Horticultural News

Volume 99, Number 4
Fall, 2019

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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Table of Contents

Selected White French-American Grape Varieties for the Northeast
J. Stephen Casscles 1

IFTA Tours Ontario
Jon Clements 5

Fall Chores for Cherry Tree Health
Win Cowgill 8

Suggested New Apple Variety: Crimson® Gold (Svatava Cv.)
Win Cowgill and Jon Clements 11

A Blast from the Past -- 50 Years Ago: Increasing Orchard Output
William J. Lord 13

Warren Stiles Passes at 86 19

New Jersey News 21

Cover: September Wonder® Fuji (U.S. Plant Patent (PP 11193) at Sunhigh Orchards, Randolph, NJ. It was discovered as a whole tree mutation of an early Fuji. Early Fuji strains were evaluated at Rutgers. See the following citation: Win Cowgill, W. Autio, E. Dager, S. Sollner-Figler, R. Magron, M. Maletta, M. Muehlbauer, and G. Sliffer. 2010. Performance of Six Early Fuji Cultivars in New Jersey. HortScience 45(4):485 (Abstr). Photo credit: Win Cowgill.

Selected White French-American Grape Varieties for the Northeast

J. Stephen Casscles, Esq.
Cedar Cliff Farm, Athens, NY

This article covers recommended white grapes that I grow in the Mid-Hudson Valley at my farm Cedar Cliff, in Athens, New York. It outlines the viticultural aspects of these grapes and the wines they produce. Wine-making capability is an important consideration as growers need to grow varieties that are not only consistently productive, and economically & ecologically sound to grow; but which produce high quality wine. In the Northeast, many growers also own a winery. Hence, the grower should be interested in growing grapes in a profitable manner, but which can be used by their winery to produce quality wines. These varieties can produce more than one style of wine; this versatility in the cellar is an added bonus for the wine producer.

Seyval Blanc (S.V. 5-276) *(lincecumii, rupestris, vinifera)*, is a white wine grape that was developed in 1921 by Bertille Seyve, Jr. (1895-1959), whose nursery was located on the Rhône River, just south of Lyon. Rayon d'Or is the pollen parent of Seyval Blanc and shares this parent with Vidal Blanc. Seyval Blanc has been used extensively in university breeding programs. Its progeny include Cayuga White, Chardonel, La Crosse, Melody, and St. Pepin.

Seyval Blanc is adaptable to where it grows and can make many different styles of wine, such as: very fruity, semi-dry Germanic-like whites; Sancerre/Sauvignon Blanc-like wines that are dry with crisp fruit and herbal notes; Chablis-style Burgundy/Chardonnay-like wines that are flinty, with the fruit of green apples and soft lemons; and California-style, fat and buttery Chardonnays.

Seyval Blanc buds out fairly early, but has a secondary crop if a late spring frost hits. It is moderately winter hardy to hardy, but less so than Baco Noir or Delaware. It is moderately susceptible to black rot, powdery mildew, and botrytis at maturity, but is more resistant to downy mildew. On average, it is more susceptible to fungus diseases than either Vidal or Vignoles.

The cylindrical to slightly tapering conical clusters are medium-large to large and compact to semi-compact. Seyval grows on a standard-sized vine of medium vigor. It ripens mid-season to late mid-season. The vine is very reliable in the field and highly productive. It should be cluster thinned to produce quality wines. It does not do well in droughty or shallow soils.

When Seyval is fermented cool and aged in neutral containers, the result is a Germanic-style white. The wine's fruit flavors include elements of green apples, pineapples, and citrusy notes of lemon, grapefruit, and pear. It is a bright, clean, and crisp – even metallic.

If made from slightly under ripe to ripe grapes, fermented cool, and then aged in oak for a short time; the wine is similar to a Sancerre or Muscadet. These Loire-like whites are more complex, with an herbaceous flint-like body and softer fruit flavors of pears, melons, peaches, and apples.

Seyval Blanc, if picked ripe – but not too ripe – and aged in oak for six months or more, is a slightly thinner version of a Burgundian-style Chardonnay. The flint and steely finish is still there, but it is more austere with fruit flavors of apples, cider, peaches, and pears with a complex yeasty and toasty vanilla finish.

The grape can also be made as a California-style Chardonnay that is fat, buttery, and full of wood and vanilla flavors. If very ripe grapes are fermented in oak and left on the lees, this results in a lighter version of a California-style Chardonnay. These wines tend to have big wild flavors of melons, bananas, honey, ripe peaches, orange blossoms, almonds, and hazelnuts. The body is round, warm, buttery, and complex with lots of vanilla throughout.

Verdelet (S. 9110) *(aestivalis, cinerea, labrusca, lincecumii, riparia, rupestris, vinifera)*, is a dual-purpose grape that makes excellent wine, but is also a superb seeded table grape. The wines are floral, with a perfumey nose, and a solid acid backbone that makes it ideal for still or sparkling wine production. It is one of Seibel's later crosses of Plantet x S. 4938.

Verdelet is a productive variety of only medium vigor, but has average yields if managed well with pruning and cluster thinning. Its bud break is neither early nor late. The variety matures by late mid-season

Verdelet.

to late, but hangs well, so can remain on the vine much later. The clusters are very large, loose to well filled, and very pretty, with large tear-shaped berries that ripen to a beautiful pink-yellow to light golden color. The skin is resilient, but not tough and adheres to the flesh. Due to its large clusters and medium vigor, Verdelet should not be allowed to over crop.

