May 6, 2011

In this Issue:

What to Look for/Do Now:

- No codling moths trapped yet in northern Utah, they may be expected soon after full bloom
- Examine apple leaves for bright white powdery spores of powdery mildew
- Continue to examine apple, peach, and cherry leaves for new colonies of aphids forming
- Check fruit tree flowers for frost damage by slicing them in half and looking to see if pistil/ovary is black/brown

Bud Stages

The upcoming warm weather should cause buds to speed along and hopefully get the bees more active for pollination. Unfortunately, frosts during the period from April 27-30 has resulted in fruit and flower damage, primarily in Utah County. Some growers are reporting losses in apples and sweet cherries. It may take a few weeks to determine the full extent of damage to peaches.

Davis, Box Elder, Salt Lake, Weber counties:
Apples: open cluster - king bloom
Cherries (tart): first white - first bloom
Cherries (sweet): full bloom
Pears: bloom - petal fall

Cache County:
Apples: open cluster - pink
Cherries: first white
Peaches: pink - bloom
Pears: first bloom

Insect and Disease Activity/Info

APPLES/PEARS

Fire Blight

Pears are in full bloom in some places, and apples starting to bloom, so it is time to start thinking about fire blight prevention.

Fire blight is caused by a bacterium, *Erwinia amylovora*, that infects open flower blossoms and sometimes, shoots. The bacteria survive the winter within previously infected twigs or branches which start to ooze when the weather warms in spring. Rain and splashing water spread the bacteria from oozing cankers to open flowers. In warm weather, bacteria will multiply rapidly on the flower parts, and as bees pollinate flowers, they spread the bacteria from flower to flower. When the bacteria become established on the flower stigma, a wetting event of at least 2 hours can wash the bacteria down to the floral cup, which will result in an infection.

Later in the season, new shoots can also be infected with fire blight through tiny wounds on the leaves caused by hail, strong winds, or thunderstorms. The resulting twigs will die and curl downward, forming a “shepherd’s crook.”

Utah County:
Apples: king bloom
Cherries (tart): begin - full bloom
Pears: full bloom

If you have pruned out last season's cankers, you are in good shape, but keep in mind that all it takes is one canker with live bacteria to infect several trees.

Pruning out brand new infections (which you might see about 7-14 days after full bloom) will help in preventing further spread.

On new infections, look for darkened fruit pedicles, and droplets of bacterial ooze.

Also look for darkened areas at the base of leaves near flower/fruit clusters.

We use a model called **Cougarblight** to provide a risk of infection in apples and pears. This model only apply to trees with open flowers, and the risk values are:

None: Weather is not warm enough to cause infection, even with open flowers and moisture.

Low: Wetting of flowers has not led to new flower blight infections in past years.

Caution: Wetting at this point is not likely to lead to infection, except within a few yards of an actively oozing canker.

High risk: If unprotected flowers are wetted, infection is possible. Apply antibiotic within 24 hours before or after the infection (wetting) event.

Extreme: Outbreak may occur if blossoms are wetted, no matter the blight history of your orchard. Apply antibiotic within 24 hours before or after the infection (wetting) event.

Antibiotics are used to control fire blight during bloom, and last about 3-4 days. There are currently two available in Utah: streptomycin (Agri-mycin) and oxytetracycline (MycoShield), for use on apples and pears. Streptomycin is the most effective. Because of bacterial resistance to streptomycin in Utah County, it is recommended that growers there use streptomycin once only, mixed with a full rate of mycoshield. All subsequent sprays must be mycoshield only. Growers in other areas can still use streptomycin.

Home orchardists can skip the antibiotic spray if you are diligent about watching your trees carefully for new infections (rapid wilt and shepherds crooking at the end of affected shoots). Promptly remove them by pruning the disease out before it spreads within the tree, to neighbors' trees, or to commercial orchards nearby. Prune 10" below visible infection, only in dry weather. You do not need to disinfect pruners between cuts.

Note that the risk levels provided in the table below for areas that had fire blight in the trees last year. The risk level goes **down** if your own trees did not have fire blight (even if there is a chance of spread from neighborhood trees).

