The Produce Pages

Serving the fruit and vegetable growers of Eastern New York

Photo: Hail Netting at Chazy Orchards

March 2018

Featured Farm

MIKE BASEDOW, ENYCHP

Chazy Orchards was originally started by the D&H Railroad back in the late 1920's. It then made its way into the ownership of four senators who hired many local people to manage and operate the farm. Eventually the orchard was transferred into the Green family's ownership. Donald Green Jr managed and operated Chazy Orchards side by side with his sons Donald Green III and Jeff. In 2010 due to health issues, Donald Green III had to make the hard decision to sell the farm. Our family, the Giroux's, decided to acquire the orchard as a good way to diversify our business while staying under the umbrella of agriculture.

Can you tell us about the staff at Chazy Orchards?

We consider ourselves fortunate that we currently have four generations involved in the business which helps to bring a good mix of new and old ways of thinking to the table as we move forward. Jay Toohill is the General Manager, and Gary Moore is our Farm Manager. Gary has been on the farm for fifty years.

Can you tell us more about the fruit you grow?

Chazy Orchards currently has 800 acres in orchards. In addition to classic varieties like McIntosh and Cortland, we have been planting many newer varieties in recent years,

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The *Produce Pages* is a monthly publication of the Eastern New York Commercial Horticulture Program. **For more information about the program and our events, please visit our website at : http://enych.cce.cornell.edu/.**

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March's Feature Farm, Chazy Orchards, in Bloom

Serving the Educational and Research Needs of the Commercial Small Fruit, Vegetable and Tree Fruit Industries in Albany, Clinton, Columbia, Dutchess, Essex, Fulton, Greene, Montgomery, Orange, Putnam, Rensselaer, Saratoga, Schoharie, Schenectady, Ulster, Warren and Washington Counties

such as Honeycrisp, Gala, NY-1, Zestar!, and SweeTango.

How do you market your apples?

We market our apples throughout the East Coast using an established network of fruit distributors. We also sell some of our fruit through our recently established farm market here in Chazy, which was our original packing house.

The Old Chazy Packing House

What changes have you made in the last five years?

There have been many changes at Chazy Orchards in the past five years. Since acquiring the orchard we started with updating the current infrastructure by redoing roofs, updating equipment, and streamlining the picking and packing processes. We have been updating trellis systems, as well as pulling out the lesser producing orchards and replacing them with new high density systems. We are putting irrigation in on all of our new plantings and trying to get it on as many established orchards as we can. We are constantly keeping our ear to the ground about new varieties, specifically ones that would do well in our climate. We also started a farm market and bakery which operates from September to December.

Can you tell us more about your packing line and hail nets?

We put in a new six lane GREEFA packing line last July. The new packing line has at least doubled our capacity, and allows us to have a better work life balance for our employees. When we have a multitude of orders to fill in the fall we are now able to do that in a 5 or 6 day work week. Before, with our limited capacity we didn't really have the option to not pack that 6th or 7th day in the week. We want our employees to enjoy their weekends at home with family, and by investing in this new packing line we believe that we have given them the ability to have a better work life balance.

Drape Net is something that we are very excited about. We've had hail in three out of the last six years, and it had gotten to the point where we wanted to do something about it. Obviously, there is a lot of variability with farming and one of those that you really can't control is the weather, and in our case, that worst was hail. We wanted to try and mitigate that risk so we reached out to a few people in the industry and found Drape Net in Australia. Drape Net is a cost effective and simple way to protect our crops from hail. (***See cover photo)***

Chazy Farm Stand Display

As farmers, it's easy to get behind something that we know can help our farm and many others in the industry so we have become the North American distributors of Drape Net.

What are your biggest challenges and opportunities in the next five years?

One of the biggest challenges that we see in the next five years will be variety selection. There are so many new club varieties hitting the marketplace every year that selecting and/or getting into the right clubs can be overwhelming. A lot goes into the decision to pick and invest in a new club variety such as our growing climate and the marketing options behind the club.

On the other hand, variety selection is one of the biggest areas for opportunity in the next five years. With the apple industry seemingly going more in the direction of club varieties, being a part of the right clubs is becoming more and more important. We are lucky enough to be involved in the Next Big Thing cooperative and the Crunch Time group, which has been an excellent experience. Finding groups with a variety that does well in our growing region,

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with a clear marketing plan, and a loyal consumer base is hard to do.

Labor is also going to continue to be a challenge within the next five years. As immigration policies and procedures are in flux, and subject to change in the coming months and years, the state of the H2A program hangs in that balance. We like many farms utilize the program, and would be unable to find the amount of help needed at harvest without it. The program as is works for us now but obviously as everyone hopes, changes will come to streamline the process and make it easier for the employers as well as the employees.

How has the Cornell fruit program impacted your orchard?

We have used Cornell many times. Recently we have used extension when they have offered pesticide handling refreshers and courses. We have also used extension to stay updated about FSMA as well as to work on different techniques of pruning. Gary Moore, our farm manager, has worked closely with Terrence Robinson on chemical thinning trials with Honeycrisp.

We now work closely with Poliana Francescatto on the chemical thinning carbohydrate model. Kevin Iungerman worked with us in the past with our IPM program by checking traps and making recommendations for our spray program. We now took what he started us with and have built and continue to build our own programs.

Young Trellis at Chazy Orchard

GRAPES

How Grapevines Reconnect in Spring

TIM MARTINSON AND MARTIN GOFFINET

[***Figure 1 - After bud swell, new shoots rely on carbohydrate reserves from canes and roots to fuel their growth. New shoots initiate vascular connections to canes and trunks, reactivating the vascular cambium that produces new conductive xylem and phloem layers down the trunks to the roots – a process that is completed around bloom. Starch is stained black in the figures above.]***

When vines are fully dormant during the coldest part of the midwinter, grapevine buds are isolated from the plant's vascular system, desiccated, and filled with compounds that resist freezing. Vascular elements in the canes and trunks are either plugged with callose tissue (phloem) or emptied of water (xylem). When growth starts in the spring, the grapevine needs to re-establish the vascular connections between buds and roots. This process, which begins at bud burst, only becomes complete around bloom, and is driven by the developing buds and new shoots.

In a previous Grapes 101 article, we described how buds gain and lose cold-hardiness. In this article, we'll focus on what happens during the early stages of vine growth in the spring when the grapevine re-establishes the vascular system between buds, canes and roots, how winter injury to buds and trunks can affect early season growth, and the key role that

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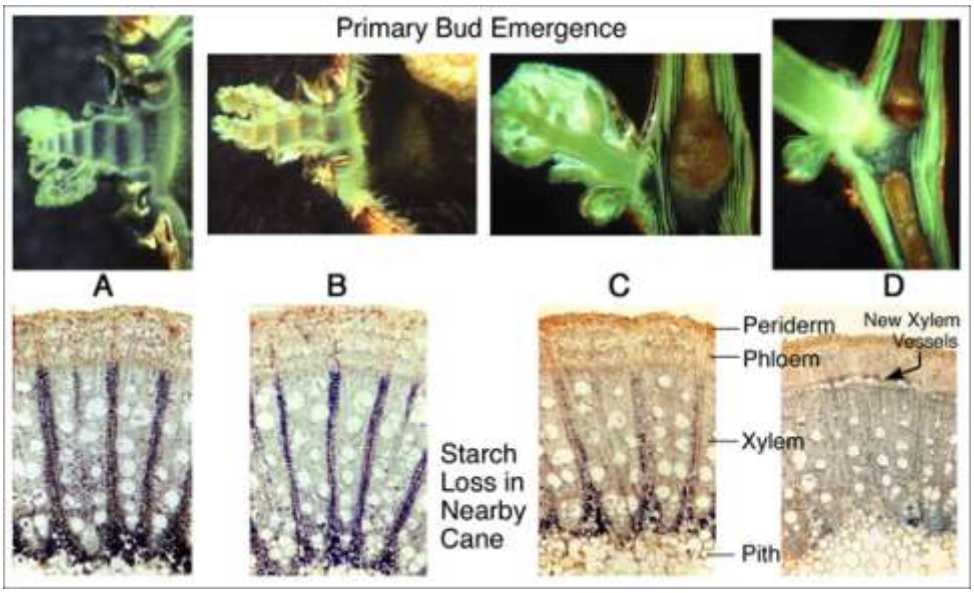

live buds and new shoots play in driving this process.

Dormant buds and canes

To survive the coldest part of the winter, grapevine buds are isolated from the vine's vascular system (water-conducting xylem and nutrient-conducting phloem) and dehydrated. It takes both increasing temperature and tissue wetting for bud break and shoot emergence to occur. In dormancy, canes are protected from external wetting by a water-resistant periderm (cork) layer, and the vascular cambium—the thin meristematic tissue between the inner xylem and outer phloem—is inactive.

Once vines enter winter dormancy, their buds will not break in early winter, even if given warm temperatures, as buds must experience a minimum time below about 40°F (5°C) to "prime" bud break. Bud deacclimation is a real threat if warming occurs, especially if it is prolonged, because it becomes more difficult to reacclimate buds toward late winter and early spring. In late winter, after minimum chilling requirements have been met, buds can push if adequate heat and moisture are present for any length of time.