It is sensitive to downy mildew and is hardier than Riesling. Verdelet is susceptible to *phylloxera,* both on its leaves and roots, so it should be grafted, but it can still be grown commercially on its own roots. The variety should be planted on warm, well-drained sites that are out of the wind.

The wine quality is excellent with a delicate, floral and perfumey nose that has a flinty finish. The flavor profile has elements of green apples, lemons, melons, lots of white peach, bananas, and light apricots. Verdelet wines tend to be very pale with some hints of green color. As it ages, they can take on flavors of orange rinds and hazelnuts. The wine has lots of structure, which makes it flinty, clean, and steely, with grapefruit flavors, and an acid profile that sometimes has almond pits.

For those who are adventurous and live in the warmer parts of the Northeast, Verdelet is highly recommended as a quality grape for wine and the table.

Vidal Blanc (Vidal 256) *(lincecumii, rupestris, vinifera)* yields ample crops that produce quality wines. It is made both as a varietal wine and used extensively in blends. This high acid white grape is very versatile in the cellar and can make either bone-dry, steely white wines; barrel-aged Fumé Blanc type wines; sparkling wines; or sweet dessert/ice wines.

Vidal Blanc was hybridized by Jean-Louis Vidal, (1880-1976), director of the Institut de Recherches Fougerate at Bois-Charentes, located near Cognac, France. The grape's seed parent, Ugni Blanc, is *vinifera* and its pollen parent is the French-American hybrid Rayon d'Or (S.4986). Vidal Blanc shares a common parent with Seyval Blanc -- Rayon d'Or. Its genetic makeup is 75 percent *vinifera.* The goal of Professor Vidal in breeding Vidal 256 was to produce a fungus disease resistant grape that could produce brandy.

Vidal Blanc is a thick-skinned grape that is moder-

ately hardy to hardy to winter damage. It is generally resistant to fungus diseases. The vine is vigorous, a consistent producer, and very productive. The variety can grow in many different soil types and conditions. It buds out late to very late, but if damaged by a late spring frost, produces a secondary crop. Vidal Blanc has greenish-white medium-small berries on a large compact cluster that is long, narrow, and tapering to cylindrical. Vidal matures late to very late and attains high sugars, but due to its late harvest date, is suitable only for the warm coastal areas of New England or the Mid-Atlantic states.

It can make a wide range of wines, including: an Alsatian-style wine with viscous/oily qualities; wines like Vouvray/Chenin Blanc; big fat Fumé Blanc-style wines/Sauvignon Blanc, if aged in oak; and Rhine wine-like dessert wines. As a crisp wine without oak aging, Vidal is very clean, metallic, and flinty with floral and resinous notes that include flavors of pineapple, grapefruit, melon, hazelnuts, pears, orange blossoms, dried flowers, and lead pencils. It has high acid levels, so residual sugars are often left to help balance the acid levels.

As a Fumé Blanc-type wine, the grapes are left on the vine longer to increase sugars and to reduce the grape's high acid levels. These wines are helped greatly with at least six months of wood aging to soften its body, brighten its nose, give it more complex smoky notes, rich spice, butter flavors, and to elongate its finish. These wines have the flavors of ripe pears, orange rinds, vanilla, and almonds. As an ice wine, Vidal Blanc has the classic Rhine wine qualities of rich honey, citrus flavors reminiscent of Grand Marnier, and hazelnuts, with an underlying metallic finish.

Vidal, on its own, can have a muted nose; but, is a solid foundation for blending. Blending it with other whites can brighten it and add complexity. One of the great strengths of Vidal in the cellar is that it is good on its own and is a worthy component in blended wines in cool climate regions.

Vignoles (Ravat 51) *(lincecumii, rupestris, vinifera)* is a hybrid of Plantet (S. 5455) x S. 880. Vignoles was bred around 1930 by Jean François Ravat (? –1940), who was a civil engineer from the Saône-et-Loire department in Burgundy. He bred grapes from 1929 to 1935, and died relatively young in 1940, whose work was carried on by his son-in-law, Jean Tissier.

This versatile white wine grape is similar to Riesling in many ways both viticulturally and in its wines. It can be made into barrel-aged dry wines; simple semi-dry county wines; and very complex sweet late-harvest wines. The grapes have high acids and sugar levels that can reach 30˚ Brix.

Vignoles is as winter hardy as Seyval Blanc or better. The vine is not vigorous, but is resistant to black rot and moderately resistant to downy mildew. However, it is susceptible to botrytis and powdery mildew because of its very compact cluster. Its susceptibility to botrytis can impart peach, apricot, and honey notes to its wines.

Its bud break is late, with very compact clusters that are relatively small, conical, with a small shoulder. The thick-skinned light green, pink tinged berries are small for a white variety. This makes Vignoles only a moderate producer. Vignoles' tight clusters make the grape even more susceptible to cracking, bunch rot, and botrytis. To help reduce fungus disease pressure, Vignoles should be pruned to open the canopy to increase sunlight penetration and air circulation.

