Many apple growers across the state have reached the transition from “spring” to “summer” pest management. With primary scab spore releases over, the need for fungicide protection switches to a looser regime of maintaining enough coverage to prevent colonization of waxy apple fruit skin with spores from the flyspeck – sooty blotch group of fungi.

Relaxing fungicide intervals safely requires taking a good look for active apple scab lesions. Potential infections from all primary scab infection periods have had time to become visible by for orchards south of Bangor. By the coming weekend, a majority of second-generation lesions will have had time to appear. And by June 28 almost all of them. If you find 5 or fewer leaves with scab on 100 shoots and fruit clusters, you can rely on fungicide protection against flyspeck to keep scab in check.

Blossom strikes from the potential fire blight infection periods during bloom have had time to appear, and have not done so in the orchards from which I have observations or reports. In 2016, fire blight was appearing by this date. However, it is also true, or at least I remember it this way, that we have had cases where fire blight did not show up until the shoot blight phase had time to appear. By the end of this week, there will have been time for that to happen, but I do not think it will. In other words, I do not think this is going to be big fire blight year.

If you have fire blight observations, please share them. There have been several cases of dead shoot tips that resemble fire blight over the past 10 days, but those were caused by apple pith moth larvae chewing into stems. This insect typically only occurs in unsprayed orchards because where insecticide is used in late July and August against apple maggot, the moths and eggs are killed before larvae enter shoots for overwintering. Later in the summer, oriental fruit moth could cause similar damage, but is rarely noticed in apple trees.
Another fire blight fake-out has been due to phytotoxicity. I am not referring to the widespread occurrence of marginal leaf whitening or yellowing caused by streptomycin application back in May. That short-term effect, as far as I know, has no consequence for fruit or health of the tree.

There have a few cases of more extensive leaf damage that seem to be associated with use of captan plus a penetrant such as LI700 or in combination with other tankmix materials such as Sevin XLR that result in captan being carried into the leaf tissue instead of remaining on the surface. That is why you never mix captan and oil. The oil acts as a penetrant to move captan inside the leaf where it kills leaf cells. In one case described over the phone, the damage is reportedly severe. In that case, application combined not only captan and LI700, but was made on June 12, which was the second of three days in a row of 90+F daily high temperatures. An old rule to prevent phytotoxicity is to not spray when the temperature is over 80F. That may be on the cautious site, but 85F does present substantially increases risk of phytotoxicity. Increase the temperature to 90F and the risk if very real. Add 3 days in a row of 90+F, and then add a LI700 + captan mix, then conditions are well set for leaf burn.

Fungicide intervals for flyspeck prevention are roughly every 14 days (captan alone) to 21 days (Topsin, Sovran, Flint) or every 2 inches rain whichever comes first. With apple scabs in the middle, fire blight is fast nail biting disease we track by the hour and day. Flyspeck is the slow disease that develops over weeks and months. If you ignore it, it can cause substantial damage. But it is not the high-speed chess game like fire blight.

That said, recent research found that the majority of the flyspeck infections that show by harvest, or develop in storage, get started in the 8-10 weeks after Petal Fall. The idea that there is siesta between the end of apple scab and the beginning of flyspeck infection risk no longer seems valid. I need to remove statements to that effect from Ag-Radar pages that help you interpret the effect of rain and temperature on optimized intervals between flyspeck fungicide prevention sprays.

As for insects, plum curculio immigration should be winding down by this weekend for orchards in the Monmouth area, and should already be done in Sanford. For orchards north of Monmouth, PC immigration should be done by June 28. If your latest insecticide lasts through the end of plum curculio immigration then you are done with needing protection against new egglaying cuts. That assumes you are using an insecticide that kills plum curculio, not just repels them like Surround. Surround coverage needs to last at least a couple more weeks to protect against new damage. Some PC cuts have been seen around the edges of sprayed orchards, but nothing major as far as I know. On the other hand, fruit on unprotected trees show a lot of damage from PC and European apple sawfly.
Then there are the caterpillars – **codling moth** being the primary pest of interest in that group. As residue from earlier insecticide applications is depleted by rain, UV, time, and tissue expansion, fruit are no longer protected against codling moth larvae that are just now starting to hatch. But if you killed the adults and/or eggs with earlier insecticide sprays the dead codling moth are not going to come back to life. Unless you have had a problem with codling moth in the past, that one is also not a concern. I do not want to be too blasé' about it, because codling moth does a lot of damage in no/low spray orchards. However, they are usually well controlled by plum curculio sprays, and use of carbaryl as a thinner also takes a toll on codling moth. For organic growers or where pest pressure is very high, the first of two applications on June 20, or where pressure is lower, a single application against codling moth on June 26 would suppress 1st generation as they hatch and before they can chew into apples.

