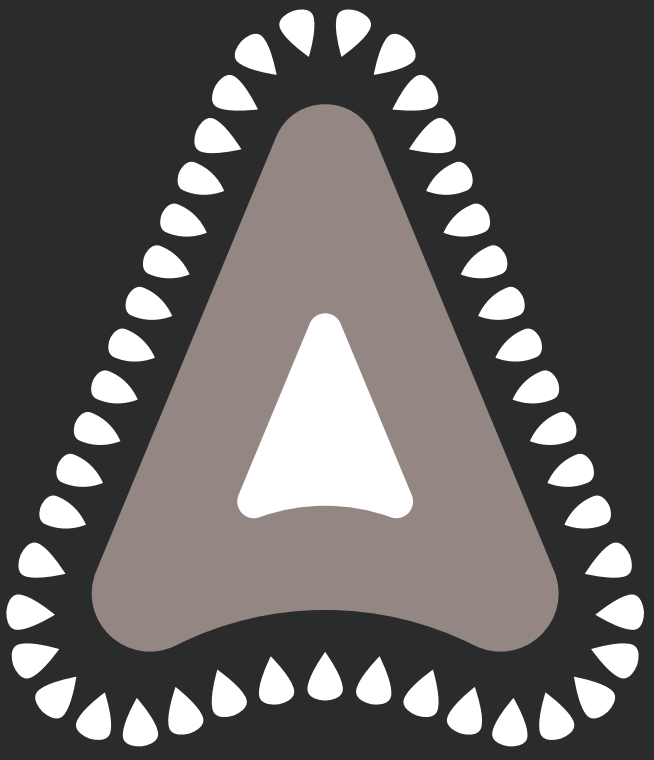
ADAMA

Apollo® SC Application Guide

Pacific Northwest



Mites 101

Mite Groups

Mites are found in many kinds of habitats. The mites that attack fruit trees in the United States belong mainly in two groups: spider mites (Tetranychidae) and rust mites (Eriophyidae).

Spider mites are one of the largest and most destructive groups of pests in agriculture. The word "spider" in their name refers to their ability to spin webs. The McDaniel spider mite spins the most webs, followed by the twospotted mite and then the European red mite.

European red mite eggs (Photo by Ken Gray)

Pear foliar damage (Photo by Dr. Elizabeth Beers)

Damage

Mites feed by inserting their mouth parts into leaf cells to suck out the chlorophyll. The initial feeding spots look white, giving the leaves a stippled appearance. As damage progresses, the infested leaves take on a brown hue, commonly called bronzing. Apples, in general, are more tolerant than pears. Damage to pear leaves can lead to "transpiration burn," where leaves develop large necrotic areas and are shed. As well as damaging foliage, spider mites feed on the epidermis of pear fruit, causing russeting.

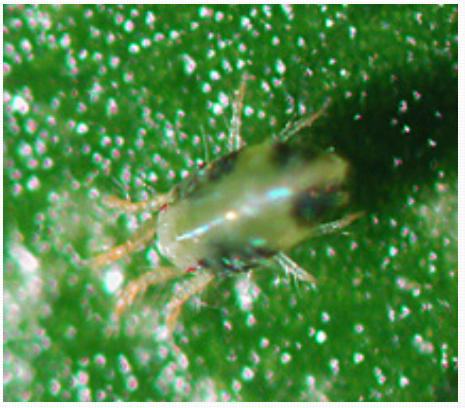
For apples in Washington, peak population is 30 mites per leaf. On pears, the greater susceptibility is reflected in a lower threshold. The economic injury level is set at 5 mites per leaf, and the treatment threshold used to prevent that from occurring ranges from 0.5 to 2 mites per leaf.