The grape ripens by late mid-season for dry wines, but can be picked much later for late-harvest white wines. If made dry, it can be clean and crisp with a touch of tartness of green apples, grapefruit, and bananas. The fruit is citrus in character, with underlying elements of peach and tropical fruits, which works well with oak aging. If made semi-sweet, Vignoles can have subtle and complex floral notes of apricots, pineapples, honey, peaches, orange rinds, melons, guava, and orange blossoms with a tart finish. The finish consists of honey, almonds, and Grand Marnier. Vignoles is good for blending. It adds complexity, color, and weight to white wine blends.

The grape varieties detailed above can prosper in some or most of the Northeast. They all make high quality white wines that are versatile in the cellar. Further, and very importantly, they consistently yield bountiful crops to boost the growers' bottom-line and can be grown in an ecologically sound and sustainable manner that make a diverse set of quality wines that are unique to the Northeast. This article is based on the author's over forty years of experience growing French-American hybrid grapes and making wine from these grapes. See generally, J. Stephen Casscles, *Grapes of the Hudson Valley and Other Cool Climate Regions of the United States and Canada* (Coxsackie, N.Y.: Flint Mine Press, 2015).

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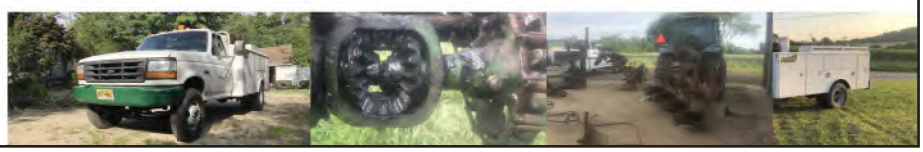

IFTA Tours Ontario

Jon Clements
University of Massachusetts Extension

In late July, 2019, the International Fruit Tree Association (https://www.ifruittree.org/) held the Annual Summer Study Tour in the Province of Ontario, Canada. Nearly 200 IFTA members spent three days touring orchards on the Norfolk escarpment, just west of Lake Ontario, and in the Georgian Bay area of Lake Huron. Here are a few pictures from each day, but you can see more at http://jmcextman.blogspot.com/2019/08/iftaontario.html. All pictures and captions by Jon Clements, UMass Amherst.

Dr. John Cline, U. of Guelph in a cider apple planting at the OMAFRA Simcoe research station. We also visited the 2014 NC-140 (http://nc140.org) rootstock research planting featuring Vineland rootstocks that are winter hardy but somewhat more vigorous and less yield-efficient than Geneva 935.

At Lingwood Farms we saw a generally well-executed orchard including tall-spindle “tipped” trees (aka Wafler system) but the orchard has recently weathered a series of challenges including a tornado, fire blight outbreak, and tree loss to black stem borers.

Near Georgian Bay we visited a turn-key orchard system from Italy that consisted of cement posts, hail net, and overhead irrigation. The 30-acre planting is all Honeycrisp.

At T&K Ferri Orchard a discussion on the apple fruitlet growth rate model and chemical thinning was followed by a farm-table dinner in the orchard.

Botden Orchards in Georgian Bay included an equipment display and here Gerbe Botden demonstrates the tools he uses to monitor orchard and fruit conditions.

Tom Chudleigh at Chudleigh's Farm talks about their PYO varieties and systems in their popular agritainment business that draws large crowds from the millions of people in the greater Toronto-Hamilton metro.

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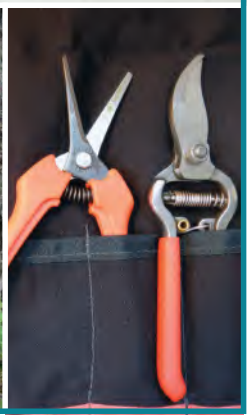


Fall Chores for Cherry Tree Health

Win Cowgill
Professor Emeritus, Rutgers, Win Enterprises International, LLC

Sweet and tart cherries need some attention in the fall to ensure tree health and strengthen fruit buds for next spring. The fall chores that I will focus on in this article will be controlling bacterial canker and foliar nutrition.

Bacterial Canker

Bacterial canker or bacterial gummosis of sweet cherry is caused by several *Pseudomonas* bacteria. This microbe infects flower buds and spurs. It can completely kill new spurs and leaves and then move into the trunk. This problem is especially difficult on Gisela dwarf cherry rootstocks as losing a scaffold or getting infection into the trunk will limit production, and the tree rapidly declines.

In our humid climate in the Northeast and Mid Atlantic, the cankers can continue to develop in lateral branches and the central leader. In some cases, the cankers have grown to girdle and kill two-year-old wood. I have observed central leader dieback as a result. In older wood, the canker looks very much like a fire blight canker in apple. In most cases the canker begins to ooze a brown to amber exudate. It appears that under our humid conditions, this disease is very hard to control and can be devastating if control measures and the proper horticultural practices are not followed. This bacterial disease is most troublesome in young plantings where it can cause loses of up to ten percent of the trees. On mature trees, it can reduce yields from 10–50%.

The source of inoculum may come from wild cherry trees in hedgerows. Black cherry, *Prunus serotina*, particularly, may be one source of inoculum for *Pseudomonas* during wind and rainstorms in the spring and summer months. Removal of these wild cherries may be beneficial.

My original source of information on controlling bacterial canker of cherry came from an Ontario Canada fact sheet, from Ontario Canada written by W.R. Allen, *Bacterial Canker of Sweet Cherry,* NO. 88-0886 which is no longer in print or posted on the web.

