

## News/What to Watch For:

Examine leaves for fresh powdery mildew on apple or shothole infections (holes in leaves) on peach  
Green peach aphid, black cherry aphid, rosy apple aphids active  
“Alternate Bearing Apples” page 4  
Spray information, pages 5-6

## Bud Stages

Warmer weekend and early week weather has sped up production. Light damage is evident on open peach blossoms. Damage on cherries and apples is variety- and site-specific.

### Davis, Box Elder, Salt Lake, and Weber Counties:

Apples: King bloom  
Apricots: In the shuck - shuck split  
Cherries (tart): First bloom  
Cherries (sweet): Petal fall  
Peaches: End bloom - petal fall  
Pears: Full bloom

### Cache County:

Apples: Open cluster  
Cherries (tart): First bloom  
Peaches: Full bloom  
Pears: First bloom

### Utah County:

Apples: King bloom  
Cherries (tart): First bloom - full bloom  
Cherries (sweet): Petal fall  
Peaches: End bloom - Petal fall  
Pears: Full bloom

## Insect and Disease Activity/Info

*Specific spray information found on last two pages.*

### APPLE AND PEAR

#### Codling Moth

Biofix has been established in several locations of northern Utah and Castle Valley; other locations need to be confirmed:

Orem: April 29  
Provo: May 5  
Santaquin (heavy pressure block): May 5  
Genola: May 5  
Perry: May 5  
Pleasant View: May 5

Estimated spray timing for commercial growers is shown under the “spray recommendation” sections. The forecasting of these dates is based on 30-year averages, not a weather forecast. They will become more accurate as the actual spray timing recommendation (220 degree days after biofix, for example) draws closer. Estimated spray timing for residential will be provided as we get closer.

#### Rosy Apple Aphid

More common in residential trees, this aphid can cause fruit to become small and deformed. The optimal control timing is pre-bloom, but if you have not made an application and know that this aphid is a problem in your trees, make an inspection in the next week or so for activity. Shake a limb over a cloth tray to look for dislodged aphids, and look for damage (curled leaves) on at least 10 terminals per tree, especially toward the center of the tree. If you find one colony per tree, make an application at petal fall.



## Insect and Disease Activity, continued

### Campylomma

A few campylomma nymphs were observed in apple blocks in Utah County, but the amount found was below the threshold for treatment.



If you have had a history of campylomma bug problems, sample your orchard by shaking a branch over a cloth tray to look for dislodged nymphs ("beating tray sampling"). See the USU sampling form at [http://extension.usu.edu/files/publications/fact\\_sheet/ENT-8ISF-06.pdf](http://extension.usu.edu/files/publications/fact_sheet/ENT-8ISF-06.pdf). The bloom-time threshold for treatment is 2 nymphs/10 "beat samples" on golden varieties and 17.5 nymphs/10 "beat samples" on red varieties.

### Fire Blight

Flowers are open in some areas, and the coming cooler weather may prolong bloom time. Usually bloom lasts 10 days but if they open slowly, a few at a time, there is a longer time period for infection to occur. We cannot predict how this flowering season will be compared to last year's situation. There are acres and acres of apple trees on an "off" year of their alternate bearing cycle and the only good thing about this is no blossom blight. But for trees that will bloom, watch especially for later varieties, or for blossoms that open late, as these are very susceptible due to the warmer temperatures.

For those of you that had severe blight last year, and whose apple blossoms are open, you should have already applied the appropriate antibiotic (oxytetracycline in Utah County, streptomycin elsewhere). A second application can be applied 3-5 days later or as indicated by the forecasting shown below, based on temperature and wetness. For "low," the risk is there is you had bad fire blight last year.

Location	Date			
	5/8	5/9	5/10	5/11
Alpine	low	low	none	none
Payson	none	none	none	none
Santaquin	caution	none	none	none
Provo	caution	none	none	none
Pleasant View	none	none	none	none
Kaysville	none	none	none	none

### Powdery Mildew

Powdery mildew is considered a minor disease of tree fruit as we seldom see fruit russetting caused by mildew infections. Leaf infections, however, can cause leaf drop and re-

duced photosynthesis. Very few infections were found on apples this week.

Treat for mildew up to petal fall, in areas where mildew was easy to find last year. Continue sprays through mid-June. Keep in mind that strobilurin fungicides (Flint) are very effective, but have a high risk potential for resistance development. Do not apply these fungicides more than twice consecutively or more than four times per season. Development of resistance means a loss of a class of fungicide and fewer tools for disease control.



