Diagnosing Tree Problems:

- **Make Careful Observations** – "the primary responsibility of a good diagnostician"
- **Use Good Judgment** – make use of common sense, want to know more about the problem, persist in your inquiry until the problem is solved, avoid quick judgments, ask for help, look things up
- **Understand the Tree**
- **Understand the Causes of Tree Problems**
- **Ask Questions** – know the tree's history
- **Know the Tree's Environment**


Oak Leaf Blister

Oak Leaf Blister

Oak leaf blister (oak leaf curl) is a fungal leaf disease caused by the fungus *Taphrina caerulescens*. Circular, raised areas ranging up to 2 inches in diameter are scattered over the upper leaf surface. During cool wet springs, almost all species of oak are subject to the leaf blister disease. Members of the red oak family are particularly susceptible to infection.

A single application of a fungicide applied in the spring at the time of bud-swelling is usually adequate. Apply with a power sprayer and coat buds and twigs thoroughly for good control. (Daconil) is currently registered for use in controlling oak leaf blister. Fungicides will not be effective if applied after bud break

The Control of Tree Problems and Managing Client's Properties

- Anticipate Pest Problems
- Monitor Trees in the Landscape Regularly
- Accurately Determine the Cause of the Problem (if you do not know, get help)
- Determine the Right Course of Action
- Carry Out the Control Decision Properly

IPM:

Part II

chemical options

and

the use of pesticides

The Four Pillars of IPM:

- *physical control*
- *cultural control*
- *biological control*
- *chemical control*

· *physical control*

· *cultural control*

- ***biological control***

· chemical control

Pesticides

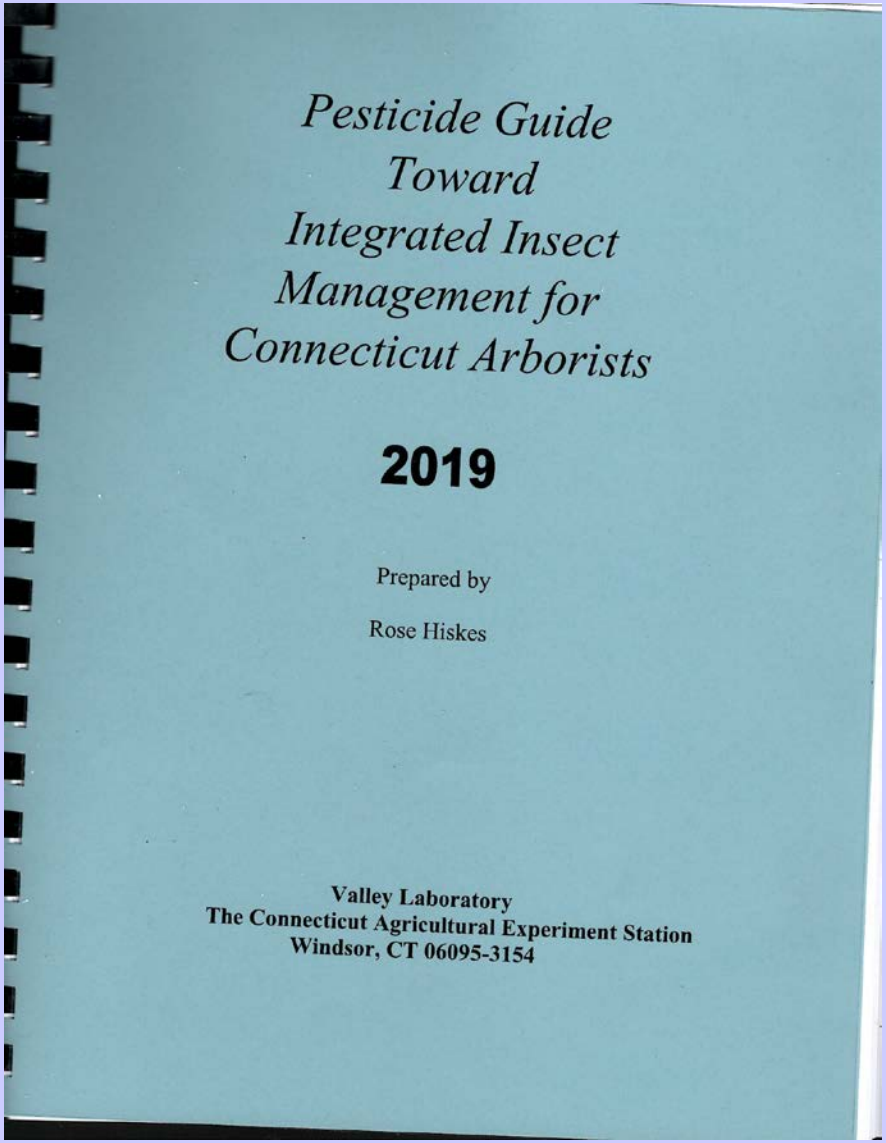
what are they?