As warm temperatures in the spring increase and buds are rehydrated (whether from actual bud wetting, from highly humid air, or by slow perfusion of water through the bud cushion at the cane), they gradually deacclimate and become less resistant to cold temperature. As temperatures rise above freezing, temperature-dependent enzymes begin to activate, their rate of activity doubling with each 10°C rise in temperature. As soils warm, root absorptive activity increases and capillary action draws water up through the trunk's xylem vessels, resulting in sap flow and increasing hydration of buds. As buds swell they initiate new vascular connections at their attachments to the canes.

The New Shoot

Inside the overwintering compound bud lies a fully formed compressed shoot (the primary bud), complete with cluster primordia and several nodes of leaf primordia. As this shoot starts to expand, its apical meristem becomes active and begins to initiate new leaves. If this central, primary bud is damaged, smaller buds at its base can become activated. These (termed the secondary and tertiary buds) bear fewer leaves and fewer or no clusters and therefore may produce a leafy canopy but a poor crop.

Live buds reactivate the vine's vascular system

The actively dividing shoot tip produces auxins, which are hormones that stimulate reactivation and development of the vine's vascular system. These auxins send signals out from the emergent bud that result in the growth of new vascular traces at the bud base, uniting the bud and its cane and then stimulating the cane to activate cell division in the vascular cambium. This stimulus proceeds downward through the canes into the cambia of cordons and trunks; thus there is a downward wave of initiation of new xylem vessels on the cambium's inner side and new phloem elements on its outer side. Winter injury to buds and trunks can disrupt this process and cause disruption of shoot-to-root connectivity.

Xylem and Phloem

The xylem tissue consists of several cell types: lignified supporting fibers, water-conducting vessels (dead, lignified tubes) for conducting water up from the soil, and ray cells for storage and radial transport. Outside the xylem is the phloem tissue, which conducts nutrients and carbohydrates to and from the new shoots and the roots. Phloem consists of storage cells, bands of fibers, and long strands of conductive sieve tubes. Sieve tubes in

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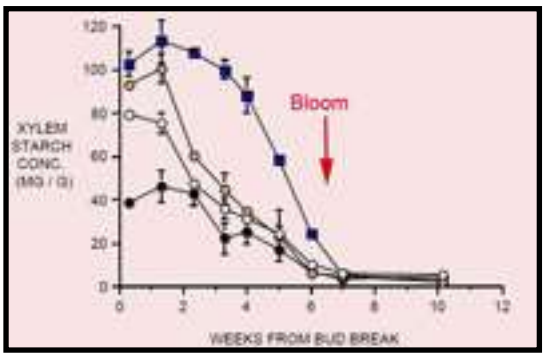
stems live about 18 months, so only one functional increment of phloem is produced each year, and that increment must survive the winter. This phloem lies just below the brown bark and periderm layer and is also the stem and trunk tissue most susceptible to winter injury. In spring, conductive phloem cells—only a few layers thick—mobilize by dissolving the callose that plugs the sieve tubes, and then they transport stored starches and nitrogen reserves to developing tissues, until a new phloem layer is produced by the activated vascular cambium.

Root growth

In spring, soils typically warm up more slowly than the air, so production of new xylem and phloem also lags behind aboveground growth. Root growth is also dependent upon the auxin signals from shoot tips, and it is thought that the vascular system—from shoot tip to roots—only becomes fully reactivated within a week or two of bloom.

Reserves Fuel Early Growth

(See photo at top of article) Early vine growth is fueled by nitrogen and starch reserves stored in canes and trunks (1/3) and roots (2/3). Starch and nitrogen stored in these tissues is mobilized between bud burst and bloom, first from the cane tissues closest to the buds. (Figure at left shows starch concentration from bud break to bloom). By bloom, the developing canopy is capable of producing enough carbohydrate to support vine growth. The vine's vascular system is reconnected and able to take up the nutrients, including nitrogen, and water needed for continued growth.



Impact of Winter Injury

This process of vascular development proceeds automatically in temperate climates, but when winter injury damages buds or trunks, these processes can be disrupted.

Bud mortality

Winter injury to buds can have a lasting impact on trunks and canes downstream of them. If most of the buds on a cane or spur are dead, then the vine's vascular cambium directly downstream of the bud's potential auxin flow will not be reactivated. Only vascular traces from live shoots will stimulate the vascular cambium downstream to produce a new layer of conductive xylem and phloem cells.

Trunk Injury

Rapid temperature drops while the vine's xylem is conducting water—often early or late in the dormant season—can lead to trunk splitting as water freezes and expands within the tissue. Split trunks can dehydrate rapidly and localized wound-compounds can seal off vascular flow. The phloem layer, just under the bark and periderm, is susceptible to freeze injury. Even when buds are apparently alive at the start of the growing season, injured trunks may supply enough water and nutrients for the early part of the season, only to suddenly collapse later in the growing season.

Inadequate Vine Reserves

Grapevines are good at storing reserves for the dormant season. However, in extreme situations where vines are defoliated early or harvest is delayed until after a killing frost, vines may enter the winter with inadequate stored carbon or nitrogen reserves. Weak shoot growth the following spring can be a consequence.

Management

Winter injury, varying in frequency, is a fact of life in cool climate regions. The key role that grapevine buds and vine reserves play in reactivating vascular tissues should be uppermost in a grower's mind in understanding and reacting to winter injury. While vines are able to tolerate and recover from moderate bud injury, growers will need to react to more severe bud and trunk injury. Growers can compensate for bud injury by leaving extra buds to produce a marketable crop following winter injury, but significant cold injury signals the need to carefully monitor vines and prepare to renew trunks.

Tim Martinson is senior extension associate and Martin Goffinet is retired senior research associate with the Horticulture department. Photos provided by Martin Goffinet.

Cherry Tomatoes and Sweet Red Peppers in High Tunnels

AMY IVY, CCE ENYCHP

Photo: The trial tunnel with cherry tomatoes at the far end of the tunnel, peppers in front

Last summer we ran some trials at the Cornell Willsboro Research Farm's high tunnel looking at a couple of popular summer crops: cherry tomatoes and sweet red bell peppers.

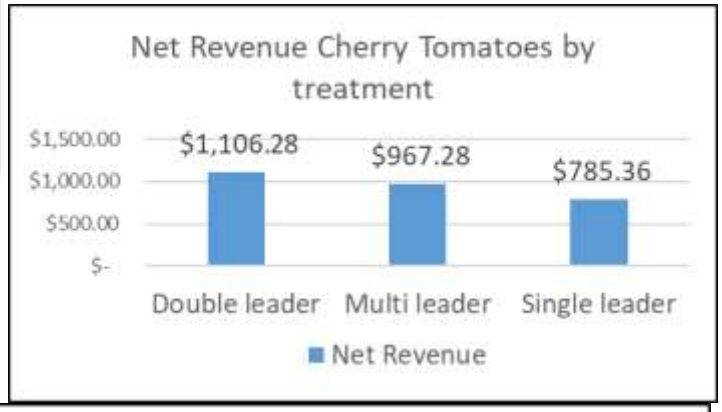
Pruning Cherry Tomatoes

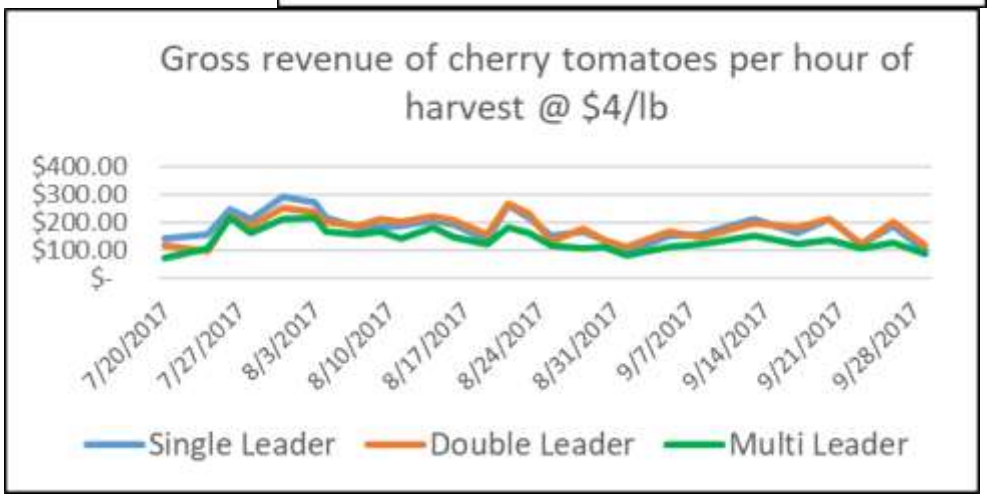
Left unpruned, cherry tomatoes quickly become a tangled mess, especially when grown under the protection of a high tunnel. Growers question whether it's worth the time and effort to prune and train them. This was the second season we studied three different pruning methods and our conclusion is even stronger: **training to the double leader system provided the most benefits as measured by labor efficiency, yield, and net revenue.**

The three systems we studied were single leader, double leader, and multi leader. We simplified the multi leader system in this second year to more closely simulate what often happens on farms. We began the multi leader treatment as a double leader but stopped pruning at the first harvest, doing only minimal training to keep the long shoots out of the aisles. We continued to prune and train the single and double leader treatments throughout the project.

The single leader took the least time to prune, train and harvest but had a significantly lower yield. Using $12/hour for labor and $4/lb for gross price for 200 plants, the double leader system in our trial would have brought an additional $1390 in net profit over the multi leader system.