### Western Flower Thrips



Thrips were observed in apple and cherry flowers this week. This is a minor pest that can cause "pansy spot" on apples (shown above), which is a blemish of the skin. Although this damage has been seen, it is rare and we usually do not need to treat for thrips. (However, greater damage is known to occur on nectarines.) Note that a greater amount of black hunter thrips was also found, and this species is a beneficial predator.

## PEACH, NECTARINE

### Green Peach Aphid

Many green peach aphid colonies were found in several orchards in Utah and Box Elder Counties. Growers that have more than 2 colonies per tree on peach or 1 colony per tree on nectarines should consider a petal fall treatment. On nectarines, aphids can directly damage and deform the fruit.

# Degree Day Accumulations and Insect Development

## Upcoming Monitoring/Insect Activity

By Insect (in order of appearance)	
Green peach aphid (GPA)	Look for colonies on peach and nectarine
Black cherry aphid (BCA)	Watch terminals for leaf-curling and feeding
Campylomma bug (CB)	Look for small nymphs in flowers
White apple leafhopper (WALH)	Look for nymph activity
Pear psylla (PS)	Look for honeydew droplets
Spotted tentiform leafminer (STL)	Adult flight at 115-205 DD (base 50)
Codling moth (CM)	Egg-laying begins approx. 158 DD (after biofix)
San Jose scale (SJS)	First flight at 190-300 DD (base 50)

By Host (see abbrev. at left)	
<b>Apple</b>	RAA, ERM, CB, WALH, STL
<b>Cherry</b>	BCA
<b>Peach</b>	GPA
<b>Pear</b>	PS

## Degree Day Accumulations [\(click here for more information on degree days\)](#)

March 1 - Tuesday, May 6

County	Location	Base 50	Codling Moth (post biofix)	Western Cherry Fruit Fly (base 41)
<b>Box Elder</b>	Perry	140	12	382
<b>Cache</b>	North Logan	117		323
	Providence	108		266
	Smithfield	101		281
<b>Carbon</b>	Price	189		464
<b>Davis</b>	Kaysville	145		398
<b>Grand</b>	Castle Valley	407		803
<b>Salt Lake</b>	SLC	180		470
	West Valley City	177		465
<b>Tooele</b>	Erda	159		459
	Grantsville	226		532
	Tooele	177		474
<b>Utah</b>	Alpine	144		383
	Genola	189	11	453
	Lincoln Point	155		389
	Orem	148	37	385
	Payson	164		401
	Provo	195	7	458
	Santaquin	156	9	393
	West Mountain	191		456
<b>Weber</b>	Pleasant View	154	12	417

“Base 41” and “base 50” refer to the lower temperature threshold at which certain insects develop. For example, no codling moth development occurs below 50 degrees.

## Production Information

### Where Have All the Flowers Gone? Alternate Bearing Apples

There are many varieties of apples and other fruit trees that tend toward a cyclical, alternate bearing phenomenon. If unmanaged, fruit in "on" years will be plentiful but small, while fruit in "off" years will be large but sparse. Ideally, alternation develops gradually, and we see "on" and "off" trees co-existing during the same year, providing fairly constant fruit yields.

Growers in Utah are used to the alternate bearing phenomenon. They employ a variety of tools to regulate fruit production from an apple cultivar that tends toward alternate-bearing, such as thinning, using growth regulators, dormant pruning practices, etc. This season, however, alternate bearing varieties such as 'Golden Delicious,' 'Fuji,' 'Cameo,' and others are synchronized across Utah's fruit growing regions in their "off" year, and in some locations, the paucity of blooms is more severe than many can remember.

The fundamental cause of alternate-bearing in apples is not clearly defined, but there are several theories: cultivar type, location of buds, reactions to environmental stress, hormones, water stress during the growing season, excessive crop load, defoliation, and possibly many more.

I am guessing that the primary reason for the abrupt and widespread alternation of apple trees across much of Utah is two-fold: weather and past heavy fruit production. The long, hot, and dry spring of 2007 occurred during the flower induction stage, when the fate of buds is decided. And the alternate-bearing varieties produced a heavy crop in 2007, and did not see a significant "off" year during the 2006 season.

Flowering consists of four stages: flower induction, flower initiation, flower differentiation, and anthesis (bloom). Flower induction and flower initiation are very similar events and because they are difficult to distinguish from one another, the terms are often used interchangeably. During the flower induction period, the meristem development changes from vegetative status to reproductive status. During flower initiation, "molecular" changes occur within the plant tissue, but no visual difference is seen.

