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# Fruit Notes

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Cornell Cooperative Extension  
Lake Ontario Fruit Program

Volume 23 Issue 12 August 11, 2023

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

Mario Miranda Sazo, Craig Kahlke, Luis Gonzalez, and Terence Robinson

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.

**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.

**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 years, most of the RMs have been installed the second or third week of August for cultivars to be harvested around Sept. 5-10. As a rule of thumb, growers have installed 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.

There is a new CCE LOF YouTube video about the use of reflective fabrics for improved fruit coloring. It is titled 'Using Reflective Materials for Improved Fruit Color'. The video describes how/when to deploy reflective fabrics and the economics on return on investment (ROI) showing the financial gains or benefits by adopting this technology. Here is the link for the video:

[Using Reflective Materials for Improved Fruit Color - YouTube](https://www.youtube.com/watch?v=hs1kkRlojrQ) <https://www.youtube.com/watch?v=hs1kkRlojrQ>

**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 last 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:** In 2019 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



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

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. In the last years, 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 in 2019 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 Minnieska™ 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.

**Plant growth regulators:** The use of plant growth regulators (PGRs) is the only chemical method described in this short article. There are currently two options which have been successful in trials conducted by Dr. Robinson at Cornell AgriTech.

**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 6 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.

### Weed Science Research Update Lynn Sosnoskie (lms438@cornell.edu)

**Paraquat Resistance in Horseweed/Marestail:** In grapes and apples, glyphosate (e.g., Roundup) has been a frequently used chemical although there is significant concern about the potential for crop injury. Consequently, paraquat (e.g., Gramoxone) has become a popular alternative for some producers. In 2020, a vineyard manager (Ontario County, NY) and an apple grower (Wayne County, NY) reported poor control of horseweed following paraquat applications and inquired about resistance screening.

Small (2.5 to 3.5 cm in diameter) horseweed plants from the suspected paraquat-resistant populations and two sensitive populations were treated with paraquat at doses of 0 (untreated check), 0.14, 0.28, 0.56, 1.12 (1X), 2.24, 4.48 and 8.96 kg ai ha<sup>-1</sup>.

Each herbicide by rate combination was replicated 12 times for each of the four horseweed populations and the study was repeated in time. Both sensitive horseweed samples were almost completely controlled by paraquat applied at 0.14 kg ai ha<sup>-1</sup>, the lowest dose evaluated in the study, except for the untreated check. The putative paraquat-resistant horseweed



Paraquat resistant plants in the top row, and paraquat sensitive plants in the bottom row, with dosage increasing from left to right.

## Cont. Weed Research Updates

populations had plants surviving treatments of 2.24 and 4.48 kg ai ha<sup>-1</sup>. Paraquat-resistant plants were sensitive to saflufenacil (e.g., Treevix) and glufosinate (e.g., Rely 280). While the two paraquat-resistant populations screened in this study were sensitive to glyphosate, glyphosate horseweed is WIDESPREAD in NY, especially in soybean production.



Fall indaziflam and glufosinate pre-mix application continues to provide excellent control in April (upper picture) and July (lower picture)

**Evaluation of an Indaziflam – Glufosinate Pre-Mix:** Indaziflam (e.g., Alion) is a preemergence herbicide for long-lasting control of annual grasses and broadleaf weeds in vigorous/healthy perennial crops including grapes (5 years old) and pome and stone fruit (3 years old), among others. Use rates are soil and species dependent. Target species include: foxtails, barnyardgrass, annual ryegrass, crabgrasses, carpetweed,

chickweed, shepherd's purse, pigweeds, lambsquarters, smartweed, and horseweed/marestail. Indaziflam should be applied to a dry soil surface, without cracks or depressions and avoiding contact with the crop. Moisture is needed for activation of indaziflam. Activation within 48 hours after application is optimum for binding the active ingredient to soil particles and preventing its downward movement to the crop's roots. Excessive crop or weed debris present on the soil surface at the time of application may prevent a uniform distribution of the product reaching the soil. If weed pressure is heavy, a burndown treatment can be applied in advance of indaziflam applications. Burndown herbicides can also be applied as a tank mix partner.

In 2022/2023, we began evaluating the efficacy of a novel pre-mix (indaziflam and glufosinate) for annual weed control in grapes. Applications were made in grapes in fall during dormancy (AgriTech) and following hill-down in spring (CLEREL). In Geneva, control lasted >180 days. Spring applications in CLEREL are also providing extended residual weed control.

**Evaluation of Tiafenacil for weed Control:** Tiafenacil is a non-selective PPO-inhibiting herbicide (in the same chemical family as carfentrazone, e.g., Aim EC) with no residual activity. In some Western states, the rate range for a registered tiafenacil product (a water-dispersible granule) is listed at 0.5

to 1.5 oz/A for use in grapes. Registrants tout low use rates for easier measuring, storage, and disposal and no need for a closed handling system; tiafenacil was developed as a paraquat alternative in Korea. A registration has not yet been secured in NYS.

In 2021 and 2022, trials were conducted in grapes at the CLEREL station in Portland, NY, to evaluate tiafenacil performance with and without the inclusion of residual tank mix partners when applied following hill down in spring. In both years, excellent control of small annual weeds was achieved; emerged perennials were also burnt back. The inclusion of flumioxazin (e.g., Chateau) and rimsulfuron (e.g., Matrix) extended the observed level weed control by several weeks for both seasons.

Tiafenacil is also being explored for use as a sucker control tool. Trials in 2021 and 2022 showed that tiafenacil was as effective as carfentrazone for controlling grape suckers; both products were better than glufosinate for the same purpose. 2022 and 2023 studies are evaluating the use of tiafenacil in a vision guided sprayer.