County	Location	Fire Blight Risk Potential

Box Elder	Perry	May 7-10: LOW
Cache	North Logan	May 7-10: LOW
Davis	Kaysville	May 7-8: CAUTION; May 9-10: LOW
Utah	Alpine	May 7-10: LOW
	American Fork	May 7-9: HIGH; May 10: CAUTION
	Genola	May 7-9: HIGH; May 10: CAUTION
	Lindon	May 7-9: HIGH; May 10: CAUTION
	Lincoln Point	May 7-9: HIGH; May 10: CAUTION
	Payson	May 7-9: HIGH; May 10: CAUTION
	Santaquin	May 7-9: HIGH; May 10: CAUTION
	West Mountain	May 7-9: HIGH; May 10: CAUTION
Weber	Pleasant View	May 7-8: CAUTION; May 9-10: LOW

Codling Moth

No moths have been detected in northern Utah, and first moth catch (biofix) will be late this year. They typically start emerging at full bloom of Red Delicious or soon after, and need a warm (above 50 F) night to fly. After we record the date of biofix, we will then be able to calculate the first spray date, which is typically about 10 days later; however, the exact timing is temperature dependent. Stay tuned!

Material Options for Codling Moth Control

Commercial Growers

The following list is **not all-inclusive**, but includes some of the newer products for codling moth control. As commercial growers must shift away from Guthion and pyrethroids (to avoid mite outbreaks), it is important to understand the alternative options.

Altacor (rynaxypyr): Altacor has been shown to have excellent control of both first and second generation codling moth. Washington State University (WSU) research has shown that it also kills eggs. It should be applied at 220 DD after biofix. It lasts 14 days.

Assail (acetamiprid): In WSU studies, Assail performed similarly to Imidan (and almost as well as Guthion). Assail is primarily a larvicide, but WSU found that Assail is also highly toxic to codling moth eggs. Assail lasts approximately 14 days and has a PHI of 12 hr, and 7-day PHI. Good coverage is essential. Michigan State University (MSU) reports that the higher rate on the label is most effective, especially for the second generation. This is a fairly broad spectrum product (neonicotinoid).

Belt (flubendiamide): Belt has the same mode of action as Altacor, but is not as effective.

Calypso (thiacloprid): Calypso is similar to Assail in mode of action, efficacy against codling moth, and mammalian toxicity, but has a 30 day PHI. The application rate at the high end works best. This is a fairly broad spectrum product (neonicotinoid).

Clutch (clothianidin): WSU field trials found that Clutch, which works against newly hatched larvae, is not a highly effective material for codling moth.

Delegate (spinetoram): Like Altacor, Delegate is very lethal to codling moth larvae. Field testing at WSU and MSU showed that Delegate has provides excellent control of first and second generation larvae. The larvae must consume the material to die, so Delegate should be applied at the start of egg hatch (220 DD after biofix). It lasts 14-21 days depending on codling moth density and rate. A program rotating Delegate and Altacor has shown to be as effective as Guthion.

Esteem (pyriproxyfen): Esteem is an insect growth regulator and it has activity primarily against the eggs. WSU found that in order for it to be effective, the insecticide must be present BEFORE eggs are laid. Therefore, Esteem should be applied at the petal fall stage. This may not be a good product for locations with high populations, but could be a good supplement to mating disruption.

Intrepid (methoxyfenozide): Intrepid is also an insect growth regulator. WSU studies found that in some cases Intrepid might not kill the larva but the subsequent adult will not be able to reproduce, which is considered a sublethal effect. Intrepid must be ingested by larvae to have a toxic effect. Intrepid has strong ovicidal activity whether applied after eggs are laid, or if eggs are laid on residues. Intrepid lasts about 14 days, but is not a good alternative to Guthion, but could be used as an early application (petal fall) to kill eggs, delaying the second cover spray.

Backyard Growers

The following list includes the chemical name of the active ingredient (carbaryl, for example). Brand names (Sevin, for example) are not used because there are many different brands that carry the same active ingredient, and individual suppliers do not all carry the same brands, but most should have products with the same active ingredients. Look at the small print on the front of the label for "active ingredient."

