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Fruit Notes

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Cornell Cooperative Extension
Lake Ontario Fruit Program

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Fertilization of 'Honeycrisp' with Consideration of Rootstock to Manage Bitter Pit

Terence Robinson, Lailiang Cheng, and Mario Miranda Sazo

In the last few years, we have studied nutrient levels in 'Honeycrisp' fruit as influenced by rootstock and found that some rootstocks impart higher potassium and nitrogen levels in the fruit than others. It does not seem that they have less Ca in the fruit, but the ratio of K/Ca or N/Ca is elevated with some rootstocks more than others. It appears that some rootstocks are more efficient at taking up K and N than others. This leads to more bitter pit with some rootstocks than others.

The issue of K fertilization is interesting because we found in the 1990's that K was essential for large fruit size and high yield of 'Empire'. Our work in 2008-2009 on 'Gala', another small-fruited variety also showed that high K levels in leaves (1.6%) and fruit (0.8%) are needed for fruit size and yield. Thus, we promoted its annual use with both varieties and had high targets for leaf K level (1.5-1.8%). It worked well with all other varieties until 'Honeycrisp' came along. We found that 'Honeycrisp' requires less K to have large fruit size and high yield than 'Gala'. Thus, it should need lesser amounts of annual K_2O than 'Gala'. We continue to recommend annual applications of K fertilizers to 'Gala'. Our work also showed with 'Gala' that a high yield of 1500 bu/acre will remove about 100 lbs of K_2O per acre with the fruit. Thus at least that amount of annual K should be applied to 'Gala' to sustain that high yield. With the new data we recommend much lower amounts of K fertilizers with 'Honeycrisp'. In addition, we also have a much lower target for leaf K level of (1.0-1.3%) with 'Honeycrisp' than with 'Gala' (1.5-1.8%).

Another factor is the efficiency of K uptake by different rootstocks. Some rootstocks such as B.9 do not take up as much K as other rootstocks. M.9 is intermediate while G.41 and G.11 are very efficient in K uptake. The low vigor of B.9 and low uptake of K is good for bitter pit, but B.9 trees almost never fills the space well enough for high yields, while G.11 and G.41 have slightly more vigor to fill the space but are very efficient at taking up K and thus can have more bitter pit in some years. Recently, we found that G.214 has similar vigor to G.41 but poorer uptake of K and thus has low bitter pit risk (the best of both worlds).

We still don't know why some rootstocks are more efficient at taking up K and Ca than others. Probably it has a lot to do with vigor and root system size. Higher vigor usually means a greater volume of soil is explored by roots and thus the plant has access to more N and K.

Lastly, for managing 'Honeycrisp' and 'Gala' we recommend using leaf analysis, and for 'Honeycrisp' we also suggest fruit peel sap analysis, to evaluate how much K and N to add or not add. Honeycrisp by itself seems to be less efficient than other scions in the ability to transport calcium to fruit, while it is able to be very effective with potassium and nitrogen. If leaf K and N levels of 'Honeycrisp' are above 1.3% and 2.2%, respectively, then we suggest a reduction in the annual K and N applications to zero for a year. For 'Gala', if leaf K levels are less than 1.5%, we suggest additions of 100 lbs K_2O per acre per year until that level is achieved. However, for 'Honeycrisp' if K level is between 1.0 to 1.3%, reduce the K rate by 25~30% that was recommended for 'Gala' at the same yield level. In addition, with Honeycrisp fruit peel sap analysis has been very helpful in deciding how to fertilize that variety. If the peel sap K/Ca ratios are above 25 then that is also a signal to reduce K applications to zero. If peel sap levels of the K/Ca ratio are below 25 then 'Honeycrisp' should receive about 40 to 50 lbs K_2O /acre at a yield level of 1000 bushels per acre. Because 'Honeycrisp' often has 15 to 30% lower yield than 'Gala', the annual maintenance K application rate is often only about 50 to 60% of what was recommended for 'Gala'.



Table 1. New potassium recommendations and plant tissue levels for ‘Honeycrisp’ to mitigate incidence of bitter pit.

Honeycrisp orchard	K Fertilization Program for Honeycrisp	K/Ca levels in Leaves and Fruit Peel Tissues
New planting	<p><u>Pre-site preparation:</u> Reduce the input of K during pre-plant soil preparations to maintain a ratio of K to Ca at 6~7.5% instead of 9.5 to 10% for most varieties</p>	<p><u>Leaf K level:</u> Keep a low value of 1.0-1.3% (years 1-2)</p>
Mature planting	<p><u>Maintenance application:</u> Reduce the K rate by 25~30% that was recommended for ‘Gala’, ‘Empire’ and ‘McIntosh’ at the same yield level. If your soil analysis indicates that there is over 350 lbs of K in the top 6” of soil per acre, we suggest skipping K fertilization for one to two years to draw down the soil K reserves and then make a decision based on leaf analysis.</p>	<p><u>Leaf K level:</u> Keep a low value of 1.0-1.3%</p> <p><u>Peel sap K/Ca ratio (July timing):</u> Keep a ratio below 25</p>

Table 2. Predicted removal rates of macro-nutrients by fruit harvest in relation to fruit yield in commercial ‘Gala’ orchards in New York.