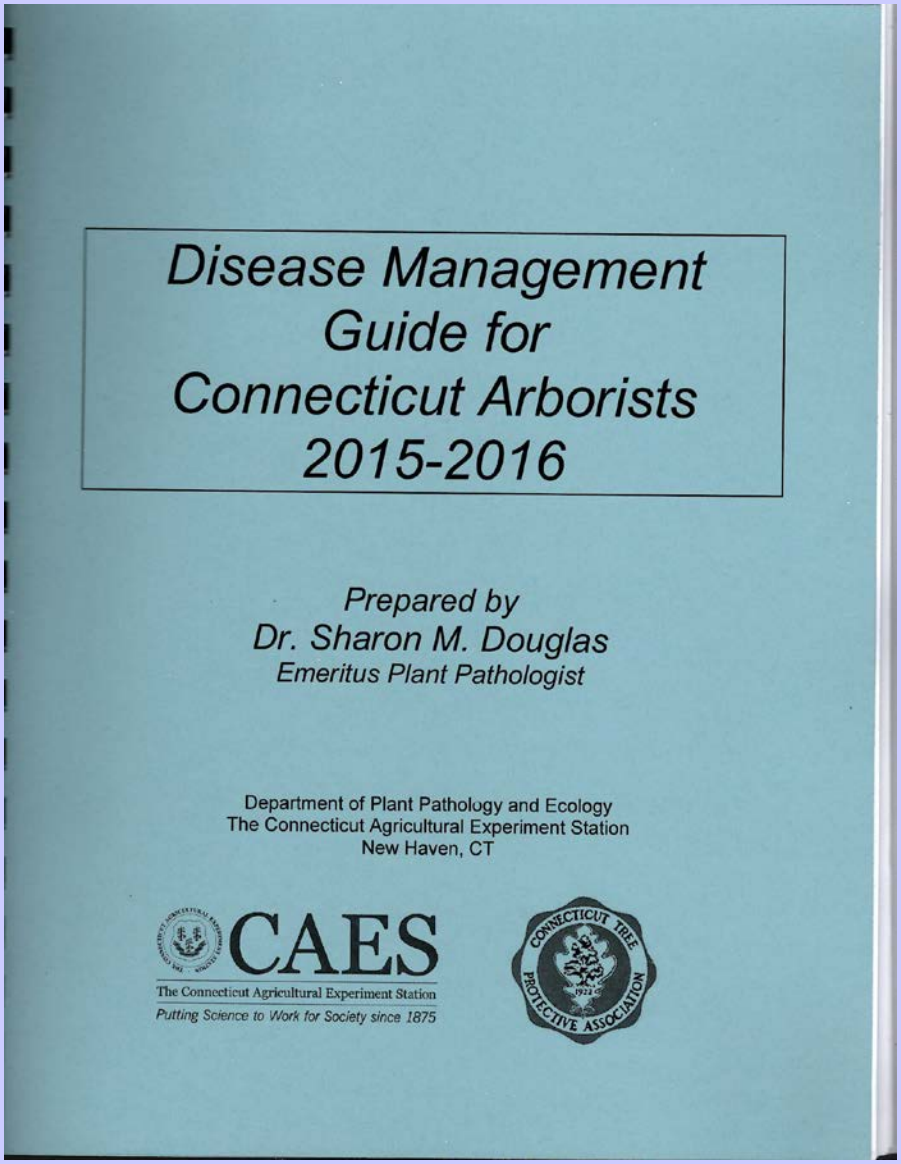
legal toxins

why use them?


McDonald's

Pesticides are an option in any IPM Program





Sources of Information

LARGE HICKORY LECANIUM

Eulecanium caryae
Page 364 (Johnson & Lyon)

GROWING SEASON **Apply thorough treatment only when pest stage found.**

Frequency with which pest occurs: **OCCASIONAL**

Part of plant to treat: **FOLIAGE**

Host Plants: Common Name	Scientific Name
apple	*Malus*
beech	*Fagus*
birch	*Betula*
cherry, black	*Prunus serotina*
cherry, flowering	*Prunus*
hackberry	*Celtis occidentalis*
hickory	*Carya*
honeylocust	*Gleditsia triacanthos*
mulberry	*Morus*
oak	*Quercus*
peach	*Prunus persica*
plum	*Prunus cerasifera*
sycamore	*Platanus occidentalis*
walnut	*Juglans*
willow	*Salix*

Pest Survey Information:

Pest Stage	From	To	Plant Part	Plant Damage	Survey Method
nymph (crawler)	May 01	Jul 15	bark to foliage	decline	visual inspection, sticky tape
nymph	Aug 15	Oct 31	foliage to bark	decline	visual inspection

Control: Stage(s) and Timing

Stage(s)	Ideal Control Dat		Degree Days			Treat HOST PLANT when the following
nymph, adult	Apr 20	- Apr 30	96	-	137	plants bloom: boxelder, star magnolia, periwinkle, Norway maple
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crawler	Jun 20	- Jun 30	737	-	967	plants bloom: Rhododendron maximum, Spiraea bumalda, Philadelphus
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Biological Control	**Comments**
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Select the appropriate insecticide/miticide for the correct life stage of the target pest.

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acephate	Acephate 97 WDG	*BEE CAUTION*	C	24 hours

Signal words: C=Caution; W = Warning; DP = Danger Poison

Growing season control may not be necessary if Dormant or Delayed Dormant Season control is effective.

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Pesticide Guide Toward IPM – page 206

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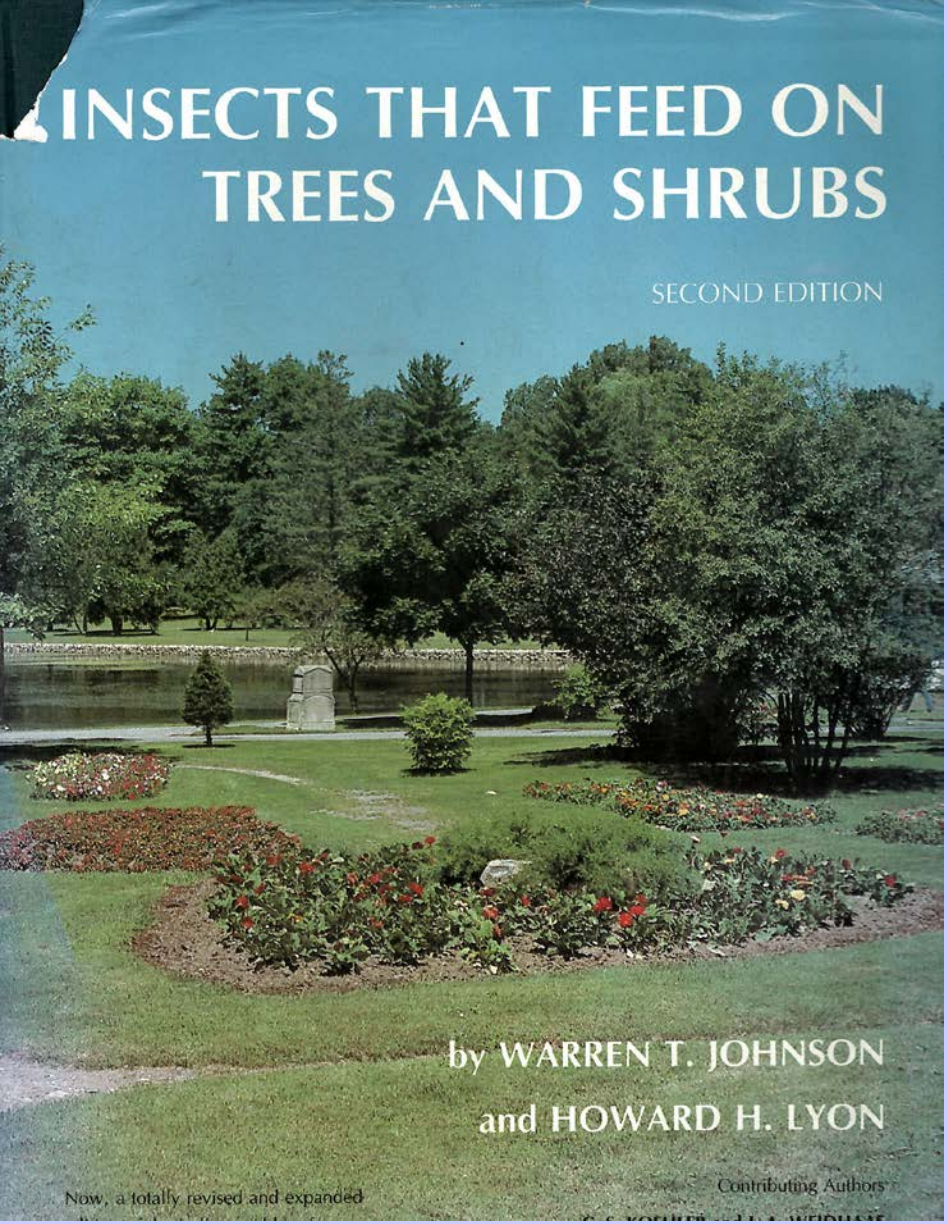