And because labor is the largest expense on most vegetable farms, the increased efficiency of harvesting the double leader system over the multi-leader is another important factor. Our average yield per hour of harvest was 45.1 lbs/hr for the double leader compared to 34.8 lbs/hour for the multi leader due to the dense, tangled growth that develops when left unpruned.





This graph shows the efficiency of harvesting each treatment. The multi-leader (green line) is consistently the least efficient to harvest due to denser growth.

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Sweet Red Peppers

This trial addressed three questions detailed below. The field variety was Red Knight and the greenhouse variety was Sprinter. The seed company recommends the greenhouse varieties be grown with supplemental heat but we used an unheated greenhouse to replicate what many growers have. We wanted to see how well a greenhouse variety would perform in these less than ideal conditions. The peppers were harvested as they ripened, with 60-80% red coloration.

1. **What are the yield and timing differences between Red Knight grown inside an unheated tunnel compared to grown outside?**

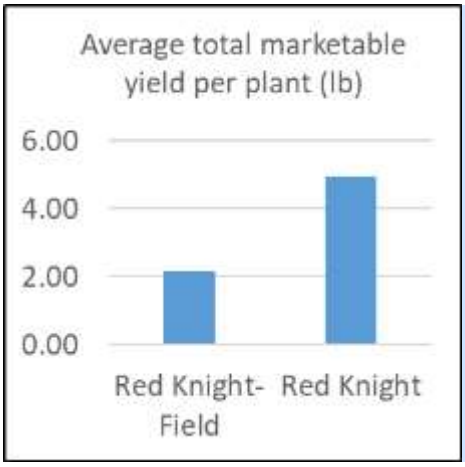
The tunnel plants yielded earlier and more than double the outside (field) plants making the tunnels a clear benefit. In 2017 we had record rainfall and cold temperatures until mid-July which made for a very slow start; we saw a marked difference in vigor between the tunnel and outside plants. First harvest in the tunnel was August 30 and first harvest outside was September 9. Unseasonably warm temperatures in September allowed the plants to continue to ripen fruit until early October. We have received funding to repeat this study in 2018 to see if the differences in yield and timing remain consistent.

2. **What are the yield and timing differences between the varieties Red Knight and Sprinter grown in the same unheated high tunnel?**

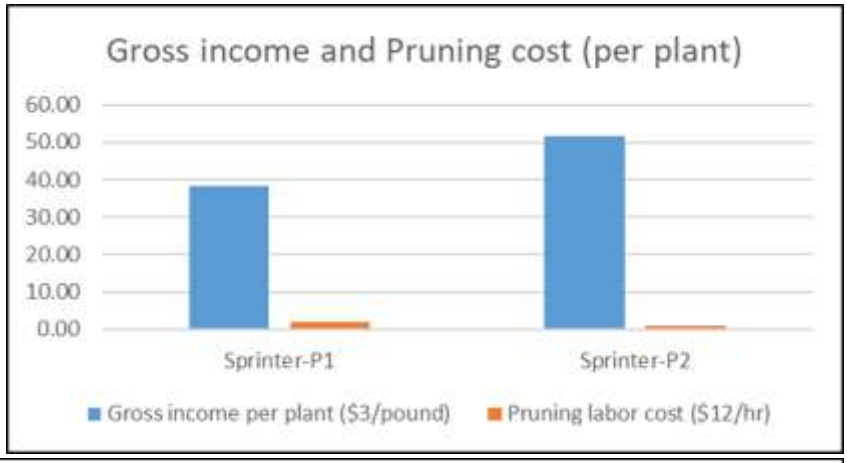
Red Knight yielded earlier then tapered off while Sprinter began yielding later and kept on yielding until killed by freezing temperatures in early November. The total yield on Sprinter was slightly higher than Red Knight but it was later, from mid-September through October when fresh market demand is less (see chart below).

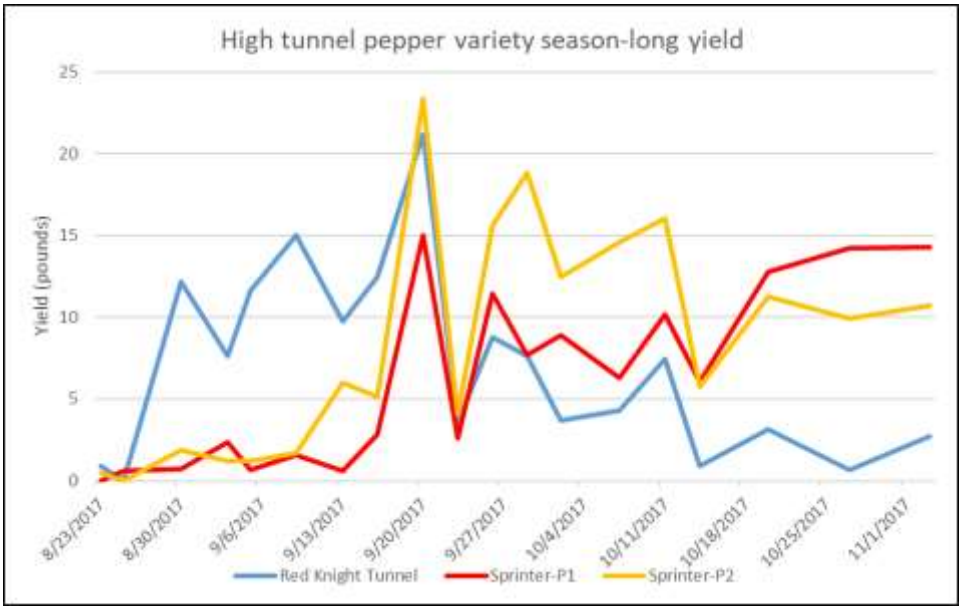
3. **Which pruning and training method works best for Sprinter, the greenhouse variety of pepper?**

We compared two pruning methods; the customary stake and weave method and the seed company's recommended double leader system, and tracked the time spent pruning and training as well as the harvest dates and yields. The double leader system took twice as long to manage compared to the stake and weave system, and the stake and weave system yielded more; an average of 4.24 lbs/plant with the double leader system and an average of 5.72 lbs/plant with the stake and weave system. The double leader system would work best when the plants are grown under the recommended ideal conditions with supplemental heat to allow for an earlier planting date and longer harvest period.



This project was funded by the Northern New York Agricultural Development Program which is supported by the New York State Senate and administered by the NYS Department of Agriculture and Markets. The detailed report of these trials will be posted later this year at www.nnyagdev.org .





Tips for Beautiful Vegetable Transplants

TERESA RUSINEK, EYCHP

Attention to detail during transplant production will reward you with quality transplants and optimal results in the field.

Seeds

Pathogens -There are numerous diseases that can impact your crop, and a good number of these can be seed borne. A first line of defense is to ensure you are planting clean seed. Buy disease indexed seeds when available. To reduce bacterial seed borne diseases in crops such as tomatoes, peppers, and brassicas, seeds can be hot water treated. Chlorine treatment can also be useful on some seeds as a surface treatment but will not kill pathogens inside the seed.

Go to this factsheet for more details: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/HotWaterSeedTreatment.html

Storage – The optimal temperature for seed storage is 34-40 °F with a relative humidity of less than 40%. A refrigerator can be a good storage place. Viability of seed will decrease over time; and after 1 year germination may not be as uniform. Pelleted seed may be primed for quick, uniform germination, but shortens storage life.

Leftover seeds- Do a germination test if using seed from last year. You can do this yourself by placing a specific number of seeds on a moistened paper towel, folding the towel over the seeds and placing it in a plastic bag in a warm place. Inspect seeds twice a day and spray with water as needed to maintain moisture. Count how many seeds have germinated after the usual days to germination for that variety.

There are commercial labs offering germination and other seed tests.

New York State Seed Testing Laboratory
6 Harriman Campus Road
Albany, NY 12206

https://www.agriculture.ny.gov/PI/nysseedlab/NYSSTL_Fee_Schedule.pdf

Greenhouse Clean Up

The greenhouse can be another point source of disease in transplant production. Bacterial spot, bacterial speck, bacterial canker, gummy stem blight, and tomato spotted wilt virus, are just a few that can start in the greenhouse and be carried to the field. Bacteria, fungal spores and viruses from previous crops can persist on bench surfaces, pots, trays, and equipment. Plant residues from previous crops and weeds in the greenhouse can also carry over disease. Overwintering insects such as thrips can spread virus to transplants. Pull weeds and remove from greenhouse, weeds harbor disease and insects. Sweep and vacuum debris from greenhouse surfaces and containers before sanitizing. Organic matter will decrease the sanitizing power of products such as sodium hypochlorite (bleach).

Sanitize benches, floors, and tools. If you reuse any plant containers (not recommended) they should be disinfected. Repeated use of chlorine solutions may be harmful to plastics or metals.

There are several different types of disinfectants that are currently used in the greenhouse for plant pathogen and algae control. They are quaternary ammonium compounds (Green-Shield®, Physan 20®, and KleenGrow™), hydrogen dioxide (ZeroTol® 2.0, Oxidate® 2.0), hydrogen peroxide & peroxyacetic acid (Sanidate®), hydrogen peroxide, peroxyacetic acid and octanoic acid (X™-3),sodium carbonate peroxyhydrate (GreenClean Pro Granular Algicide) and chlorine bleach. Bleach contains sodium and chloride. Excess chlorine can be toxic to some plants. Objects to be sanitized with chlorine require 30 minutes of soaking and then should be rinsed with water.