It is during the flower induction and initiation phase that buds become sensitive to environmental or biological events. Although we can only guess, the hot, dry (and early) spring of 2007 may have led to water stress during this exact time

period, which would "trigger" the apple tree to not invest resources in creating flower buds. Obviously, this weather pattern occurred equally throughout the fruit-growing region.

During flower differentiation, visible floral organs are developed. This occurs after shoot growth has ceased (about 12 weeks after full bloom). It is at this time that the bud develops a dome-shaped peak, distinguishable from vegetative buds. (The "peak" is represented by the king, or central, bloom.) The further development and growth of the flowers within the bud continues until the following spring, until bloom.

Utah growers have been fortunate with decent apple crops the last few years. Research has shown that the development of fruit coincides with the time of flower induction. An excessive crop of developing fruit requires a large amount of carbohydrates, which suppresses flower induction through direct competition. Other research has shown that the production of excessive fruit sends flower-inhibiting "signals" to stop flower initiation to conserve energy for the health of the tree. And finally, when alternate-bearing trees have a heavy "on" year with extreme flowering and fruit production, very little vegetative growth occurs, resulting in few flowering sites on which flower buds would normally form.

Alternate bearing is widespread among many different tree species as a means of long-term survival. Developing flowers and setting fruit and seed takes a great deal of energy. In cropping systems, we have tried to eliminate most stresses (drought, pests, etc.) which in nature, would result in irregular bearing. In addition, selection, breeding, and horticultural practices has helped to regulate flowering. Sometimes, however, we cannot always control nature.

## Spray Materials - Commercial Applicators

**NOTE:** If your trees are in bloom, we do not recommend applying any pesticides unless you are controlling fire blight with antibiotics. Although it is legal to use “softer” materials such as Bt or spinosad during bloom, we still recommend waiting until the petal fall stage to make applications to prevent harming pollinators.

Target Pest	Host	Chemical	Example Brands	Amount per acre	REI	Comments
Rosy apple aphid	apple	acetamiprid	Assail	1.7 oz	12 h	
Campyloasma	apple	acetamiprid	Assail	1.7-3.4 oz	12 h	
Codling moth	apple, pear	novaluron pyriproxyfen methoxyfenozide	Rimon Esteem Intrepid	30-50 oz 4-5 oz 16 oz	12 h 12 h 4 h	insect growth regulators to kill eggs already laid as well as newly laid eggs (see timing below)
Western flower thrips	apple, nectarine	spinosad	Success	6-8 oz	4 h	
Green peach aphid	peach, nectarine	imidacloprid	Provado	4-8 oz	12 h	
Powdery mildew	apple	potassium bicarbonate myclobutanil trifloxystrobin triflumizole fenarimol boscalid/pyraclostrobin	Kaligreen Rally Flint Procure Rubigan Pristine	2.5-3 lb 5 oz 2-2.5 oz 8-16 oz 12 oz 14.5-18 oz	4 h 24 h 12 h 12 h 12 h 12 h	
Fire blight	apple, pear	streptomycin oxytetracycline	Agri-mycin Mycoshield	check label		apply within 24 h of a wetting event only if fire blight was present last year

### Spray Timing for Codling Moth

Location	Biofix	Timing (75 DD) for Ovicides (IGRs)
Perry	May 5	May 16
Castle Valley	May 5	May 15
Genola	May 5	May 15
Orem	April 29	May 13
Provo	May 5	May 17
Santaquin	May 5	May 17

## Spray Materials - Residential Applicators

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

In addition, we recommend waiting until the petal fall (or pre-bloom for Cache County) stage to make applications to prevent harming pollinators.

Target Pest	Host	Chemical	Example Brands	Comments
Rosy apple aphid	apple	carbaryl esfenvalerate malathion neem oil permethrin	Bayer Advanced Ortho Bug-B-Gone Bonide Green Light Lilly Miller	
Green peach aphid	peach, nectarine	malathion pyrethrin	Bonide Pyganic	
Powdery mildew	apple	bayleton lime sulfur propiconazole neem oil potassium bicarbonate	Bonide Lilly Miller Ferti-Lome Garden Safe Kaligreen	do not apply lime sulfur when temperature is over 75 degrees F
Fire blight	apple, pear	streptomycin oxytetracycline	Ferti-Lome Mycoshield	apply within 24 h of a wetting event only if fire blight was present last year

**Precautionary Statement:** Utah State University Extension and its employees are not responsible for the use, misuse, or damage caused by application or misapplication of products or information mentioned in this document. All pesticides are labeled with ingredients, instructions, and risks. The pesticide applicator is legally responsible for proper use. USU makes no endorsement of the products listed herein.

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