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Tree Fruit News



Temperature and Rain 3/21/17 - 4/17/17				
Locations	Avg Temp (F)	Max Temp (F)	Min Temp (F)	Total Rain (in)
Chazy	39.4	49.5	4.0	3.4
Peru	40.7	51.9	8.9	3.4
Crown Point	40.7	54.0	8.5	1.3
Clifton Park	44.0	64.1	10.5	4.9
Hudson	45.2	62.0	14.9	4.8
Highland HVRL	46.9	64.1	15.8	3.9
Marlboro	45.9	64.4	13.1	3.8
Riverhead	49.3	61.0	25.1	5.3

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Is it Time to Consider a Combined ENY Fruit School? *Anna Wallis & Dan Donahue, ENYCHP, 3/4/17*

The 2017 Eastern NY Commercial Tree Fruit Schools held mid-February were received with a great deal of success: the NENY Fruit School was held in Lake George Monday Feb. 13th and the Hudson Valley Tree Fruit School in Kingston Tuesday & Wednesday Feb. 14-15th. Over 500 participants attended both events in total, over the course of four days. Unfortunately, *very* heavy snow had a notable effect on attendance at the NENY Fruit School in Lake George, with attendance down about 20%; on the other hand the Hudson Valley attendance was up 10%.

Programs and speakers at both locations were very highly rated by survey responses as well as unsolicited personal feedback. Highlights included out of state speakers Dr. Duane Greene, UMass Amherst who gave advice on PGRs, and Dr. Win Cowgill, private consultant and professor emeritus at Rutgers University, who provided recommendations on weed management and practical alternatives to buying finished apple trees from the nursery. Growers were able to meet

the new president of the NYAA, Cynthia Haskins, who showed she is extremely well informed about the apple industry, and has acted as a strong spokeswoman for agriculture industries in multiple positions in the past. Dr. Srdjan Acimovic, Plant Pathologist at the Hudson Valley Research Lab, gave a timely presentation about the catastrophic effects of climate change and implications for managing fire blight in our region.

Feedback was extremely positive. Participants felt the value of topics and quality of presentations were overall very high. Topics of particular interest included mechanization, use of PGRs, pest management, pollinators, and sunburn mitigation; participants asked for future topics to include pruning and more information on WPS and other government regulations. Nearly half of participants responded that they would make changes on their farm based on information presented.

Despite the positive responses *continued on next page*

continued from page 1 and smooth logistics (we're quite practiced at this by now...), we can't help feel that some significant changes would vastly improve the fruit school experience in the future. After all, what would extension be without making adjustments once in a while, to adapt to changing circumstances and keep you on your toes!?

Topic 1 - If our ENY schools are currently successful, why consider a change?

Program Logistics: The programs between the two schools are historically very similar. This is not accidental, as similar forthcoming research and seasonal challenges tend to be applicable to the entire Eastern NY Region. Current logistical challenges are:

- Developing and administering two educational events and trade shows is time consuming, using up limited ENYCHP resources that could be put to better use elsewhere.
- The NENY program in Lake George is limited to a single day, reducing the educational and interactive opportunities for our northern New York growers, unless they make a four hour drive to Kingston.

Speaker Travel: Many of our speakers are asked to cover both ENY schools. For those speakers, a Monday presentation in Lake George often means Sunday travel, followed by a Monday dash to Kingston, all at the height of an upstate NY winter, no further explanation necessary! Some speakers will also stay for the berry & grape programs on Thursday, or travel to present at the Vermont fruit school at the same time.

- Travel is expensive, both in time and money
- Winter travel in upstate New York is unreliable, and risky, both to our speakers and our program.
- Our pool of "local" speakers has declined (retirements, lost faculty positions). In response, we have begun to reach out to out of state experts in the northeastern region. Our friends and colleagues from outside of NYS add greatly to our programming, but are understandably more expensive to support.

Our Venues: Keeping costs down requires competition. In Lake George, our venue actually has to re-open for our northern school as the facility closes for the winter. In Kingston, our day 1 attendance (233 in 2017) is straining the capacity of the facility.

We have not been able to successfully identify al-

ternative venues with sufficient capacity in the Hudson Valley. As a result, there is no competition for our business and our costs have been increasing significantly.