The Extension – Pomological Society Scouting Co-op has traps out for codling moth. Captures so far have been typical and in almost all cases not high enough to warrant targeting a spray against them.

Our **lesser appleworm** traps were busy last week, somewhat less so this week. The LAW trap captures were much higher than codling moth, and much higher than the pseudo-threshold of 10 moths per week per trap. Male moths are not a very reliable indicator of the number of egglaying females, thus the use of “pseudo-threshold”. As with codling moth, LAW has not been a frequent source of damage in sprayed Maine orchards, and for the same reasons. Its life cycle timing is similar to codling moth, presumably plum curculio sprays take care of the 1st generation LAW, and apple maggot sprays take care of the 2nd generation. And like codling moth, LAW have been found to cause a lot of calyx end damage in no/low spray orchards. We also have obliquebanded leafroller traps and oriental fruit moth traps, but those have been less active.

**European red mites** have been almost a complete no-show so far. But as 2nd generation nymphs hatch and mature their numbers may increase. San Jose scale is not a problem, until it is a problem, but that is rare. If they were abundant, the vulnerable crawler stage would be moving around June 25 in Sanford, and by June 30 in Monmouth. Once they settle and start covering themselves with a shell, they are much less vulnerable to control.

So if everything looks good at this point, then the pest management regime for rest of summer is to keep up protection against flyspeck, and watch for fire blight, scab and mites because they could still emerge as needing attention. **Apple maggot** never fail to show, so be ready to set monitoring traps and spray when they start emerging. That is usually in mid-July (Monmouth), unless we have an extended dry spell. There is **obliquebanded leafroller** and 2nd generation leafminer to think about in late July, but we can talk about them, and **white apple leafhopper** and **woolly apple aphid** in late July and August, when their time comes.

Looking toward August, make plans to put on a final fungicide against flyspeck as late as you can with either Pristine (best), Sovran or Flint (30 day PHI on Sovran), or Topsin + captan. Then watch the weather after that final spray to see if late harvested cultivars need a touch up if there is persistent wet weather.
**Return Bloom in Honeycrisp & other biennial bearers**

To disrupt or break a biennial bearing cycle, growth regulators can be sprayed during early summer to encourage flower bud development. Ethrel and NAA (PoMaxa, Fruitone) are labeled for this use, but each at its own rate. Apply one of these at weekly intervals beginning one month after bloom and up to four times. NAA is less likely to induce early ripening. Additional information can be found on the product labels.

Suggested rate of NAA is 5 ppm (Fruitone or PoMaxa at 2 oz. per 100 gal.).

Suggested rate of Ethrel is ½ pint / 100 gal.

**Sprayer Calibration and Coverage**

In a perfect world, every sprayer would be fully calibrated and tested for coverage before Green Tip and again after Fruit Set. If your world wasn’t quite that perfect this spring, that makes it all the more important to take the time to assess sprayer performance and make corrections before relying on it for summer spray applications. Good coverage becomes difficult as canopies thicken with continued shoot growth until terminal bud set in late July. Moreover, the whole point of growing apples is to get saleable fruit that benefit from protection between now and harvest.

The [http://sprayers101.com/](http://sprayers101.com/) website by Jason Deveau and Tom Wolf has a wealth of material about crop spraying. That site has much more detail, discussion and graphics than possible here. All the points made below are covered in the online version of the 2015-2016 New England Tree Fruit Management Guide at [http://tinyurl.com/NewEngTreeFruitGuide](http://tinyurl.com/NewEngTreeFruitGuide). (The new smartphone version of the online guide does not have this content yet, but I think will by next season.)

The following discussion is from a recent email exchange I had with a Maine grower who confessed that sprayer calibration was among his least favorite topics, but that he also recognized the need to attend to it, are intended as mid-season pep talk and reminder of some of the key points for getting good performance from your sprayer.

If you are terrified of not doing it perfectly, you are correct. Perfection is impossible. Fortunately, perfection is not necessary either. **A few steps can make a big improvement in sprayer accuracy and coverage.**

For starters, remember that one acre = 43,560 square feet.
1. **Estimate the gallons you want to apply per acre** for a 1X dilute application. The Tree Row Volume formula is described in the 2015-2016 New England Tree Fruit Guide linked above.