Figure 1: Bacterial Canker of Sweet Cherry, Rutgers Snyder Farm, New Jersey.

Mixing and Making -Bordeaux Mix

- Copper sulfate -- Use only powdered copper sulfate (bluestone or blue vitriol), often referred to as copper sulfate "snow" because it is finely ground and dissolves relatively quickly in water, to prepare tank-mix Bordeaux. Ordinary lump copper sulfate is not satisfactory. Store copper sulfate snow in a dry place. Moist snow becomes lumpy and is difficult to work through the screen into the tank. Use copper sulfate registered to make Bordeaux mixture.

- Hydrated Lime -- To prepare tank-mix Bordeaux, use only good quality hydrated lime (calcium hydroxide) also called builders lime. The hydrated lime should be fresh, that is, not carbonated by prolonged exposure to air. Hydrated lime is stable and usually is readily available under several trade names (Builders Lime) or Magnesium lime, a mixture of Ca(OH)2 and Mg(OH)2, may also be used.

- Bordeaux formulas are stated as three hyphenated numbers: 8-8-100. The first number refers to the pounds of bluestone (copper sulfate), the second number to the pounds of spray (hydrated) lime, and the last number to the gallons of water to be used. Thus, an 8-8-100 Bordeaux contains 8 pounds copper sulfate, 8 pounds spray lime, and 100 gallons water.

- Have your spray tank ½ full of water and the agitation turned on, then add the copper sulfate or copper sulfate solutions, let mix thoroughly, then add the hydrated lime solution and mix, and then add the Canola Oil at 2.8 quarts/100 gallons to safen the mix for the foliage.

Pruning Cherries. Focus on pruning in the summer immediately after harvest. Avoid large, dormant pruning cuts; and instead utilize summer pruning (immediately after harvest) to minimize the impact of this disease. Use the short stub method of pruning. On infected branches, leave stubs 6 to 8 inches long. This practice will prevent the canker from entering the trunk and scaffolds. The canker will not move down the stub. Watch the Pruning Video clips on our website (http://giselacherry.com/) and our view more recent videos on our YouTube channel (https://www.youtube.com/user/giselacherry/videos).

Note that on trees utilizing Gisela Rootstocks, some cuts may have to be made in the dormant stage. However, I suggest waiting until to close to bloom. Look for 3 days of clear sunny low humidity to begin pruning. Apply a copper spray before starting pruning, paint the cuts with a copper solution immediately after pruning, and before the next rain event, apply another copper spray.

Spray Copper Now as Bordeaux. Begin spraying early in the fall to control bacterial canker. Cankers get started mainly in the fall after most of the leaves have fallen and the trees are beginning to go dormant. The only effective way to control this disease is to reduce the number of bacteria before the trees enter their susceptible period. The bacteria that start these cankers are found on the surfaces of mature leaves and other green tissues, and do not come from existing cankers.

The only successful control we have found is repeated applications of the old Bordeaux mixture in September, October, and November and repeated again in the spring. Bordeaux Mix consists of hydrated lime (Builders Lime) and Copper Sulfate. The rates and methods of mixing are important. Begin your sprays as soon as the second week in September, make four applications in the fall. It would be my recommendation that in all cherry blocks a program of Bordeaux Mix applications should be made as soon as possible before the next rains. Note, however, that sprays of Bordeaux applied to green leaves must be safened with vegetable oil (Canola) to avoid burning the foliage. Three additional sprays 14 days apart will be applied.

Bordeaux mix will also be applied in the spring with several applications before bud break.

Spring Copper applications. In addition to the 4 fall applications of copper for bacterial canker, two additional applications of copper should be applied in the spring prior to bloom.

Foliar Nutrition

Foliar applications of Urea nitrogen on cherry have been shown to aid fruit size, increase set and increase cold hardiness (from Ouzounis, T. and G. Lang. 2011. Foliar applications of urea affect nitrogen reserves and cold acclimation of sweet cherries (*Prunus avium* L.) on dwarfing rootstocks HortScience 46:1015-1021).

With your airblast sprayer, apply two fall foliar applications of low-biuret urea at 20 lbs. per acre per application in 100 GPA spray water. The fall nitrogen applications increase the flowering spur nitrogen content going into winter and can improve spur leaf size the next spring. This translates into larger fruit size. Optimal timing is early-mid September and repeat with a second application 2 weeks later. The September application helps with cold hardiness. Dr. Greg Lang, MSU, reported that foliar urea was so strikingly consistent in its benefits and that he feels the mid-Sept through mid-Oct is the best window for Michigan growers. They usually expect leaf senescence from Halloween through the second week of November.

Nitrogen and carbohydrates are stored in tree tissues in fall and are vital for fruit tree growth and development in spring. Fruit trees accumulate carbohydrate and nitrogen reserves prior to leaf drop, which are stored through the winter until they are remobilized to growing points (flower buds, new shoots, and expanding spur leaves) the following spring. Reserves provide trees with the necessary energy for new growth when leaves are not yet present for photosynthesis and roots have not yet begun taking up adequate amounts of N from the soil.

Combining Nitrogen and Copper

I have had several growers over the years combine the copper spray with the urea spray. Copper-based fungicides also are effective and economical in controlling cherry leaf spot, but they can be phytotoxic to cherry leaves, hence the combination of Canola Oil to the tank to safen it.