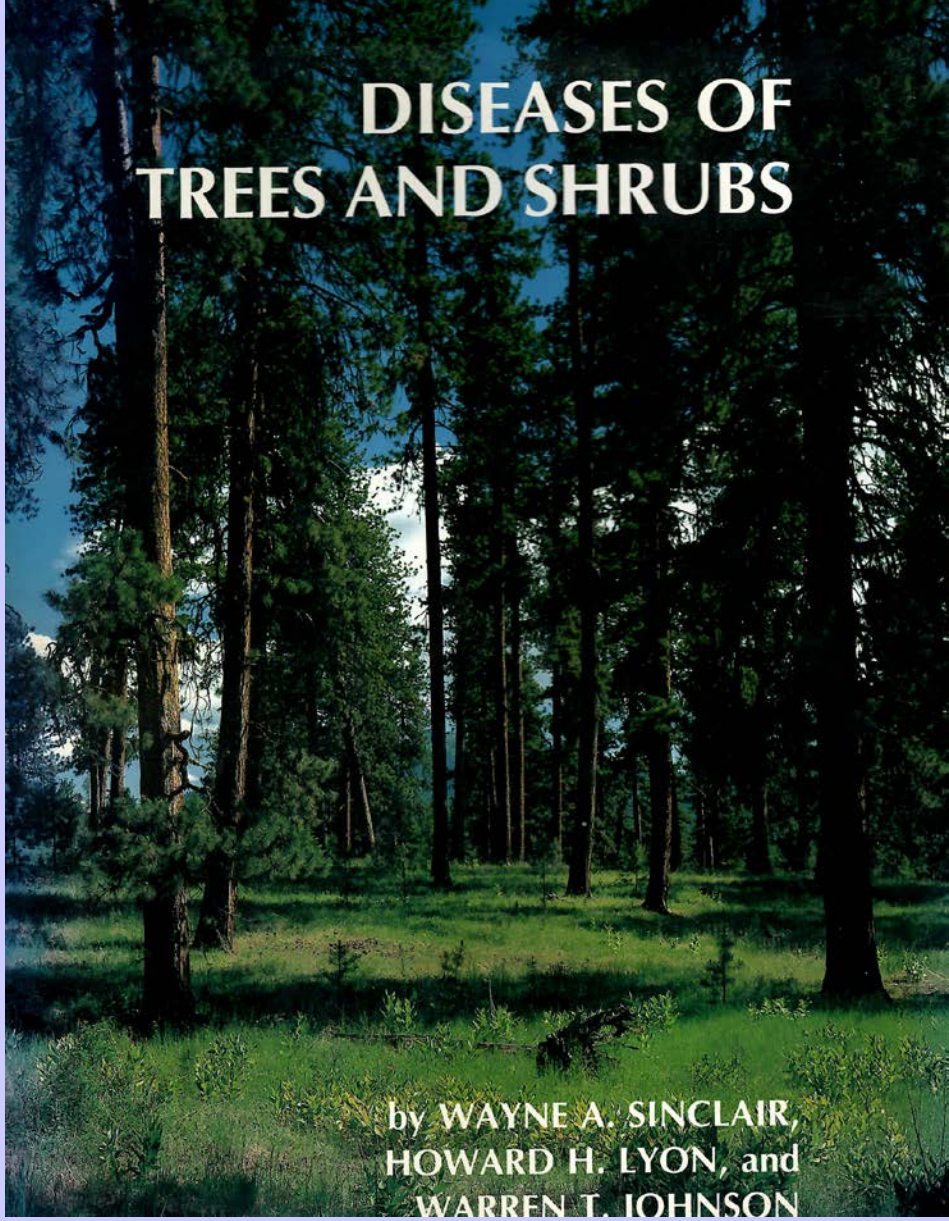

The Cornell Books

LARGE HICKORY LECANIUM

Eulecanium caryae

Page 364 (Johnson & Lyon)

Page 205 discusses this insect in the dormant season.

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Three Approaches to Timing:

- calendar based approach
- growing degree days
- approach based on phenology
  (what's in bloom)

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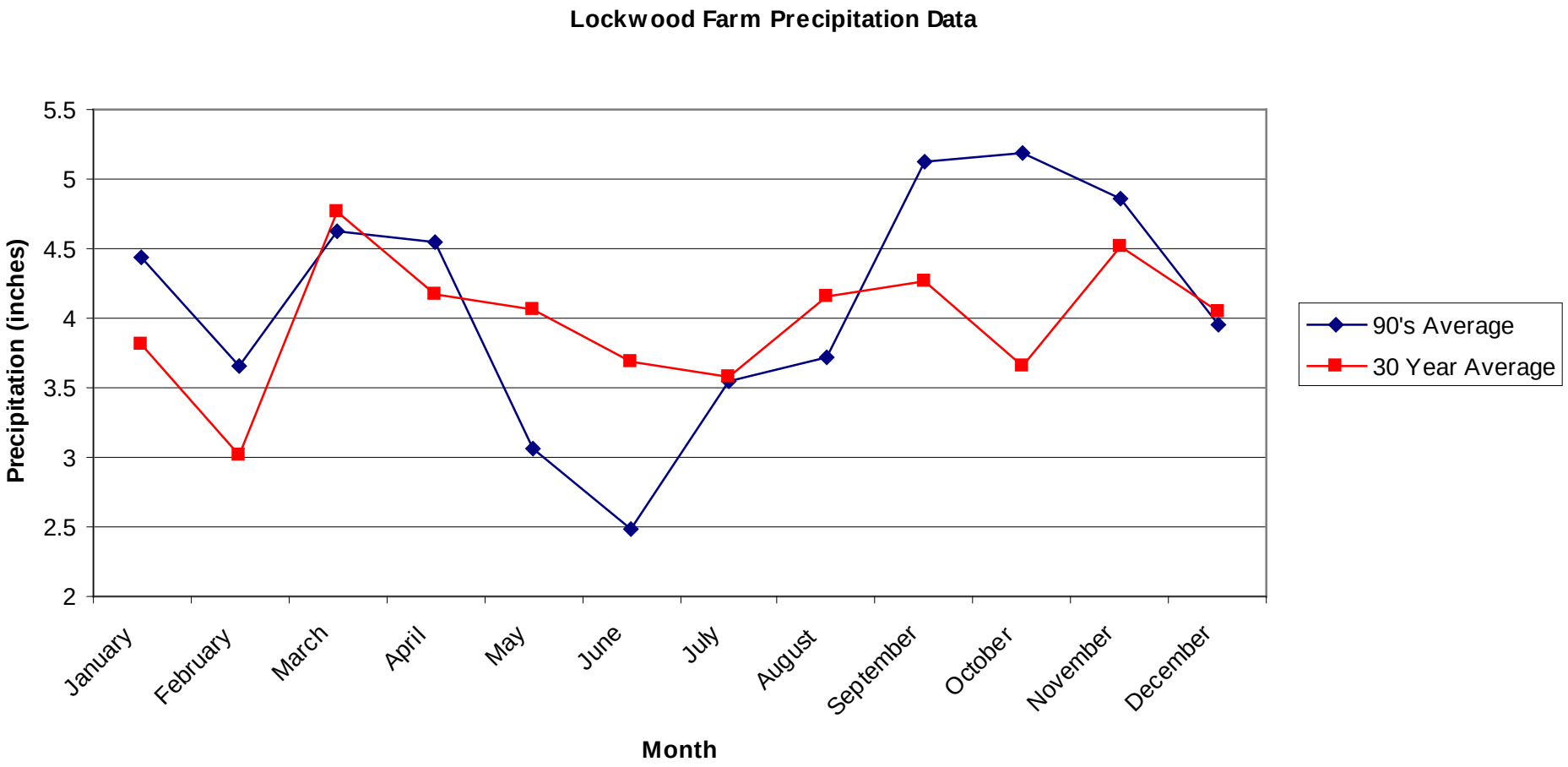