Macronutrients (lbs/acre)

Yield(bu/acre)	N	P	K	Ca	Mg	S
500	10.3	2.6	30.6	3.7	1.8	1.0
1000	20.3	5.0	57.9	7.6	3.5	2.1
1500	30.3	7.4	85.1	11.5	5.3	3.1
2000	40.3	9.7	112.4	15.4	7.1	4.2

Maintenance K₂O application rate is the K removal rate in the table at a given yield multiplied by 1.2. For example, at a fruit yield of 1500 bushels per acre, the maintenance K₂O rate is: 85.1 X 1.2 = 102 lbs/acre.

Use of MaxCel on Whips to Induce Feathering in the Orchard and Scoring/Girdling with the Use of a Double-Bladed Clipper plus MaxCel to Promote Bud-Breaks on Two-Year-Old Blind Wood Sections

Mario Miranda Sazo

Last Friday (April 21) we had the last optimal weather conditions for MaxCel to stimulate feathering or branching of apple trees. We will need another good period of warmer weather for this purpose (the same applies for the use of Apogee at pink for effective vegetative growth control and bitter pit suppression). The MaxCel application will be also useful to trees that were top-, side-, or beaver-grafted last year. There will be additional reminders via the CCE LOF Fruit Facts for timely chemical branching information with the use of PGRs this season.

If you plant a Tall Spindle apple block you should not head the leader. Heading of the leader of a young apple tree after planting is undesirable as it removes a significant portion of the tree structure already produced in the nursery. Even if a whip is planted, the leader is not pruned or headed at planting for the Tall Spindle system. Instead of heading a whip, we recommend applying MaxCel (500ppm or 3.2 ounces/gallon) to stimulate branching of an “unheaded” whip so a more “calm tree” without much new upright growth can be grown as result of the heading cut. The MaxCel can be applied with a backpack sprayer using a single nozzle to the leader from the tip down to 24 inches above the soil at 10-15 days after bud break or with a spray tower (nozzles directed to the lower part of the canopy) (Figure 1). To improve branching even more you may combine the MaxCel treatment at 10-15 days after bud break with scoring (at bud swell) above every other bud along the leader from 24 to 45 inches high. It is very important you pick a warm day for the MaxCel treatment. Better results with MaxCel can be achieved if you spray your whips with temperatures above 67-70° F.

MaxCel use to promote shoot growth of two-year old blind wood: MaxCel has also increased shoot growth of blind wood on two-year old sections of leader of Granny Smith/M.26 and Fuji/M.9. Steve McArtney and JD Obermiller reported in 2015 good results when MaxCel was applied for this purpose at 1500ppm (9.6 ounces/gallon) at the pink bud stage (a later timing!). MaxCel should be applied into the notch (and above

the bud section) immediately after cutting.

In the past few years, I have emphasized the importance of scoring and girdling for two-year-old blind wood sections with a double-bladed clipper, plus a directed spray of MaxCel at green tip. We have had good results with this technique, and I have encouraged growers (via multiple reminders in the *Fruit Facts*) to try this approach for better results on two-year old blind wood sections of the most valuable apple cultivars. It is very important that growers secure as many productive fruiting units as possible along the entire trunk. With this new approach, future high value mature canopies will always have the opportunity to produce fruit closer to the trunk for trees established at three-feet or less in the in-row spacing (please use 11 ft instead of 12 ft for the between row spacing).

The above cutting techniques temporary interrupt the movement in the phloem (carbohydrate and hormone balance). Better results have been achieved if these techniques are performed with a double-bladed clipper (as suggested recently), or a small saw (as suggested by several other scientists and orchardists in the past). For whatever the level of cutting and type (double-bladed versus one side above the bud) on the xylem of two-year-old blind wood, trunk wounds will heal a couple weeks later. These cuts can promote bud-break and enhance vegetative growth. The techniques must be applied early in the spring (green tip stage) the first year. However, better results have been achieved if techniques are applied in the second year after planting when the root system is well established. Scoring/girdling should be followed with a directed spray of MaxCel at 1,500ppm (9.6 ounces of formulated product/gallon) (Figure 2).