For more detailed information on greenhouse clean up and disinfectants see:

http://ag.umass.edu/greenhouse-floriculture/fact-sheets/cleaning-disinfecting-greenhouse

Media

Start with clean fresh media free of of insects, pathogens, nematodes and weed seeds. Old media, 8 months or older, can be difficult to wet. Keep growing media in a clean area and covered. Select media that is appropriate for

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germination. It should have finer shredded peat particles, as well as smaller grade vermiculite and perlite. Media should drain well and provide good aeration but still have moderate water-holding capacity, and an appropriate nutrient starter charge for seedlings. The electro-conductivity (EC) reading measuring nutrient salts should be between 0.26 to 0.75 mS/cm using the 1:2 extraction method.

Fertilizer

Nutrient starter charge in media (if there is any) can be depleted anywhere between 2- 6 weeks after seeding. Monitor soil EC and initiate a fertility program before plants show signs of deficiency.

As a guideline, a dilute fertilizer program ~25 ppm N is normally started at the opening of the cotyledons and the rate of application is gradually increased as the seedlings grow larger and approach transplanting. For seedlings with 2 true leaves, provide constant fertilization at 50 ppm Nitrogen or 100 ppm Nitrogen 2-3 times per week. Adjust your fertility program to the nutrient starter charge in media and crop demands. Tomato, pepper and cole crops tend to be heavier feeders, cucurbits crops and basil are lighter feeders.

Cool, wet conditions typical in early spring can lead to ammonium toxicity, use fertilizers with low or no ammonium nitrogen. Media should not be waterlogged. Media with compost tends to be heavier and hold more water.

Checking the EC of the water coming out of the hose after the proportioner is a simple way to determine if you are mixing fertilizer correctly and that your proportioner is functioning as it should. Check the fertilizer bag or container for a table of EC readings for target ppm of N at various proportioner settings. The meter in the photo on the right can be used to monitor pH and EC of water and media.

The root tips of these pepper plants are damaged due to fertilizer salts accumulating in media at bottom of container. Leaching salts through the media and out the bottom of the container during irrigations will help avoid this problem.

Avoid high phosphorus fertilizers during transplant production. Phosphorus promotes stretch as do ammonium forms of nitrogen.

Do not over fertilize, check your proportioner and calibrate! http://www.greenhouse.cornell.edu/crops/factsheets/FertilizerInjector.pdf

http://www.greenhouse.cornell.edu/crops/factsheets/AmmoniumToxicity.pdf

Water Quality

Test irrigation water, highly alkaline water source (greater than 200 ppm CaCO3) will raise media pH and result in iron deficiencies, especially in peppers. If you have highly alkaline water you should consider treating water with sulfuric acid or citric acid for organic production. If your alkalinity is moderate (between 120-200 ppm CaCO3) using an acidifying fertilizer. Fertilizers with a higher proportion of ammonium and Urea Nitrogen cause an acidifying reaction while fertilizers with high nitrate forms of nitrogen cause a basic reaction. Purchase a pH and Electro Conductivity (EC) Meter to monitor media.

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http://www.greenhouse.cornell.edu/crops/factsheets/pHGreenhouseCrops.pdf

Temperature

Reducing the day-night temperature difference, or reversing it, can greatly reduce stem elongation. In most heating programs, a greenhouse will be much warmer in the daytime than nighttime. The greater this difference, the more potential for stretch.

http://agdev.anr.udel.edu/weeklycropupdate/?p=2671

Light

Most vegetable seeds germinate in light or dark conditions (lettuce needs light), to avoid stretching of seedlings and "leggy" transplants provide higher intensity light right after germination. After germination, stretching can occur if seeds are left in dark or low intensity light. Be careful if moving seedlings from germination chambers to high intensity light situations you may need to provide some shading for a few days while seedlings adjust.

http://content.ces.ncsu.edu/starting-plants-from-seeds.pdf

Other resources on transplant production

The UGA extension publication "Commercial Production of Vegetable Transplants **(B 1144)"** contains lots of useful information especially for those who are relatively new to transplant production. **You can download the PDF of this publication at** http://extension.uga.edu/publications/detail.cfm?number=B1144#

Below is a link to a power point by Dr. Ajay Nair, from Iowa State, it's almost 20 MB, so it will take a bit to download, but it has useful information and visuals.

http://www.ifvga.org/documents/filelibrary/ifvga_2013_powerpoint_presentations/Ajay_Nair__Transplant_production_IF_8B3476E62446C.pdf

Effects of Growing Techniques on Yield, Grade, and Fusarium Infestation Levels in Garlic

CRYSTAL STEWART, ENYCHP & ROBERT HADAD, CORNELL VEGETABLE PROGRAM

Background: Almost every garlic grower struggles to a greater or lesser extent with Fusarium diseases, which are naturally found in most soils. Two primary Fusarium diseases historically concern garlic growers: Fusarium Bulb Rot, caused by *F. proliferatum* , causes brown to reddish sunken lesions on the bulb surface; and Fusarium Basal Rot, caused by organisms *F. culmorum,* causes the basal plate and gradually the entire bulb to break down. Because the diseases are nearly almost always present, the focus for growers and researchers alike is on management rather than eradication.

Fusarium diseases tend to be worse in fields with poor drainage, but we were unsure of the impact that other techniques such as the use of straw mulch or black plastic might have on Fusarium levels.

We decided to trial different common and novel techniques growers use to cultivate garlic and track both the levels of Fusarium and the quality of the garlic in each approach. We separated the work into two sets of trials: one focusing on cultural changes such as variety selection, raised beds and mulches; and another focusing on inputs that growers can use to affect disease levels such as fertility and organic soil or bulb treatments. The trial including raised beds and mulches was located in the Hudson Valley and replicated in western New York, while the trial looking at inputs was located on Long Island and replicated in western New York.

Fusarium basal rot in June
Image: Crystal Stewart

Fusarium Bulb Rot
Image: Crystal Stewart

During the growing season, each of the treatments was monitored for disease development as the garlic grew. Diseased garlic was

sent to a Cornell lab in Geneva, NY where the Fusarium was genetically tested to see if the disease is always the same, or if there are different species or pathovars of Fusarium in different locations or situations.

In July the garlic was harvested in all four sites and brought to high tunnels to be dried. When it was dry, all the garlic was cleaned, roots and tops were trimmed, and it was graded into small (less than 1.5 inches in diameter), medium (1.5 to two inch diameter) and large (greater than two inch diameter) categories.

Samples of each treatment were kept in storage and are being assessed during the winter of 2017/18 to determine if Fusarium severity varied by treatment. Ten randomly selected cloves from ten different bulbs were rated for percent of total surface area infested with Fusarium.

This report will focus on the techniques and results used in the cultural controls trials. The results of the nitrogen fertility and organic controls will be discussed in a separate report.

Trial Overview: the cultural controls trial included 9 different treatments, which are listed below. Two of the treatments, raised beds and flat ground, were blocked (not randomized) because of the difficulty of switching between raised beds and flat ground in one row. One row of the trial was a 4-inch raised bed, the other was flat ground. The other seven treatments were randomly replicated three times within the rows. Each treatment was twenty feet long, with a small buffer between treatments.

Fall planted garlic was planted in Mid-October, and spring planted garlic was planted in April. All garlic was harvested in mid July. Many of the treatments were also chosen for their excellent weed control. The bare ground treatments were regularly hand weeded so that weed pressure would not interfere with the results of the trial.

Bare Ground cultivation of garlic is common because it allows for mechanical weed control as well as side-dressing nitrogen in the spring. Mechanical weed control is very time sensitive, so growers need to be quite attentive to keep weeds from competing with the crop. In a field with high weed pressure, up to 6 cultivations may be necessary for weed control.

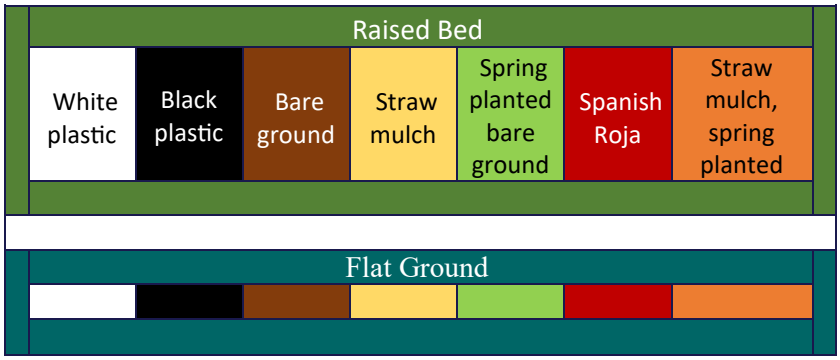
An additional consideration in growing garlic in a bare ground system is that the soil becomes more compacted

than in a system with straw or plastic mulch.

Straw Mulch is commonly used in organic garlic production where all fertility is applied in the fall, at planting. Straw mulch can help protect garlic from freezing and thawing in the winter and spring, can moderate soil moisture and temperature, and can suppress annual weed growth. It also reduces soil compaction and contributes to soil organic matter and soil health.

Concerns about using straw mulch focus on two main issues: the potential for mulch to hold too much moisture in wet years and contribute to fungal disease issues (Fusarium); and weed control failures, which can lead to increased labor weeding compared to bare ground

Map of the first of three replications of the garlic treatments. Following replications in the same row were randomized.



