Horticultural News

Volume 97, Number 3
Summer, 2017

Horticultural News

Editors: Winfred P. Cowgill, Jr. & Wesley R. Autio

The New Jersey State Horticultural Society was organized on August 17, 1875 at Geological Hall, Rutgers College, New Brunswick, NJ. It remains the oldest Horticultural organization in New Jersey.

Horticultural News began as the *The New Jersey State Horticultural Society News*, in October of 1920. The Society began "collecting paid membership in order to obtain funds to promote new features of the society and extend the usefulness of the society. The Horticultural Society News was started to be the official society publication." Published M. A. Blake, Professor at Rutgers College was the first president and chair of the publication committee.

Editors served as follows:

MA Blake	1920 - 1947
Norman F Childers	1948 - 1980
Win Cowgill	1981 - 1988
Emily Brown Rosen	1988 - 1990
Linda Butenis Vorsa	1991 - 1995
Jerry Frecon	1995 - 2010

June 2010: *Horticultural News* has moved to an online web-based format. The New Jersey State Horticultural Society has partnered with the University of Massachusetts *Fruit Notes*, Dr. Wesley Autio, Editor. Cowgill and Autio will be the new editors of *Horticultural News* and *Fruit Notes*.

Horticultural News is distributed to growers, extension personnel and researchers and libraries across North America. Horticultural News focuses primarily on tree-fruit culture, but addresses small-fruit cultural issues as well. Most reports are from current research at Rutgers University, University of Massachusetts, and other universities.

Horticultural News is published four times per year by the New Jersey State Horticultural Society. It is provided as a benefit to membership in the society. Membership costs $50 per year. Each one-year subscription begins January 1 and ends December 31. Payments via check must be in United States currency and should be payable to the New Jersey State Horticultural Society . Horticultural News Electronic subscriptions are available as benefit of membership in the NJ State Horticultural Society. A hidden link will be mailed immediately after publication to members. Issues will be made freely available on this website six months after publication.

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Cover: Win Cowgill conducted a replicated Honeycrisp trial to evaluate redder strains of Honeycrisp from the University of Minnesota. Dr. Jim Schupp, Pomologist, Penn State University, originally identified 16 selections that had potentially more red color. The University of Minnesota selected (MINNB42) PP#26644 as the best one. It is now available from Adams County Nursery, Aspers, PA. Win Cowgill photo.

Spray Mixing Instructions Considering Tree Row Volume

Terence Robinson and Poliana Francescatto
Cornell University

Win Cowgill
Professor Emeritus, Rutgers University

Plant Growth Regulator response is a function of the amount of chemical deposited on the leaves of the tree. The amount of chemical that is sprayed per acre should consider tree size to not over-apply chemical to small trees and under-apply chemical to large trees.

Tree size can be used to adjust the amount of chemical added to the spray tank by calculating the size of the tree canopy (tree row volume). The tree row volume (TRV) of an orchard is defined as the volume of water needed to spray the trees to drip point, which is termed a full dilute spray.

The amount of chemical can then be adjusted to the size of the trees with fully-grown trees receiving a full amount (100% dose) and smaller trees receiving an appropriate fraction of a full dose.

The volume of water used to carry the chemical to the leaves can be less than the full dilute volume, but if less than the full dilute volume is used then the amount of chemical in the tank must be concentrated to allow the proper amount of chemical to be applied to each tree.

The concentration factor is determined by dividing the full dilute volume of water (TRV) by the actual amount of water to be sprayed.

First Step is to Mix the Tank Properly

This process can be broken down into 3 easy steps:

1. <u>Calculate Tree Row Volume</u> (Tree height X Tree width X 43,560 X 0.7) / (Between row spacing X 1000)
   - Example of a Tall Spindle Orchard – for many mature Tall Spindle Orchards this is ~200 gallons/acre. Example (11' X 7' X 43560 X 0.7) / (12' X1000) = 196 gallons/acre (rounded to 200GPA).
2. <u>Then set up the sprayer for less than the full TRV amount</u>
   - For the example of the Tall Spindle trees lets assume you set up the sprayer to spray ½ of Tree Row Volume which would be100 gallons/acre. Thus this is a 2X application on TRV trees of 200GPA (200/100=2).
3. <u>Concentrate the chemicals in the tank</u>
   - Multiply the recommended rate for 100 gallons dilute TRV basis X 2 for each chemical (except oil or surfactants).

We suggest that for each orchard block, you calculate tree row volume with the formula above and set up your sprayer for some fraction of TRV and then calculate YOUR own concentration factor. **Note**- Old semi dwarf trees may be 300GPA+ however, these older bigger trees with more vigorous rootstocks, thin easier, so set your maximum TRV at 200 GPA max, never 300. However younger trees in tall spindle blocks may be only be 150, 125 or 100 GPA TRV on younger trees. We strongly recommend that you calculate the actual TRV with the formula in #1 above and then adjust the chemical rate based on how many gallons you spray per acre.