Final notes: I am not recommending the use of MaxCel to stimulate shoot growth of three-year old blind wood or older. Also, I am not recommending the use of the double-bladed clipper plus a PGR for three-year old blind wood sections, or older. You can certainly try a few old trees, panel sections, and learn this year (flag the area/treated trees so you can remember later!). Finally, don't spray the tip of the leader with MaxCel in the orchard (whip case). I don't recommend the use of MaxCel applied to the tip of the leader after planting. This application method is only recommended in the nursery for chemical branching.

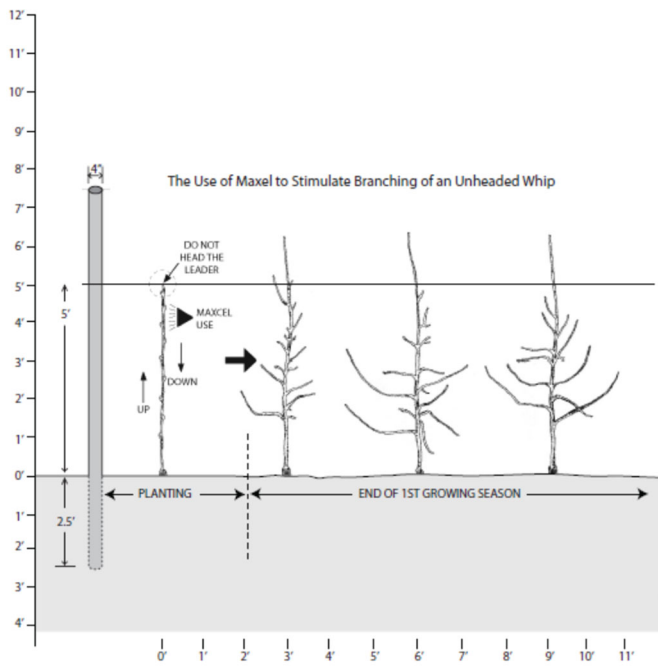


Figure 1: Diagram to illustrate the use of MaxCel to stimulate branching of an unheaded whip in the orchard.

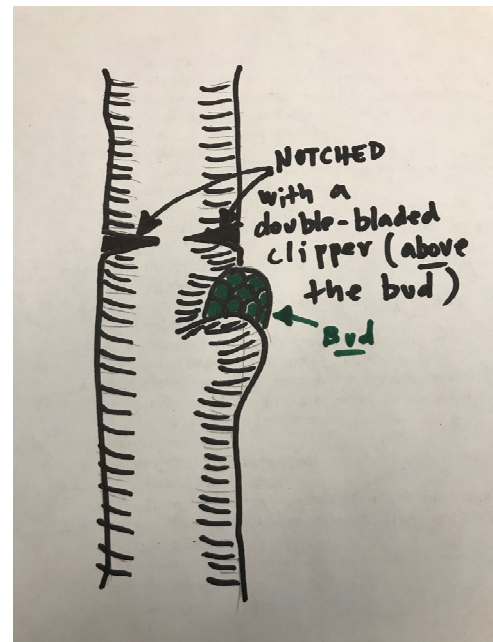


Figure 2: Diagram to illustrate a two-year-old blind wood section notched with a double-bladed clipper above the bud to promote bud-breaks (the technique must be followed with a directed spray of MaxCel in a warm day as indicated above).

Virtual Good Agricultural Practices (GAPs) Grower Training

May 2, 2023

8:45 am - 4:30 pm via Zoom

Cost: \$25 per farm

Registration: https://pub.cce.cornell.edu/event_registration/main/events_landing.cfm?event=VirtualGAPTraining_230

Good Agricultural Practices (GAPs) is a voluntary food safety audit program requiring minimum standards for the production, handling, packing, and storing of fresh fruits and vegetables. Many wholesale buyers, including grocery stores, schools, and other institutions, require GAPs certification from farms in order to purchase their produce. Farms considering expanding their wholesale markets should attend this training, which will cover:

- An introduction to the GAPs certification program and audit requirements
- Record-keeping and worker training, health and hygiene
- Manure, compost, and wildlife management
- Pre-harvest, harvest, and post-harvest food safety assessments
- Production water management
- Postharvest water use & packinghouse sanitation
- Traceability & transportation
- Writing a farm food safety plan

Fruit and Vegetable Grower Feedback Needed on Produce Safety Costs, Needs, and Barriers

The Produce Safety Alliance (PSA) Team and personnel from the Northeast Center to Advance Food Safety (NECAFS) at the University of Vermont would like to understand the costs and the barriers of beginning or expanding food safety practices on farms and in packinghouses to make educational materials more relevant to fruit and vegetable growers and packers. To do so, we have developed a survey to collect food safety information from fruit and vegetable growers.

What are the Goals of this Survey?

To understand:

- what steps growers have taken toward adopting food safety practices on their farm,
- the costs of adopting food safety practices (both one-time and reoccurring), and
- where growers have questions about food safety.

Why Should You Participate?

The detailed information that is provided will allow future educational materials to be tailored to specific challenges that growers are facing.

