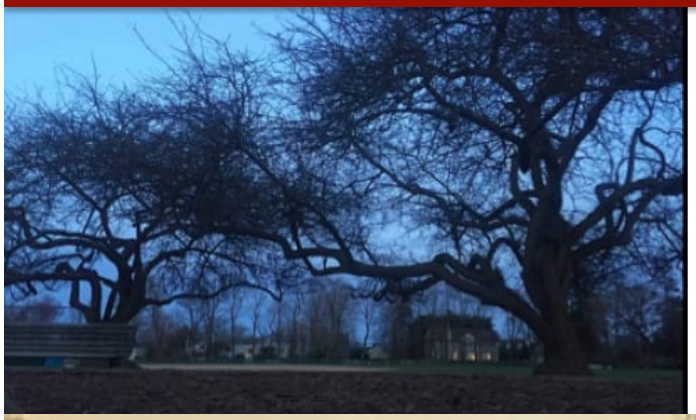
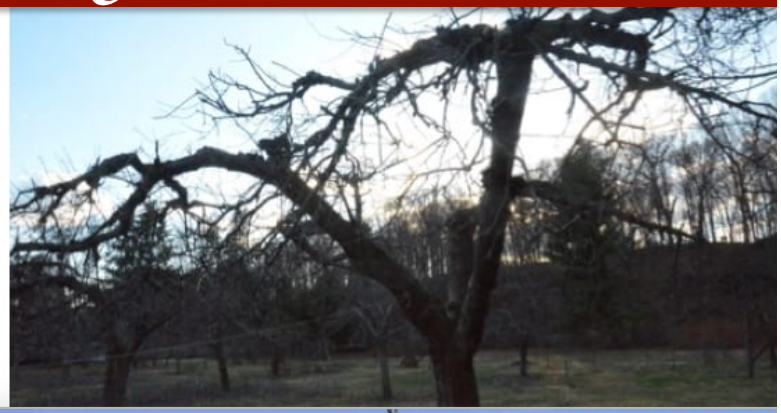
The Heirloom Orchard
Estate Orchard Management





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INSECT BIOLOGY, ECOLOGY, AND MANAGEMENT IN HUDSON VALLEY AGRICULTURAL COMMODITIES

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Research Our research and extension outreach program is directed by Cornell University's Department of Entomology and located at the Hudson Valley Research Laboratory (now FARM), in Highland, NY. We are a part of the New York State Agricultural Experiment Station in Geneva, NY, with the laboratory building owned by a non-profit cooperative tree fruit grower organization (HVRL Inc.).

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Plant Protection Presentations

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Plant Protection Presentations

Fruit Production IPM Presentations:

2018

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CONNECTICUT POMOLOGICAL SOCIETY. Nov. 27th. Biological Insecticides:What are they and do they really work?

Insecticide Efficacy HVRL IPM Workshop, Highland, NY October 10th, 2018.

Brown Marmorated Stink Bug Management in Northeastern Orchards. Mississippi Valley Fruit Company, TruEarth Growers Meeting, Monday, March 27, 2018, 10:00 AM – 3:00 PM, The Green Mill Restaurant, 1025 Hwy 61 E, Winona, MN 55987 (Remote via GoToMeeting.com).

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The Heirloom Orchard
Estate Orchard Management

Why Grow Heirloom Apple: Discussion

- Understanding the why behind growing apple. Simply not just fruit.
- How orchardists (estate owners) see themselves and how they want to be seen by the world
- **Orchardists** should prioritize the why of fruit growing.
  - Esthetics – View & Vista, Garden & Grounds , Fresh Eating, Storage, Juice, Cider, PYO, For Wildlife
- **Managers** need to understand and prioritize the needs of the why clients have fruit trees

The Heirloom Orchard
Estate Orchard Management

Why Grow Heirloom Apple: Discussion

Cider Tasting: Survey

Bad Seed Cider	Ulster Co. (Highland)	Dry
Abandoned Orchard	Sullivan Co.	'Traditional Farm'
Stella Cidre	Global	Crisp / semi-sweet
Doc's Draft	Orange Co. (Warwick, NY)	