Next Step is Adjusting the Spray Pattern

Often the bottoms of trees show over-thinning while the tops of trees show under-thinning. Our standard recommendation is to nozzle the sprayer so that 2/3 of the spray volume is directed to the top half of the tree and only 1/3 is directed to the bottom half of the tree. Recent studies have shown that this still gives 65% of the fruit in the top half of a tall spindle trees and only 35% of the fruit in the bottom half of the tree. To overcome this imbalance of crop load and ensure fruit on the entire tree uniformly, our new recommendations are in two parts:

1. Bloom and petal fall sprays
   - Adjust nozzles so that spray pattern directs 2/3 of the spray to the top of the tree and 1/3 to the bottom of the tree.
2. Sprays from 10-18mm
   - Completely shut off the bottom half of the nozzles, so that all of the spray is directed to the top half of the tree and no spray be directed to the bottom half of the tree.

These recommendations are based on three years of research with Terence Robinson and Andrew Landers and the last 3 years with Poliana Francescatto and Jaume Lordan. Turning of the bottom half of the nozzles and adjusting the chemical rate up produced the most uniform fruit set overall. The reason this works is that the upper part of the tree gets so much sun light and therefore produces more carbohydrate. Fruit on top receive a greater carbohydrate supply making fruits are harder to thin, as compared to the fruit located on the bottom of the tree where you have more shade. The harder to thin fruit on tree tops need the extra chemical (PGR) to assist in thinning fruit.

Please note that when you shut off the bottom half of the nozzles you need to adjust up your rate of chemical per acre you add to the tank since the volume of water applied per acre is less. We still want to keep the same amount of chemical per acre, even though you are spraying only the top of the trees. The bottom part of the trees will get some drift and do not need to be directly sprayed in 8-14 and 18mm sprays. Therefore, if we turn of 50% of the nozzles and reduce the GPA by 50% you need to recalculate the concentration factor and increase amount of chemical you add to the tank. More chemical has to go in the tank to account to the factor you shut off nozzles and less water is applied to the acre.

For example, if you reduce the water per by 50%, instead off covering five acres with one tank it now covers ten acres. The way to think about this is how many acres will your tank be covering, this determines how much chemical per acre you need to add. (If you just want to try shutting of 30% of the bottom nozzles that's ok to start, and adjust the chemical you add per tank accordingly.)

Note: one important item, you will have to know the output of the nozzles you turn off, to calculate the water reduction in gallons per acre. Often growers have already have smaller nozzle sizes on the bottom. Calculate the total output for each nozzle turned off on each side x 2 sides, and subtract from your GPA to get your actual GPA output.

Example 1. Calculations for bloom or petal fall spray of Maxcel+Sevin with all nozzles on. Standard rate of Sevin XLR at 1 pint per 100gal TRV basis+ Maxcel at 48 ounces per 100 gallons TRV basis:

- Mature Tall Spindle Orchard (11' X 7' X 43560 X 0.7) / (12' X1000) = 196 gallons/acre (rounded to 200GPA)
- Sprayer calibrated at 100GPA (1/2 TRV)
- Concentration factor = 2X (200/100=2)
- The dilute rate for Sevin is 1pt/100 but the orchard needs 200 gallons for full coverage so each acre should receive 2pts.
- The dilute rate for Maxcel is 48oz/100 but the orchard needs 200 gallons for full coverage so each acre should receive 96 oz.
- Calculation: 1pint Sevin x 2X= 2pt Sevin per 100 gallons of spray
- + 48 ounces Maxcel x 2X=96 oz. Maxcel per 100 gallons of spray
- If your tank is 500 gallons you would times chemical by 5
- 5 x 2 Pints of Sevin XLR= 10 pints per 500 gallon tank+
- 5 x 96 ounces Maxcel=480 ounces per 500 gallon tank and sprayer will cover 5 acres

Example 2. Calculations for 12mm or 18mm sprays of Maxcel+Sevin with bottom nozzles turned off. Standard rate of Sevin XLR at 1 pint per 100gal TRV basis+ Maxcel at 48 ounces per 100 gallons TRV basis:

- Mature Tall Spindle Orchard (11' X 7' X 43560 X 0.7) / (12' X1000) = 196 gallons/acre (rounded to 200GPA)
- Sprayer calibrated at 50GPA (1/4 TRV since bottom half of nozzles turned off)
- Concentration factor = 4X (200/50=4)
- The dilute rate for Sevin is 1pt/100 but the orchard needs 200 gallons for full coverage so each acre should receive 2pts.
- The dilute rate for Maxcel is 48oz/100 but the orchard needs 200 gallons for full coverage so each acre should receive 96 oz.
- Calculation: 1pint Sevin x 4X= 4pt Sevin per 100 gallons of spray

- + 48 ounces Maxcel x 4X=192 oz. Maxcel per 100 gallons of spray
- If your tank is 500 gallons you would times chemical by 5
- 5 x 4 Pints of Sevin XLR= 20 pints per 500 gallon tank+
- 5 x 192 ounces Maxcel=960 ounces per 500 gallon tank and sprayer will cover 10 acres

Example 3. Calculations for bloom or petal fall spray of NAA+Sevin with all nozzles on. Standard rate of Sevin XLR at 1 pint per 100gal TRV basis+ NAA (Fruitone) at 10ppm or 4 ounces per 100 gallons TRV basis:

- Mature Tall Spindle Orchard (11' X 7' X 43560 X 0.7) / (12' X1000) = 196 gallons/acre (rounded to 200GPA)
- Sprayer calibrated at 100GPA (1/2 TRV)
- Concentration factor = 2X (200/100=2)
- The dilute rate for Sevin is 1pt/100 but the orchard needs 200 gallons for full coverage so each acre should receive 2pts.
- The dilute rate for Fruitone is 4oz/100 but the orchard needs 200 gallons for full coverage so each acre should receive 8 oz.
- Calculation: 1pint Sevin x 2X= 2pt Sevin per 100 gallons of spray
- + 4 ounces Fruitone x 2X=8 oz. Fruitone per 100 gallons of spray
- If your tank is 500 gallons you would times chemical by 5
- 5 x 2 Pints of Sevin XLR= 10 pints per 500 gallon tank+
- 5 x 8 ounces Fruitone=40 ounces per 500 gallon tank and sprayer will cover 5 acres

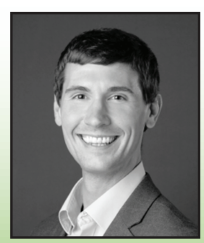
Example 4. Calculations for 12mm or 18mm sprays of NAA+Sevin with bottom nozzles turned off. Standard rate of Sevin XLR at 1 pint per 100gal TRV basis+ NAA (Fruitone) at 3 ounces per 100 gallons TRV basis:

- Mature Tall Spindle Orchard (11' X 7' X 43560 X 0.7) / (12' X1000) = 196 gallons/acre (rounded to 200GPA)
- Sprayer calibrated at 50GPA (1/4 TRV since bottom half of nozzles turned off)
- Concentration factor = 4X (200/50=4)
- The dilute rate for Sevin is 1pt/100 but the orchard needs 200 gallons for full coverage so each acre should receive 2pts.
- The dilute rate for Fruitone is 3oz/100 but the orchard needs 200 gallons for full coverage so each acre should receive 6 oz.
- Calculation: 1pint Sevin x 4X= 4pt Sevin per 100 gallons of spray
- + 3 ounces Fruitone x 4X=12 oz. Fruitone per 100 gallons of spray
- If your tank is 500 gallons you would times chemical by 5
- 5 x 4 Pints of Sevin XLR= 20 pints per 500 gallon tank+
- 5 x 12 ounces Fruitone=60 ounces per 500 gallon tank and sprayer will cover 10 acres

Jan Melvin

Katie Schuld

Dawn Melvin



Matthew Schuld

Branching Young Apple Trees with Plant Growth Regulators

Win Cowgill
Professor Emeritus, Rutgers University

Jon Clements, and Wes Autio
University of Massachusetts Amherst

Applications where PGR's can be used to increase branching on apple.

1. **First-leaf apple trees where the leader with no buds broken but just prior to bud swell. For example, newly planted nursery tree "whips."**
   A) If dormant buds are present on one-year-old wood: Apply a high rate (5,000 ppm) of MaxCel® or Promalin® mixed in latex paint BEFORE buds break. See product labels for more details and instructions.

   B) If buds have broken, and the leaf tissue is showing on one-year-old wood: Mix 400 PPM MaxCel with water, NO SURFACTANT, or 400 PPM Promalin plus a non-ionic surfactant

Two-year-old Ruby Mac/M.9 Pajam 2 trees at UMass Cold Spring Orchard, Belchertown, MA as part of a branching trial conducted by Jon Clements. Untreated (left) and MaxCel treatment (right), one year after application. Treatment (MaxCel at 400 ppm) was applied in early July 2016, with a backpack sprayer. This was considered a late application; spur leaves were almost fully leafed out and starting to form a fruit bud. MaxCel treatment for branching is recommended once the buds break and green leaf tissue is visible.

Notching blindwood in the spring before significant bud growth.

Two-year-old non-bearing Granny Smith trees with no visible buds (blind wood). Trees were notched with a hacksaw blade (narrow, fine-toothed saw, usually used for cutting metal) just above the existing bud scar on the leader, and then the cut was sprayed immediately with a 1500 PPM solution of MaxCel. Photos courtesy of Dr. Steve McCartney, Valent BioSciences.

(NIS). Apply by spraying with a back-pack sprayer. Works best when temperatures are warm and there is enough tissue to absorb the PGR. Note: Never add surfactant to a solution of MaxCel as it is already included in the formulated product. Promalin should be combined with a NIS following the label instructions.

2. **Second-leaf apple trees where leaders have "blind wood" with no visible buds or branches.**

   A) Make a notch with a hacksaw blade (narrow, fine-toothed saw, usually used for cutting metal) just above the existing bud scar on the leader then on nonbearing trees, immediately spray the cut with a 1500 PPM solution of MaxCel.

3. **Existing young tall-spindle or vertical-axis apple orchards with limited branching in the tops of the trees: an airblast sprayer application should be considered.**

   A) If spraying non-bearing trees in second or third leaf, to increase overall branching, apply MaxCel at 200-300 PPM using an airblast sprayer. It is best if lower nozzles are turned off and the spray is targeted to the top 1/3 to 2/3 of the tree where more branching is desired.

Second-leaf Cortland trees at the end of the season after receiving MaxCel at 200 ppm with an air-blast sprayer during bloom. Apex Orchards, Shelburne, Massachusetts.