Suggested New Apple Variety: Crimson® Gold (Svatava Cv.)

Win Cowgill
Professor Emeritus, Rutgers, Win Enterprises International, LLC

Jon Clements
University of Massachusetts Extension

At Sunhigh Orchards in Randolph NJ last week, owner Phil Green was excited to show me his crop of Crimson® Gold apples grown on a 5-year-old tall spindle trellis. I ate one and my taste buds exploded with flavor. It is a very hard crunchy apple with lots of acid that forms a complex flavor balanced with high sugar. It fills a nice slot for PYO operation coming in before Golden Delicious. Trees had filled their space on M.9 NAKBT337 and were highly productive.

Crimson® Gold (Svatava Cv.) is available from Adams County Nursery. Their catalog lists Crimson Gold as "a new scab-resistant cultivar just ahead of Golden Delicious. The fruit colors nicely with a near full red-orange blush on a yellow background, and the flesh is white, firm and juicy. Apples are medium in size with a sweet-tart flavor. Fruit has storage life of up to eight months. The trees have medium vigor and are very productive, so they should be thinned accordingly." Trees at Sunhigh Orchard had fairly strong vigor on M.9 NAKBT337.

Figure 1. Crimson® Gold (Svatava Cv.) grown at UMass Cold Spring Orchards Photo Credit, Jon Clements.

In Massachusetts, Crimson Gold has been evaluated in two locations beginning in 2011 (per the Apple Testers database, appletesters.net). Little, if any pre-harvest drop was noted when harvested from September 13 to October 30. October 30 was way too late to harvest it. Although largely a yellow apple, it has a prominent bright and very attractive red-orange blush that covers from 35 to 70% of the apple surface. It is a medium-large apple when adequately thinned, fruit diameter ranging from three to three and one-half inches. Flesh firmness centers around 20 pounds (quite firm). Brix has been as high as 16 but is more often about 14 when picked before becoming over-mature. Starch-index readings are variable but should be in the 4-7 range about October 1, the approximate recommended harvest date, just before Golden Delicious. Fruit flavor is best described as complex with both high sugar and acidity. It is admittedly not for everybody, but for those who appreciate a complex flavor. Fruit flesh is green-white, medium texture, crisp-melting, and sweet-tart. Skin is a bit chewy. Tree

Figure 2. Crimson® Gold (Svatava Cv.) grown at Sunhigh Orchards, Randolph, NJ. Photo Credit: Wes Autio.

habit has been described as medium vigor with an upright-spreading growth habit. It can be biennial if not adequately thinned. Otherwise it is an easily managed tree. It might make a good cider apple, but is also recommended for fresh eating. Although Crimson Gold is scab-resistant, it is recommended a season-long fungicide (and insecticide) program be in place for optimum tree health and fruit quality. See the UMass maturity report: http://ag.umass.edu/fruit/2019-apple-maturity-report.

Origin of Crimson® Gold (Svatava Cv.)?

Crimson® Gold is a Czech Republic apple variety tested as Svatava that is exclusive to ANIFIC which is an Australian Company which focus's on in Intellectual Property Management & Commercialization: https://www.anfic.com.au/ and https://www.anfic.com.au/portfolio-view/svatava-2/. Adams County Nursery https://www.acnursery.com/ appears to be the only US nursery propagating it.

ANIFIC has the following descriptors for Crimson® Gold (Svatava Cv.).

FRUIT: medium sized with fine texture, juicy, aromatic and good acid balance. Average weight 148g.
SKIN: red striped bi-coloured apple with yellow background. Medium in thickness.
FLESH: cream, slightly crisp & slightly sweet. 13° Brix.
PRESSURE: 8kg (17.6 pounds)
MATURITY: ripens just before Golden Delicious.
COMMENTS: requires thinning similar to Golden Delicious.
STORAGE LIFE: 7-8 months.

A Blast from the Past -- 50 years ago.

