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News/What to Watch For:

Look for shiny black rosy apple aphid eggs on stems and small, greenish green peach aphid eggs under buds; pear psylla eggs in crevices beneath buds
Prune out old fire blight and shothole cankers
“Apogee for growth regulator versus fire blight management tool” page 3
Images of bud stages, page 5
Spray information, pages 6-7

Bud Stages

Development of buds on trees in northern Utah continues at a slow pace, not much different from last week. See last page for pictures.

Davis County, Box Elder County, Salt Lake County:

Apples: Dormant - Silver tip
Apricots: Bud burst
Cherries: Dormant - Swollen bud
Peaches: Dormant - Swollen bud
Pears: Dormant - Swollen bud

Cache County:

Apples: Dormant
Cherries: Dormant
Peaches: Dormant
Pears: Dormant

Utah County:

Apples: Dormant
Cherries: Dormant - Swollen bud
Peaches: Swollen bud
Pears: Dormant - Swollen bud

Weber County:

Apples: Dormant - Silver tip
Apricot: Bud burst
Cherries: Dormant - Swollen bud
Peaches: Swollen bud
Pears: Dormant - Swollen bud

Insect and Disease Activity/Info

Specific spray information found on last two pages.

No change in insect or disease activity or spray information from last week. There is still time for dormant oil sprays on all varieties, including apricots:

Apples: swollen bud - 1/4" green
Pears: swollen bud - cluster bud
Peaches and Nectarines: swollen bud - pink bud

When applying, spray trees just to run-off to get good application on all the stems. Some eggs, such as green peach aphid, are under buds and will “escape” light applications. See the previous advisory for more information on specific materials.

Coryneum blight of peaches, cherries (shothole): Coryneum blight is caused by a fungus that attacks the buds and stems, fruit, and leaves. On leaves, it causes circular necrotic lesions that eventually fall out, leaving the characteristic “shothole” behind. On fruit, it causes light purple spots that eventually turn brown and sunken, or can be crusty.



Now is a good time to inspect your trees for overwintering cankers. They will be centered at the bud (as shown above), and when the sap starts running in the tree, the cankers will appear gummy. Prune these out and remove clippings to reduce potential for spread. Apply copper or Bordeaux for control, or where infestations are more severe, use Bravo, Echo, or Ziram.

Understanding Copper Sprays: There are dozens of different copper trade names available, but most used for tree fruits can be classified as either fixed coppers (copper hydroxide and copper oxychloride) or copper sulfate. (If copper sulfate is mixed with lime to make Bordeaux mixture, however, it becomes fixed.) Fixed coppers usually

Insect and Disease Information, continued from previous page

provide longer residual on the plant, and are less phytotoxic than other coppers. The copper in these products is relatively insoluble, and the copper ions, which help protect from diseases (but also

cause plant damage at toxic levels), are released slowly. Examples of commercial trade names are C-O-C-S, Kocide, Nu-Cop. Both fixed coppers and other types have similar effectiveness.

Use a copper spray for:
fire blight at half-inch green
coryneum blight at dormancy

Degree Day Accumulations and Insect Development

Upcoming Monitoring/Insect Activity

Pear psylla	Adults active 31-99 DD; egg-laying at 40-126 DD (base 41)
Rosy apple aphid	First egg hatch around 90 DD (base 50)
Codling moth	Hang traps at 100 degree days (base 50) First flight at 190-260 DD
European red mite (rare)	First egg hatch around 135 DD (base 50)
Campylomma bug	Egg hatch begins at first pink (apples)
White apple leafhopper	Egg hatch begins at first pink (apples)

Degree Day Accumulations

March 1 - Tuesday April 1

County	Location	Codling Moth, Peach Twig Borer (Base 50)	Western Cherry Fruit Fly (Base 41)
Box Elder	Perry	18	85
Cache	North Logan	2	27
	River Heights	4	46
	Smithfield	3	30
Carbon	Price	16	83
Davis	Kaysville	30	115
Salt Lake	SLC	28	138
	West Valley City	44	165
Tooele	Erda	30	145
	Grantsville	---	---
	Tooele	26	148
Utah	Alpine	24	117
	Genola	42	149
	Lincoln Point	---	---
	Orem	41	174
	Payson	38	132
	Provo	41	174
	Santaquin	29	121
	West Mountain	39	137
Weber	Pleasant View	21	89