Acetamiprid: This active ingredient was made available in 2009 and is a good option for backyard growers. It lasts approximately 14 days and is very effective against codling moth larvae and eggs. Spectracide and Ortho have acetamiprid products.

Spinosad: Spinosad is a low toxicity product that is soft on beneficials. It must be applied every 10 days, and is moderately effective.

Carbaryl: Carbaryl is a broad spectrum insecticide with good efficacy against codling moth and many other pests. It lasts 14 days for heavy populations, and possibly up to 21 days in areas of light infestations. It is a fruit thinner, so using carbaryl 4-6 weeks after petal fall will cause fruit drop. It is toxic to natural enemies and honeybees, and can cause spider mite outbreaks.

Malathion: Malathion is a broad spectrum insecticide that has good efficacy against codling moth, but must be applied every 7 days. Not all malathion products are the same, so be sure to read the label for application information.

Horticultural oil: Oil at the 1% rate can be used during the egg laying stage at the beginning of each generation (for example, 7-10 days after full bloom for first generation) to kill eggs. It has no residual activity, so another material should be used 7-14 days later.

Azadirachtin: These products are softer on beneficial insects and mammals, but not as effective on codling moth.

Bt (Bacillus thuringiensis), Pyrethrum, insecticidal soap, and pyrethrin/rotenone are not effective against codling moth.

PEACHES/NECTARINES

Green Peach Aphid

Scattered green peach aphid colonies should be forming now, and populations will continue to increase with warmer weather and expanding foliage. For commercial growers, if you find more than an average of two colonies per tree, you may need to treat. (Nectarines, 1 colony/tree.)

Early feeding on nectarines can cause damage similar to that caused by thrips (scarring, gummosis). Look for small, green insects on the new foliage and treat if necessary. Backyard growers can use insecticidal soap.

Western Flower Thrips

Thrips activity was observed in peach and plum flowers, and activity will increase as temperatures climb into the high 70s. Remember that thrips are damaging to nectarines and plums in that their feeding and egg-laying causes russetting of fruit.

Use products containing spinosad for control. If trees are in bloom, treat at night or early in the morning as it is harmful to bees only while the product is wet.

Powdery Mildew on Peaches

Adapted for Utah from: "Powdery Mildews of Peaches in California", by J. E. Adaskaveg, UC Riverside Plant Pathologist

Most backyard growers do not need to worry about powdery mildews on peaches, but sometimes commercial growers can experience economic losses.

Powdery mildew of peach occurs worldwide, but is most damaging in semi-arid growing areas such as Utah. The disease can be caused by several different species of powdery mildew fungi that commonly occur on Rosaceous plants. Historically, two species have been reported on peach in the West. Both *Podosphaera pannosa* (peach powdery mildew, formerly *Sphaerotheca pannosa*) and *Podosphaera leucotricha* (apple powdery mildew) occur in Utah. Recently, a third Western species was identified in the central valley of California called *P. tridactyla*. It is unknown if *P. tridactyla* occurs in Utah, but in general, fruit infections caused by *P. pannosa* or *P. leucotricha* can result in possible economic damage. Leaf infections are less common in Utah, but serve as important sources of secondary inoculum while stem infections on peach and nearby apples serve as primary inoculum.

peach powdery mildew caused by *Podosphaera pannosa* (peach powdery mildew)	rusty spot caused by *Podosphaera leucotricha* (apple powdery mildew)

The susceptibility of peach and other stone fruit crops varies greatly among cultivars. The eglandular (without glands at the leaf base) peach cultivars are more susceptible than the glandular ones. Furthermore, in some cultivars, tissues also vary in their susceptibility, with fruit being more or less susceptible than leaves, depending on the mildew species involved and maturity of host tissue. Leaves, buds, green shoots, and fruit are commonly attacked by most powdery mildew fungi, but flower infections are rare. Symptoms include circular, white, web-like colonies that become powdery once masses of asexual conidia (spores) are produced. Leaves may then curl or become stunted. Severe infections commonly cause leaf chlorosis, necrosis, and leaf drop.