FRUIT NOTES

Prepared by the Department of Plant and Soil Sciences

Cooperative Extension Service

College of Agriculture

University of Massachusetts, Amherst

EDITORS

W. J. LORD AND W. J. BRAMLAGE

JULY—AUGUST, 1969

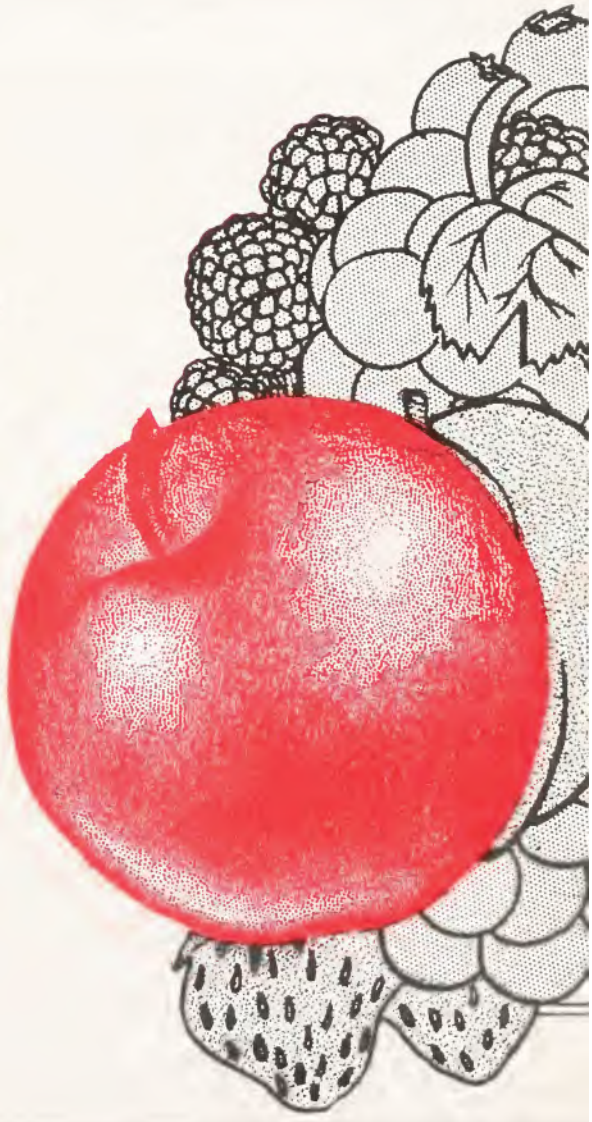
TABLE OF CONTENTS

Increasing Apple Orchard Output

Pomological Paragraph
Certified Sweet Cider and Approved Farm Stand Programs

New Extension Publications

The Application of Concentrate Sprays on Apples by Large Airblast Sprayers



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INCREASING APPLE ORCHARD OUTPUT

William J. Lord
Department of Plant and Soil Sciences

Dr. John C. Cain of the New York State Agricultural Experiment Station, Geneva, New York, recently published a report entitled "Tree Spacing in Relation to Orchard Production Efficiency," (N.Y. Agr. Res. Circular No. 15).

In this report, the efficiency benefits of close spacings for apple trees are discussed. Efficiency was defined simply as OUTPUT/INPUT. The output factors were resolved into bushels per tree and trees per acre, while the input factors included planting, production and harvest costs.

In spite of technological advances, efficiency increases have barely kept pace with inflation and higher living standards. Yields per tree have improved considerably, but according to Dr. Cain, too little attention has been given to a study of tree spacing in relation to land-use efficiency and its effect on production per acre. Using some of the information presented by Cain as well as other data and ideas, the writer has attempted below to analyze our Massachusetts orchards and visualize how production efficiency can be increased.

Many of our older orchards are spaced 40' x 40' and as pointed out by Dr. Cain, at maturity the trees may actually cover no more than 50-60% of the land. Furthermore, at least 25 years are required for these trees with 40' x 40' spacing to reach maximum production. If production were approximate linear function of the land area covered by the trees, the lifetime production efficiency in terms of land usage in a 40' x 40' planting could be no more than 30-35%. However, as it will be pointed out later, yield per square foot of space occupied by the tree is greater for the smaller tree.

What can be done to improve land utilization and production per acre for trees on seedling roots? First, Cain suggests the elimination of cross alleys. With air blast sprayers and chemical control of weeds in the tree row, the necessity for spraying and mowing or cultivation in both directions is eliminated. Therefore, input is reduced and efficiency is increased. Second, the minimum alley width required for orchard travel needs to be determined and used. Grower opinion regarding travel space needed, appears to vary between 7 to 10 feet. If it is assumed that an 8-foot alley is needed, trees on seedling roots can be planted 32' x 40' instead of 40' x 40'. Tree number per acre is increased 26% (27 to 34 trees) and an equal gain in production is possible with no more miles of rows to travel. The space requirement of trees will vary with variety and soil, however, and the maintenance of trees on seedling roots at planting distances of less than 32' x 40' is possible. Furthermore, tree size can and is being controlled by restrictive pruning and filler trees in many blocks are not being removed which makes higher yields per acre possible.

Now let's look at our plantings on size-controlling stocks, most of which are on EM VII rootstock, in terms of efficient land utilization. In the past, we recommended a 20' x 30' spacing for McIntosh on EM VII rootstock. Three possibilities exist in these plantings regarding space: (a) the trees may not fully utilize the space alloted; (b) it may take an excessive number of years to fill the alloted area; or (c) the spacing is too close.

Dr. Cain cited a report of National Fruit Trials in England which indicated that the average spread of 89 varieties on EM VII rootstock was about 10 feet at 10 years of age and that they can conveniently be held to this size by minimum peripheral pruning. However, variations due to variety, soil, nutrition and climate may cause wide differences from this figure. In 1963, the branch spread on 19-year-old McIntosh on EM VII in the University of Massachusetts orchard in Amherst, averaged 29 feet, with a range of 27 to 31 feet. No attempt had been made to confine the spread of these trees by pruning. Since 1963, the height (12' to 14') and the spread has been restricted.

Data shown below (Table 1) for branch spread and yield of a young McIntosh orchard on EM VII in Shelburne, Mass., planted 20' x 30', 72 trees per acre, also indicate the vigor of this variety on EM VII. It would appear that McIntosh on EM VII in Massachusetts is much more vigorous than trees on similar stock in England, and that we can assume that trees here will fill the 20' x 30' spacing alloted this variety in the past. When these trees eventually obtain a spread of 20 feet, they will fill about 66% of the land area if a 10 foot alley is maintained.

Table 1. Spread and yields of young bearing 'McIntosh' trees in Shelburne, Mass. 1965-1968.