- The quality of the lunch at the Kingston school is excellent, but lunch seating is stretched to the limit.
- No flexibility in Kingston to hold concurrent sessions
- Limited trade show space at both locations

ENYCHP Educational Programming in Total: As the ENYCHP grows, we find that we are able to offer more and more programs across the region, tailored to specific needs of diverse horticultural areas. We have continued to organize historically important events such as Fruit & Vegetable Winter Schools and the Empire State Expo. We have also introduced numerous programs including a NENY & VT Winter Grape School, Garlic School, and Food Safety Trainings. We have been able to do this with fewer total specialists and administrative support, in part because we are functioning as a team of specialists and staff who support each other. That said, there is a limit to the number of programs and events a finite number of people can manage while balancing our increasing applied research expectations—to create one event would make winter meetings more manageable and efficient, and provide us with more time to improve or introduce other events (Special permit training, pest management workshops, young grower event, etc).

Topic 2 - Concerns for a combined program: We can think of several major concerns associated with combining our ENY fruit schools:

- First, we realize moving to one more central location will mean a longer travel distance for some producers in the more distant parts of the region, and may require more people to stay overnight. Regional, local events have been a strength of CCE Tree Fruit programs historically, and have made information more accessible to the large area. We do not wish to alienate producers by moving locations. Will we lose attendees? How many
- Also, it stands to wonder whether we are re-creating or competing with the Empire State Producers Expo. This premier statewide multi-commodity event has a smorgasbord of pros and cons unto itself. This is a shame in many ways, because it is really the only time growers have to interact with industry members across the state, there is significant funding to bring in national and

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internationally recognized speakers, and the venue is one of few places where such a large trade show is possible. However, we have found that fewer and fewer fruit producers are attending this event, precious few of those attending are from ENY. Holding a joint ENY Fruit School would possibly draw participants away from the Expo, but it may also bring a stronger program to the ENY Region.

Fruit schools do serve as a fundraiser for the ENYCH program. As we have discussed in the past, your regional extension program is funded from three sources: Member county CCE associations contribute 55% of the team budget, Cornell University contributes 17% as a pass through of federal funds, SUNY covers fringe benefits, and the balance of 28% (termed "Program Generated Funding" or PGF) is raised by

the Extension Specialists themselves through successful grant writing and charging registration fees for programming. In the future, we will be expected to raise a higher percentage of PGF. In today's age, providing an effective and viable extension program is more like running a business than you might think! Our bottom line, just like yours, is that we cannot afford to lose either clients or financial support.

To be absolutely clear, at present this is just an idea. In Extension, all of our programming is justified by data and stakeholder input, and this will be no exception. Please contact either of us with your reactions and input.

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Guidelines for Controlling *Listeria monocytogenes* in Small- to Medium -Scale Packing and Fresh-Cut Operations

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UNIVERSITY OF CALIFORNIA, Division of Agriculture and Natural Resources

Recent outbreaks of the bacterial pathogen *Listeria monocytogenes* have drawn attention to the severity of listeriosis in humans, and to the risk of *L. monocytogenes* contamination in all foods. The risk is highest in refrigerated and ready-to-eat foods because *L. monocytogenes* is one of the few foodborne pathogens capable of multiplying at refrigerated temperatures. New handling and packaging technologies that extend visual quality of fresh produce items and inhibit normal spoilage organisms may result in the consumption of a food beyond its generally recognized safety period. Healthy individuals are not usually affected when they consume foods containing this organism. However, illness can be very severe in immune-compromised individuals and in pregnant women. Mortality rates of 20 to 30 percent are not uncommon in listeriosis cases. *Listeria monocytogenes* is found almost everywhere and can be readily isolated from most environments, including soil, humans, animals, agricultural irrigation sources, decaying plant residue on equipment or bins, cull piles, packing sheds, and fresh-cut processing systems. The widespread nature of *L. monocytogenes* mandates a systematic approach to sanitation of high-risk locations in packing operations. Although the clinically demonstrated linkage between listeriosis and fresh fruits and

vegetables is very limited, the risk is serious and appears to be increasing. A consistent monitoring system, especially for fresh-cut produce processors, is strongly recommended. The severity of listeriosis to humans demands immediate corrective action when *L. monocytogenes* is detected in a packing or fresh-cut processing facility.