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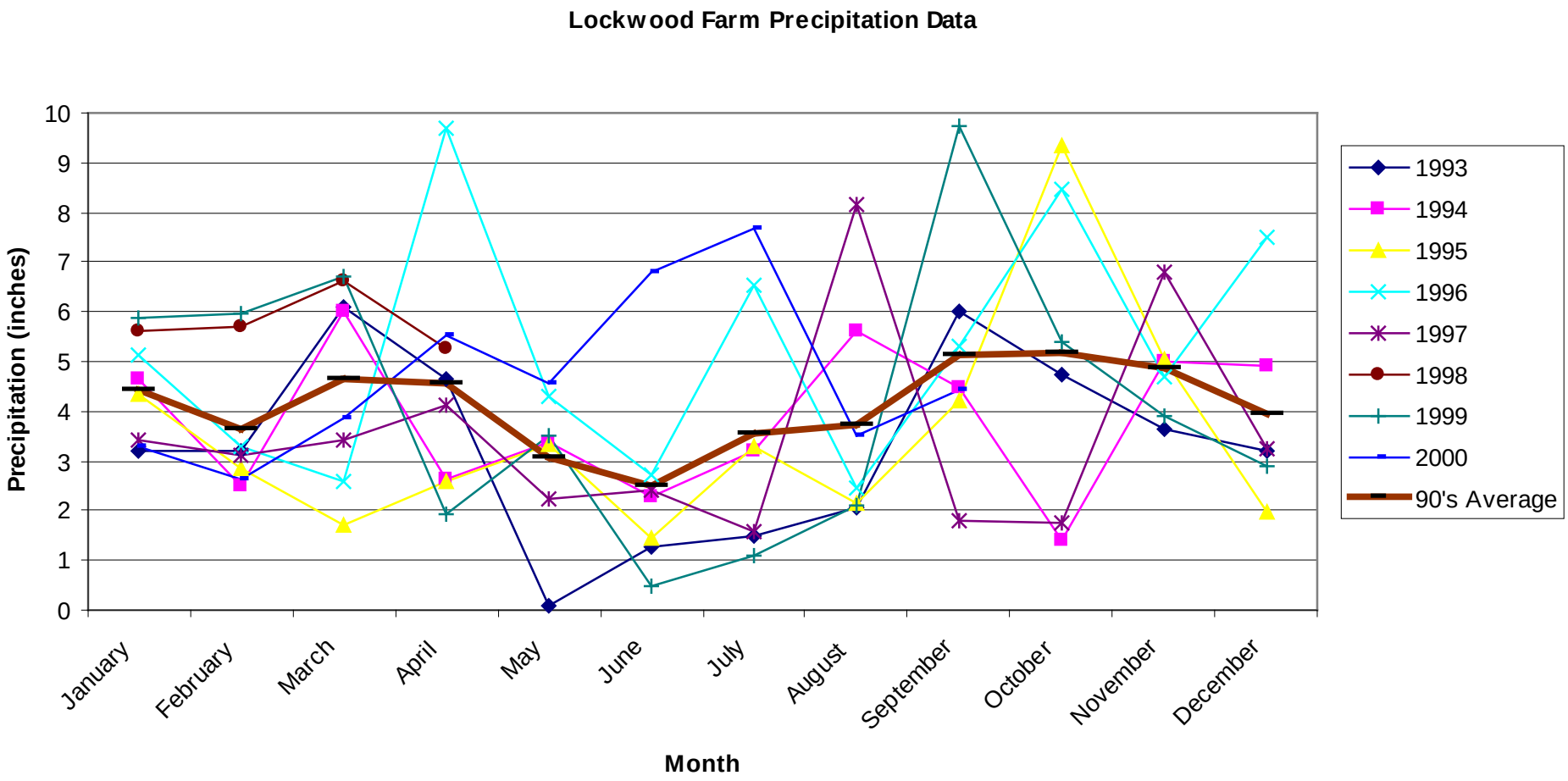


Growing Degree Days:

- The use of Growing degree days (GDD) is a way of tracking ‘heat units’ and is used to estimate the growth and development of crops and pests during the growing season.
- It is based on tracking the accumulation of average daily temperatures, starting with a minimum threshold or baseline temperature that must be exceeded for growth to occur.

Growing Degree Days:

To calculate the Growing Degree Days throughout the season:

Start at the beginning of the season (usually March 1).

For each day, add the high and low temperatures of the day together.

Divide this sum by 2.

Subtract the baseline temperature (usually 50 degrees Fahrenheit).

The resulting difference is that day's contribution to the GDD total. If the difference for that day is less than zero, set it equal zero. If it is zero or greater than zero, add to running total for season.

The GDD's for any day in the season is the sum of the contributions of each day to the GDD total, going all the way back to March 1.

Growing Degree Days:

	March 1	March 2	March 3	Total
High Temp	52° F			-
Low Temp	46° F			-
High + Low	98			-
divide by 2	49			-
subtract 50	-1			-
GDD	0			**0**

