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University of Maine Cooperative Extension

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Maine Tree Fruit Newsletter

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Oil and Heat

With maximum temperature forecast to be well into the 80s tomorrow, growers are naturally wondering how that affects a copper, oil, or fungicide application. The short answer is that spraying at over 80F is never recommended. Having it so warm this early in the season is unusual, but I do not know of any additional precaution beyond the "Don't spray when it's hot" rule.

Applications of copper, oil, or mancozeb applied early enough that the spray is dry before the heat of the day should not pose any additional risk.

Do not concentrate oil for concentrate spray applications. Between Green Tip and Half Inch Green, apply 2 gallons of oil in each 100 gallons of tankmix regardless of spray volume and calculated spray dosage concentration for other pesticides. More on this below.

Scab fungicide selection

Copper is a good protective fungicide, and will help prevent primary scab infections for about a week. If you are spraying copper, you probably do not need mancozeb as a fungicide in the same spray.

Captan cannot be combined with oil, and should not be applied within 7-10 days before or after oil. The same applies to sulfur. Some sulfur labels require a 30-day offset.

I do not think it is important for this week, but if in the next two weeks you feel like your apple trees were not protected during a significant apple scab infection period, a good option for early season post-infection scab control is Vangard or Scala. These two fungicides are in the AP group (anilinopyrimidine) and provide 48-72 hours post-infection activity.

Sprayer Calibration

1. What is Rate per 100 gallons dilute?

For rates stated as "per 100 gallons", that refers to 100 gallons of water applied in a dilute spray. This is also a "1X" spray. Few applications are ever made at 1X because carrying around that much water increases the number of refills and spray time. The dilute rate is a theoretical value of how much water it would take to cover every bit of foliate with enough water that it could not hold anymore and any additional water would just run off.

The amount of dilute spray per acre depends on tree size and row spacing. The method to calculate the dilute rate is called Tree Row Volume (TRV). The formula is simple and online at http://fruit.umext.umass.edu/tfruit/2015-16netfmg/4-sprayer.pdf (see page 23). Here is a synopsis:

Step 1: Canopy Volume per Acre

TRV = Canopy width x Tree height x Row length per acre

$$\text{Tree row volume (cu ft/acre)} = \text{Canopy width (feet)} \times \text{Tree height (feet)} \times \frac{43{,}560 \text{ sq. ft./acre}}{\text{Distance between rows (feet)}}$$

Example 1a:
Trees are 12 feet wide and 11 feet tall in rows 20 feet apart

$$= 12 \text{ ft.} \times 11 \text{ ft.} \times \frac{43{,}560 \text{ sq. ft./acre}}{20}$$

$$= \frac{132}{0} \times 2178 = 287{,}496 \text{ cu. ft./acre}$$

Step 2: Dilute Gallons per Acre

It takes about 0.5 gallon to cover 1,000 cubic feet of tree canopy volume early in the spring, about 0.7 gallon at Petal Fall, and about 1.0 gallon in late summer. If you want to use a single value for the whole season, assume 0.7 gallon per 1,000 cu. ft. of canopy volume for reasonably well pruned trees. For large poorly pruned trees, 1.0 gallon per 1,000 cu. ft. is a safer estimate to insure good coverage.

Example 1b: Dilute gallons per acre for pruned orchard.

$$\text{Dilute gallons per acre (DGA)} = \text{Tree row volume (cu. ft./acre)} \times \frac{0.7 \text{ gal}}{1{,}000 \text{ cu. ft.}}$$

$$\text{DGA} = 287{,}496 \text{ cu. ft.} \times \frac{0.7 \text{ gal.}}{1{,}000 \text{ cu. ft.}} = 201 \text{ gallons}$$

Because of real world inefficiencies of spray deposition, even if measurements indicate a dilute rate of less than 200 gallons per acre, at least one research study found that you should assume a basement "don't go lower" value of 200 gallons per acre. But the more common assumption is to assume a base of no less than 150 gallons per acre.

2. Do you concentrate oil?

Oil works by smothering eggs and soft-bodied insects (and maybe some immature mites). The recommended rate per 100 gallons dilute tankmix changes through time because trees become more sensitive as foliage develops, AND because as temperatures warm, respiration rate increases, and those eggs become also become more sensitive to being smothered so you don't need as much oil anyway.

Thus, at silver tip and right at Green Tip you can use a 3% solution, i.e. 3 gallons per 100 gallons dilute. But after Green tip that goes down to 2%, then 1% after Tight cluster. And no oil between Pink and Petal Fall.

Growers rarely spray at dilute. They spray at some fraction thereof, i.e. "concentrate" spraying. The whole point of tree row volume is to estimate the dilute amount of water for the trees you are spraying and adjust the amount of pesticide accordingly.

If the TRV for a block is trees 200 gallons per acre, then for an oil spray at a rate of 2 gallons per 100 gallons dilute, for a 1X spray you would put 4 gallons of oil into each 200 gallons and spray 200 gallons of water per acre. But what growers really do is spray a lesser amount. For this example, let's say 66 gallons per acre. Since 66 is exactly 1/3 of the dilute rate, in order to deliver the same amount of pesticide per acre, you would have to concentrate the pesticide at 3X the amount recommended for a dilute application.