Second-leaf Macoun trees at the end of the season after receiving MaxCel at 200 ppm with an air-blast sprayer during bloom. Apex Orchards, Shelburne, Massachusetts.

B) If spraying bearing trees in second or third leaf to increase overall branching, apply MaxCel at 200 PPM using an air-blast sprayer. It is best if lower nozzles are turned off and the spray is targeted to the top 1/3 to 2/3 of the tree where more branching is desired. Time the application to apply at bloom to petal fall to cover green tissue. This rate will help remove fruit in the top 1/3 of tree, where you do not want to allow the canopy to fill out.

4. Nursery Trees

A) Apples in a nursery or planted in place can be

Applying MaxCel/Promalin for branching to apple trees at Adams County Nursery, Ellendale, DE USA.

branched with applications of MaxCel or Promalin at 400 PPM (400 mg. L^{-1}) when leader growth reaches approximately 70 cm. or 28 inches above ground. i.e., the height at which the start of branching is desired. This treatment should be repeated at 7-14 day intervals or every 5-6" of leader growth for a total of 4 -5 applications. This rate of terminal growth on the leader will depend on temperature.

On the first application date, the central leader shoot tips should be 28 inches above ground. We suggest applying PGR'S to tree leaders with a backpack sprayer. Use a single nozzle (cone jet hollow cone spray tip), calibrated to apply 4 ml of solution per application, and directed over the tip of the leader of each tree. Any hand

TeeJet ConeJet Nozzle, pressure regulator, swivel head applying 4ML of PGR solution to apple growing tip.

Feathers starting in treated Trees at Adams County Nursery, Delaware. Trees are Macoun/M.9 NAKBT337 and received four applications of Promalin at 500 ppm to the growing tips every 7-10 days.

Feathers on Macoun/M.9 NAKBT337 trees with four applications of Promalin at 500 ppm to the growing tips. Adams County Nurser, Delaware.

pump manually operated back pack sprayer can be used but should have the boom modified to have a pressure regulator, and a swivel head attachment for the nozzle head (See Photo) so that the desired amount of spray can be applied to each tree. Parts are available from TeeJet Corporation and Gate Technologies. **Note:** A complete parts list and instructions can be obtained from the author: Win Cowgill, P.O. Box 143, Baptistown, NJ 08803 USA (wincowgill@mac.com).

Acknowledgements

This research was partially supported by Valent Bioscience, the International Fruit Tree Association, the Northwest Nursery Improvement Institute, the New Jersey State Horticultural Society, the New Jersey Agricultural Experiment Station, and the University of Massachusetts Agricultural Experiment Station.

We thank Gregory Clarke for technical support and guidance and Mike Beese, Wayne Kessinger, Dave Johnson, Rebecca Magron, and other Rutgers Master Gardeners for support. We also thank John Baugher and Shaun Calahan of Adams County Nursery for their cooperation and support in our research trials that generated the data for these recommendations.

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Duane Greene. 1983. Use of Promalin to increase branching of young trees. *Fruit Notes* 48(2):20-22.

Win Cowgill, Mike Beese, Rebecca Magron, Wes Autio, Jon Clements, and Terence Robinson. 2014. Studies and recommendations for branching young apple trees. *Horticultural News* 94(3):1-9.

MaxCel and Promalin mixing rates

200 PPM	400 PPM	1500 PPM
128 ounces/100 gallons	256 ounces/100 gallons	960 ounces /100 gallons
1.3 ounces/1 gallon	2.6 ounces /1 gallon	9.6 ounces /1 gallon
10 mL /Liter	20 mL/Liter	75 mL/Liter

Generic formulations of the active ingredients in MaxCel and Promalin are available as Exilis Plus® and Perlan®, respectively (both from Fine Chemical). Please note that Perlan rates are the same as those used for Promalin, but Exilis Plus has a slightly higher percent active ingredient, so the rate is about 5% lower (always check the label to be sure).

'Kicker' Canes Removed at Bloom Affect Hedging Weights in Cabernet Franc, Chambourcin, and Chardonnay in Southern New Jersey

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Rutgers Agricultural Research and Extension Center, Bridgeton, NJ 08123

'Kicker' cane is a supplemental cane retained during winter pruning, typically at the crown or the apical end of the grape vine. These disposable canes can suppress the grapevine vigor at the onset of the growth cycle. Though it is not uncommon practice, its effectiveness has not been studied in high vigor agro-climates such as New Jersey. Excess vigor during growth cycle requires multiple hedgings and can increase the cost of canopy management. Reduced vigor not only requires less number of hedging but can improve light penetration in to canopy and fruit zones and enhance fruit quality.

An experiment was conducted in *Vitis vinifera* and hybrid varieties of wine grapes to study, if by retaining kicker cane at various positions on the grapevine cordons, excessive vegetative growth (vigor) of a vine could be diverted into those kicker canes. Those canes can then be removed at bloom to get rid of the extra vigor. The principle behind this strategy was that vines distribute the vigor proportionately to the number of nodes or buds. Having extra buds at the kicker canes will take some of the vigor of the vine, since the extra 10-12 buds will have at least those many shoots after the bud break. Consequently, shoots from the standard spurs may have less vigor, grow less, and require less frequent hedging.