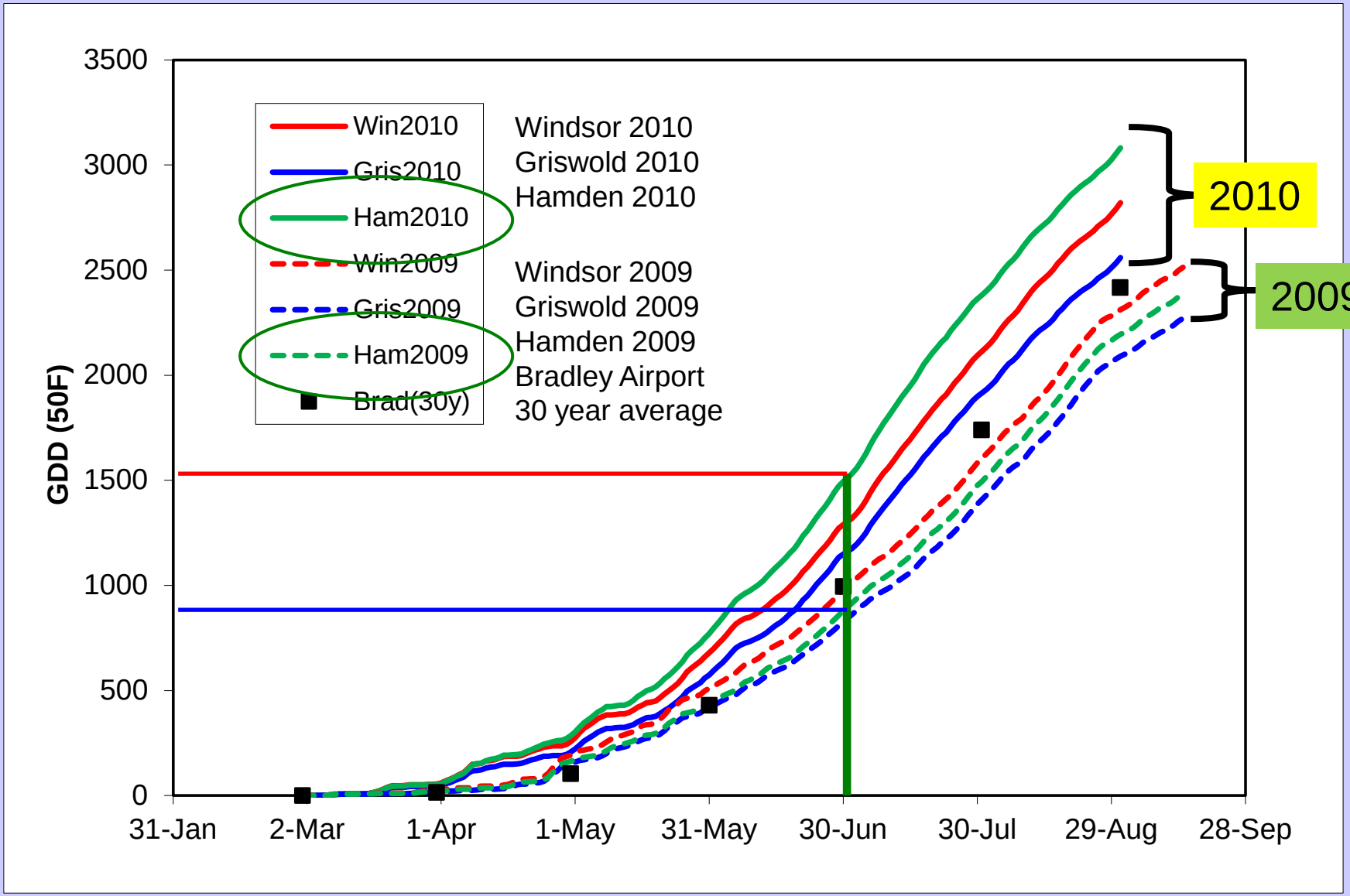
Growing Degree Days:

	March 1	March 2	March 3	Total
High Temp	52° F	58° F		-
Low Temp	46° F	48° F		-
High + Low	98	106		-
divide by 2	49	53		-
subtract 50	-1	3		-
GDD	0	3		**3**

Growing Degree Days:

	March 1	March 2	March 3	Total
High Temp	52° F	58° F	62° F	-
Low Temp	46° F	48° F	52° F	-
High + Low	98	106	114	-
divide by 2	49	53	57	-
subtract 50	-1	3	7	-
GDD	0	3	7	**10**

GDD 2009 and 2010



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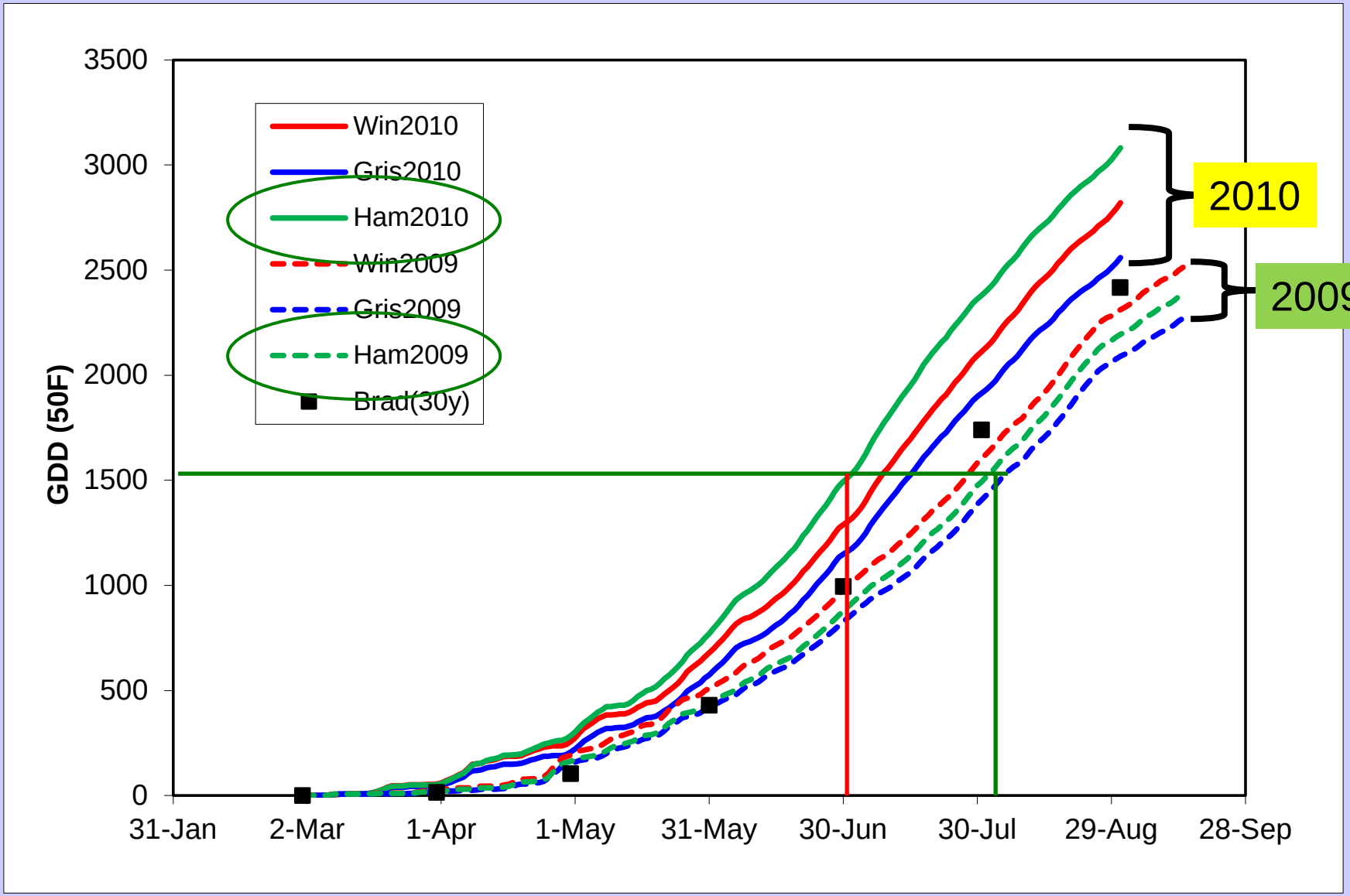

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acephate	Acephate 97 WDG	*BEE CAUTION*	C	24 hours