Unfortunately, the fact that *L. monocytogenes* is present in most environments renders it nearly impossible to eliminate completely from a packing shed. This bacterium is constantly being reintroduced into the plant by employees and by incoming products, soil, vegetation, and equipment. Monitoring for general cleanliness and sanitation with respect to overall microbial populations is always important, but the unique ability of *Listeria* to persist and multiply on equipment, in the packing shed, and in a fresh-cut plant environment demands special attention. Produce buyers are increasingly expecting growers and shippers of all scales to verify that they have a *Listeria* management program in their operational plan.

U.S. regulatory agencies consider *L. monocytogenes* an adulterant in ready-to-eat foods, and as such, they will ask a company to recall a product found to be contaminated with this bacterial pathogen. The policy, known as "Zero Tolerance," is one reason why *L. monocytogenes* control should be a primary concern with packers and shippers.

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Control of *L. monocytogenes* in a plant requires reducing the number of these bacteria on products and equipment surfaces via physical means and preventing general growth and proliferation of *Listeria*, by managing the environment. Cleaning and sanitizing treatments applied to equipment, walls, and drains should be adequate to destroy or remove *L. monocytogenes*. Guidelines vary since adequate treatment depends on the equipment and environment in each plant. This document will primarily address the second element of control: preventing establishment and proliferation of *Listeria* in the packing and processing environment. This aspect involves regular sanitation of equipment surfaces and consistent monitoring of these surfaces. In order to verify control of *L. monocytogenes*, managers should, at minimum, implement a short-term monitoring program that tests for indicator bacteria, such as “generic *Listeria*” to establish a baseline of performance in general sanitation procedures. This monitoring program acts to detect the presence of all *Listeria* species, with the assumption that if any *Listeria* species are detected, *L. monocytogenes* may also be present. The program becomes plant-specific when the frequency of sampling, location of samples, and the corrective action taken are tailored to the plant’s operation. Each product and process within each facility should be considered a separate unit, and appropriate monitoring points should be developed according to this philosophy.

The goal of this publication is to offer guidelines for monitoring and minimizing the presence of *L. monocytogenes* in an agricultural packing operation and minimizing the possibility of its presence in the final food product, whether sold as a raw agricultural product or uncooked minimally processed vegetable.

GENERAL CONSIDERATIONS

A product is most likely to become contaminated when it comes into contact with a contaminated surface. This risk is highest between the primary trimming or chopping step and the packaging step. This is because various processing measures may occur after cutting, with no effective treatment to clean the product before packaging. Common sites for this type of cross-contamination are listed below:

- Slicers, dicers, shredders, and blenders used after cutting and trimming but before packaging
- Conveyors
- Holding containers such as bins, tubs, or baskets used for spin-drying or to hold the finished product before packaging or further processing

- Solutions used to chill product
- Hand tools, gloves, and aprons that come into contact with finished product
- Racks for transporting before packaging
- Collators used to assemble and arrange product before packaging
- Filling or packaging equipment

SAMPLING

Weekly sampling is recommended for most wet areas since these are the areas most attractive to bacteria. Drains, floors, walls, and overhead and support structures are recommended for sampling. Air sampling may be advisable in some operations. After a profile of potential bacteria-harboring sites is established, the plant should develop its sampling schedule accordingly. Any increased incidence in the presence of generic *Listeria* should be further investigated. If a sample that is positive for generic *Listeria* is a composite sample, the individual samples that made up the composite should be retested to determine where the contamination is occurring.

Remember that any contamination during processing will continue to spread downstream. If further sampling of a positive site is positive, use of that site and all sites downstream from it should be suspended. Intensive cleaning and retesting of the site should be completed. All positives that occur on food contact surfaces should be investigated. Determine which remedial actions are appropriate, including modification of cleaning and sanitizing procedures, equipment redesign, retraining, and so on.

Product sampling (final packed or minimally processed and packaged produce) to test for *L. monocytogenes* remains a controversial point in food safety management and is of debatable value. Initial levels of *Listeria* in the product are likely to be very low and not uniformly distributed. Therefore, the effectiveness of monitoring to provide safety assurance is questionable. Statistically, unless the final product is grossly contaminated, it is highly unlikely that a practical and economical random sample of finished product would result in a positive detection. Monitoring retained product held under refrigeration for an extended period has been more reliable in detecting *L. monocytogenes* on diverse leafy vegetables. Unfortunately, this information is limited and largely of retrospective value only.