Why Grow Heirloom Apple: Discussion

Heirloom Apple Variety Tasting: Survey

- Esopous Spitenburg
- Baldwin
- Jonathan
- Northern Spy

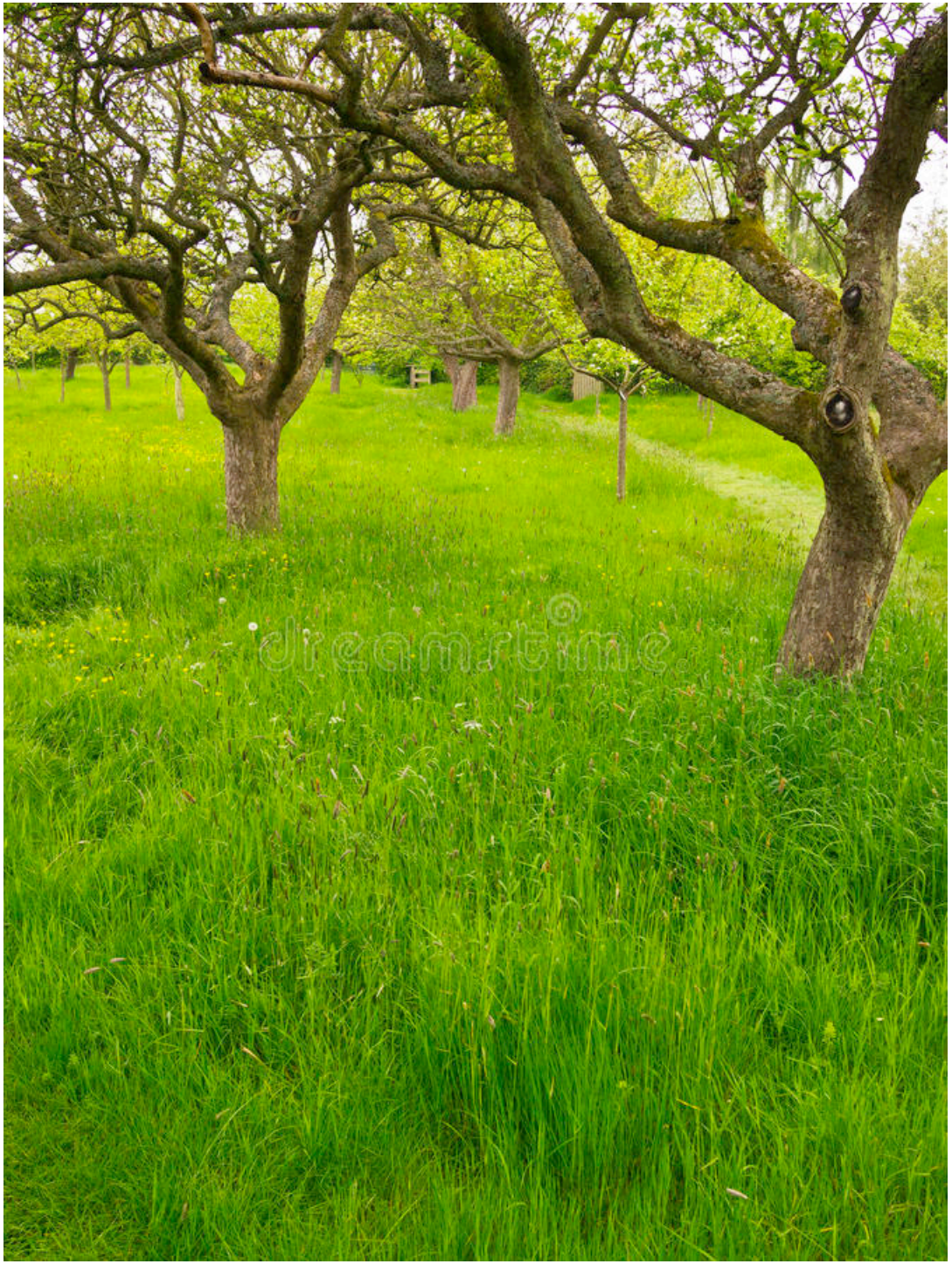
- Newer varieties
  - Keepsake
  - Elstar