Black Plastic is used as another option for weed control. Moisture levels under black plastic tend to stay relatively constant, because not much rainfall makes it under the plastic and because evaporation is minimized. Black plastic also warms the soil more quickly in the spring, encouraging earlier top growth than straw mulch or bare ground systems.

There are two primary concerns that growers have about black plastic. The primary concern is that it can actually get too hot under black plastic during the growing season, restricting garlic sizing in late June and early July. The second concern is that plastic can shed snow during the winter, leaving garlic more exposed to winter injury than in other growing systems. A third concern is that in very dry years, it may be necessary to irrigate garlic under plastic, which necessitates the use of drip tape.

White plastic has similar properties to black plastic related to weed control and moisture moderation. However, because it reflects light rather than absorbing it, it keeps the soil cooler rather than warming it. This reflective property might also provide more light to the garlic. White plastic has typically been used in brassica production during parts of the growing season, but has not traditionally been used in garlic production.

White plastic may shed snow during the winter similarly to black plastic, which was a concern with this treatment as well. The effect that temperature moderation would have on early growth was a question mark with this treatment, as was the cooler soil temperature during the summer.

Variety selection plays a role in disease susceptibility and adaptability to various environments. For this trial, we selected two varieties grown by the majority of garlic growers: a Porcelain variety (German White) as our primary, and a Rocambole (Spanish Roja) as a treatment for comparison.

Porcelain varieties are very vigorous and perform well under most growing conditions; Rocambole varieties are often considered to have better flavor but seem more susceptible to disease under many conditions.

Spring planting of garlic is something that growers tend to avoid if possible, but occasionally we are asked if it is possible to do. We also wanted to know if winter injury is contributing to Fusarium levels on garlic. For this trial we cracked seed at planting time and then stored it in a standard refrigerator at 40 degrees F over the winter. As soon as the ground was thawed in the spring, we planted garlic into bare ground and straw mulch.

Cultural Control Trial Results:

After harvest, garlic from both the Hudson Valley and Western NY trials was dried at the Hudson Valley Farm Hub, in high tunnels. Each of the plots was kept in enough separate bags to allow for good airflow for optimum drying. All treatments had their tops clipped in the field at approximately 4 inches. When the garlic was dried, determined by the innermost wrapper leaf being dry to the touch, the marketable bulb and cull counts and weights were recorded by plot. Data analysis was based on the average weight per bulb, as well as by the size distribution. The average weight per bulb was used rather than weight per plot because some of the plots were damaged by factors not considered part of the trial, such as crows picking garlic from the mulched sections. This damage changed bulb number per plot.

The average weight per bulb metric showed black plastic providing the highest yield, followed by white plastic, bare ground, and then straw. Not surprisingly, spring planted garlic had the lowest yields.

While there are numerical differences between the treatments, only the black flat ground treatment was significantly different. White plastic (raised and flat), bare ground, and black raised were all statistically indistinguishable, and straw mulch and Spanish Roja were statistically indistinguishable from white plastic and bare ground. Only spring planted garlic was significantly smaller than all other treatments.

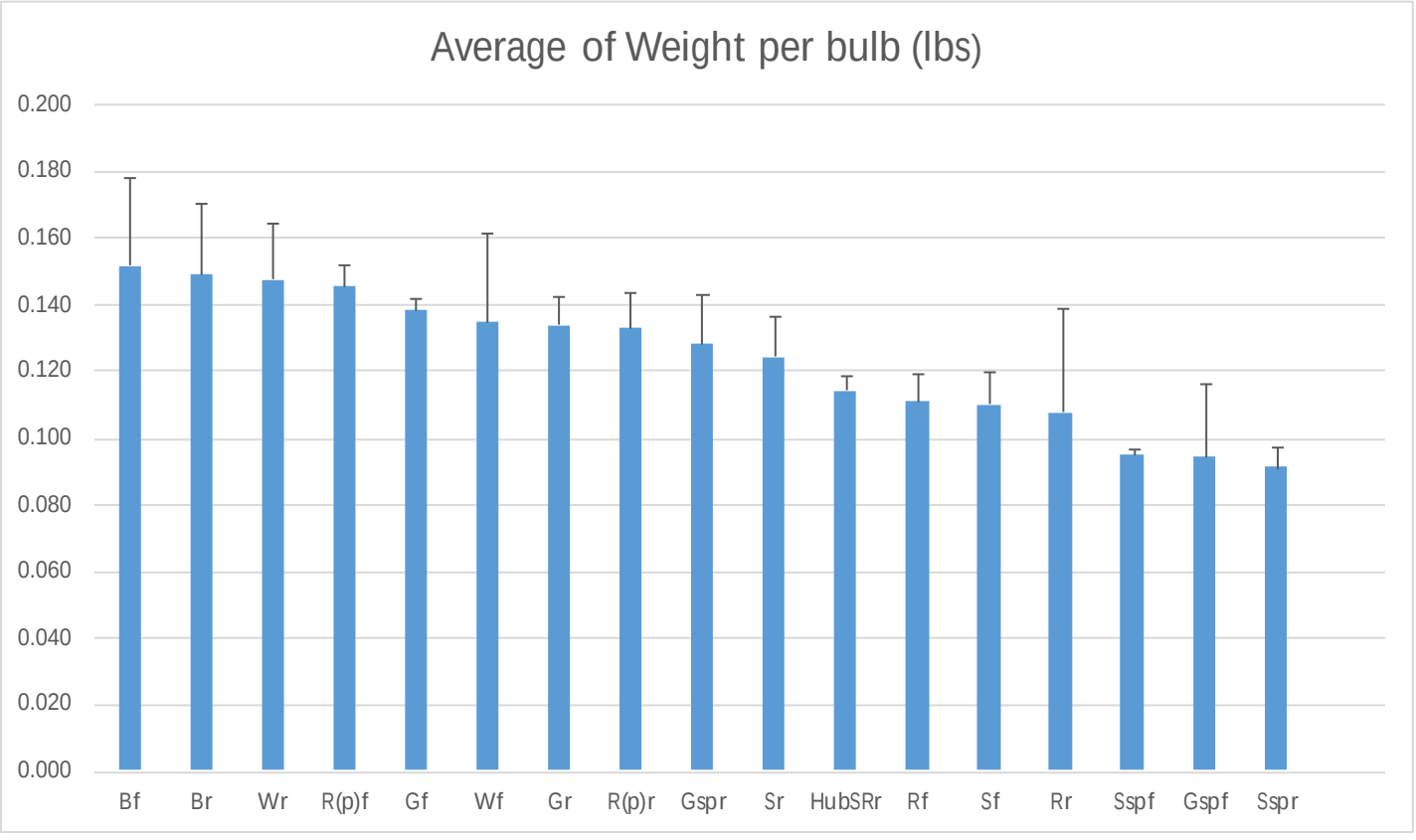
Besides total yield, we also examined the distribution of small, medium and large bulbs.

Small Bulbs: 1.5 inches or smaller

Medium Bulbs: 1.5-2 inches

Large Bulbs: 2 inches or larger

White plastic mulch yielded the highest percentage of large bulbs on both flat ground and raised beds. Spanish Roja had the most even distribution of small, medium and large bulbs. Black plastic, raised beds, and straw mulched garlic all yielded more medium bulbs than the white plastic. Not surprisingly, the spring planted garlic yielded the most small bulbs.