If the food contact surface sampling result is positive, the product must be held or recalled until confirmatory lab results are obtained.

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continued from page 4 In-house testing for *L. monocytogenes* is only recommended when appropriate facilities are available for the testing. In addition, adequately trained microbiologists should perform the testing procedures. Many of the test procedures function by steps that amplify the levels of *L. monocytogenes*, if it is present, which requires absolute containment and consistent, good laboratory practices to prevent accidental transfer to outside the lab area. Poorly trained individuals or inappropriate facilities could lead to further contamination of the processing facility. There are many commercial testing facilities that can safely perform these tests.

POSTHARVEST OPERATIONS

A safe general rule is to assume that any breakdown or change made to a facility or packing line might introduce or cause contamination of the packing shed or fresh cut plant. Examples include the following:

- Postharvest wash water comes from a new, possibly contaminated source.
- A packaging line is moved or changed.
- Used equipment is brought in and installed without thorough cleaning and sanitation.
- Equipment breakdown leading to the ineffectiveness of some of the barriers to bacterial contamination.
- A drain back-up.
- Product gets caught in newly installed or modified equipment, allowing time for microbial growth in the system.
- Construction in the ready-to-eat product area.
- A new employee is not familiar with the safeguards against *L. monocytogenes* contamination.

Periods of heavy production can lead to a special group of problems. In this case, elimination of the scenarios listed below is essential to controlling the growth and spread of *L. monocytogenes*:

- Personnel are moved from the field or receiving dock to the finished product area, leading to cross-contamination.
- Busy periods of packaging make it difficult to clean and sanitize as often as necessary.
- Inadequately cleaned product or postharvest equipment in the finished product area.
- Frequent product changeovers. Some basic packaging management guidelines can significantly limit the possibility of *L. monocytogenes* contamination:

- Remove plant residue and rinse plant liquids from harvest and packing surfaces, belts and conveyors, bins, and totes.

- Make sure that equipment, parts, and product bins and totes are not cleaned on bare soil or on the floor, where *L. monocytogenes* contamination is most common.

- Waste or cull bins in final packing areas should be in good repair, cleaned, and sanitized.

- Traffic flow between receiving, packing, and shipping areas should be controlled. This includes maintenance employees and outside contractors and their tools, in addition to traffic between raw and ready-to-eat agricultural product areas.

- Product flow should proceed in a linear fashion to avoid contact between field products and final packed products.

- It may be beneficial to establish positive air pressure in the finished product area (relative to the raw material side) to contain contamination.

- Compartmentalize. Dedicate separate washing areas for field equipment, color code trash barrels according to field or final product, use separate utensils, and so on.

- Wet process areas should be separated from other areas whenever possible. Bacteria require a cool, damp place to grow, and limiting the amount of standing water helps control the growth of *L. monocytogenes* and most other bacteria.

- Drains from the “soiled” side of packing or processing should not be connected to the drains from the “clean” side.

- Eliminate overhead fixtures in the finished product area wherever possible, especially over areas where the ready-to-eat product is exposed.

- Footbaths can be installed but should be maintained properly. The maintenance of clean, dry floors is more effective. The use of chlorine in a footbath is not recommended because it quickly becomes deactivated. An iodophor or quaternary ammonium compound is preferred.

- Water that comes into contact with product should contain an antimicrobial agent effective against *L. monocytogenes*.

PACKAGING AND STORAGE

- Pallets entering the packaging room should be clean and dry. It is much easier to transfer bacteria between wet surfaces.

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continued from page 5 • Packing materials should be palletized and covered until used.

- Cooling units should have dehumidifying properties in order to limit moisture in these areas.