   Tree Height x Canopy Width x (43,560/distance between rows) x 0.0007.

   (The 0.0007 figure is an allotment of 0.7 gallon of water for each 1000 cubic feet of tree row volume. That is a good value for an average across the entire growing season. If you want to be more specific, 0.5 gallons per 1000 cu. ft. works in early season, 0.7 fits the Petal Fall – 1st Cover period, and by the end of July 1.0 is may be more accurate, depending on pruning and tree canopy thickness. Most people just stick with 0.7 for the entire season and it works.)

   **Example** for 12 feet tall and 12 feet wide trees, planted with 20 feet row spacing

   Gallons per acre = 12 x 12 x (43560/20) x 0.0007
   = 144 x 2150 x 0.0007
   = 220 gallons per acre

   Important: As tree size diminishes, spray capture efficiency also declines. So assume at least 150 gallons per acre for a dilute spray even if the calculated number is smaller (which will be the case for young trees and many trees on modern dwarfing rootstocks).

2. **Decide what concentration you will use for making tankmixes.**

   **Example** - for a 4X spray in the block described above, 220/4 = 55 gallons per acre.

3. **Calculate your travel speed, and from that calculate the number of minutes it takes to spray one acre.** To do this accurately, you need to measure the travel time with a stopwatch over a measured course.

   MPH = 60/ number of seconds to travel 88 feet.

   **Example 3a:** Set two sticks 88 feet apart on level ground. At normal travel speed and tractor settings with the tank half full, measure how long it takes to get from first stick to second one. If it takes 24 seconds, then you are going 60/24 = 2.5 mph.

   **Example 3b.** 1 mph = 88 feet per minute. So 2.5 mph = 2.5 x 88 feet = 220 feet per minute.

   With 20 row spacing, travel distance for one acre of orchard is 43,560/20 = 2178 feet.

   The minutes to cover one acre at 220 feet per minute = 2178/220 = 9.9 minutes.

4. **Calculate the number of gallons per minute you need** to deliver 55 gallons per acre (from our earlier example for a 4X spray in a block that needs 220 gallons per acre for a 1X spray. Of course, you will use the gallons per acre for your blocks.

   **Example.** 55 gallons per acre / 9.9 minutes per acre = 5.6 gallons per minute.
5. **Measure total sprayer output.** Fill spray tank to the top with water. With settings you use for spraying, run the sprayer for 10 minutes. Measure how much water it takes to refill the tank to the top. That amount of water / 10 = the actual gallons per minute.

6. **Compare you Actual to your Target gallons per minute.** If the actual amount is more then you may be able to reduce the gallons per acre by adjusting travel speed (but only within a narrow range, less than 2mph will likely be too slow for your sanity, more than 3 mph will be too fast for good coverage). More likely, your tractor has set speed points so you will have to use one of those speeds and adjust nozzle selections to get the volume you want.

Or, you could use the gallons per minute you have and adjust tankmix concentration to match that.

**Example:** You wanted 55 gallons per acre for a 4X spray = 5.6 gallons per minute at your travel speed.

You measured output and it was 6.3 gallons per minute.

If 5.6 gpm = 4X, then your real concentration is 5.6 / 6.3 = 4X x 0.89 = 3.6X. You could just mix at 3.6X concentration instead of 4X.

But let’s stick with getting the sprayer set to your targeted output. To get from 6.3 gallons per minute down to 5.6, you could change to slightly lower volume nozzles to reduce total sprayer output so that you can mix at 4X.

You could also reduce pressure to reduce nozzle output. But pressure adjustments only reduce output by square root of the change in pressure. Thus, cutting pressure by 25% only changes the output by about 5%. That is a general rule, so see what the values are for you specific nozzles.

Remember that the sprayer and the nozzles are only designed to operate within a specified range of pressures. For correct droplet size to reduce drift, you do not want the pressure too high. Adjusting pressure alone is good for minor tweaking of sprayer output, but is not the way to go for large adjustment in gallons per minute.

7. Re-measure actual vs. target gallons per minute after you make changes to travel speed, nozzles, and or pressure. **Keep adjusting and re-measuring until total spray output is within 5% of your desired output.** Or get as close as you can, and adjust you tankmix concentrations to the result you get.