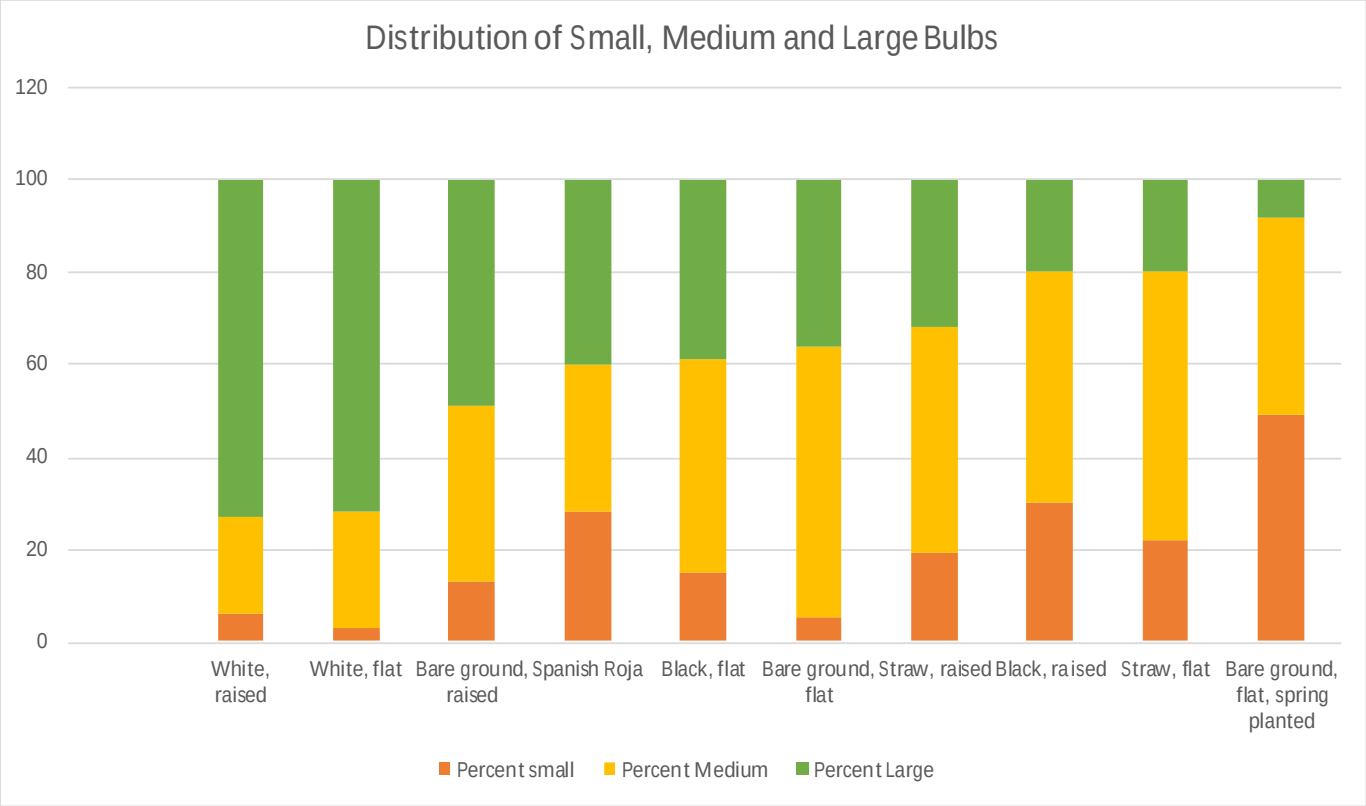


Next Steps in 2018…

The final pieces of data to analyze from this trial are the Fusarium ratings, which are happening now. This information will be available on the website and in the newsletter by the end of February.

The trial is being replicated in 2018 in Eastern and Western New York. We have eliminated the spring planted garlic due to the obvious yield suppression of spring planting. This year we are paying close attention to the effects of winter on garlic quality, and have begun qualitative assessments of field conditions of garlic as it sprouts. We are documenting winter injury, field conditions which may negatively affect garlic such as winter flooding, and winter predation/disease pressure.

After data is collected this summer we will compare results across the two years and two locations, and verify or adjust the information reported during 2017.



VEGETABLES

Chilean Nitrate: The Monster Energy Drink of N Sources

CRYSTAL STEWART, ENYCHP

All of us need a pick me up sometimes, and likely all of us also know that when we choose the quick fix, it's followed by a crash (yes, I'm coming down from my third cup of coffee today, stop judging me). Soluble forms of nitrogen are for plants what Monster™ Energy Drinks are for people—a serious pick me up when nothing else is working, but not conducive to long-term health. Some of you might already be creating a counter argument that because Chilean Nitrogen is organic, it can't be compared to Monster™ Energy Drinks. I entertained that idea when crafting my analogy until Googling a little and finding….wait for it….Rockstar ORGANIC™ energy drink!

With organic caffeine, organic refined sugar, and organic regretful feelings during the inevitable organic crash.

Chilean Nitrate is remarkably similar to its synthetic soluble nitrogen cousins in many important ways. Some of them make it extremely useful. For example, because it is a salt (Sodium nitrate), it is entirely soluble and can be run through drip systems with ease. The nitrate part of the molecule becomes immediately available to the plant when dissolved in water, unlike sources of N derived from organic matter which need to go through a biological process of mineralization before being available. This is a particular boon to winter

greens growers, who struggle to provide plants with enough nitrogen when soils are cold and biological activity is low. Finally, because Chilean Nitrate is a purified mined mineral, it contains very little but sodium nitrate, providing growers with a source of N that doesn't add P or K and which doesn't affect soil pH.

However, there are consequences to the production and use of Chilean Nitrate which make it quite problematic. Let's start with where the stuff comes from. Chilean Nitrate is refined from the caliche ore found in the Atacama Desert in northern Chile. This ore is often found in veins approximately 6 feet beneath the soil surface. To mine it, the soil above it is stripped off, and the ore is extracted from the underlaying rock. Tailings, the debris left over from this process, is then discarded. This disruption is similar in environmental impact to other forms of mining, with the notable additional issue of exposing soluble nitrogen to the elements in the tailings piles and providing the opportunity for it to enter surface and ground water.

After the caliche ore is mined, it must be refined to remove impurities which include sulfur, chloride, boron, and more (Table 1). The process of refining the ore is energy intensive and produces air pollution. Refinement results in a product which is 98% pure sodium nitrate, but one of the remaining impurities of concern is perchlorate, which can interfere with iodine uptake in humans. This substance and its effects is not fully understood, but it is notable enough to show up in the USDA resource on Chilean Nitrate relating to the NOSB TAP review.

Aside from the environmental effects of mining, the on-farm application of Chilean Nitrate also raises some concerns. Because it is completely soluble, any nitrogen not immediately taken up by the plant is leached out of the root zone and potentially into groundwater sources. That's just half the molecule, though. The positively charged sodium ion will bond to clay particles and organic matter, and leaches much more slowly than the nitrate half of the molecule. This binding damages soil structure by decreasing aggregate stability. Once the negatively charged nitrate ion is gone, the positively charged sodium ion can also raise the pH of the soil and damage plant and soil microbe health as we know salts do.

So, our favorite quick source of N is damaging the environment in Chile, damaging our soil, and potentially contaminating the water. What is a farmer to do? First, follow the existing restrictions: both national organic standards and NOFA restrict certified growers to no more than 20% of N coming from Chilean Nitrate. Next, work on strategies to reduce use of Chilean nitrate to the perceived essentials such as cold-soil applications. Finally, respect the solubility of this fertilizer, and use it in spoon-feeding applications rather than in larger quantities.

Table 1: average % of ionic saline constituents in mined caliche

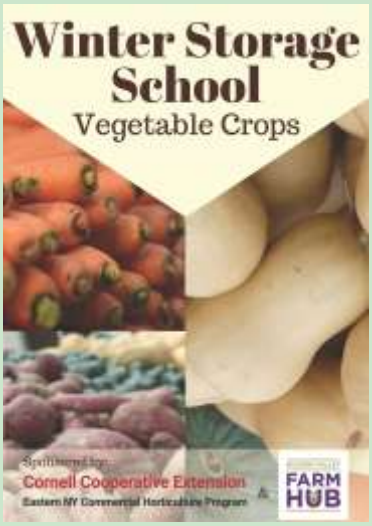
Minerals	Percent raw ore
SO4(-2)	10%
Na(+)	6.90%
No3(-)	6.30%
Cl(-)	4.60%
Ca(+2)	1.80%
K (+)	0.70%
Mg(+2)	0.50%
B(OH4)(-)	0.50%
IO3(-)	0.06%
Cl04(-)	0.03%

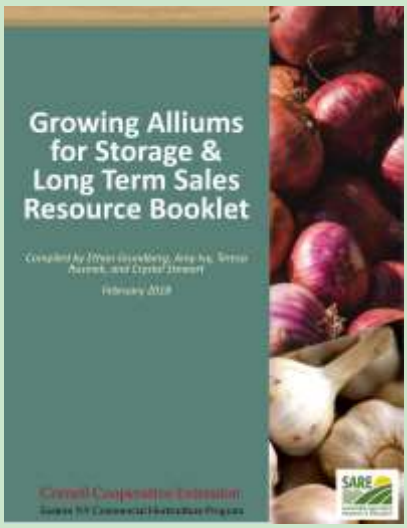
Source: https://www.ams.usda.gov/sites/default/files/media/Sodium%20Nitrate%20TR%20General%202002.pdf

NOW AVAILABLE Resource booklets from two ENYCHP schools are now available on our website! Please utilize these resources as we head into the growing season!

Growing Alliums for Storage and Long Term Sales Resource Booklet:
https://rvpadmin.cce.cornell.edu/uploads/doc_646.pdf

Winter Storage of Vegetable Crops Resource Booklet:
https://rvpadmin.cce.cornell.edu/uploads/doc_619.pdf





Biostimulants: Of Snake Oils, Seaweed and Salvation (or not)

ETHAN GRUNDBERG, CCE ENYCHP

There has been an explosion in the use of agricultural biologicals over the last decade. While university research is finally starting to really catch up to provide some data on product efficacy, there still aren't many good resources for growers to consult when considering using biopesticides and biostimulants. As a disclaimer, this article is not that much needed resource. Instead, consider this a small effort to clarify the potential use of one common active ingredient in biostimulant formulations: kinetin!

But first, what are biopesticides and biostimulants? Unfortunately, there isn't a standard definition for either (which certainly adds to the confusion surrounding their potential use and benefit). Generally, however, biopesticides are products that are registered with the EPA and have a corresponding specimen label dictating acceptable uses and rates for use. As the new New York State Integrated Pest Management Biocontrols Specialist, Dr. Amara Dunn, explained succinctly, "biopesticides have the primary function of controlling pests." In contrast, biostimulants are what Alex Rodriguez got busted for using and will result in his never being inducted into Cooperstown. Alright, that's not true, but Dr. Dunn again clarifies that, "biostimulants primarily function to enhance plant health, without making specific claims about pest control (and therefore aren't labeled as pesticides)." The Association of American Plant Food Control Officials defines biostimulants as a subcategory of their "beneficial substances" classification, which is defined as "any substance or compound other than primary, secondary, and micro plant nutrients that can be demonstrated by scientific research to be beneficial to one or more species of plants, when applied exogenously."