Yield	Tree age	Tree spread	Yield (boxes/tree)	Yield (boxes/acre)
1965	4	8.0	0.23	17
1966	5	9.8	0.88	63
1967	6	12.3	3.30	238
1968	7	14.3	3.10	223

[1]Measurements made by taking 2 measurements at right angles to each other. Measurements were made from the tip of the outermost branch on one side of the tree to the outermost tip on the opposite side.

Dr. Cain stressed the importance of filling the land area quickly with bearing surface and cited the beneficial effect of close tree spacings on the lifetime production of the orchard. At 8' x 16' spacing with an 8 foot alley, the trees will occupy 50% of the land in 8 years and will be near maximum production. On

the basis of equal production per unit of land area utilized, the total lifetime production of the 8' x 16' planting will be about 50% greater than a 15' x 30' planting at 30 years of age. Therefore, he concluded that if we can accurately estimate the spacing at which trees can be economically maintained by pruning, and can maintain high yield per square foot of tree-spread for a reasonable lifetime of the tree, great gains in production can be achieved by choosing the proper spacing at planting.

With a constant alley width, land utilization favors the larger tree. For example, with a constant alley of 8', an 8' x 16' planting of trees will eventually occupy 50% of the land, whereas a 32' x 40' planting will occupy 80% of the land at full spread.

If one assumes equal yield per square foot of space occupied, the larger tree may eventually surpass the smaller trees in production. However, Cain showed that small trees produce higher yields per foot of space occupied by the trees. When he applied the factor for yield in lbs/ft^2 of tree-spread to the calculation of space occupied at different tree spacings, he concluded that with a constant alley-way of 8 feet, the smaller tree properly spaced produces more bushels per acre and reaches maximum production at an earlier age, thereby eliminating the possibility of the larger tree ever exceeding the smaller tree in lifetime production.

Dr. Cain estimated the efficiency and net return for life-time-average bushels per acre for a 40-year-old orchard at various spacings. Tentative cost values were assigned for the various input factors and these costs were converted to bushels of apples so that input and output could be expressed in the same units. His calculations showed the following. "The total input per acre per year is much greater for the smaller trees, but is largely accounted for by the cost of harvesting greater yields. Efficiency (output/input) is only about 25 per cent greater for the 12' x 20' planting than for the 32' x 40' planting. However, the net gain (output-input) for the smaller tree is over 2.5 times that of the large tree. The maximum efficiency and net gain for life-time production appears to be obtained from a tree about 12 feet wide, but variations in orchard lifetime; weather conditions, and other variables of estimate could not justify distinction between tree sizes of 8 to 15 feet. However, there does not appear to be any good reason to plant trees whose final spread is expected to exceed 20 feet."

With the information quoted above in mind, let's re-examine our older recommendation of 20' x 30' spacing and our newer suggestion of 15' x 25' spacing for McIntosh on EM VII. Some persons are talking about the possibility of restricting tree spread of McIntosh on EM VII to 6 feet. The question is: Would it have been possible to restrict spread to 6 feet in the University of Massachusetts orchard mentioned above without forcing excessive vegetative growth and without reducing yields? Furthermore, Dr. Cain's calculations indicated no distinct differences between 8 feet and

15 feet tree-spread regarding efficiency. It would appear, therefore, that our current recommendations of 15' x 25' spacing for McIntosh on a good orchard soil is reasonable from the standpoint of maximum efficiency and a high lifetime production of the orchard. (Dr. Cain is suggesting 13 feet for McIntosh on EM VII, plus or minus 2 feet depending on soil capability.) With the 15' x 25' spacing, a 10-foot alley was considered necessary for bulk boxes and space to drive past the boxes. As previously mentioned, however, grower opinion regarding travel space needed appears to vary between 7 and 10 feet.

Growers who have established close spacings--6' x 14', 10' x 18' and so forth--have in mind the development of tree walls and the possible use of a harvesting aid. Restricting tree size and maintaining productivity at these spacings will challenge the horticultural ability of the grower. Since the ultimate answer as to the planting distance, height and spread of our trees is not known, it would appear based on the data presented by Dr. Cain, that the more conservative spacings of 15' x 22' to 15' x 25' should enable the grower to obtain high lifetime yields without encountering problems that may arise with closer tree spacings.

SUMMARY

The inflationary spiral must be counteracted by similar increases in orcharding efficiency for the industry to remain profitable in the future. Fortunately, significant increases in lifetime yields per acre are possible through better utilization of land. Spacings of 40' x 40' or greater are no longer needed for trees on seedling roots. New production techniques--herbicides, restrictive pruning with hand tools, air blast sprayers, and mechanical pruning have eliminated the need for the cross-alley and filler tree removal in many instances. The alley for the movement of orchard equipment can be kept to the absolute minimum to reduce tree spacing between rows.

Small trees on size-controlled rootstock, properly spaced, produce more bushels per acre and reach maximum production at an earlier age than larger trees. Hopefully, within a few years we will be able to predict, with reasonable accuracy, the size at which we can hold the tree with a minimum cost of pruning and a size at which high yields per square foot of tree spread can be maintained for the lifetime of the tree.

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Warren Stiles Passes at 86

Warren Stiles, age 86, of Dias Creek, New Jersey, died on Sunday, July 28, 2019.