Materials & Methods

"Kicker" canes were retained then pruned off at bloom to evaluate their effects on hedging weight in Cabernet Franc, Chambourcin, and Chardonnay in southern New Jersey in 2015. Mature vines trained to a bilateral cordon VSP system were used for the experiment. The trials were located in several vineyard blocks in southern New Jersey. These blocks included about; one acre of Cabernet franc planted in 2006 at Repoupo Road in Salem County, an acre block of Chambourcin and a 5 acre block of Chardonnay planted in 2009 and 2008, respectively at Belleview vineyards at the border of Atlantic and Gloucester County. Each of these blocks is trained to a standard bi-lateral cordon system and drip irrigated. A randomized, complete-block experimental design was employed in each block with at least four replications of four treatments each. Each treatment plot consisted of three consecutive vines of which the middle vine was marked for observation. With the exception of the kicker cane pruning treatment, leaf removal and cluster thinning, the experimental areas were managed identically using standard cultural practices under the supervision of vineyard owners and managers.

Four treatments were performed at winter pruning: 'control', standard cultural practices throughout the growing season; 'only distal', one kicker cane each at distal end retained at winter pruning; 'only proximal', one kicker cane each at proximal end retained at winter pruning; and 'distal plus proximal', one kicker cane each at distal and proximal end retained at winter pruning (Figure 1). Two hedgings removed excess shoot growth after which air dried hedged shoots were weighed. All the treatments were applied on the same date close to standard winter pruning. For all the treatments, standard spurs had two nodes while each kicker canes had 10-12 nodes. Two hedgings were performed after kicker cane removal. Hedged shoots were air dried and then weighed.

Data were analyzed using *STATISTICA* software program.

Figure 1. Kicker cane treatments; ‘only distal’ kicker cane (A), ‘only proximal’ kicker cane (B), ‘distal and proximal’ kicker cane (C) and untreated ‘control’ (D), performed during pruning in Chardonnay grown in south New Jersey.

Results & Discussions

Table 1 summarizes the average hedging weights in all three varieties. In Cabernet Franc, average hedging weights of the control was highest and the distal and proximal treatments were lowest after the first hedging, although the differences were not statistically significant. After the second hedging, the control had

Table 1. Average hedging dry weights in response to kicker cane treatments; ‘control’, ‘distal and proximal’, ‘only distal’, and ‘only proximal’ in Cabernet Franc, Chardonnay, and Chambourcin of wine grapes varieties grown in New Jersey in 2015.

Treatment	Average hedging dry weight (g)								
	First	Second	Total	First	Second	Total	First	Second	Total
	Cabernet Franc			Chardonnay			Chambourcin		
Control	35.5	210 [z] a	246 a	186 a	235	421 a	66.0	237 ab	303
Distal and proximal	6.2	155 ab	161 b	58 b	199	257 b	45.6	269 a	315
Only distal	26.5	125 b	152 b	81 b	181	262 b	48.3	190 b	238
Only proximal	11.3	128 b	139 b	98 b	214	312 b	37.6	244 ab	282
P value	0.134	0.057	0.057	0.001	0.275	0.005	0.052	0.147	0.211

[z] Means followed by different letters within columns differ significantly at $P = 0.05$ by Duncan’s new multiple range test.

significantly higher hedging weight compared to other three treatments, and the same pattern was reflected in a total hedging weight (Table 1). In Chardonnay, hedging weights after the first hedging were significantly lower in all three treatments compared to the control; however, hedging weights of all treatments were comparable after the second hedging, still, the combined hedging weight in all treatments were lower compared to 'control' (Table 1). In Chambourcin, the first hedging resulted in comparable dry weights of hedged shoots, even though average hedged weights from the control were higher compared to the other three treatments. There were no significant differences in the hedging weight after the second hedging, although the distal and proximal treatment had higher hedging weights compared to the only distal treatment. Total hedging weights were comparable for all the treatments in Chambourcin (Table 1).

There was inconsistency of hedging weight reduction due to treatment/ however, kicker cane retention and its removal at bloom reduced hedging weights in all three varieties. In all three varieties, typically the second hedging had higher dry weight compared to the first hedging which could be due to enhanced growth of grapevine following the first hedging. Removal of the proximal plus distal cane resulted in reduced vigor in Chardonnay and Cabernet Franc but not in French-American hybrid variety Chambourcin. There was no clear trend between the only distal or the only proximal treatments in all three varieties.

Overall results indicate that 'kicker' cane treatment has the potential to reduce vigor in *Vitis Vinifera*; however, the results could depend of the variety and other factors such as site-vigor and the overall season. For example, here we found that, 'kicker' cane reduced average hedging weights more so in Chardonnay than in Cabernet Franc. Also, it seems that in hybrid varieties, 'kicker cane' may reduce vigor initially; however, due to its inherent rapid growth, it may catch up with normal vigor, and one may not see the difference after second hedging or in overall hedged weights.

Acknowledgements

Authors thank NJ State Horticultural Society for funding this project

Summary of Peach Rootstocks and Current Research

Win Cowgill
Professor Emeritus, Rutgers University

Most growers in NJ and the New England states have been using the same rootstocks for many years. Primarily seedling rootstocks. We will review those and then outline some of the research that is ongoing to identify newer stocks that are more dwarfing and productive.