  - Goldrush – Cider / Keeper
  - Pink Lady – Firm, attractive color, elongate

The Heirloom Orchard
Estate Orchard Management

Apple Tree Architecture

- Rootstock:
- Tree size management
  - Scion rooted standard (100%)



Estate Tree Architecture

- Scion Rooted
- Open Canopy
- ‘Kid Friendly’
- Orchard Floor visability

Estate Revival

- Re-establishing orchard
- Long Slow Process
- Historically Significant

Estate Revival

- Re-establishing orchard
- Long Slow Process
- Historically Significant
- Wildlife Fruit
- 3-dimentional fruiting

The Heirloom Orchard
Estate Orchard Management

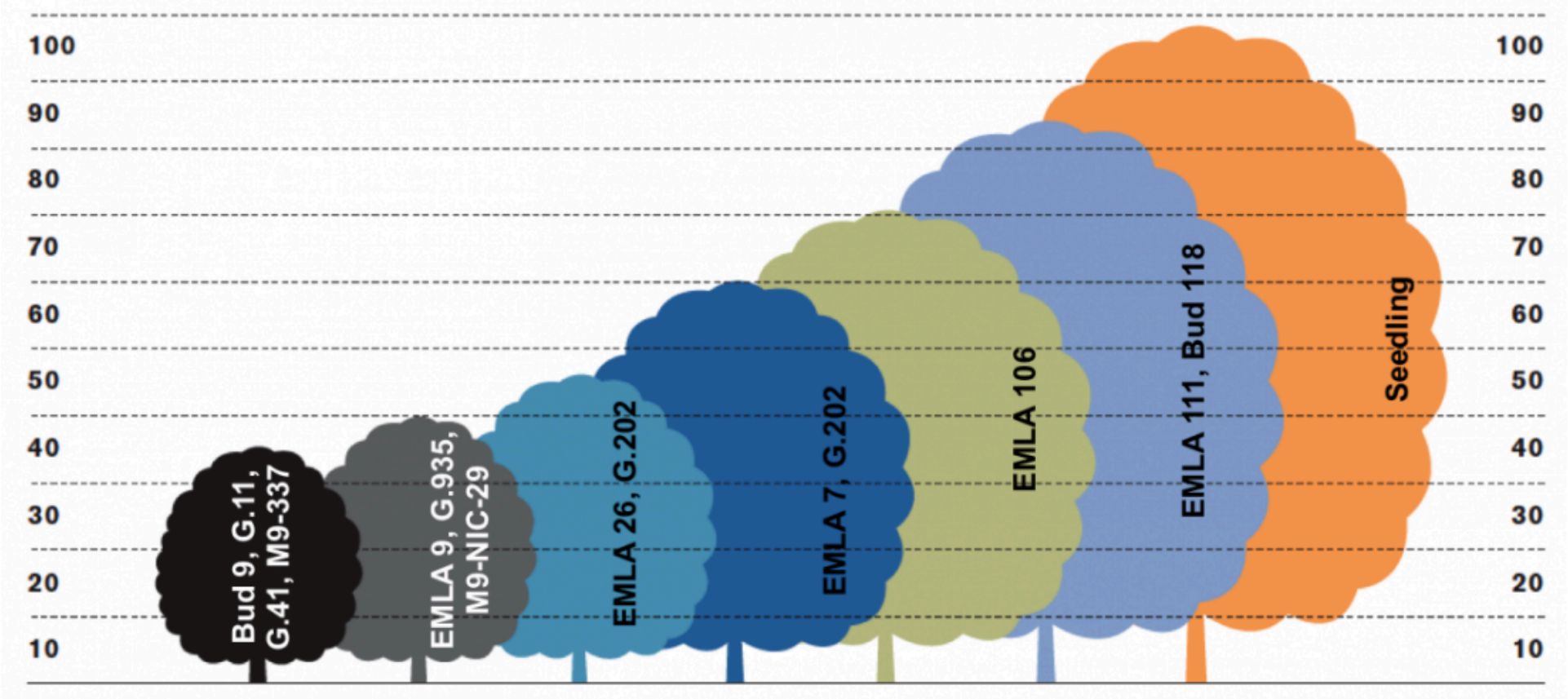
Apple Tree Architecture

- Rootstock:
- Tree size management
  - Scion rooted standard (100%)
  - Semi-dwarf
- Root distribution and depth
- Susceptibility to insect and disease
- Sucker growth, management inputs
- Apple require 1” of water / week

Scion: Tree Characteristics

- Tree height (management requirements)
- Branching (upright, horizontal, drooping)
- Bark characteristics (smooth, flake, burr knots)

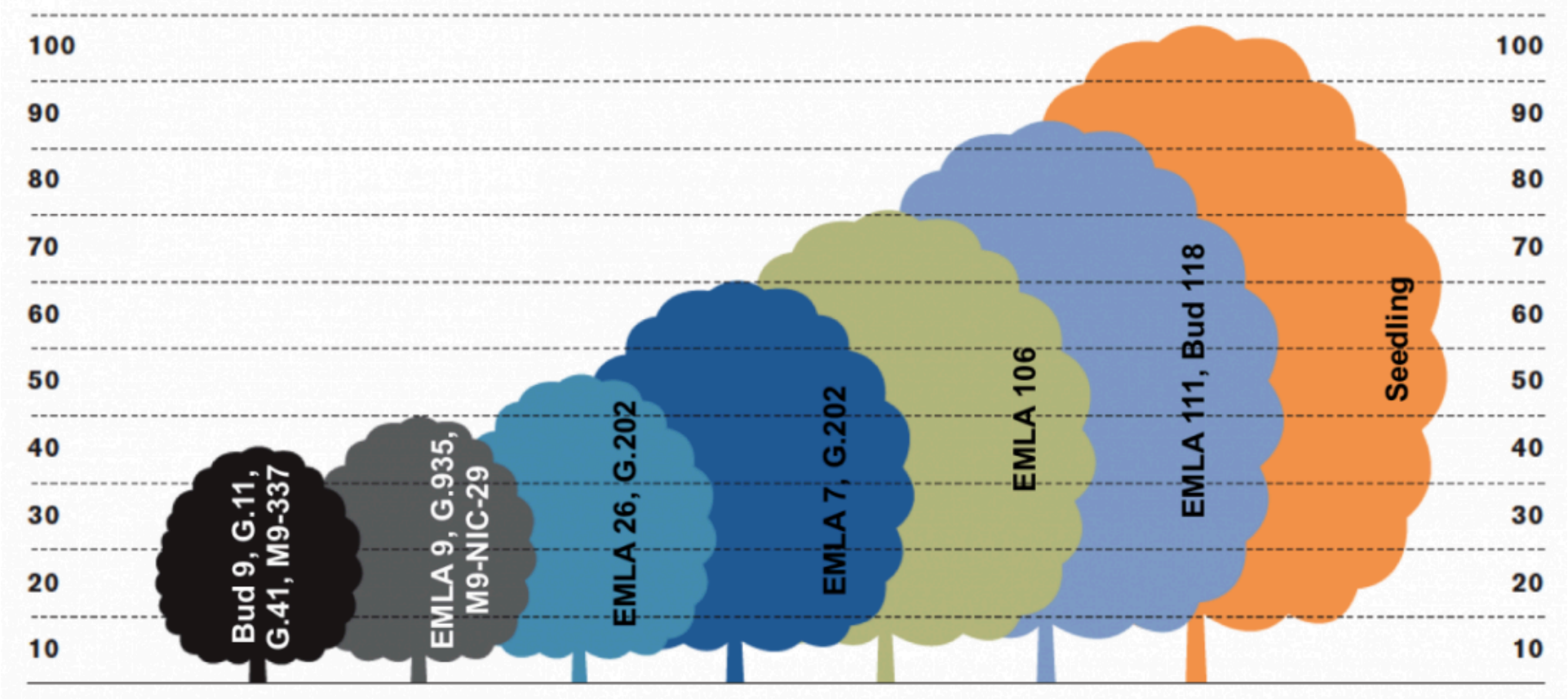
Tree size comparisons using different rootstocks based on percent size of standard apple seedling.