8. **Steps 1-7 are about total spray output. You also need to test individual nozzles.** Nozzles get plugged or wear out. Any nozzle that is more than 10% off its correct output should be fixed or removed. The New England Tree Fruit Management Guide chapter covers choosing nozzles according to location on the sprayer manifold and testing individual nozzle output. So let's skip that for this newsletter. As dealing with different blocks, set your sprayer up for the tallest trees, and turn off upper nozzles when not needed for the smaller trees.
9. Steps 1-7 help define what is coming out of the sprayer. **Now let’s talk about something equally important, defining where it is going, i.e. Coverage.** The sprayers101.com website describes using flagging and yellow water-sensitive paper to measure actual canopy coverage.

Getting the right gallons per acre is not enough; you need to get spray water distributed across canopy leaves and fruit. Covering the leaves at head height is easy, getting spray into tops of the tree is harder. So your nozzle selections need to account for that by having bigger nozzles up top and small nozzles down low. Wind vanes around the fan cage are also important to direct airflow.

Fan speed is another big factor. The name "airblast" is misleading. In the old days with large apple trees, growers needed to blast the trees with hurricane force winds to deliver pesticide through big thick canopies. However, with small trees **too much wind actually reduces droplet and pesticide deposition.** If the wind speed is too high, the airstream goes around a target surface instead of letting droplet land on it.

So a better name for orchard sprayers these days would be "air loft" sprayers. You want enough air movement to carry spray to the tops and gently around the canopy (and at least half way through the middle of the canopy). You do not want so much wind that the spray just passes through the tree so fast that the droplets cannot fall out until wind speed slows down over grass half way across the next drive row. Depositing captan on alley grass is not the goal. This is another reason why alternate row spraying is not a good idea.

The flagging tape and water-sensitive paper testing methods described at sprayers101.com can show you where the spray is actually going. Flagging on the far side of tree away from sprayer should gently lift as the sprayer passes by. You need a partner to make this observation. If the flagging does not rustle, fan speed is too low. If it goes to a 90-degree angle, wind speed is too high.

Water-sensitive paper will show you where the droplets are landing. Papers at head height next to sprayer will likely be totally covered, but check the papers clipped into the middle and especially at top middle of canopy to see if enough droplets are landing there. The sprayers101.com site has pictures of what good coverage looks like.

10. Ten is a nice number so we’ll stop here. **10% of your spray bill is good pay for the time it takes to check your sprayer. More importantly, 10% of your crop value is even better return on investment.** **Getting the best possible performance out of fungicides, insecticides, nutrients, and growth regulators requires pharmaceutical attention to detail.** Not all sprays are created equal with regard to tolerance for imperfect dosage and coverage. Harvest management applications are probably more demanding for accurate rate and coverage than summer fungicide and insecticide applications. Preventing a botched ReTain or NAA application can save a lot of dollars and heartache.
Orchard Calendar

Dates are for Monmouth

**mid-June to mid-July**

**Most effective timing for controlling persistent weeds** (bindweed, brambles, dandelion, goldenrod, vetch etc.) with Gramoxone (paraquat) or Rely (glufosinate).

**Green apple aphid** populations typically become more apparent at this time. Effective biocontrol in most orchards limits threat to young trees for which maximum growth is desired. Treatment threshold on established trees is if more than 50% of shoots are infested AND less than 20% of aphid colonies have predators.

**June 16, Fri**

ERM threshold increases to 2.5 mites per leaf, or mites present on 59% of middle-aged fruit cluster leaves, until July 16. See ERM sampling table for optimum scouting intervals.

**June 19, Mon**

**Roundheaded apple tree borers** begin laying eggs.

Young trees or other trees not receiving insecticide for other pests need to have protection by a physical barrier or trunk insecticide on or before this date.

**June 19, Mon**

Recommended timing to begin calcium foliar sprays at two week intervals to prevent early summer cork spot and late summer bitter pit before harvest, and to decrease senescent breakdown in storage. Increased calcium level may also decrease chance of storage scald. Where zinc is deficient, second of two zinc chelate applications recommended for 2nd cover spray after petal fall.

**June 19, Mon**

Second generation European red mite nymphs appear.

An important monitoring period is between now and June 25 to detect above threshold population before 3rd generation eggs are laid.

**June 20, Tue**

1st generation **Codling moth** 3% egg hatch. Codling moth control typically provided by insecticide applications against plum curculio and apple maggot. If separate codling moth control is needed, and Bt or other material requiring repeated applications for control is being used, this is best date for first application. See Codling moth tables for follow-up spray dates to maintain protection through 1st generation CM egg hatch.

No reliable threshold: Go by block history. Another risk indicator is pheromone trap capture above 5 to 14 codling moths per week.