For mildew caused by peach powdery mildew, fruit are susceptible from the early stages of development until pit-hardening on peach. White circular spots may enlarge, coalesce, and cover large areas of the fruit. Apple powdery mildew causes “rusty spot” on peach fruit. With this disease, small, circular, orange-rusty lesions develop on the fruit that enlarge and may cover the entire fruit surface. No symptoms occur on leaves and stems. Lesion development has been related to rapid fruit growth. Infections for all powdery mildew species usually result in some deformation of the fruit surface with depressed or slightly raised areas. Secondary infections caused by other fruit decay fungi may also occur in necrotic mildew lesions.

Disease cycle

In the spring, newly developing leaves become diseased with peach powdery mildew as they emerge from infected buds. When overwintering spore cases (chasmothecia) are present, ascospores are released that serve as primary inoculum. Because roses are an important host for the *P. pannosa* pathogen, diseased roses can be major contributors to the development of epidemics of peach powdery mildew. Secondary infections by the wind-disseminated, asexual conidia occur throughout the growing season. Conidia germinate between 36 and 95°F, with an optimum of 70°C. Conidia can germinate in free water and at relative humidities of 43 to 100%. Excessive durations of wetness will kill conidia of powdery mildew fungi. During periods with warm, humid conditions the disease can quickly develop into an epidemic.

Management of powdery mildew

Selection of less susceptible cultivars, cultural practices, and the use of protective fungicide treatments are the most important practices for managing the disease. Less susceptible cultivars should be planted in areas that commonly have a high incidence of disease. To reduce the relative humidity in the orchard, the frequency of irrigation periods should be minimized and low-angle sprinklers should be used to keep foliage dry. Fungicide applications should be applied from full bloom until the pit hardening stage of fruit development for peach. Adequate management of rusty spot was achieved with three to four fungicide applications including the full bloom treatment in the most favorable conditions for disease.

Several products are available for managing powdery mildew. Wettable sulfur has been known to be effective for many years but has the shortest residual residue. In orchards where mildew has been a problem, a pre-bloom treatment with wettable sulfur can be used to reduce the chasmothecia and subsequently the primary inoculum.

For bloom sprays the sterol biosynthesis-inhibiting (SBI) fungicides (propiconazole/Tilt, Bumper, fenbuconazole/Indar, metconazole/Quash, myclobutanil/Rally, tebuconazole/Elite, Tebuzol, Orius in EC or WP formulations), the quinone outside inhibitor/strobilurin (QoI) fungicides (azoxystrobin/Abound or trifloxystrobin/Gem) and wettable sulfur are all effective materials.

Other materials include premixtures such as pyraclostrobin+boscalid/Pristine and the newly registered propiconazole+azoxystrobin/Quilt Xcel. Several new premixtures will be registered this coming year and include azoxystrobin+difenoconazole/Quadris Top, trifloxystrobin+fluopyram/Luna Sensation and pyraclostrobin+fluxapyroxad/BAS703.

Testing in California found that the new fungicide active ingredients, fluopyram and fluxapyroxad, are also highly effective against powdery mildew but will only be sold as premixtures. Thus, the premixtures offer high activity, very consistent performance, and built-in resistance management with two different modes of action for powdery mildew management.

For petal fall to pit hardening applications, the products mentioned above can be used, as well as two new materials that only have activity against powdery mildew. Quinoxyfen/Quintec, which was registered in 2010 for peaches, has a unique mode of action and can be used to break-up overuse of the SBI and strobilurin fungicides.

Another material with a different mode of action that is only active against powdery mildew is metrafenone. This material is not registered on tree crops but it is going through the specialty crop registration process.

The outlook is very positive for new modes of action that are highly effective against powdery mildew. Just as using single-site mode of action fungicides, when using pre-mixtures or tank mixtures rotate between the FRAC Groups, never apply more than two consecutive applications of the same FRAC Group number, and, ideally, rotate between the FRAC Groups with every application.