EQUIPMENT

Other areas in the plant can provide a place for *Listeria* to grow and contaminate the product indirectly:

- Equipment framework (especially rotating blades, belts, etc.)
- Floors
- Drains
- Walls, especially cracks that retain moisture
- Ceilings, catwalks
- Condensate
- Wet insulation
- Trolleys, forklifts, walk-alongs
- Cleaning tools such as sponges and brushes
- Maintenance tools

Equipment is often forgotten in the scheme of minimizing *L. monocytogenes* risk, but it provides numerous hiding places for bacteria. The following considerations decrease the risk of *L. monocytogenes* contamination of equipment contact surfaces and product surfaces:

- All equipment should be designed to be easily cleaned and serviced.
- Previously-used equipment must be thoroughly cleaned and sanitized. Disassemble equipment to clean as needed.
- Maintain equipment in order to minimize breakdowns because the repair of equipment provides an opportunity for the introduction of contamination.
- Hollow equipment or catwalk frames should be prohibited.
- Lubricants should contain a listericidal additive, like sodium benzoate, to prevent them from becoming a harboring point for *L. monocytogenes*.
- Conveyors should not contain hollow rollers and should not be located near the floor. In addition, overhead conveyors should be avoided because they are harder to clean and inspect.
- Transporting racks should have cover guards over the wheels to prevent spray from the wheels from reaching the product.

- If compressed air is used to remove debris from equipment, be sure to maintain and replace in-line filters regularly.

- Coolers or other rooms should not be cleaned when ready-to-eat food is exposed.

SANITATION

Follow a standard cleaning procedure:

- Dry clean.
- Pre rinse equipment.
- Visually inspect equipment.
- Foam and scrub equipment.
- Rinse equipment.
- Visually inspect equipment.
- Clean floors.
- Sanitize equipment and floors.
- Conduct post sanitation verification.
- Dry floors.
- Clean and put away supplies.

Some plants use the following sanitizing protocol:

- After cleaning equipment, apply a high level of chemical sanitizer (800 ppm quat) and let it sit for 20 minutes.
- Rinse, and then apply a normal level of sanitizer (200 ppm).
- At the end of the week, apply a high level of sanitizer and leave it on equipment until just before start-up.
- Rinse high level of sanitizer and apply a normal level. Then rinse off at start-up.
- It may be beneficial to spray 200 ppm quat aerosol into a room as final sanitation step, weekly or monthly.
- The most reliable method of sanitizing equipment is with heat. Heat may be applied using hot water (180° F rinse), steam, or the application of moist heat in an oven to raise the temperature to 160°F or higher.
- When using heat to sanitize, it is very important that all soil is removed from the apparatus so that it does not bake on.
- Chemical sanitizers such as iodophor (200 ppm) and quaternary ammonium compound (400–800 ppm) are effective on equipment and other surfaces. Sanitizers containing peracetic acid and

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peroctanoic acid are also effective against *L. monocytogenes*. Chlorine may be used, but as with foot baths, the chlorine quickly becomes deactivated.

- Rotating sanitizers in the program may increase effectiveness.

- Sanitizing with high temperatures may increase effectiveness. See the manufacturers' instructions to judge whether this is advisable with the product.

GENERAL PLANT SANITATION

- Visual inspection and routine microbiological testing (for example, Aerobic Plate Count) are important in the development of an idea of what potential bacterial problems are present in a plant. Commercial bioluminescent monitoring systems are useful in observing overall sanitation. However, none of these techniques are specific for *L. monocytogenes*. A generic *Listeria* monitoring system is also recommended.

- Clean-up crews should receive special training in controlling *L. monocytogenes*, as well as close supervision. The clean-up crew is most effective if employees understand why sanitizing procedures are necessary. Management and employees

should share the view that monitoring is needed to identify needs and opportunities to improve cleaning techniques or frequency in specific areas.

- Mid shift cleanups should be eliminated when possible, as they produce aerosols and add water to the processing environment.

- A hose emptying in a drain should divert condensate from drip pans of refrigeration units. Solid sanitizers should be placed in the drip pans.

- Use a caustic cleaner to clean floors. Use brushes that are color-coded according to what processing area they belong to.

- Make sure drains are designed to prevent backups. Stop production if a backup does occur. The room must then be cleaned, rinsed, and sanitized. Do not clear a drain with a high-pressure hose, as this creates an aerosol throughout the room.

- Eliminate trench drains where possible.

- Use bactericidal drain rings.

- Brushes used for cleaning drains should be dedicated to that purpose.

- Sanitize cleaning tools with 600 to 1000 ppm quaternary ammonium solution.