Who Should Participate?

We are looking for feedback from people involved in fruit and vegetable production and packing, including those who have and who have not adopted food safety practices. This survey should be completed by someone who has knowledge about the operation's produce safety practices (e.g., equipment, finances, supplies, training, market distribution, third-party audits).

Participation is voluntary and anonymous. It will take 10 – 30 minutes to complete the survey, depending on the farms' food safety practices.

By completing this survey, you can choose to be entered into a raffle to win a \$75 prepaid credit card. Ten participants will randomly be selected to win. The raffle will be held when the survey closes, approximately June 1st. If selected, you will be contacted to confirm your mailing address and acknowledge acceptance of the \$75 prepaid credit card.

Direct link to the English-language survey: https://qualtrics.uvm.edu/jfe/form/SV_agW9o6VWOUcivCC

Direct link to the Spanish-language survey: https://qualtrics.uvm.edu/jfe/form/SV_agW9o6VWOUcivCC?Q_Language=ES

Questions?

Please contact Elizabeth Newbold at elizabeth.newbold@uvm.edu with any questions. Thank you for helping to inform the national food safety landscape.

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Thank you!

The PSA and NECAFS teams

Get Ready! There's a New Grant Program in Development for New York's Food Producers

Aileen Randolph, NYFVI

The New York Farm Viability Institute (NYFVI) is partnering with NYS Grown & Certified to launch a grant program to assist New York food producers, processors, distributors, and other eligible entities in bringing NYS Grown & Certified products to market. We anticipate releasing Request for Proposals (RFPs) later in 2023.

While NYFVI is working to develop the details and management infrastructure for the program, we are encouraging potential applicants to take steps now to make sure they are prepared when the RFPs are released.

Grant applications will be more competitive if the applicant is already enrolled or actively in the process of becoming part of the NYS Grown & Certified program. That is why we are encouraging all potential applicants to take a look NOW at the NYS Grown & Certified program and determine if it is a good fit for their business.

More information about the RFPs, as well as a sign-up form to be notified when it is released, is available at www.nyfvi.org.

Mark Your Calendar

Meeting Title	Tree Fruit and Small Fruit Twilight Meeting (4 scheduled)
Date	Thursday, April 27 (first one)
Time	7-8:30 PM, please arrive at 6:45 PM to sign in for DEC credits
Location	Orchard Dale Fruit Farm 1287 Oak Orchard River Rd. Waterport, NY
Cost	Free
Contact for Info/Registration	Please bring pictures or descriptions of pests you are concerned about on your farm. 1.5 DEC credits will be offered in categories 1a, 10, and 22. Please arrive at 6:45PM to sign-in for DEC credits.
Brief Description of Meeting	Join specialists Janet Van Zoeren, Anya Osatuke, and Anna Wallis for a conversation about fruit and berry phenology and pest management

Meeting Title	Virtual Good Agricultural Practices (GAPs) Training
Date	Tuesday, May 2
Time	8:45 AM-4:30 PM
Location	Virtual (Zoom)
Cost	\$25 per farm
Contact for Info/Registration	Registration: https://pub.cce.cornell.edu/event_registration/main/events_landing.cfm?event=VirtualGAPTraining_230
Brief Description of Meeting	See information on page X of this newsletter

Meeting Title	2022 Tree Fruit IPM Schools (simultaneously in English & Spanish)
Date	June 14 (Wayne County) and June 21 (Hudson Valley)
Time	8:30 AM – 3 PM
Location	TBA
Cost	TBA
Contact for Info/Registration	Stay tuned for registration information
Brief Description of Meeting	Stay tuned for more information.

Meeting Title	IFTA 2023 Summer Study Tour
Date	July 23-25
Time	All Day
Location	Nova Scotia
Cost	\$550
Contact for Info/Registration	Registration info: https://ifruittree.org/event/ifta-2023-summer-study-tour/
Brief Description of Meeting	See IFTA website for detailed itinerary.

Meeting Title	2023 Summer Fruit Tour
Date	Friday, July 28
Time	All day
Location	Wayne County
Cost	Free
Contact for Info/Registration	Stay tuned.
Brief Description of Meeting	This year's tour will be co-hosted by CCE-LOF, Agrassistance, Lake Ontario Consulting, and Reality Research!

Meeting Title	2023 LOF Spanish Summer Tour
Date	Wednesday, August 16
Time	TBA
Location	TBA
Cost	TBA
Contact for Info/Registration	Stay tuned.
Brief Description of Meeting	Stay tuned for more information.

Cornell Cooperative Extension

Lake Ontario Fruit Program

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YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

Fruit Specialists



Craig Kahlke | 585-735-5448 | cjk37@cornell.edu

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

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

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,

For more information about our program visit us at lof.cce.cornell.edu