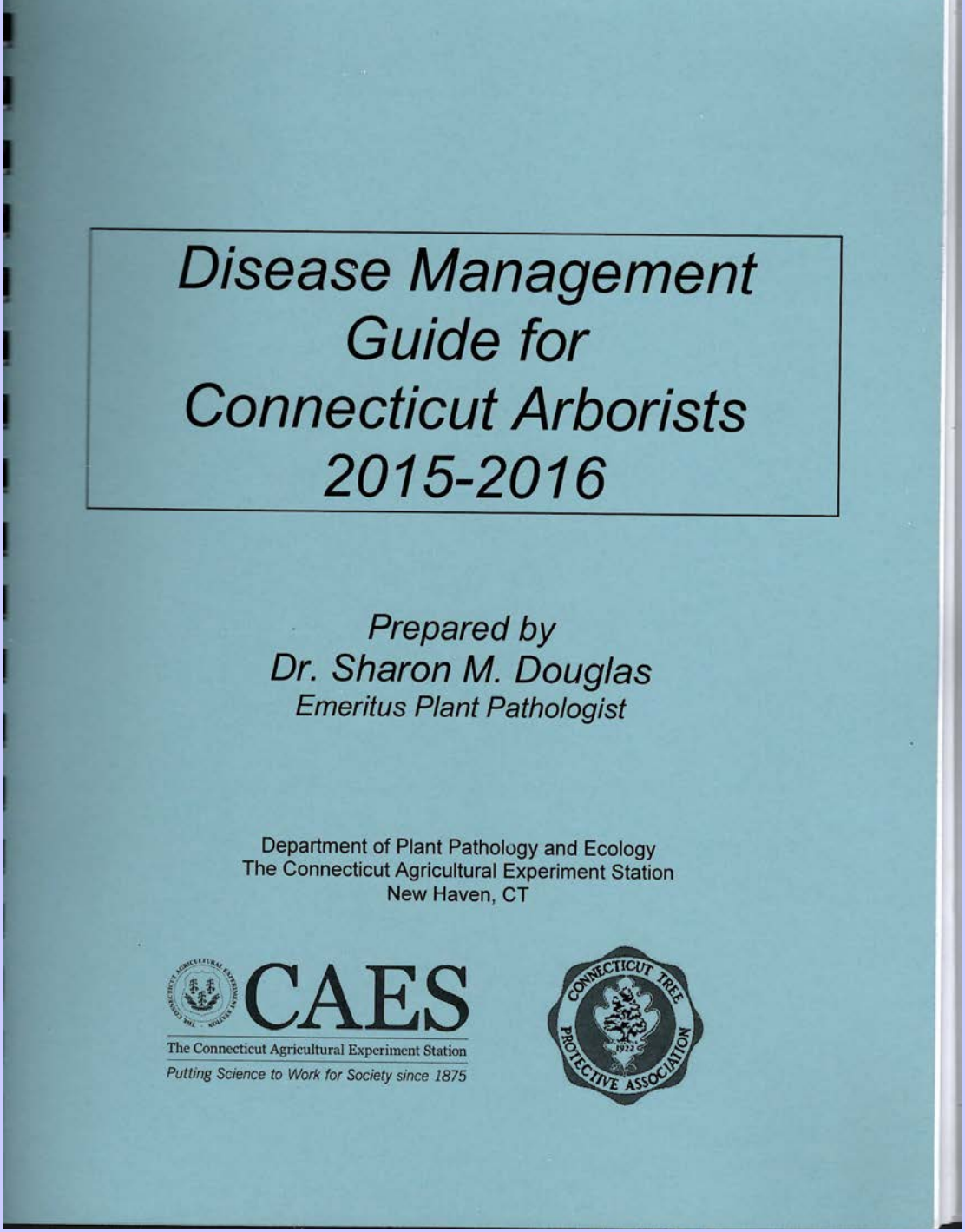
Signal words: C=Caution; W = Warning; DP = Danger Poison

Growing season control may not be necessary if Dormant or Delayed Dormant Season control is effective.

***restricted use pesticide** ****ESA approved common name** **^for agricultural applications only.**

Chemical Control		**Comments**	**Signal Word**	**Agricultural Restricted Entry Interval (REI)^**
Reference use only. NOT a label substitute.				
Select the appropriate insecticide/miticide for the correct life stage of the target pest.				
	Lepitect	*Effective against immatures. Bee caution.*	C	24 hours
	Orthene T,T & O WSP	*BEE CAUTION*	C	24 hours
acetamiprid	TriStar 8.5 SL	*BEE CAUTION*	C	12 hours
*bifenthrin	Talstar P Professional	*Effective against immatures. Bee caution.*	C	12 hours
carbaryl	Carbaryl 4L	*Effective against immatures. Bee caution.*	C	12 hours
	Sevin SL	*BEE CAUTION*	C	12 hours
*chlorpyrifos	Chlorpyrifos 4E AG	*Non-residential, BEE CAUTION*	W	24 hours
*clothianidin + bifenthrin	Aloft GC G	*BEE CAUTION*	C	12 hours
*clothianidin	Arena .25 G		C	12 hours
*deltamethrin	Suspend SC	*Effective against immatures. Bee caution.*	C	
*dinotefuran	Safari 20 SG	*BEE CAUTION*	C	12 hours
horticultural oil	Damoil		C	4 hours
	Sunspray Ultra-Fine Spray Oil		C	4 hours
*imidacloprid	Mallet 75 WSP	*BEE CAUTION*	C	12 hours
	Merit 75WSP	*BEE CAUTION*	C	12 hours
	Xytect 2F	*BEE CAUTION*	C	
insecticidal soap	Des-X Insecticidal Soap Concentrate		W	12 hours
	M-Pede	*Only effective against immatures.*	W	12 hours
lambda-cyhalothrin	Demand CS	*Effective against immatures. Bee caution.*	C	
*lambda-cyhalothrin	Scimitar GC	*Effective against immatures. Bee caution.*	C	24 hours
malathion	Malathion 5 EC	*Effective against immatures. Bee caution.*	W	12 hours
	Malathion 8 Flowable	*Effective against immatures. Bee caution.*	C	12 hours
pyriproxyfen	Distance IGR	*Only effective against immatures.*	C	12 hours
*thiamethoxam	Meridian 0.33G	*BEE CAUTION*	C	12 hours