Biostimulants can contain a wide range of ingredients from amino acids to fulvic acids to trace minerals to living organisms. However, one of the most ubiquitous biostimulant components is kinetin. Kinetin, which is a specific type of cytokinin (another commonly listed ingredient in biostimulant formulations), is most commonly derived from different species of seaweed. Kinetin and cytokinin are plant hormones that act as natural plant growth regulators. Kinetin and cytokinin affect crops in ways that involve a lot of advanced biochemistry and plant morphology, but suffice it to say that they promote cell division, shoot elongation, and root development.

Can cytokinin and kinetin-containing biostimulants boost your crop yield? As is often the case, the answer is "maybe." Most research has demonstrated that the biggest impacts on yield and produce quality from the use of such products is observed when they suffer abiotic stresses, especially low fertility soils, and even biotic stresses like plant diseases. A retired extension agent from Pennsylvania who worked with biostimulants for years essentially said that, if you're doing everything else right, you probably won't see any impact from the use of seaweed extract products. However, he also encouraged the group to broaden their understanding of what counts as plant stress. For example, flowering and fruit set in tomatoes puts an incredible strain on the plant as demand for nutrients and water skyrockets. Some research has shown that the use of seaweed-containing biostimulants has increased the average Brix reading of tomatoes compared to the untreated control, increased the average number of cucumbers per plant in a greenhouse, and increased root growth and development of field grown onions.

So, are kinetin and cytokinin based biostimulants going to make you a millionaire and eliminate the use of fungicides on your farm? That's unlikely. Are biostimulants complete rubbish to be added to the expansive "snake oil" silo? Nope! Is the truth context and crop specific? Yes! Some years during periods of minor drought or in a low fertility field, you might see an obvious improvement in plant health or crop yield. In other years, impacts may be less obvious, but fruit quality and shelf life may improve slightly. In other years, you may be better off spending your money on scratch tickets.

I'll have more specific information to share at the end of the season on the performance of over 10 biostimulant products that I'm evaluating in a bare root onion pre-plant dip trial this year. I'll be measuring root growth and development over the season across treatments, assessing the presence and severity of root diseases, and evaluating any potential yield impacts as well. For now, though, feel free to reach out if you'd like to talk more about what exactly is in that jug of mystery juice you might have sitting in the barn and how it might make sense to apply it to your crops!

WHEN PLANTING GOES WRONG...

Prevented Planting & Replant Provisions in Crop Insurance 2018 Crop Year, NY

Crop insurance can help your farm recover from a crop failure. Did you know it can also help you manage risk at planting time? Most crop insurance policies include provisions that can compensate you if you are unable to plant or help you afford to replant your crop if necessary.

Prevented Planting

Prevented planting provisions in insurance policies can provide valuable coverage when extreme weather conditions prevent or delay planting.

Am I covered?

Most policies include a provision for prevented planting with the exception of group risk (GRP, GRIP, and ARPI) and catastrophic-level ("CAT") policies.

Eligibility

You may be eligible to file a claim if:

- Your acreage is physically available for planting
- Your acreage was planted in at least 1 of the 4 most recent crop years
- An insured cause of loss occurred within the insurance period, for example:
  - Excessively wet conditions throughout the growing season which prevented nearby producers from planting similar acreage
  - A specific event, like flooding, which impacted only your field
- You were unable to plant by the final planting date (see reverse) or during the late planting period (generally 25 days after the final planting date but varies)

So you were unable to plant, now what?

You must provide notice that you were prevented from planting an insured crop within 72 hours after you determine you will be unable to plant. Then you may choose to:

- Leave the acreage idle or plant a cover crop (and receive a full prevented planting payment as long as you do not hay or graze the cover crop before November 1),
- Plant the crop late (your original production guarantee applies but is reduced one percent per day for each day planting is delayed after the final planting date), OR
- Plant a second crop (you may receive a prevented planting payment equal to 35% of the prevented planting guarantee).

Payments

The prevented planting guarantee for most crops is typically 60% of the production guarantee purchased for timely planted acreage. Some policies have additional coverage options available.

Cornell University delivers crop insurance education in New York State in partnership with the USDA Risk Management Agency. Diversity and Inclusion are a part of Cornell University's heritage. We are an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities.

Final Planting Dates (NY)

* Dates differ by county

5/10: Barley (spring), Oats (spring), Forage Seeding (spring), Onions
5/20: Green peas
5/30: Potatoes*
6/5: Tomatoes (processing)
6/10: Potatoes*, Corn, Soybeans
6/20: Grain sorghum, Sweet Corn (fresh-market)*
6/30: Sweet Corn (fresh-market)*, Dry Beans, Sweet Corn (processing)*
7/1 (previous year): Pasture and Hay
7/10: Sweet Corn (processing)*
7/20: Cabbage
7/25: Green Beans (fresh and processing)
8/31: Forage seeding (fall)
9/30: Barley (winter)
10/10: Wheat (winter)

Replant

Replant provisions in insurance policies provide a payment to help producers replant after extreme weather destroys a planting.

Am I covered?

Most policies include a replant provision with the exception of group risk (GRP, GRIP, and ARPI) and catastrophic-level ("CAT") policies.

Eligibility

The acres to be replanted must be:

- Originally planted on or after the earliest planting date
- Either at least 20 acres total or 20% of the insured planted acreage (whichever is less - this is known as the "20/20 Rule")
- Affected by an insured cause of loss such as a late frost
- Appraised as having an expected yield below 90% of the guaranteed yield in your policy
- Determined to be "practical to replant" by an Authorized Crop Insurance Adjuster
- Replanted with the original crop

So your planting was destroyed, now what?

- Notify your crop insurance agent within 72 hours
- An adjustor will appraise your expected yield and whether it is practical to replant
- If applicable, replant with the original crop
- Your original planting guarantee will continue as if nothing had happened (as long as you plant before the final planting date)

Earliest Planting Dates (NY)

4/1: Cabbage
4/11: Corn
4/21: Grain Sorghum
4/30: Soybeans
5/1: Beans (dry)
5/15: Tomatoes (processing)
5/25: Green beans (fresh)

Payments

The replant payment is typically equal to the lesser of either your actual costs of replanting or a formula provided in your crop insurance policy provisions (for example: for corn, the per-acre replant payment equals the projected price/ bushel x 8 bushels).

Communicate regularly with your agent about any issues with your crop, especially before planting deadlines! This is essential for receiving prevented planting or replanting payments.

Managing Employees Who Don't Speak English

ELIZABETH HIGGINS, ENYCHP

Increasingly farmers in New York are finding themselves supervising employees who don't speak English, many of whom also have limited experience living in the United States. Supervising employees is made even more challenging when they can't understand you. Sometimes, even when they understand the words you are saying, they misunderstand your meaning.

"One of the things that I had to learn was that when a guy said yes, or *si*, it didn't mean yes. That he would say yes to anything I asked" a farmer said recently at a workshop on ag labor. In this case that yes meant that the farmer assumed that the worker knew how to operate a piece of equipment that the worker was actually unfamiliar with, a potentially dangerous and costly mistake.

So what can an employer do to improve communications with workers who come from different cultures and speak different languages? Mary Jo Dudley, of the Cornell Farmworker Program has some tips in working with Latino farmworkers, based on interviews she has conducted with farmworkers and farmers in New York.

First, make an attempt to get to know each of your workers as an individual. When they are hired make sure that you meet with each of them one on one so that they know who you are. Know their names and make a point of exchanging greetings when you see them. It can be challenging with seasonal and H2A workers to find the time to do this, but it can pay off in creating a positive work environment where workers feel respected as individuals.

Understand that in many cultures any time the boss asks for something the answer will be yes, regardless of whether or not the real answer is yes. Do not ask yes or no questions in these situations, be more specific and, if the question relates to critical job skills, have the workers demonstrate their knowledge to you.

Make a point of noticing and commenting on good work, not just problems. As bosses, we tend to take good work from good employees for granted and notice only the bad. Our dad's management style "if I am not saying anything, then you are doing it right" is not motivating to employees. Also, by pointing out when employees are doing a good job, you provide an example to the other workers about how a job should be done and what your expectations are.

Use videos, and picture-based instructions as a supplement to help train your workers. Many workers from other countries are not literate in their native languages, so complex written instructions – even if translated – may not be effective. The Cornell Farmworker Program and NYCAMH (for health and safety) are good resources for materials and new materials are being developed all the time. English language instruction is available to farmworkers, although accessing services, for seasonal workers in particular, may be challenging. The Cornell Farmworker Program has developed a resource Creating Positive Workplaces: A Guidebook for Dairy Producers, that has some translated resources and is relevant to fruit and vegetable farms also. It is available on the Cornell Farmworker Program website: https://cardi.cals.cornell.edu/programs/farmworker

Finally, try to learn Spanish or the primary native language of your employees, or hire a manager who is bilingual. This will increase your effectiveness as a manager because you will be able to communicate more effectively with your employees reducing errors and increasing their performance for you. It will also create an environment where workers feel more comfortable and may increase your competitiveness in attracting and retaining employees. Consider it an investment in long term farm profitability. Winter language school in Guatemala or Mexico might be enjoyable in the middle of January.