“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

Implications of Using Apogee as a Seasonal Growth Retardant versus a Shoot Fire Blight Management Tool

Jim Schupp, Horticulturist, Jim Travis, Tree Fruit Pathologist and Henry Ngugi, Plant Pathologist, Penn State University Extension

Reprinted with permission; revised for Utah

The goal of this article is to explain the side effects of Apogee on fruit set and size, describe how to minimize these effects, and to describe circumstances when these effects are the lesser of two evils and should be ignored. Apogee (prohexadione-calcium) is a plant growth regulator that is labeled on apple for controlling shoot growth and for fire blight management. It reduces shoot growth by blocking the synthesis of certain gibberellins, which are naturally-occurring growth promoters.

Timely application of Apogee, beginning just as growth starts, causes shoots to stop elongating. When used in the right combination of rate and timing, multiple applications of Apogee can give season-long control of growth. The benefits of vigor control include better light and spray penetration of the orchard canopy, resulting in improved fruit color and quality, as well as improved pest management. Apogee treated trees require less pruning labor.

Early in the development of Apogee, it was recognized that it could also lessen the susceptibility of apple trees to fire blight, and this use was also labeled. Several application rates and timing options of Apogee may be used for the effective management of fire blight depending on tree growth and fire blight risk, as is covered later in this article.

Effects on Fruit Set, Fruit Size, and Return Bloom

Shortly after Apogee became commercially available, growers reported that treated trees produced smaller fruit. Some researchers documented that Apogee increased fruit set, while in other studies it had no effect on fruit number per tree. Similarly, variable results were also found for effects of Apogee on fruit size, and reductions in size were attributed to competition caused by increased fruit numbers. Increased set was often noted when high rates of Apogee were applied, leading to recommendations to use the lowest rate needed to achieve growth control. Increasing the rate of Apogee seemed to stretch the duration of growth control more than the degree.

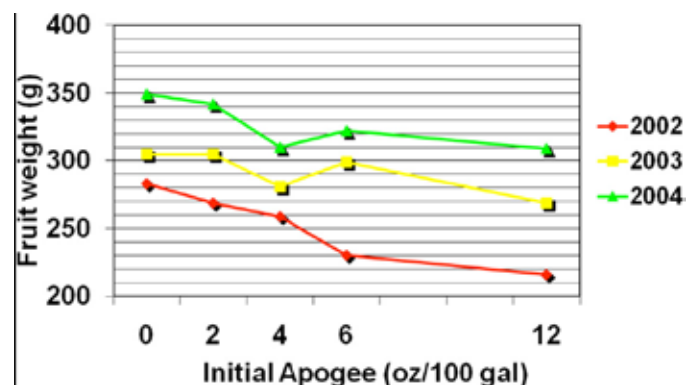
Part of the explanation for why Apogee increased fruit set seemed to be related to the timing of Apogee relative to the timing of chemical thinning. Apogee should be applied when the emerging shoots are at 1-1.5 inches in length, a stage of growth that often coincides with early petal fall. Apogee takes

about 10 days to suppress growth, and by this time, chemical thinners would be applied.

Chemical thinners are typically applied when fruits are 7-10 mm in diameter, as this size is linked to the beginning of a period of intense competition for carbohydrates between many rapidly growing parts of the tree. The stress caused by all this competition marks a time when weaker fruits can be thinned.