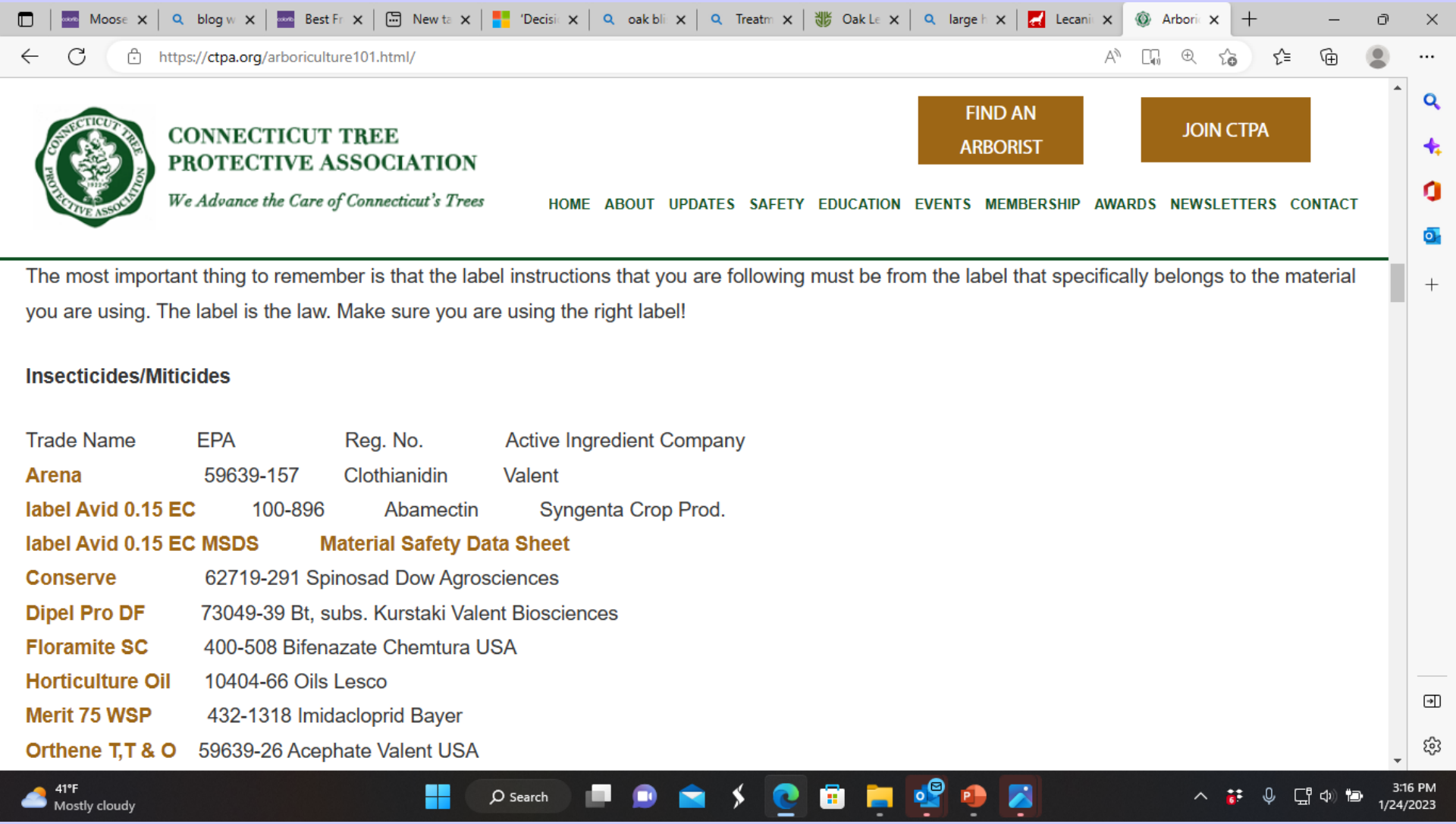
Disease Management Guide



Quercus (Oak)

Disease ✓ *(Pathogen/Cause)*	Diagnostic Symptoms ✓	Management ✓	Materials ✓
Anthracnose *(Apiognomonia)*	Irregular, necrotic spots which are tan and papery in appearance develop on newly emerging leaves in wet weather; spots are often so numerous that they coalesce and leaves appear blighted; some leaf distortion also occurs when margins are infected; as leaves reach full size they become resistant; heavily infected leaves drop and defoliation can occur; twigs with overwintering infections may die; white oak is most susceptible;	• rake and remove fallen leaves; • prune and remove infected twigs; • maintain vigor; • fungicide sprays are usually not practical or necessary except for new transplants, young or specimen trees, or when defoliation has been heavy for several years; fungicide sprays can be applied at budbreak and repeated 2-3 times at label intervals;	azoxystrobin chlorothalonil chlorothalonil + fenarimol copper salts of fatty acids copper sulphate pentahydrate mancozeb mancozeb + copper hydroxide thiophanate methyl thiophanate methyl + chlorothalonil

Disease Management Guide



The Class Website ( ) has a listing of common insecticides and miticides. You can use these to get yourself familiar with some of the more common chemicals used.

Categorizing Pesticides:

learning about what they have in common, and how they differ

Kinds of Pesticides by use:

- insecticides
- fungicides
- miticides

Kinds of Pesticides by chemistry:

- horticultural oils
- organophosphates
- carbamates
- synthetic pyrethroids

Kinds of Pesticides by mode of action:

- systemic
- locally systemic
- contact
- residual

Kinds of Pesticides what they affect:

- broad spectrum
- narrow spectrum
- protectant / eradicant
- phytotoxicity

Kinds of Pesticides by how they're applied:

- foliar application (spray)
- soil injection
- trunk injection


ARBORJET

and so on:

- formulation
- signal word (toxicity)

Signal Word	Relative Toxicity (*to mammals*)
Danger	High
Warning	Moderate
Caution	Low
Caution	Relatively Non-Toxic

Chart of Signal Words – Core Manual

Sample label using Merit 75 WSP as an example

MERIT® 75 WSP

INSECTICIDE

* *For foliar and systemic insect control in turfgrass (including sod farms), landscape ornamentals, fruit and nut trees, and interior plantscapes.*

ACTIVE INGREDIENT:	
*Imidacloprid, 1-[(6-Chloro-3-pyridinyl)methyl]-*N*-nitro-2-imidazolidinimine	75%
OTHER INGREDIENTS:	25%
Total:	100%

MERIT® 75 WSP

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EPA Reg. No. 432-1318

EPA Est. No.

STOP - Read the label before use.

Keep out of reach of children.

CAUTION

Merit 75 WSP

FIRST AID	
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
In case of emergency call toll free the Bayer Environmental Science Emergency Response Telephone No. 1-800-334-7577. Have a product container or label with you when calling a poison control center or doctor, or going for treatment.	
Note To Physician: No specific antidote is available. Treat the patient symptomatically.	

Merit 75 WSP

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Harmful if swallowed, inhaled, or absorbed through skin. Causes eye irritation. Avoid contact with skin, eyes, or clothing. Avoid breathing dust or vapor. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse. Keep children or pets off treated area until spray is dry.

Applicators and Other Handlers Must Wear:

- Long-sleeved shirt and long pants
- Chemical resistant gloves made of any waterproof material such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton.
- Shoes plus socks

Follow manufacturer's instructions for cleaning/ maintaining personal protective equipment, PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Merit 75 WSP

User Safety Recommendations

User should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Merit 75 WSP

ENVIRONMENTAL HAZARDS

This product is highly toxic to aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. This chemical demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Do not formulate this product into other end-use products.

Merit 75 WSP

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Merit 75 WSP

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in a cool, dry place and in such a manner as to prevent cross contamination with other pesticides, fertilizers, food, and feed. Store in original container and out of the reach of children, preferably in a locked storage area. Handle and open container in a manner as to prevent spillage. If the container is leaking, invert to prevent leakage. If container is leaking or material spilled for any reason or cause, carefully dam up spilled material to prevent runoff. Refer to Precautionary Statements on label for hazards associated with the handling of this material. Do not walk through spilled material. Absorb spilled material with absorbing type compounds and dispose of as directed for pesticides below. In spill or leak incidents, keep unauthorized people away. You may contact the Bayer Environmental Science Emergency Response Team for decontamination procedures or any other assistance that may be necessary. The Bayer Environmental Science Emergency Response Telephone No. is 1-800-334-7577 or contact Chemtrec at 800-424-9300.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Completely empty container into application equipment. Then dispose of empty container in a sanitary landfill, by incineration or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

Merit 75 WSP

APPLICATION TO ORNAMENTALS

MERIT® 75 WSP Insecticide is for use on ornamentals in commercial and residential landscapes and interior plantscapes. MERIT® 75 WSP Insecticide is a systemic product and will be translocated upward into the plant system from root uptake. To assure optimum effectiveness, the product must be placed where the growing portion of the target plant can absorb the active ingredient. The addition of a nitrogen containing fertilizer, where applicable, into the solution may enhance the uptake of the active ingredient. Application can be made by foliar application or soil applications; including soil injection, drenches, and broadcast sprays. Foliar applications offer locally systemic activity against insect pests.