Apple rootstocks can have a variety of desirable characteristics including **tree size, crop load**

- Dwarfing and tree branching modifications
- Increased precocity (early fruitfulness)
- Increased productivity, tree spacing for light interception
- Tolerance to apple replant disease (ARD)

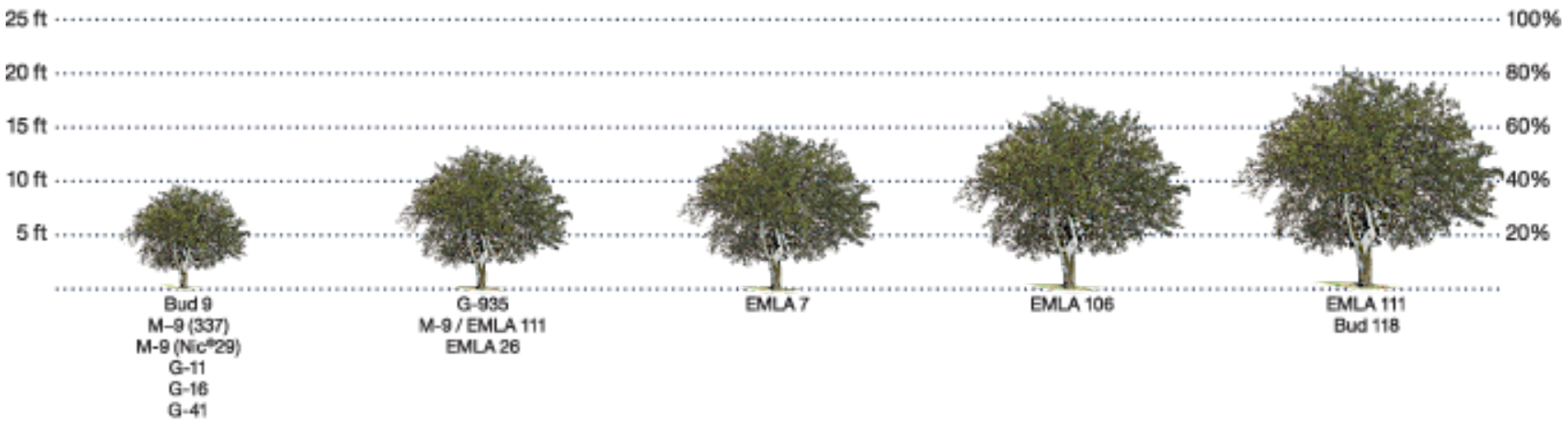
Tree size comparisons using different rootstocks based on percent size of standard apple seedling.