Foliar apple damage from spider mites (photo by Utah State University)

Comparison of Tree Fruit Mites

Mite	Crop	Overwintering Stage	Egg Description	Adult Description
European red mite	Apple, pear, stone fruit	Eggs in crevices of twigs & small branches.	Overwintering eggs are brick red with stripes. Summer eggs are smaller & laid on foliage.	Brick red oval with large bristles on back (female bristles will be white). Males are yellowish & more slender.
McDaniel spider mite	Apple, pear	Females overwinter in an orange color under bark or in litter at tree base.	Translucent when laid, then turn darker. Dull ivory just before hatch.	Greenish or yellowish with large spot on each side and smaller spots at rear. Males are smaller with pointed abdomens.
Twospotted spider mite	Pear, apple, stone fruit	Females on orchard floor.	Spherical & translucent, becoming more opaque as they mature, then pale yellow.	Light green to straw color with 2 large black dorsal spots. Females are oval while males have pointed abdomens and may be more orange or brown.

European red mite (Photo by D. Cotton)



McDaniel spider mite (Photo by E. Beers)

Twospotted spider mite (Photo by Marlin E. Rice)

Monitoring Mites

Mite Math

In hot weather, European red mites can complete their life cycle in as little as 10 days, though it can take up to 25 days in cooler weather. There are 6 to 8 generations per year, which overlap as the season progresses.

Summer-form twospotted females can lay about 100 eggs over a period of 30 days. Egg hatch takes only one or two days during the warm part of the summer, and the entire generation time may take only 10 days.

There are up to 10 overlapping generations of McDaniel spider mites per year in central Washington, depending on the temperatures. In the absence of predators, populations peak in late July to mid-August, then decline.

Predatory Mites

Not all mites that occur on tree fruits are pests. Several mite species prey on pest mites. Orchardists can effectively adopt practices (both in terms of chemical choices and cultural practices) that will allow predator populations to thrive. While this might not immediately solve mite problems, it can lead to more stable, long-term mite control and eliminate or slow the development of resistance to miticides.

Predatory Mite (Photo by CGIAR)

Binomial (Presence-Absence) Sampling Scheme

% of mite-infested leaves	Estimated density (mites/leaf)
40	0.7
45	0.9
50	1.1
55	1.3
60	1.6
65	2.0
70	2.6
75	3.4
80	4.7
85	6.8
90	11.4
95	26.4

Choose 5 to 10 leaves from 5 to 10 trees scattered throughout a block. Scan the leaves with a hand lens to determine whether or not mites are present. Keep track of the total number of leaves scanned, and the total number of leaves infested by one or more mites. Divide the number infested by the total number scanned and multiply by 100 to calculate the percentage of infested leaves. Use the nearest value from the first column of the table above and read across to obtain the estimated number of mites per leaf for the orchard block.

Example: If you inspect a total of 50 leaves and 22 of them have mites, the percentage of infested leaves for your orchard block would be 44%. According to the table, that would mean your block has 0.9 mites per leaf.

About Apollo

Apollo SC

Apollo SC is a long-lasting ovicides/miticide that delivers consistent residual control for up to 60 days in apples, pears, stone fruit, and tree nuts. Its unique mode of action breaks the mite lifecycle by inhibiting respiration in eggs laid by adult females and controlling the first two larval stages. Apollo SC is highly effective for use early and mid-season.

Apollo is a great fit for Integrated Pest Management systems, as it leaves beneficials, including other predatory mites, unaffected.

Apollo is a suspension concentrate liquid formulation containing 4 pounds of active ingredient clofentezine per gallon. The product has a bright magenta color that is an inherent characteristic, not an additive.

The first sight of Apollo activity is a slight darkening of the egg, an indication that the embryo development has been interrupted. Treated eggs will not hatch.

Apollo's ovicidal activity works best when applied early, while mites are in the egg state. Ideal control occurs when applications are made at the first sign of egg lay on nut and fruit trees, although later applications can still be made mixed with adulticides to help with residual.

Best in Class

Broad early mite control.
Targets 3 stages of lifecycle.
Easy handling. Low rates.

Residual Activity

Protects up to 60 days.
Reduces spray passes.
Saves money.