**June 20, Tue**

Date by which ALL primary scab infection periods have had time to begin appearing as 1st generation lesions. Finding scab infections on fewer than 5 leaves per 100 clusters/shoots suggests that primary scab control was successful. If there is doubt about primary scab control, continue sampling for 2nd generation lesions before relaxing protection against secondary scab. Light infestation of 1st generation lesions can be difficult to detect. Infections delayed but not killed by fungicide application or partial resistance of older leaves may appear later.

Finding more than 5 leaves with fresh scab lesions per 100 fruit clusters and vegetative shoots in a commercial orchard at this time suggests that fungicide selection and spray intervals need to be adjusted to suppress spore production, and need to protect fruit and foliage for at least 4 weeks until active scab lesions exhaust their supply of spores.

**June 22, Thu**

Date shoot blight symptoms would become obvious if fire blight blossom infection occurred on May 18.
Highmoor Farm / Pom. Soc. Field Day

The Maine State Pomological Society and Maine Small Fruit and Vegetable Growers Summer Meeting & Highmoor Farm Field Day will be held on Wednesday July 26 from 8:30am to 3pm. Special guests will be Gennaro Fazio from Cornell Univ./USDA and Jim Schupp from Penn State University. Finalized details will be out next week, here is the tentative agenda:

8:30 am  Registration
9:00 am  Opening Remarks from UMaine Ag. Experiment Station & Coop. Extension
9:15 am  David Handley - Food Safety Modernization Act Update
9:45 am  Break
10:00 am  Gennaro Fazio, Cornell University & USDA/ARS - Apple Rootstock Research
11:00 am  Jim Schupp, Penn State University - Topic TBD
11:45 am  Maine State Pomological Society Business Meeting - Aaron Libby, President
12:00 pm  Lunch
1:00 pm  Concurrent Experiment Station Research Tours
          Berry & Vegetable Tour – Dr. David Handley and Dr. Mark Hutton.
3:00 pm  Adjourn
Leaf and Soil Tests

Mid-July is the right time to collect leaf samples to plan for next year’s fertilizing. Samples will be analyzed this fall with results available in early winter. The charge for leaf tests is $22. The charge for a soil test is $12 with the winter discount. You may bring samples to the Summer Meeting on July 26, or send them to Highmoor Farm (PO Box 179, Monmouth ME 04259). The sample submission form is at http://anlab.umesci.maine.edu/soillab_files/forms/index.html

Pesticide Recordkeeping

Question: Are growers required to have a paper record for pesticide application records and safety data sheets (SDSs) or are electronic records sufficient? This refers to the records that must be kept for two years after the restricted-entry interval (REI) expires.

Answer: The EPA Worker Protection Standard (WPS) requires agricultural employers (including growers) to keep records of the pesticide application information and the safety data sheets on the agricultural establishment for two years after the REI has ended. These records can be kept electronically as long as the employer can access and provide them upon request by a worker, a handler, a designated representative, or medical personnel.

Farm Safety Links

Agri-tourism farm safety planning:
  http://agritourism.rutgers.edu/training/modules.html
  http://safeagritourism.org/

Farm fire plan worksheet
  http://www.uvm.edu/sites/default/files/farm_fire_preplan_june2010.xls

Northeast Center for Occupational Health and Safety in Agriculture, Forestry, and Fishing has an online catalog of personal protective equipment.
  http://www.nycamh.org/programs/ppeonlinecatalog
Highmoor Farm Apple Bid

The University of Maine Highmoor Farm is inviting interested parties to place bids on our 2017 apple crop from the orchard listed on back of this page. Picking is defined as removing all marketable fruit on the tree. The successful bidder will pick all specified blocks under the following conditions:

- Pickers must be supervised
- Pickers & supervisors must respect flagged research trees
- No fruit may be removed from research trees without permission

Please submit both an orchard run price and a juice price.

Half of the total payment must be paid by March 1, 2018. Highmoor Farm reserves the right to reject any or all bids.

Bids should be mailed or delivered in a sealed envelope marked “Apple Bid”, and will be opened at 1 p.m., June 30, 2017.
Mail bid to: Highmoor Farm, C/O Greg Koller, PO Box 179, Monmouth ME 04259.
For more information: (207) 933-2100 or gkoller@maine.edu

Please write your bid offers below:

1) Orchard run per bushel: ________________________

2) Juice per bushel: ________________________

Name (Print): ____________________________

Address: ________________________________

Phone Number: __________________________

Signature: ________________________________
### Closing Words

"The end cannot justify the means, for the simple and obvious reason that the means employed determine the nature of the ends produced."

~ Aldous Huxley