But oil is different than most other pesticides. It works by a physical smothering process, not a biochemical pharmaceutical dose like most pesticides. If a 2% oil solution sprayed onto overwintered mite eggs by a dilute spray is thick enough to smother them, then it is thick enough for spray going on at a lesser amount per acre. Spraying at less than dilute reduces spray coverage, which is key for covering a high portion of the target eggs, so high volume spray as close to 1X as you can stand is recommended.

Bottom line is that you do not concentrate oil in same manner as you concentrate chemical pesticide compounds for less than dilute applications, but try to spray as close to dilute as you can.

3. Coverage, coverage, coverage

If "Location, location, location" are three top issues in real estate, you might say the same about coverage for pesticide application. Obviously, timing, pesticide selection, and dosage also require accuracy, but a perfectly timed application of the correct material at the perfect dosage does no good if it does not land on the tree where you want it.

Some materials are more demanding of perfect coverage than others. Those that require excellent coverage to be effective includes oil, thinners, other growth regulators, and fungicides. Because of that, those materials work best when the spray concentration is no more than about 3-4X.

Going above 8X for any spray is not recommended at any time of year, and especially for primary scab fungicide applications. There are rapidly diminishing returns for going at a higher concentrate than 8X, i.e. it does not save much more water per acre to spray at 10x versus 8X. Getting good coverage on even small tress becomes much more difficult above 8X. And without good coverage, much of your investment in materials and labor is wasted.

Many growers use flip nozzles on the sprayer, with one set selected to deliver relatively high volume spray of 2 or 3X, and the other set chosen to deliver a more concentrate application of 4, 6 or 8X.

You can add Surround to the tank to use a quick and easy marker to see if spray coverage is reaching the tops and interiors (once foliage is developed) of trees. A more precise method is to use water sensitive paper. Hang strips at 4 or 5 locations per tree, and number each piece before doing so (because you WILL get them mixed up otherwise). You can use paper clips or alligator clips to attach. Do at least 3 or 4 trees, as individual strips can have odd results. So having at least 3 or4 replicates sorts out the typical from the flukes. Run the sprayer by the trees and look at the cards. The ideal coverage is about 85 droplets per square centimeter, with about 15% of the card covered. Cards on the outside of the tree facing the sprayer may be

much heavier than this, but the coverage needs to be adjusted so that all the cards are reasonably close to the 85/cm2 – 15% level.

Except for oil application for which you want maximum coverage, if all the cards turn solid blue, then there is too much water going on.

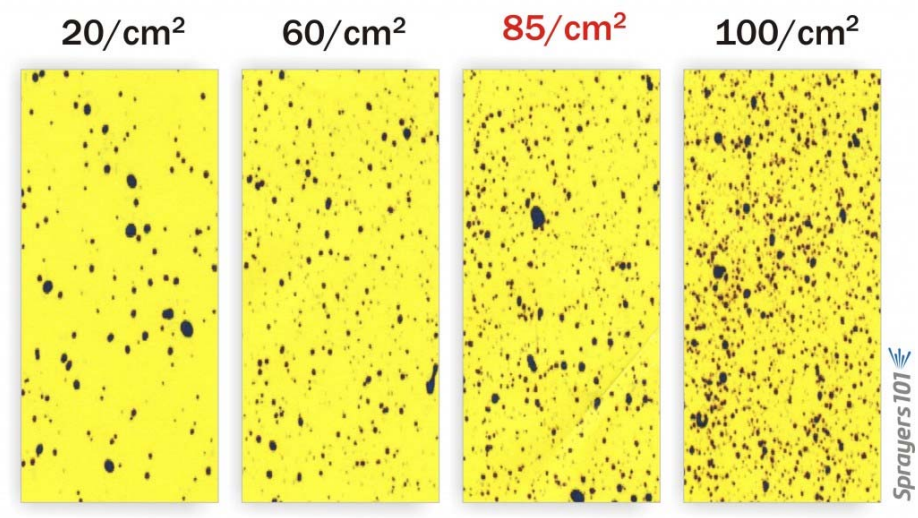

Image from Sprayers101.com by Jason Deveau
https://sprayers101.com/confirm-coverage-with-water-sensitive-paper/

New Apple Disease Can Spoil Pasteurized Foods

Excerpts from a Cornell Chronicle, March 29, 2018, article by Krishna Ramanujan.

http://news.cornell.edu/stories/2018/03/new-apple-disease-spoils-even-pasteurized-foods?utm_term=

A Gala apple infected with newly described disease, Paecilomyces rot.

Consumers might be concerned by reports from food scientists of a fungus, *Paecilomyces niveus*, that spoils apple products even after heat pasteurization. The fungus also produces an FDA-regulated toxin called patulin that is found in these spoiled processed foods.