Application Flexibility

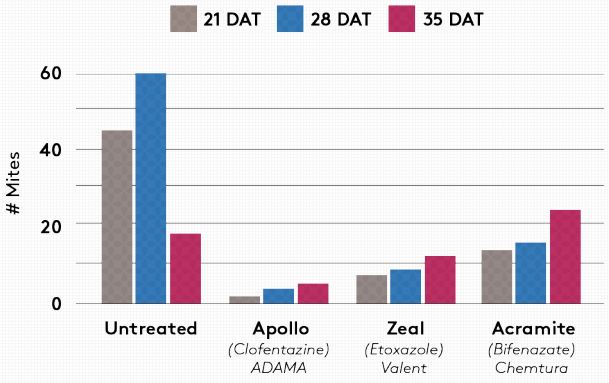
Early & mid-season control.
Tank mixes with adulticides.
Extends time between sprays.

Resistance Fighter

Unique mode of action.
Breaks resistance cycles.
Stops population flare ups.

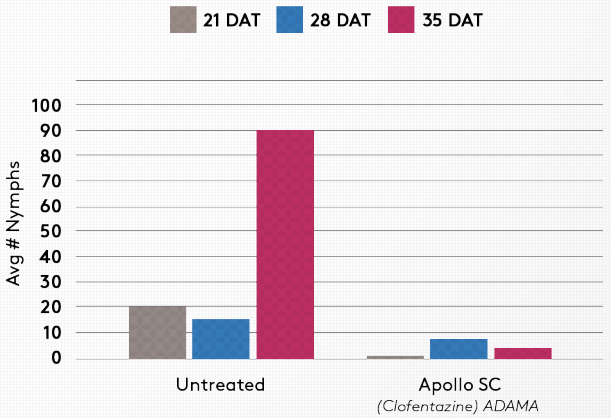
Trial Data and Graphs

Control of European Red Mite in Apples



Drew Hubbard, Hood River, OR Application on 22 July 2014

Control of Twospotted Spider Mites in Pear



Omak, WA- Northwest Contract Research, Application at petal fall

Apollo Label

Labeling

Registered on

- Almonds
- Apples
- Apricots
- Cherries
- Grapes
- Nectarines
- Peaches
- Pears
- Walnuts

PPE:

1. Long-sleeved shirt & pants
2. Chemical resistant gloves
3. Shoes plus socks

Label Rates

Crop	Rate/Acre	PHI
Apples	4-8 oz.	45 days
Pears, Grapes	4-8 oz.	21 days
Cherries	2-8 oz.	21 days

REI: 12 hours

Active Ingredients
Clofentezine

Formulation
Suspension Concentrate

Signal Word
Caution

Mode of Action
Novel, but unresolved

Restricted Use
No

Group Number
10A

Timing
Early season, mid-season

Packaging Information
3 x 4 x 1 quart

EPA Registration #
66222-47

Target Insects
Two spotted spider mite, european red mite, pacific mite and more

Apollo Application Tips

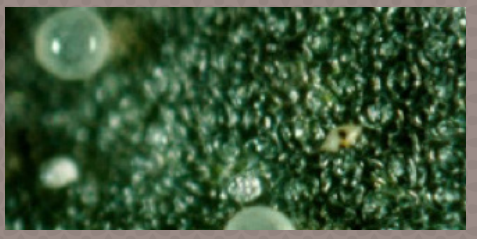
Mite Lifecycle: Direct Impact

- Interrupts ovicidal & early immature development
- Inhibits respiration in eggs, larvae & nymph (Proto) stages
- Adult females lay infertile eggs as long as they stay on treated area
- Mode of action stops resistance between populations
- Non-toxic to beneficial mites, insects & pollinators
- No phytotoxicity observed

Mite Control: Achieving High Performance

1. As soon as you see eggs, apply Apollo
2. If you see adults and eggs, use Apollo mixed with a good adulticide
3. Label approved rate is 6 to 8 fluid ounces
4. Length of control will increase via rate adjustment
5. Expect 7 days of additional residual for each ounce applied
6. Use high spray volumes to cover top & bottom of leaf surfaces
7. A pH of 5 or below is recommended to improve performance
8. Early season, mid-season

How Apollo Works



Inhibits Egg Respiration

Stops Nymph Development

Reduces Fecundity

Easy on Beneficials

Simply. Grow. Together.

ADAMA

For additional product information call 866-406-6262 or visit adama.com