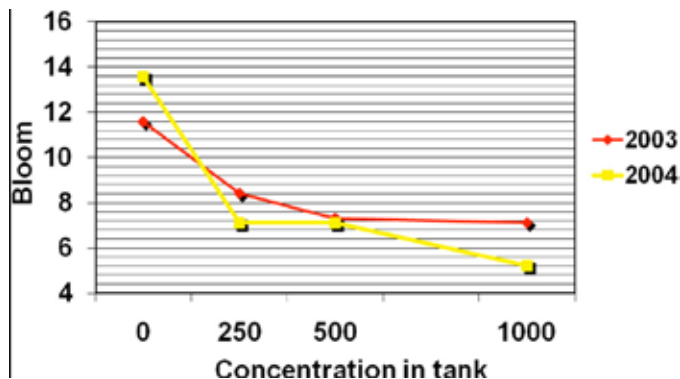
To counteract the effect of Apogee on fruit set, pomologists recommended the use of lower rates of Apogee, and more aggressive chemical thinning: stronger thinner solutions, and/or additional thinner applications. Now there is new data to suggest that while Apogee sometimes increases fruit set, the fruit size reduction isn't due only to fruit competition. There also appears to be a direct effect of Apogee on fruit growth. Dr. Duane Greene of UMass, an authority on plant growth regulators in tree fruit, has published data in the April 2008 issue of HortScience showing that fruit size declines as the rate of Apogee is increased (Figure 1). The dose response is linear with increasing rate, and occurred even in seasons when fruit set was unaffected by Apogee (2003 and 2004 in Dr. Greene's study). Increasing the rate of Apogee also reduced return bloom (Figure 2). This also appears to be a direct effect of Apogee, as it occurs even following years when crop load wasn't excessive.

Figure 1. Effect of increasing Apogee concentration on fruit weight (g) of Mutsu apples, based on data from Dr. Duane Greene, University of Massachusetts.



Apogee, continued from previous page

Figure 2. Effect of increasing concentration of Apogee on return bloom of McIntosh apples, based on data from Dr. Duane Greene, University of Massachusetts.



Dr. Greene's study was designed to examine the full commercial range of Apogee rates from one extreme to the other, and was conducted on two vigorous varieties: Mutsu and McIntosh. Green also noted that all of the concentrations used gave comparable results in controlling shoot growth, concluding that "excellent commercial growth retardation...is possible using lower rates. Furthermore, reductions in fruit weight and return bloom were linear with increasing concentration; thus these consequences may be minimized by using these lower rates".

Apogee and Fire Blight of Shoots

The susceptibility of apple shoots to fire blight is greatly influenced by the vigor of the shoot. High vigor shoots are much more susceptible to infection and canker expansion than lower vigor shoots. When Apogee is applied a minimum of 10-12 days before a potential infection, it can be effective in preventing shoot infections.

Researchers in Pennsylvania looked at using Apogee applications starting at petal fall (shoot growth of 1-3 inches) for wound-inoculated shoot blight control on mature York Imperial apple trees and found:

- 12 ounces per 100 gallons applied once was more than 95 percent effective in preventing shoot infection
- 2 applications at 6 ounces per 100 gallons at a 7-day interval was 99 percent effective
- 3 applications of 4 ounces per 100 gallons at 7-day intervals was only 88 percent effective

The time required for resistance to become active in the tree following treatment is 7 to 10 days. The reduced susceptibility remains active in newly developing shoots for about 21 days.

Keep in mind that a 12 oz/100 gal rate will cause increased fruit set and make thinning difficult, so the 6 oz/acre rate is recommended in high risk areas. Apply a second application 2

weeks later at the same rate, and a third at the 3 oz/acre rate only if warranted. When calculating the gallons of water to use in an Apogee application, remember that thorough spray coverage is needed for maximum effectiveness in inhibiting fire blight shoot infection and spread.

Summary

Apogee is a valuable tool with two uses; however the use pattern and rate should be carefully considered for each respective purpose. When the risk of fire blight is low, Apogee can be used at 3 or 4 ounces per 100 gallons to reduce shoot growth with minimal impact on fruit set and fruit size. Use multiple sprays at one- to four-week intervals for seasonal growth control. These lower rates, if repeated, will be effective for growth management, and may provide some reduction in susceptibility to fire blight, while minimizing the negative side effects on fruit set and fruit growth.

Most rates and application timing should be determined on a site by site basis, depending on the amount of fire blight from the previous year, the vigor of the trees, and the local weather. Even if a high rate of Apogee is applied, the flowering and fruit side effects are just part of the price that growers may have to pay for fire blight shoot strike control, but dead trees bear no fruit!

Editor's Note:

Apogee does not control fire blight, but can be incorporated into an IPM management tool to help suppress infection. It is labeled for fire blight shoot strike suppression on apples only. Apogee is ineffective on the blossom blight stage of fire blight infections.