If you would like more in-depth information on working with Latino farmworkers consider attending Navigating the Ag Labor Maze in Geneva on April 12th. The half-day program (11-5) will cover how to create positive workplaces and reduce miscommunication and culturally-based misunderstandings. Other speakers will address access to health services, opportunities for English language learning, and tips for worker and employer emergency preparedness. From 4:00-5:00pm there will be a discussion about navigating the H2-A temporary guest worker program. Registration information is available on the ENYCH events page https://enych.cce.cornell.edu/events.php.

Apple Crop Insurance Plan Information Collection
Listening Sessions for Growers, Insurance Co. Staff & Agents

Agralytica of Alexandria, Virginia is conducting a review of the apple insurance plan on behalf of the USDA's Risk Management Agency (RMA). As part of the review, Agralytica staff will hold listening sessions with **growers, insurance staff and other interested parties** in several states. For New York, the sessions will be on March 21 in Rochester and March 23 in Highland. Participants from New England states are also welcome at the Highland session.

The aim is to get feedback on how the program is working and how it can be improved. A central focus of the research is experience with and alternatives to the Fresh Fruit Quality Option, but Agralytica is also charged with reviewing current production and marketing practices in New York and identifying other issues that growers face with the current apple program. **This is an opportunity for producers, insurance staff and agents alike to communicate concerns and possible improvements for consideration in the development of future apple crop insurance policy.**

The dates, venues, and timing of the listening sessions are as follows:

Wednesday March 21 Monroe County	Irondequoit Public Library 1290 Titus Ave. Rochester, NY 14617 Tel: 585-336-6060 Time: 1:30 -3.30 pm
Friday March 23 Ulster County	Hudson Valley Research Lab 3357 US Hwy 9W Highland, NY 12528 Tel: 845-691-7151 Time: 9:00 – 11:00 am

If anyone would like an individual meeting, Agralytica staff will be available at the above locations. To arrange a time, contact Tom Earley by cell at 703-981-6004 or by email at tearley@agralytica.com. Alternatively, anyone who cannot attend can submit e-mailed comments. Please us "Apple policy" as your subject line.

Wall Board Options for Wash/ Pack Sheds

ROBERT HADAD, CCE CORNELL VEGETABLE PROGRAM

If you are thinking of renovating or building a new wash/ pack facility, one of the most important considerations is how best to clean the area. Food safety is paramount where reducing the chances of microbial contamination is always in the forefront. Having walls that are easy clean is worth the investment. There are a lot of choices out there; some options are much more expensive than others. Being able to readily clean up after running a wash and pack line will make the job more manageable with better results. This will pay off in the long run. No one wants to spend a lot of time scrubbing walls or ceilings so having the right building materials will go a long way. Chris Callahan and Andy Chamberlin, Univ. Vermont, have created an easy to use chart that provides the pros and cons of different wall and ceiling materials:

Smooth and cleanable surfaces are an important aspect of areas where produce is washed, packed, stored and processed. Many farms are investing in renovations and expansions of these areas and are seeking materials to meet this "finish surface" need regardless of specific regulation. Meanwhile, food processing companies are

continued on next page

often required to incorporate these materials due to regulation. This is a summary of some of the finish surface materials that are available, their pros, cons and pricing at this time.

Notes:

- These are not necessarily compliant for food contact surfaces; they are meant to be finish materials for areas where food is being washed, packed or stored. The general guidance is "smooth and cleanable." Check with the appropriate local and/or state enforcement agency to confirm applicability to your project.
- The prices listed are material cost only. The products differ in with regard to installation labor. For example, flexible sheathing like FRP will require some sort of rigid wall material to mount to where as rigid panels such as Trusscore, Extrutech and Utilite can be installed on top of furring strips. No installation costs have been captured in the prices listed.
- Links to manufacturer info are included. Most manufacturers sell via distribution channels. Check with your local building supply company for availability and current pricing. As with most materials, higher volume purchasing generally results in lower unit costs.

continued on next page

Material	Description	Pros	Cons	Material Cost ($/ft^2)
Fiber Reinforced Plastic (FRP) Textured – Class C 	Fiberglass-based wall sheathing material. Dimpled or textured surface.	Very common and familiar to trades and suppliers. Can be installed with rivets or with adhesive. Wide array of trim pieces to aid in clean installation.	Requires a backer board to install. Drilled and riveted installations can allow moisture and water leakage into wall. Consider adhesive.	$1.03
Fiber Reinforced Plastic (FRP) Smooth – Class C 	Fiberglass-based wall sheathing material. Smooth, flat surface.	Very common and familiar to trades and suppliers. Can be installed with rivets or with adhesive. Wide array of trim pieces to aid in clean installation. Smooth surface is more appealing to some due to cleanability.	Requires a backer board to install. Drilled and riveted installations can allow moisture and water leakage into wall. Consider adhesive.	$1.92
Galvalum Roofing – Ridged 	Painted, aluminum coated, galvanized steel sheets intended for roofing material but often used for wall sheathing as well.	Does not require a backing board, can be installed on furring.		$0.95
Galvalum Roofing – Flat 	Flat version of the ridged product above sheet galvalum sheathing. (see p.25 of linked manual)	Does not require a backing board, can be installed on furring. Flat surface may be easier to clean for some.		$0.76

- The pricing on these materials is quite variable depending on the source, when you obtain a quote, the quantity being ordered and how it is delivered. The listed price is the best information available at the time of writing. Shop around and obtain quotes from several distributors.
- Most manufacturer webpages include an easy to find, specific, installation guide for their product that will be helpful in guiding installation.
- FRP panels use H or J channel trim between pieces and corners which are calked in place to ensure a moisture proof seam. Follow the manufacturers installation procedures.

The complete fact sheet, containing photos and additional information, can be found at http://blog.uvm.edu/cwcallah/files/2016/04/Smooth-and-Cleanable-Surfaces-Fact-Sheet-2017-09-29-1.pdf

Trusscore Paneling 	PVC twin-wall plastic panels in 16" widths, and available in a variety of lengths.	Does not require a backing board, can be installed directly on studs		$1.52
Find more info at: http://www.trusscore.ca 1-888-418-4679				
WallTuf Paneling 	Recycled PVC-based wall sheathing.	Considered more environmentally benign than FRP panels.	Requires a backer board to install. Drilled and riveted installations can allow moisture and water leakage into wall. Consider adhesive.	$1.25
Find more info at: http://www.palramamericas.com/Products/Flat-Sheets/WALLTUF 1-610-285-9918				
Extrutech Twinwall 	PVC twin-wall plastic panels	Does not require a backing board, can be installed on furring.		$2.20
Find more info at: http://www.epiplastics.com 1-888-818-0118				
Utilite Paneling 	Polypropylene twin-wall plastic panels	Does not require a backing board, can be installed on furring.		$1.85
Find more info at: http://www.nudo.com/p_utilite_wall.php 800-826-4132				
Ribcore 	PVC ribbed panels Used for ceilings	Will not rust or rot		$0.77
Find more info at: http://www.ribcore.info 888 773-3130				

Upcoming ENYCHP Events

What is my job? Hiring, Training and Evaluating Farm Employees Effectively

MARCH 8, 2018
5-7:30 PM
HIGHLAND, NY

How well do your employees understand their jobs?

Everyone wants farm employees who know what to do without being told. Unfortunately most people you hire or manage can't read minds. This workshop will help you develop effective tools for training and evaluating new employees or employees moving into new positions. You will learn to develop clear job descriptions, learn techniques in hiring, and training new staff and how to use "just in time" feedback and performance appraisal to both correct problems and motivate your staff.

Keeping Good Staff when Money is Tight & Managing Conflict in the Workplace

MARCH 15, 2018
5:00-7:30PM
HIGHLAND, NY

Although everyone likes to be paid, money is not the only, or even most important, motivator for staff retention and performance. Poorly addressed conflict, however, can cost you good employees. Learn to motivate and retain farm staff while managing conflict and problem farm employees.

Hudson Valley Pesticide Applicator Pre-Exam Training

MARCH 19 - MARCH 21, 2018
9:00AM-12:00PM
HIGHLAND, NY

CCE ENYCHP Agriculture Specialists will be offering a training to review core concepts and commodity specific items in preparation for the exam.

Registration Fee covers two days of review: Monday 3/19 and Wednesday 3/21, 9am-12noon

Exam: Tuesday 3/27, 9AM-1PM

Are you managing your risks as a farm employer? The compliance and safety workshop

MARCH 22, 2018
1:00-4:00PM
HIGHLND, NY

This is the workshop that covers the nuts and bolts of risk management as a farm employer. Hear presentations from NYS DOL and NYCAMH on employer regulations and safety.

NEWA "Hands-On" Workshops:

MARCH 28, 2018
VOORHEESVILLE, NY

GRAPES AND SMALL FRUITS
9:30 TO 11:45PM

TREE FRUITS
1:00 TO 4:00PM

At this workshop, growers will learn the ins-and-outs of the NEWA system (Network for Environment and Weather Applications). NEWA is an online system that provides hourly and daily weather data, pest forecasting models, and crop production models, to help implement IPM practices on farms across the Northeast. Attendees will learn how to efficiently navigate the NEWA interface, including how to get weather data, access station specific pages, and effectively utilize models for grape berry moth, black rot, downy mildew, powdery mildew and Phomopsis. New models currently being developed for small fruits and tree fruits will also be discussed.

CLICK HERE to register online for any of these events, or call Abby Henderson at 518-746-2553