New Jersey is the most northern state with large commercial acreage of peaches and nectarines. About 5000 acres remain. Pennsylvania and New Jersey trade places for who is the third and fourth largest peach producing states. Growers in New York and all the New England states have expanded peach production over the past 20 years, but cold winters, early springs do limit the life of peach plantings in these states and growers loose more crops when looking at 5 year cycles.

We desperately need dwarfing peach rootstock(s) that are disease resistant, cold hardy and precocious and productive in the Northeast. These peach rootstocks must be well anchored and produce large fruit on the scion variety. Finding peach rootstocks with all these characteristics has long been the goal. Many researchers have conducted peach rootstock trials in the Northeast, most in conjunction with NC-140.

2009 NC140 Peach Rootstock Trial

This trial located in 16 locations had Redhaven as the cultivar. Lovell and Guardian are the standard rootstocks commercially grown included for comparison. Some of the new rootstocks in the NC-140 trials have been clonally propagated and included genetics of peach and other *Prunus* species (Table 1).

Massachusetts. Dr. Wes Autio, UMass, noted on the Massachusetts trial at UMass Cold Spring Orchard, that Under Northeastern conditions in this trial, most peach rootstocks performed similarly. It is interesting, however, to look more closely at the dwarfing rootstocks. In this trial, trees on Controller 5, Krimsk 1, and *P. americana* were all substantially smaller than trees on all other rootstocks. Trees on *P. americana* yielded similarly to those on Lovell. Cumulatively (2011-15), trees on Krymsk 1 and *P. americana* yielded similarly to trees on Lovell, but trees on Controller 5 yielded less.

Pennsylvania. Dr. Jim Schupp, Penn State, reports the following: "This trial has identified a range of tree size control options, and with good tree survival, high

NC-140 technical committee meeting, Clemson, South Carolina, November, 2014, touring peach rootstock plantings at Clemson University.

Dr. Greg Reighard, Clemson University, discusses the 2009 NC-140 Trial with the NC-140 group, November, 2014.

Table 1. Rootstocks included in the 2009 NC-140 Peach Rootstock Trial.

Rootstock	Genetics	Source	Origin
Lovell	Peach	California (1882 selection drying cultivar)	USA--CA
Guardian	Peach	USDA/Clemson	USA--SC
HBOK 10 (Controller 8)	Peach	University of California Davis	USA--CA
HBOK 32 (Controller 7)	Peach	University of California Davis	USA--CA
KV010-123	Peach	Ralph Scorza, USDA Kerneysville	USA--WV
KV010-127	Peach	Ralph Scorza, USDA Kerneysville	USA--WV
Prunus americana	American Plum	Bailey's Nursery	USA--MN
Penta	European Plum	Istituto Sperimentale per la Frutticoltura	Italy
Controller 5	Japanese plum x Peach	University of California Davis	USA--CA
Krymsk 86 (Kuban 86)	Myrobolan Plum x Peach	Krymsk Breeding & Research Station	Russia
Krymsk 1 (VVA-1)	Nankin Cherry X Myrobolan Plum	Krymsk Breeding & Research Station	Russia
Brights Hybrid 5	Almond x Peach	Brights Nursery	USA--CA
Mirobac (Replantpac)	Myrobolan Plum x Almond	Agromillora Catalana	Spain
Atlas	Peach x Almond x Flowering Plum	Zaiger's Genetics	USA--CA
Viking	Peach x Almond x Flowering Plum	Zaiger's Genetics	USA--CA

Dr. Wes Autio hosts a grower tour of the 2009 NC-140 Peach Trial planting at UMass Cold Spring Orchard Research & Education Center, July 12, 2016.

productivity, and freedom from flaws, so far. Some are P. persica (HBOK 10, HBOK 32, KV 10123, and Guardian), which should result in less risk of incompatibility. *Prunus americana*, a selection of American Plum grown from seed, is among the most dwarfing, with tree size 60% that of Lovell. It was the most precocious rootstock when cropping began in 2011. It has been very productive with high yield efficiency, second only to HBOK 10. Survival has been 100% to date, however root suckering is excessive. (Same for California, Massachusetts). HBOK 10, recently named Controller™ 8 is a Harrow Blood x Okinawa cross from UC Davis. In our trial it produces a small semi-dwarf tree, 70% the size of Lovell. Its high cumulative yield is similar to that of large trees on standard rootstocks, ranking it first in yield efficiency. Survival is 100% to date. HBOK 32, recently named Controller™ 7, is another Harrow Blood x Okinawa cross from UC Davis, with tree size 79% that of Lovell. It has been precocious in our trial, with good cumulative yield and average yield efficiency. KV 10123 is the largest of the "semi-dwarfs", producing a tree 88% size of Lovell. In our trial it was very precocious and high yielding. It is a Prunus persica (peach) cross from Dr. Ralph Scorza's breeding program at USDA, Kearneysville, WV."

California. Kevin Day, UC Davis, reported to the California Cling Peach association on the 2009 trial. "Dwarfing rootstocks could provide a significant benefit to the cling peach industry by substantially reducing labor costs without sacrificing yield. When comparing rootstocks among the various locations, it is interesting to note that some behave very differently from one location to another. For instance, Mirobac is quite dwarfing in California (about 50% of Lovell) but even more vigorous than Lovell in Alabama, Missouri and Utah and about equal to Lovell in most other locations." *Prunus Americana,* Krymsk 1, and Controller 5 were the most dwarfing stocks. Mirobac, HBOK 32, Penta, HBOK 10, and Tetra were the next smallest and statistically the same, and would be considered semi-dwarfing.