**Electric weeder trials:** USDA OREI Funded research results suggest that electrical weeding is as effective as shallow cultivation for the suppression of weeds in a Cornell University organic apple orchard. To date, research results do not show any impacts on soil microbial respiration or soil microarthropod numbers and diversity.

Additional trials are looking at electrical weeding combined with cultivation (organic apples) and herbicides (conventional apples)



1<sup>ST</sup> ANNUAL



# WESTERN NEW YORK FRUIT GROWER TOUR



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## Mark Your Calendar

<b>Meeting Title</b>	2023 NASGA Summer Tour
<b>Date</b>	August 15-16
<b>Time</b>	All day
<b>Location</b>	New Jersey
<b>Cost</b>	Varies by tour choice, plus membership fees. Membership info: <a href="https://nasga.org/n-american-strawberry-growers-join-us.htm">https://nasga.org/n-american-strawberry-growers-join-us.htm</a>
<b>Contact for Info/Registration</b>	<a href="https://nasga.org/n-american-strawberry-growers-summer-tour.htm">https://nasga.org/n-american-strawberry-growers-summer-tour.htm</a>
<b>Brief Description of Meeting</b>	Annual summer tour for the North American Strawberry Grower's Association

<b>Meeting Title</b>	2023 LOF Spanish Summer Tour
<b>Date</b>	Wednesday, August 16
<b>Time</b>	8:30 AM-Noon, lunch to follow.
<b>Location</b>	G & S Orchards 825 Atlantic Ave. (Route 286) Walworth, NY 14568
<b>Cost</b>	Free
<b>Contact for Info/Registration</b>	Register now, space is limited: <a href="https://lof.cce.cornell.edu/event.php?id=1799">https://lof.cce.cornell.edu/event.php?id=1799</a>
<b>Brief Description of Meeting</b>	This tour will include a wagon tour of the orchard and discussions on berries, irrigation, CSA, and more. Space is limited. Please be sure to register for this free event. Lunch is included. Check back for more details.

<b>Meeting Title</b>	Cornell Storage Workshop
<b>Date</b>	Wednesday, August 16
<b>Time</b>	8:30 AM – 4:30 PM
<b>Location</b>	404 Plant Science Building Tower Rd Ithaca, NY 14853
<b>Cost</b>	\$60 before August 9, \$75 after.
<b>Contact for Info/Registration</b>	<a href="https://lof.cce.cornell.edu/event.php?id=1785">https://lof.cce.cornell.edu/event.php?id=1785</a>
<b>Brief Description of Meeting</b>	Click link above or see article in the newsletter.

<b>Meeting Title</b>	Tree Fruit & Small Fruit Twilight Meetings Extended - Bonus Meeting!
<b>Date</b>	Thursday, August 31
<b>Time</b>	6:45pm - 8:30pm
<b>Location</b>	Reality Research 4729 Preemption Rd Lyons, NY 14489
<b>Cost</b>	Free
<b>Contact for Info/Registration</b>	Janet van Zoeren - <a href="mailto:jev67@cornell.edu">jev67@cornell.edu</a>
<b>Brief Description of Meeting</b>	This series of monthly meetings will examine seasonal changes in tree fruit and berry crops, demonstrate scouting techniques, and discuss integrative pest management solutions to maximize the health and productivity of berry and fruit plantings.  1.5 DEC credits will be offered in categories 1a, 10, and 22.

<b>Meeting Title</b>	Fire Blight Informational Webinar Series- Using weather and environmental conditions to optimize biologicals and biopesticides for bloom produ
<b>Date</b>	Wednesday, October 18
<b>Time</b>	7:00pm - 8:00pm
<b>Location</b>	Webinar
<b>Cost</b>	Free
<b>Contact for Info/Registration</b>	<a href="https://events.anr.msu.edu/event.cfm?eventID=3783854B8D78477D0CE147ADEE7B9058A0A80B7C7474A905BFFD889E38BA206A">https://events.anr.msu.edu/event.cfm?eventID=3783854B8D78477D0CE147ADEE7B9058A0A80B7C7474A905BFFD889E38BA206A</a>
<b>Brief Description of Meeting</b>	Using weather and environmental conditions to optimize biologicals and biopesticides for bloom production. Dr. Sara Villani, North Carolina State University

## Cornell Cooperative Extension

Lake Ontario Fruit Program

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# Fruit Notes

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**Team Leader, Fruit Quality Management**

**Areas of Interest:** Fruit Quality and factors that affect fruit quality before, during, and after storage.

**Crops:** Blueberries, Raspberries / Blackberries, Strawberries, Apples, Apricots, Cherries, Nectarines, Peaches, Pears, Plums



Mario Miranda Sazo | 315-719-1318 | [mrm67@cornell.edu](mailto:mrm67@cornell.edu)  
**Cultural Practices**

**Crops:** Blueberries, Raspberries / Blackberries, Strawberries, Apples, Apricots, Asian Pears, Cherries, Currants, Gooseberries, Nectarines, Peaches, Pears, Plums



Janet van Zoeren | 585-797-8368 | [jev67@cornell.edu](mailto:jev67@cornell.edu)  
**Integrated Pest Management (IPM)**

**Areas of Interest:** IPM of tree fruit and berry pests, biological control, pollinators.

**Crops:** Blueberries, Raspberries / Blackberries, Strawberries, Apples, Apricots, Asian Pears, Cherries, Currants, Nectarines,



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**Business Management**

**Areas of Interest:** Fruit Farm Business Management, Farm Labor & Regulations, and Evaluation of ROI of New Technologies

For more information about our program visit us at [lof.cce.cornell.edu](http://lof.cce.cornell.edu)