EMPLOYEE HYGIENE

- Clean gloves, smocks, and aprons are essential. Depending on your operation, color-code these items according to which production area the employee is assigned.

- Make sure employees understand that the clean garments and disposable gloves are to protect the product from contamination, not to protect the employees from getting dirty.

- If an employee touches an unclean surface, their hands should be washed and their gloves changed.

- If possible, have one person in the packaging room responsible solely for picking up material from the floor, removing trash, and so on.

CONCLUSION

The most important point in limiting risk for *L. monocytogenes* contamination maybe in ensuring that personnel are aware of the severity of the effects of contamination and what practices increase this risk. Many seemingly insignificant practices, such as setting equipment on the floor to clean it, not wearing clean gloves, or handling "dirty" produce or equipment and then touching cut and trimmed or packed produce, can be catastrophic for a processing system. Make sure that every employee feels a sense of personal responsibility toward maintaining the sanitation and safety of the plant.

ADDITIONAL RESOURCES

The following USDA site has links to current information on *L. monocytogenes*. Much of the information for the food industry is related to ready-to-eat meats. However, the means to control *L. monocytogenes* is very similar for all food types.

<http://www.fsis.usda.gov/OA/topics/lm.htm>

The following site provides very detailed information regarding *L. monocytogenes* and testing and detection procedures.

<http://seafood.ucdavis.edu/HACCP/Compendium/Chapt15.htm>

A list of commercial food testing laboratories (primarily in California) can be found at the following site.

<http://foodsafes.ucdavis.edu/ResourceGuide>

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FOR MORE INFORMATION

You'll find detailed information on many aspects of postharvest handling and food safety in these UC ANR publications:

Commercial Cooling of Fruits, Vegetables, and Flowers, publication 21567 Postharvest Technology of Horticultural Crops—Second Edition, publication 3311 Don't Give Kids a Tummyache (CD ROM), publication 21586

To order these materials, visit our online catalog at <http://anrcatalog.ucdavis.edu>.

You can also place orders by mail, phone, or fax, or request a printed catalog of publications, multimedia, slide sets, and videos from:

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In addition, United Fresh has a document "Guidance on Environmental Monitoring and Control of *Listeria* for the Fresh Produce Industry" which can be found at:

<http://www.centerforproducesafety.org/amass/documents/document/263/Listeria%20Guidance%20UFPA%202013.pdf>

The Practical Implementation of Horticultural Techniques in High Density Orchards

Anna Wallis CCE ENYCHP & Mario Miranda Sazo CCE LOFT

In the implementation of high density systems over the past 2 decades, the Eastern NY industry has been confronted with a host of challenges, ranging from deciding which specific cuts to make, to making a transition in overall pruning philosophy. First let's revisit the basic concepts of the high density, tall spindle system. It's important to keep these in mind as we study specific challenges:

- The key objective of high density is to maximize yield in early years (years 1-4) and produce high yield, high quality fruit at maturity (years 5+)
- Canopy should be narrow and slender with an overall conical shape, to maximize light interception, and minimize shading.
- Minimal pruning should be practiced in early years, with the tying down of upright branches to promote fruitful wood.
- Renewal cuts should be used for branch replacement. No permanent limbs should be maintained in the canopy, and no heading/stubbing back cuts should be made, as these are invigorating.

Complete recommendations for Tall Spindle Planting, Pruning, Training can be found on the Cornell Tree Fruit website:

http://www.fruit.cornell.edu/tree_fruit/resources/The%20Tall%20Spindle%20Planting%20System.pdf

Challenges to practical implementation and their solutions

The following are some common challenges and errors observed in commercial orchards, and how to address them:

Shape of the tree is critical to success.

- The goal should be to create a narrow, slender shape. The tree should be conical, narrower at the top of the canopy than the bottom, to reduce shading.
- Maximizing light interception and minimizing shading will increase the energy captured for fruit and shoot production. Achieving the narrow, slender tree shape has been a problem in some cases where plantings have not

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been pruned aggressively

enough. In these situations, begin by making large pruning cuts, making sure the top tier of the canopy is smaller than the lower portion.