North Carolina. Dr. Mike Parker, NC State Univ., North Carolina reported in 2016: "The 2009 Peach Rootstock Trial is planted at the Sandhills Research Station in Jackson Springs, NC and consists of 17

Dr. Jim Schupp discusses the peach trial at Penn State Fruit Research & Extension Center, Biglerville, PA. January, 2013.

rootstocks with Redhaven as the scion cultivar. Soil was preplant fumigated in October 2008 with Telone II. Tree death has been an issue, primarily due to bacterial canker (*Pseudomonas syringae* pv. *syringae* van Hall) and all of the trees on Imperial California have died and will be removed from the analysis. Excessive tree death has also occurred with trees on Controller 5, Empyrean 2 (Penta), Mirobac (Replantpac), Krymsk 1, and Fortuna."

2017 NC-140 Peach Rootstock Trial

A new peach rootstock trial was planted in the spring of 2017 at 10 locations in North America (AL, CO, GA, MI, NC, NY, ON, PA, SC, and UT). Cresthaven was used as the scion cultivar. Eight rootstocks were included. Guardian and Lovell were used as controls. University of California Davis rootstocks included were Controller 6 (HBOK 27), Controller 7 (HBOK 32), and Controller 8 (HBOK 10). Rootpac 20 (Nano Pac) and Rootpac 40 (Densi Pac) were from Agromillora Catalana, Spain.

MP-29 (from Tom Beckman, USDA, Byron, Georgia) is a clonal plum-peach interspecific hybrid that was released in 2011 and is resistant to peach tree short life (PTSL), Armillaria root rot (ARR), and root-knot nematodes.

All trees are planted across the state plantings at a spacing of 1.8m (5.9') X 5.5m (18'). The training system will be Perpendicular-V.

Evaluating these more dwarfing rootstocks in a closer spaced system will allow better assessment of these newer rootstocks in a modern higher density production system.

Summary

It is important to evaluate peach rootstocks in different regions of North America. Peach rootstocks perform differently under different growing conditions. For the Northeast Jim Schupp summed up our NC-140 peach trials very well as follows "Several promising new rootstocks are under trial, with a range of tree size-control options, and with good tree survival, high productivity, and freedom from flaws, so far. Some are *P. persica* (HBOK 10, HBOK 32, KV 10123, and Guardian), which should result in less risk of incompatibility. Thus there is good reason for some optimism that we may soon have the missing key in peach rootstocks"

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New Jersey News

Rising from the Ashes

Donaldson's Farm suffered a significant fire in 2016. The fire completely leveled their equipment storage, which was full of farm equipment and supplies. Kieran Donaldson was able to rescue three

tractors by driving them out of the fire but received second-degree burns as a result.

Two thousand bales of straw, a complete workshop, and all kinds of fruit and vegetable equipment were lost.

They have rebuilt and have a brand new building to house the workshop, produce packing line, cooler, and equipment and supply storage. Note the 1937 John Deere B in front of the new building; it was destroyed in the 2016 fire.

Greg Donaldson offers everyone a few words of advice, "Update your inventory with the insurance company on an annual basis. It's amazing how much value in miscellaneous tools and supplies accumulates over the years. I was extremely under insured!"

Stuart Race Passes

Dr. Stuart R. Race passed at the Bridgeway Care Center, Bridgewater, NJ surrounded by his family on May 31, 2017 at the age of 90.

Dr. Race was a cherished Extension Specialist of tree fruit with Rutgers Cooperative Extension for close to 30 years. Born in Glen Ridge on September 20, 1926, he was the son of the late Stuart R. Sr. and Martha Camp Race. A 1944 graduate of Newton High School, Newton, he attended Bloomfield College before transferring to Gettysburg College where he graduated in 1951. He received his MS degree in 1955 and his doctorate in entomology in 1957 from Rutgers University, New Brunswick. He was a member of the Lambda Chii Alpha, Beta Beta Beta, and Sigma Xi fraternities.

A US Army veteran of World War II, he served as a medical photographer from 1945 to 1946. Thereafter, photography and presenting slide shows for his family and friends was a favorite past time.

He was an extension specialist in entomology at Cook College, Rutgers University, New Brunswick from 1965 until retiring July 1, 1993. He published many research studies and was well known among the New Jersey farm community whom he advised regarding insect issues concerning vegetable and field crops, tree fruits, poultry, and livestock.

Dr. Race was a member of the Gardeners of Somerset Valley. He was a member, elder, deacon, and liaison to the Presbytery of Elizabeth at Pluckemin Presbyterian Church, where he was active in various church functions. He and his sons were involved with Boy Scout Troop 154 of Pluckemin. An avid golfer, he participated in the Somerset Businessmen's Golf League and enjoyed passing on his passion for golf to his sons and grandsons. He was member of the Hunterdon Health and Wellness Swim Club, the Rutgers Retirees Lunch Club, and a local pinochle club. He was a volunteer driver with the American Red Cross. He enjoyed travelling throughout the United States camping with his family; his favorite spot being Arches National Park in Utah. He fondly recalled cruising to Alaska and through the Panama Canal.