Upcoming Monitoring/Insect Activity

Pest	Host	Appearance/Management
Cherry powdery mildew	cherry	Look for small white lesions on new foliage near the base and interior of the tree
Apple powdery mildew	apple	Look for small white lesions on new foliage
Green peach aphid	peach, nectarine	Look for colonies on peach and nectarine
Black cherry aphid	cherry	Watch terminals for leaf-curling and feeding
White apple leafhopper	apple	Look for nymph activity
Codling moth	apple fruit	First flight approximately Red Delicious full bloom
San Jose scale	apple mostly	Crawler emergence in mid spring Treat in mid to late June

Bud Phenological Stages

Apple	
Open cluster	King bloom

Cherry	
First Bloom	Bloom

Peach	Pear
Petal fall	Bloom

Spray Materials - Commercial Applicators

Target Pest	Host	Chemical	Example Brands	Amount per acre	REI	Comments
Campylomma	apple	acetamiprid	Assail	1.7-3.4 oz	12 h	
Rosy apple aphid	apple	acetamiprid	Assail	1.7 oz	12 h	apply post bloom only if scouting shows that this pest is present
		clothianidin	Clutch	2-3 oz	12 h	
		flonicamid	Beleaf	2-2.8 oz	12 h	
		imidacloprid	Provado	4-8 oz	12 h	
		thiacloprid	Calypso	2-4 oz	12 h	
Thrips	light-skinned apples, nectarines	spinosad	Success	4-8 oz	4 h	scout by shaking flower clusters into a paper cup
Powdery mildew	apple	potassium bicarbonate	Kaligreen	2.5-3 lb	4 h	apply starting at open cluster stage and repeat every 7-14 days if necessary
		myclobutanil	Rally	5 oz	24 h	
		trifloxystrobin	Flint	2-2.5 oz	12 h	
		triflumizole	Procure	8-16 oz	12 h	
		fenarimol	Rubigan	12 oz	12 h	
		boscalid/pyraclostrobin	Pristine	14.5-18 oz	12 h	
Fire blight	apple, pear	streptomycin	Agri-mycin	check label		apply within 24 h of a wetting event only if fire blight was present last year
		oxytetracycline	Mycoshield	check label		
Green peach aphid	peach, nectarine	acetamiprid	Assail	8 oz	12 h	apply to nectarines if >1 colony/tree and peaches, >2 colonies/tree
		imidacloprid	Provado	4-8 oz	12 h	
Lygus bug	peaches	azadirachtin	Aza-Direct	1-2 pints	4 h	OMRI certified organic
		beta-cyfluthrin	Baythroid	2-2.4 oz	12 h	restricted use product
		cyfluthrin	Tombstone	2-2.4 oz	12 h	restricted use product
		pyrethrin	Pyganic	4.5-18	4 h	OMRI certified organic

Spray Materials - Residential Applicators

Note that these treatments are only recommended if you know you have the particular pest in your trees.

If your trees are in bloom, we do not recommend applying any pesticides unless you are controlling fire blight with antibiotics. Although it is accepted to use "softer" materials such as Bt or spinosad during bloom, we still recommend either: waiting until the petal fall stage or apply at dawn or dusk when pollinators are not active.

Target Pest	Host	Chemical	Example Brands	Comments
Rosy apple aphid	apple	carbaryl	Bayer Advanced	start with a single application **bifenthrin**: pears only **permethrin**: do not apply to apples after petal fall
		bifenthrin	Ortho Bug-B-Gone	
		malathion	Bonide, Malathion	
		neem oil	Green Light	
		permethrin	Lilly Miller	
Powdery mildew	apple	bayleton	Bonide	do not apply lime sulfur when temperature is over 75 degrees F
		lime sulfur	Lilly Miller	
		propiconazole	Ferti-Lome	
		neem oil	Garden Safe	
		potassium bicarbonate	Kaligreen	
Fire blight	apple, pear	biological	Blightban, Bloomtime	Biologicals should be applied at 15-20% bloom and again at full bloom Do not use antibiotic unless necessary; apply within 24 h of a wetting event only if fire blight was present last year
		streptomycin	Ferti-Lome	
		oxytetracycline	oxytetracycline	
Green peach aphid	peach, nectarine	malathion	Bonide, Malathion	start with a single application
		pyrethrin	Pyganic	

Precautionary Statement:

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