOMING EVENTS & IMPORTANT INFORMATION

Design Your Succession Plan

"Empowering Families to Get Started on Their Succession Plan"

Online Zoom Series

Thursday, October 8, 2020, 6:30 PM - 8:00 PM

Thursday, October 15, 2020, 6:30 PM - 8:00 PM

Thursday, October 22, 2020, 6:30 PM - 8:00 PM

Thursday, October 29, 2020, 6:30 PM - 8:00 PM

How will your family farm operate in the future when the owner retires or is gone?

Are you currently working with another generation who may be questioning their role in the future of the farm or are you yourself questioning your current role?

Register ASAP to ensure on-time delivery of the workbook. You can register here: https://reg.cce.cornell.edu/dsp_230

Fee The cost is \$60 per farm family and includes a workbook

Virtual: To Market, To Market

October 6—November 10, 2020

Have a great idea? This exciting six-week class will help you develop a product or service from start to finish! Local CCE Educators Mariane Kiraly, David Cox, Nicole Tommell, Elizabeth Higgins, Laura Basillio and Jim Barber have partnered to offer "To Market, To Market," a six-part series to be held virtually and in-person at five regional locations to make your learning experience comfortable, safe, and flexible. Participants will learn how to develop and screen an idea, analyze current trends, develop a budget, consider cash flow, determine pricing, manage marketing and distribution, access funding, test a prototype, consider legalities, manage risk, navigate regulations, and much more. A logical, process-oriented curriculum will lead to dynamic business plans that create new economic opportunities in the region.

This series will run Tuesdays, October 6, 13, 20, 27 and November 3 and 10, 9:00 am-noon. We hope that most will attend virtually as space is limited at each association meeting room at Hamden, Cooperstown, Cobleskill, Norwich, and Binghamton, to allow for social distancing.

The cost is \$25 per person for entire series. Bring your own snacks and drinks. Pre-registration is required at https://pub.cce.cornell.edu/event_registration/main/events_landing.cfm?event=to-market_212. "To Market, To Market" is supported by the Chobani Community Impact Fund at the Community Foundation for South Central New York.

Best Management Practices for U-Pick Farms During the COVID-19 Pandemic

U-Pick is a critical direct marketing approach for many of our Eastern New York orchards and provides customers with a unique connection to fresh produce grown close to home. In light of what we understand about the spread of COVID-19, new management practices will be needed to protect your farm team and your customers. This document provides recommended practices and communication strategies for U-Pick operations for the 2020 season. <https://smallfarms.cornell.edu/wp-content/uploads/2020/05/Cornell-U-Pick-Best-Practices-COVID-19.pdf>

Have ideas on article topics you'd like to see covered in future editions of the Tree Fruit News? We would like to hear from you! Please call 518-410-6823 or email Mike at mrb254@cornell.edu with your suggestions.

The Eastern New York Commercial Horticulture Program is a Cornell Cooperative Extension partnership between Cornell University and the CCE Associations in these seventeen counties: Albany, Clinton, Columbia, Dutchess, Essex, Fulton, Greene, Orange, Montgomery, Putnam, Rensselaer, Saratoga, Schenectady, Schoharie, Ulster, Warren & Washington.

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