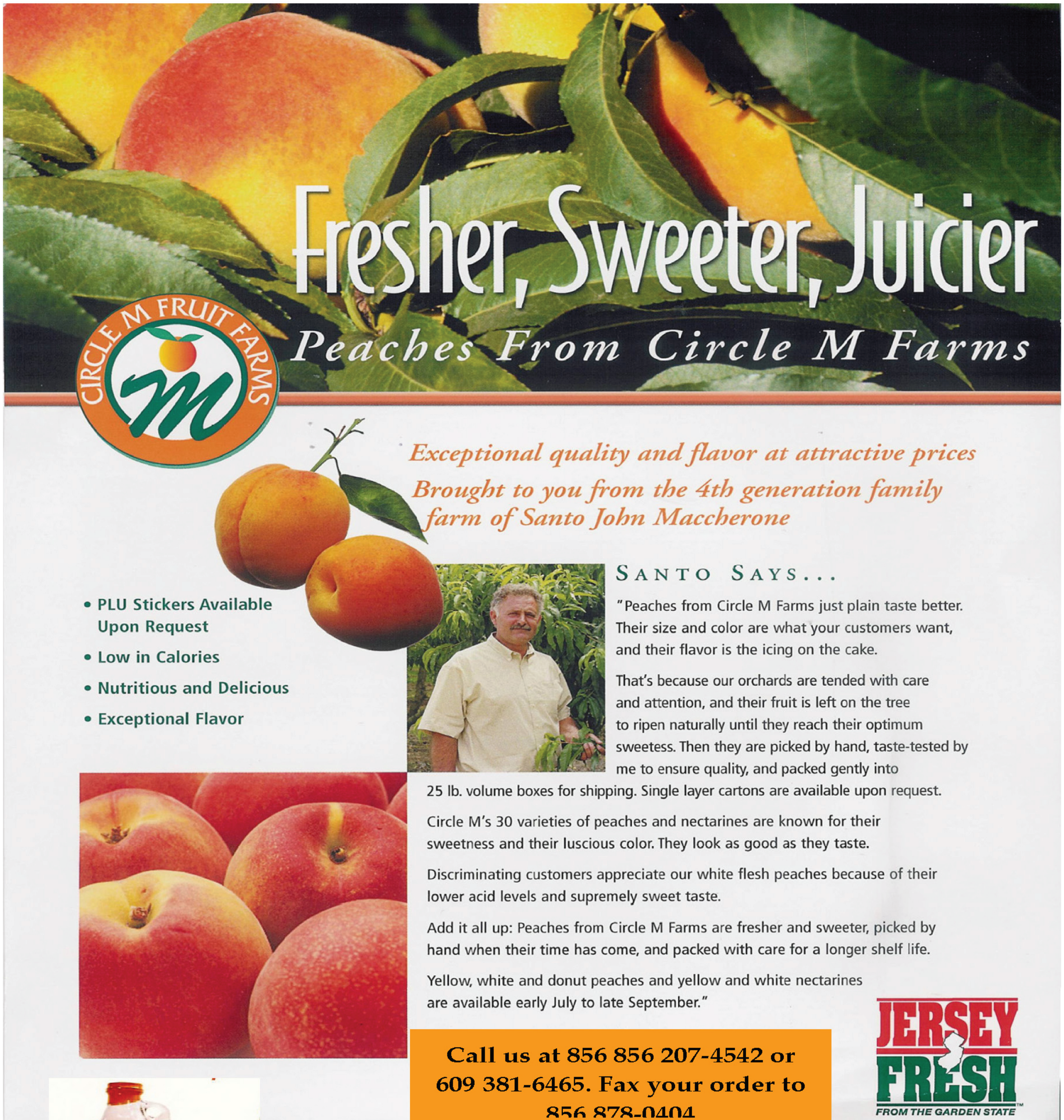
He was predeceased by his first born son, Peter Camp Race, who died in January 1958; and by a sister, Joan R. Rowen, who died in 2011. Dr. Race is survived by his wife of 60 years, Doris Rossetto Race; four children, Donna L. Freeby and her husband, Warren, of Bangor, PA, Andrew W. Race and his wife, Roxana, of Bridgewater, Susan L. Van Gelder and her husband, Paul of Denville, and Thomas S. Race and his wife, Melissa, of Wellington, FL; 11grandchildren; 2 great grandsons; and a great granddaughter due in July.

Funeral service were held at the Pluckemin Presbyterian Church on June 8, 2017. Memorial contributions should be made to the American Red Cross, the American Cancer Society, or the Pluckemin Presbyterian Church.

Editors' Note: Stu was one of the old time extension specialists who believed in the agricultural community and served farmers. He believed in young extension agents working closely with us, mentoring, conducting applied research trials with them on grower farms. By supporting young agents in this way Dr. Race ensured another generation of extension workers would succeed.

New Peach Planting 2017!

Kyle Reese and Dave Barclay of Eastmont Orchards near Colts Neck, NJ are proud of the new 20-acre peach planting that went in this spring. Photo credit Jerry Frecon.



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