In a 2001 study evaluating Apogee in a Utah orchard, retired USU Plant Pathologist Sherm Thomson "found excellent control of shoot blight in apples after inoculation. All of the control shoots were infected whereas none of the Apogee treated shoots were infected. However, a mid vein on 30% of the inoculated leaves on the Apogee treated shoots turned black. The vein infection did not progress into the shoot and did not cause shoot blight. Apogee significantly reduced the growth of new shoots. The average shoot length of Apogee-treated trees on May 14 was 12 cm while the shoots on the check trees averaged 17 cm."

Thomson, Sherman. "Control of Shoot and Blossom Blight in the Presence of Streptomycin Resistance." Proceedings of the Utah Horticultural Association Meeting. 2002

Bud Phenological Stages

Apple



Dormant



Silver Tip

Cherry



Dormant



Swollen bud

Peach



Dormant



Swollen Bud

Pear



Dormant



Swollen bud

Apricot



Bud burst

Spray Materials - Commercial Applicators

For dormant and delayed dormant timing

Target Pest	Host	Chemical	Example Brands	Amount per acre	REI	Comments
San Jose scale	pome and stone fruits	hort. oil alone or with: lime sulfur pyriproxyfen methidathion	Esteem Supracide	6-12 gallons	varies 12 h 2-14 d	good coverage essential
Aphids	apple, cherry, peach	hort. oil alone or with: chlorpyrifos	Lorsban	6 gal 4 pints	varies 4 d	good coverage essential
Pear psylla	pear	hort. oil with: esfenvalerate lime sulfur kaolin clay permethrin lamda-cyhalothrin	Asana Surround Ambush, Pounce Warrior	4-6 gallons 3 qts 1 pint 1 l gal see label 2.5-5 oz	varies 12 h 4 hr 12 hr 1 day	good coverage essential Surround (organic) must be applied up to 3 times before first bloom.
Pearleaf blister mite	pear	hort. oil with: carbaryl	Sevin	4 gal 4 pints	4 h 12 h	
Coryneum blight (shot-hole)	stone fruits	copper sulfate fixed copper chlorothalonil ziram	COCS, Kocide, etc. Bravo, Echo Ziram	varies varies 3-4 pints 6-8 lbs	1 d 1 d 12 h 48 h	copper can be injurious to plant tissues; fixed copper less so. Do not use after green tip stages. Be sure tank is always agitated during sprays.
Fire blight	apple, pear	fixed copper	many	varies	1 d	do not apply copper after green tip stage because fruit russetting may result

Spray Materials - Residential Applicators

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

Dormant and delayed-dormant timing

Target Pest	Host	Chemical	Example Brands	Comments
San Jose scale, aphids	pome and stone fruits	hort. oil alone or with: esfenvalerate malathion permethrin	Ortho bug-b-gone, Ortho Max, etc. Malathion Bug Stop, Spectracide, etc.	
Pear psylla	pear	hort. oil with: esfenvalerate kaolin clay malathion permethrin	Ortho bug-b-gone, Ortho Max, etc. Surround Malathion Bug Stop, Spectracide, etc.	Best to treat before egg-laying and when adults are detected. Surround (organic) must be applied up to 3 times before first bloom.
Pearleaf blister mite	pear	hort. oil with: carbaryl lime sulfur	Sevin variety	Only a single application is needed
Coryneum blight (shot-hole)	stone fruits	copper sulfate fixed copper	Basic Copper, Microcop COCS, Kocide, etc.	copper can be injurious to plant tissues; fixed copper less so. Do not use after green tip stages.
Fire blight	apple, pear	fixed copper	many	do not apply copper after green tip stage because fruit russetting may result

Precautionary Statement: All pesticides have benefits and risks, however following the label will maximize the benefits and reduce risks. Pay attention to the directions for use and follow precautionary statements. Pesticide labels are considered legal documents containing instructions and limitations. Inconsistent use of the product or disregarding the label is a violation of both federal and state laws. The pesticide applicator is legally responsible for proper use. Any mention of a pesticide brand in this document is not an endorsement by USU, and brand lists are not all-inclusive.

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