The tree fruit industry and the farm community have lost a valuable friend and great extension worker. Dr. Stiles made valuable contributions in fruit nutrition at three different Land Grant institutions, Rutgers University, University of Maine, and Cornell University, and was a valuable member of the New Jersey farm community for 20 years after he retired. He was also a member of the American Society for Horticulture Science, American Pomological Society, and the NJ State Horticultural Society.

Warren was born on his maternal grandfather's farm in Green Creek, New Jersey, the son of the late Maurice and Laura Tomlin Stiles. He was raised on the family farm in Dias Creek. Warren's middle name is Cryder as he was delivered by Dr. Millard Cryder. He was a 1950 graduate of Middle Township High School and attended Rutgers University earning a BS degree in Farm Crops in 1954 and an MS degree in Horticulture in 1955. He received his PhD degree in 1958 from Penn State University. He was a member of the Dias Creek United Methodist Church where he was the organist.

Warren's professional career consisted of the teaching positions at Rutgers University as Assistant Professor of Pomology from 1958-1963; University of Maine as Extension Fruit Specialist and Associate Professor of Pomology 1963-1969 and Professor of Pomology 1969-1980; Cornell University as Associate Professor of Pomology 1980-1985 and Professor of Pomology 1985-1999. After retirement in 1999, Warren returned to the farm. He had various memberships including the Cape May County Agriculture Development Board Farmland Preservation Program; County Board of Agriculture, of which he was a member of the Board of Directors; the Beach Plum Association; County Cooperative Extension Advisory Council; County Master Gardeners Program, County Technical School Horticulture Program Advisory Committee; NJ Farm Bureau; NJ Agricultural Experiment Station Board of Managers.

Warren is survived by his wife, Sally A.; his children: Matthew P. (Lisa); Elizabeth Stiles; Kathleen Holzer (Jeffery) and Steven W.; step-children: Susan Clark, Robert Clark, and Christine Balch; two brothers: Francis T. (Barbara) and Irvin R. (Shirley); a sister, Beverly Schellinger (Leland); sister-in-law: Anne Stiles; three grandchildren: Michael and Allison Loder and Emily Holzer; and two step grandchildren: Jack and Grace Balch. In addition to his parents, he was preceded in death by two brothers: Herbert and Lucky.

As per wishes of the family, memorials in his name may be made to the Cape May County Board of Agriculture Scholarship Fund, 4 Moore Road, Cape May Court House, NJ 08210. Condolences at www.radzieta.com.

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New Jersey News

Tranquility Farms New Farm Market and PYO Apple Orchard

The Freeborn family, Tranquility Farms, has expanded its retail operation at Tranquility Farms with a new farm market last year and has added a five acre Pick Your Own Apple Orchard in 2018-2019. Frist fruit will be available in 2020. https://www.tranquillityfarmsnj.com/

Tranquillity Farms, located in Allamuchy, NJ, is home to a diverse third-generation, family-run agriculture business. Set on 600 acres and farming 800 total acres, the farm prides itself on its registered Holsteins and continual expansion of crops. We are keeping farming in New Jersey and supplying our customers with fresh, local produce! See https://wwwtranquillityfarmsnj.com/about-us for more information.

Tranquility Farms farm market ready for pumpkin sales.

Farm Market at Tranquility Farms, Andover, NJ.

New 5-Acre Tall Spindle Apple Orchard Established in 2018-19 at Tranquility Farms. Trees have reached the top wire at second leaf, with good fruit bud formation for first crop in 2020.

Emma Freeborn has been testing all of the apple varieties in our orchard before we open up to u-pick next season. Tranquillity Farms.

Ed Kesler Passes at 85

James "Ed" Kesler, 85, of Port Murray, New Jersey, passed away suddenly Sept. 14, 2019, at Overlook Medical Center in Summit, NJ. Ed was born on Jan. 11, 1934, in Mount Hope, WV, to the late Dewey and Eva Mae Kesler. Ed graduated from Virginia Poly Technic Institute & State University as an electrical engineer. He went on to receive his master's degree from New York University where he was involved in the launch and operation of the Telstar program and the initial call between France and the U.S.A. in 1960. He was employed at AT&T for 33 years.

He "retired" and purchased Marlatt's Fruit Farm and formed Tree-Licious Orchards in Port Murray, New Jersey, which he loved. The orchard gave him years of joy developing new varieties of apples and peaches and supplying his customers with special, unusual varieties native to their countries or areas of the United States. He was an active participant in the Green Market Farmers Markets in New York City.

Ed was an active member of the New Jersey State Horticultural Society.

During his last week, he chatted with his family about planting new varieties of peaches for the future. Ed was a hard worker who loved his orchard; he loved computers, but above all, he loved his family and treasured every moment spent with them.

In addition to his devoted wife of 56 years, Carol Kesler, he is survived by his loving children, Virginia Ann and her husband, Dale Carlson, James Charles Kesler, Susan Margaret and her husband, Sal Athalye, and Elaine Marie and her husband, Robert Johnston, and by his loving grandchildren, Andrew, Benjamin, Victoria, Olivia, and William.

In lieu of flowers, donations may be made in James' name to St. Luke's Lutheran Church or Mansfield Emergency Squad, P.O. Box 131, 301 Airport Rd., Port Murray, NJ 07865, www.mansfieldtownship-nj.gov/first-responders.

Obituary published in *The Express Times* on Sept. 19, 2019.

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