Merit 75 WSP

When making soil applications to plants with woody stems, systemic activity will be delayed until the active ingredient is translocated throughout the plant. In some cases, this translocation delay could take 60 days or longer. For this reason, applications should be made prior to anticipated pest infestation to achieve optimum levels of control.

For outdoor ornamentals, **broadcast applications** cannot exceed a total of 8.6 oz (0.4 lb of active ingredient) per acre per year.

Merit 75 WSP

RECOMMENDED APPLICATIONS

For use only in and around industrial and commercial buildings and residential areas

CROP	PEST		DOSAGE MERIT® 75 WSP
Trees Shrubs Evergreens Flowers Foliage plants Groundcovers Interior plantscapes	Adelgids Aphids Japanese beetles Lace bugs Leaf beetles (including elm and viburnum leaf beetles) Leafhoppers (including glassy-winged sharpshooter)	Mealybugs Psyllids Sawfly larvae Thrips (suppression) Whiteflies	1.6 oz (1 packet) per 300 gal of water
	Foliar Applications: Start treatments prior to establishment of high pest populations and reapply on an as needed basis.		
	White grub larvae (such as Japanese beetle larvae, Chafers, *Phyllophaga* spp. Asiatic garden beetle, Oriental beetle)		1.6 oz (1 packet) per 8,250 to 11,000 sq ft
	Broadcast Applications: Mix required amount of product in sufficient water to uniformly and accurately cover the area being treated. Do not use less than 2 gallons of water per 1000 sq ft. For optimum control, irrigate thoroughly to incorporate MERIT® 75 WSP Insecticide into the upper soil profile. Refer to use directions specific for FLOWERS and GROUNDCOVERS concerning additional use directions.		

Merit 75 WSP

RECOMMENDED APPLICATIONS

Trees, Shrubs, Flowers and Groundcovers

For use only in and around industrial and commercial buildings, and residential areas and state, national, and private wooded and forested areas to control the insect pests listed below:

Adelgids	Flatheaded borers (including bronze birch borer and alder borer)	Leafhoppers (including glassy-winged sharpshooter)	Sawfly larvae
Aphids	Japanese beetles	Leafminers	Soft scales
Armored scales (suppression)	Lace bugs	Mealybugs	Thrips (suppression)
Black vine weevil larvae	Leaf beetles (including elm and viburnum leaf beetles)	Pine tip moth larvae	White grub larvae
Eucalyptus longhorned borer		Psyllids	Whiteflies
		Royal palm bugs	

Trees	1.6 oz (1 packet) MERIT® 75 WSP per 24 to 48 inches of cumulative trunk diameter

Soil Injection: GRID SYSTEM: Holes should be spaced on 2.5 foot centers, in a grid pattern, extending to the drip line of the tree. CIRCLE SYSTEM: Apply in holes evenly spaced in circles, (use more than one circle dependent upon the size of the tree) beneath the drip line of the tree extending in from that line. BASAL SYSTEM: Space injection holes evenly around the base of the tree trunk no more than 6 to 12 inches out from the base.

Mix required dosage in sufficient water to inject an equal amount of solution in each hole. Maintain a low pressure and use sufficient solution for distribution of the liquid into the treatment zone. For optimum control, keep the treated area moist for 7 to 10 days. Do not use less than 4 holes per tree.

No Soil Injection Applications Allowed in Nassau or Suffolk Counties of New York.

Soil Drench: Uniformly apply the dosage in no less than 10 gallons of water per 1000 square feet as a drench around the base of the tree, directed to the root zone. Remove plastic or any other barrier that will stop solution from reaching the root zone.

For Control of Specified Borers: Application to trees already heavily infested may not prevent the eventual loss of the trees due to existing pest damage and tree stress.

Merit 75 WSP

RECOMMENDED APPLICATIONS
For use only in and around residential areas

CROP	PEST		RATE PER APPLICATION	
Pome Fruits Apple Crabapple Loquat Mayhaw Pear Pear (oriental) Quince	Aphids (except Wooly apple aphid) Leafhoppers (including glassy-winged sharpshooter) Leafminer	Mealybugs* San Jose Scale*	1.6 oz (1 packet) per 300 gal of water	2.1 oz per acre[1]

Apply specified dosage as foliar spray as needed after petal-fall is complete.

For control of rosy apple aphid, apply prior to leafrolling caused by the pest.

For first generation leafminer control, make first application as soon as petal-fall is complete. Greatest leafminer control will result from the earliest possible application. For second and succeeding generations of leafminer, optimal control is obtained from applications made early in the adult flight against egg and early instar larvae. A second application may be required 10 days later if severe pressure continues or if generations are overlapping. A single application may result in suppression only. MERIT® 75 WSP will not control late stage larvae.

For San Jose Scale, time applications to the crawler stage. Treat each generation.

For late season (preharvest) control of leafhopper species, apply MERIT® 75 WSP while most leafhoppers are in the nymphal stage.

For optimal control of mealybug, insure good spray coverage of the trunk and scaffolding limbs or other resting sites of the mealybug.

Do not apply more than 2.1 ounces per acre in a single application. Do not make more than 5 applications.

Allow 10 or more days between applications. Allow at least 7 days between last application and harvest.

*Not for use in California for control on pears.

Merit 75 WSP

RESTRICTIONS

Do not graze treated areas or use clippings from treated areas for feed or forage. Avoid runoff or puddling of irrigation water following application. Keep children and pets off treated area until dry. Avoid application of MERIT® 75 WSP Insecticide to areas which are water logged or saturated, or frozen, which will not allow penetration into the root zone of the plant. Do not apply more than 8.6 oz (0.4 lb of active ingredient) per acre per year.

Treated areas may be replanted with any crop specified on an imidacloprid label, or with any crop for which a tolerance exists for the active ingredient.

For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant-back interval should be observed.

Merit 75 WSP

IMPORTANT: READ BEFORE USE

Read the entire Directions for Use, Conditions, Disclaimer of Warranties and Limitations of liability before using this product.

If terms are not acceptable, return the unopened product container at once. By using this product, user or buyer accepts the following conditions, disclaimer of warranties and limitations of liability.

CONDITIONS: The directions for use of this product are believed to be adequate and should be followed carefully. However, because of manner of use and other factors beyond Bayer Environmental Science's control it is impossible for Bayer Environmental Science to eliminate all risks associated with the use of this product. As a result, crop injury or ineffectiveness is always possible. All such risks shall be assumed by the user or buyer.

Merit 75 WSP

Sources of Information:

- State Coop Extension Services
  - Cornell (NY State)
  - UMass
- Books (esp. Cornell books)
- Pesticide Suppliers

Final:

Thoughts?

Comments?

Questions?