- Renew branches based on the following caliper management guidelines: In the upper part of the canopy, branches $\frac{1}{2}$ the diameter of the leader should be removed, $\frac{3}{4}$ diameter in the lower part of the canopy.

High density systems are based on limb renewal

- Differing from the more traditional systems, high density tall spindle systems require *complete* limb renewal. Although this is a familiar mantra, there is still a hesitancy to make the aggressive pruning cuts that are necessary.
- No permanent lower tier branches should be retained. Young renewal shoots will be more productive; bigger wood draws too much energy which otherwise could contribute to fruit production.
- Ideally, trees should be spaced 3' apart so that the smaller renewal limbs adequately fill the space. But this can be accomplished wider spacing (4-6') as well.
- The goal is to remove 1-2 large branches each year in mature trees (>5 yrs old). More than this can lead to the expression of excessive shoot vigor during the growing season. However, where trees have too much large wood or have been neglected, 4-5 big cuts may be necessary to open up the canopy.
- Nervous about taking out too many buds? Then count them. After making the big pruning cuts on a few trees, count the floral buds remaining on the tree.
- Make sure your canopy is balanced on both sides: send workers down both sides of the row, to make sure canopy is even! Use the herbicide strip as a guide for where the canopy should fall.

Check the 'texture' of the wood

- The primary goal should be to produce lots of fruitful wood—many smaller horizontal branches, no big branches or narrow crotch angles. Select branches that are more limber or soft. Make sure the limbs are positioned correctly before the texture becomes stiff and too upright. In younger trees, use clothespins to flatten branch angles on emerging shoots at 2-3" of growth and tie down longer branches; in bearing trees, fruit will weigh the branches down.

Minimal pruning does not mean 'no pruning' during establishment.

- Minimal pruning is emphasized in high density systems, with very little to be done during establishment. However, in young trees (years 1-2), *some corrective pruning* must still be done to establish a good tree shape early on. If trees have too many feathers (or are too long, too narrow, or too thick), branches will be overcrowded, leading to competition for resources and shading. Use the 4-finger rule: feathers should be spaced approximately this distance apart along the trunk. Thinning cuts can be used to remove the excess branches.
- Another essential pruning technique involves the early simplification of branches, especially in varieties like NY 1 and NY 2. Secondary side branches larger than $\frac{1}{2}$ the diameter of the branch should be removed from the original feathers of two, three and four year old trees, leaving each branch as a long fruiting column "a long finger instead of a hand with several fingers". This pruning technique is important for these new cultivars which produce "forky" branches.

Weak growing cultivars take additional consideration and patience.

- It is a common problem to see weaker cultivars (NY-1, Honeycrisp) not reaching the top wire or

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filling the space

adequately. Compensate for this by planting them at close spacings (3ft or less) using the more vigorous M.9 clones (Pajam 2, Nic 29), or G.41 (comparable to the large M.9 clones, but fire blight resistant). G.41 may be useful when orchards are replanted on old orchard sites since it has some tolerance to replant disease. Another good option for less vigorous cultivars is G.935.

- Avoid cropping young trees until they fill the space. Leave renewal limbs to grow (don't stub limbs partially back) and be patient as they may take an extra season to fill the space. When making renewal cuts, stubs should be kept somewhat longer (4" instead of 2") to make sure a bud breaks for the renewal limb.

Cropping considerations

- In high density systems, there is emphasis on cropping trees early to realize the crop and return necessary to pay of the high expense of planting. However, this translates to considerable stress on the tree. Trees must be managed intensively in the first 3 seasons, especially if you expect to carry a significant crop in years 3 & 4. You must make the appropriate investment in tree health by supplying adequate irrigation, balanced nutrition, excellent weed control, and overall good orchard management. Aggressive cropping in the early years can translate to stunted, poorly shaped trees that will be difficult if not impossible to correct later, while producing lesser quality fruit. Making the right decisions and implementing them in a timely fashion will ensure the establishment of a productive and profitable orchard.

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PEST FOCUS

Highland:
Oriental Fruit Moth and **Lesser Appleworm** 1st trap catch today, 4/17.
Pear Psylla 1st nymphs today, 4/17.



2017 ENYCHP Tree Fruit – Calendar of Events

May Apple Thinning Meetings

Ulster, Columbia, and Clinton Counties

Dates to be announced, depending on bloom timing.