A new study, **published online** in March in the journal Plant Disease, describes for the first time a new apple disease, Paecilomyces rot, caused by the little-studied fungus. Though food scientists have attributed *P. niveus* in foods to soil contamination, the study's authors now think infected apples may be the true source.

In the study, the researchers created wounds in Gala and Golden Delicious apples with a toothpick covered with the mold. The apples developed brown rings of rot that resembled other apple diseases, such as black rot, bitter rot and bull's eye rot. When they cut the apples

open, they found spores of *P. niveus* being made inside the cores. "Some cores were filled with fluffy white mold with plenty of spores," Biango-Daniels said.

The researchers found *P. niveus* in 34 percent of soils sampled from apple orchards across New York. The fungus produces abundant, durable ascospores that can survive heat as high as 194 degrees. This leads to spoilage on the shelf of even pasteurized processed foods containing bad apples.

The disease may be overlooked because it so closely resembles other apple diseases, Biango-Daniels said. "The most effective way we can prevent apple spoilage from this mold is to cull apples with wounds and bruises that makes them likely to get this, and to never use dropped apples, the ones that people pick up off the ground," Biango-Daniels said, adding she doesn't yet know of a way to stop spoilage once the fungus has been introduced in foods.

Researchers will now make processed apple products, pasteurize them and see if the fungus survives when bad apples are used.

Spotted Lanternfly

Photo: Erica Smyers, Penn State University

The photo is from October 2017 in Pennsylvania. This may look like another biblical scale pest plague from Pennsylvania like the Brown marmorated stinkbug outbreak in 2010. But this time the situation is probably not so serious, and may be more temporary. But then again, nobody knows for sure yet.

As with BMSB, this species has wide host range, originated in East Asia, and builds up populations on Tree of Heaven (Ailanthus) before spreading out onto ornamental and crop plants. Tree of Heaven is not common in Maine, but it is reported as present in Cumberland and Penobscot County.

Tree-of-heaven is native to Taiwan and central China, where it occurs from 22° to 34° N in latitude. I thought it was rare in Maine because it prefers a warmer climate, but according to the U.S. Forest service:

It tolerates minimum temperatures of -38 °F and maximum temperatures of 110 °F. Mean annual precipitation ranges from 0.55 to 158 inches across tree-of-heaven's North American and Chinese distributions. Tree-of-heaven tolerates drought of several month's duration.

That's one tough tree. I guess it isn't Maine winter keeping it at bay. For more information on spotted lanternfly, see
http://www.growingproduce.com/fruits/apples-pears/new-finds-spotted-lanternfly-apple/

Neonicotinoid Registration Update

Sixteen countries in the European Union, including the United Kingdom, France, and Germany, recently voted to ban the outdoor use of three neonicotinoid insecticides. The ban is expected to take effect before the end of 2018. Neonicotinoids may still be used in permanent greenhouses in those countries.

The three materials affected are:

Clothianidin - the active ingredient in Belay.

Imidacloprid - the active ingredient in Admire Pro, and one of two active ingredients in Leverage on apples in U.S., and

Thiamethoxam - the active ingredient in Actara, and also part of the mixture products Agri-Flex, Endigo, and Voliam Flexi.

The European Union ban does not affect U.S. pesticide registrations. It does not affect the neonicotinoid most widely used on apples, which is acetamiprid, the active ingredient in Assail. While also a neonicotinoid, acetamiprid is in a different chemical subclass, with a much lower toxicity profile to honey bees than the three nitro-group neonic products covered by the European ban.

The U.S. EPA is evaluating the registration status of clothianidin, imidacloprid, thiamethoxam, and also dinotefuran. Dinotefuran is registered in Maine as Scorpion and Venom. These products do not include apples on the labeled crop uses, but has been used under a special needs label for Brown marmorated stink bug in other states. Both are registered for use on peaches and nectarines.

In December 2017, the EPA released risk assessments for these materials for public comment. In June 2018, EPA anticipates releasing the final pollinator-only risk assessments for those four neonics. This process has already taken years. Deadlines are routinely extended. If in fact a final decision is made in June and results in a label change, I do not know what the timeline would be for that happening.

https://www.epa.gov/pesticides/epa-releases-neonicotinoid-assessments-public-comment

Assail (acetamiprid) is NOT under special review by EPA.

Pollinator experts note that in addition to pesticide exposure, many factors affect pollinator populations including honey bee diseases, loss of nesting habitat, reduced flower diversity, parasites, and other stressors.

Obsolete Pesticide Collection in October

Each year, the Maine Board of Pesticides Control conducts an autumn program to collect and properly dispose of banned and unusable pesticides from homeowners and farms. Collections are held at four sites across the state. Presque Isle, Bangor, Augusta, and Portland. The next collection will be in October 2018. Preregistration is required, no drop-ins will be accepted. The registration deadline will probably be in September, but you will be very busy then. Even though the date is not set yet, you can get more information and sign up at http://www.maine.gov/dacf/php/pesticides/public/obsolete_pesticide_collection.shtml

Closing Words

"Do not judge me by my successes, judge me by how many times I fell down and got back up again."

~ Nelson Mandela

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