Apple rootstocks can have a variety of desirable characteristics including **resistance to**

- Crown rot oomycetes (Phytophthora spp.)
- Fire blight bacteria (Erwinia amylovora)
- Woolly apple aphids

Growth Characteristics of Apple Rootstocks



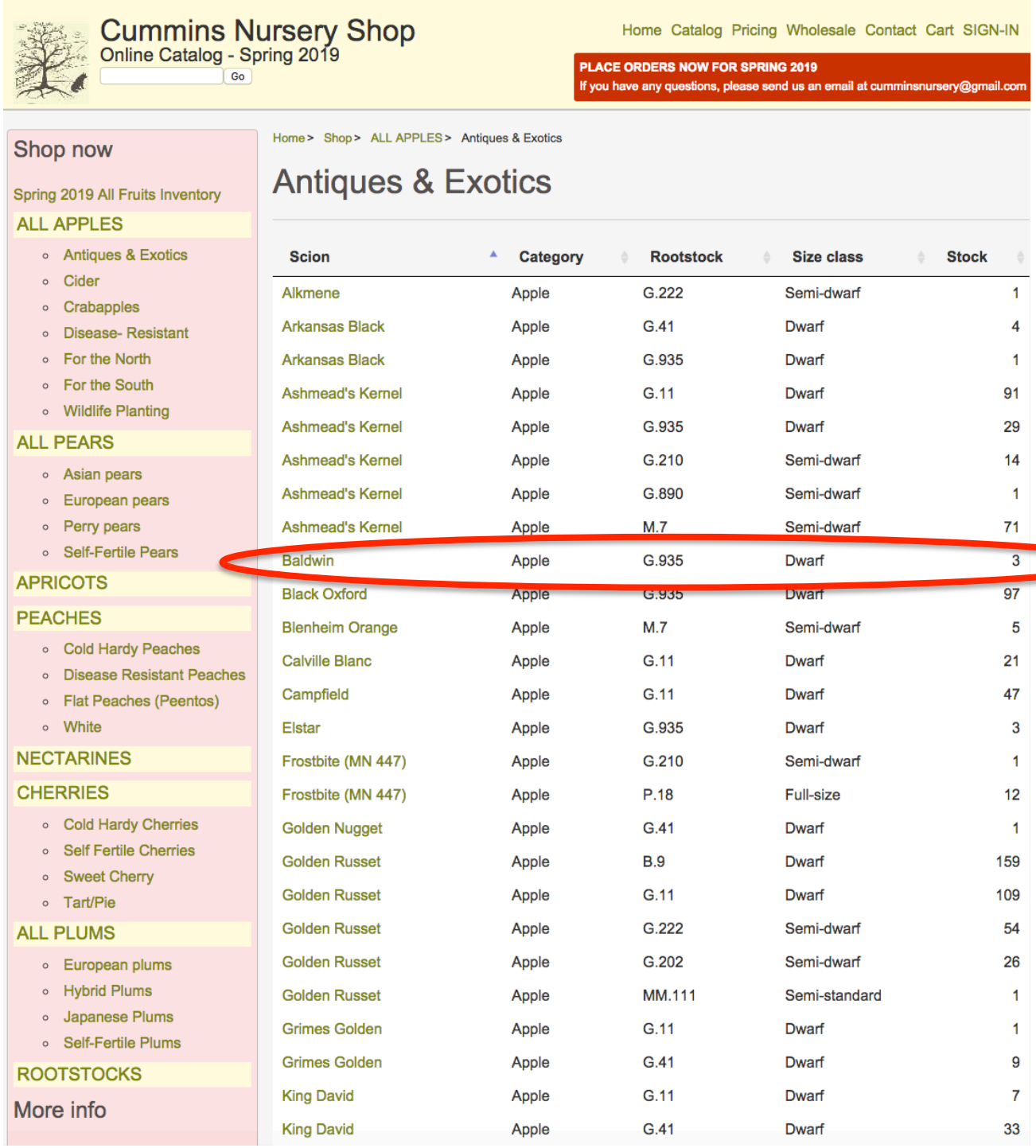
General Characteristics of GENEVA® Apple Rootstocks

- **Disease resistance**
  - o Fire blight
  - o Crown and root rots (Phytophthora)
  - o Apple Replant Disease Complex *
- **Pest resistance**
  - o Woolly apple aphid*
- **Other characteristics**
  - o All are dwarf types that differ within dwarf sizes
  - o Cold hardiness*

*Applies to some GENEVA® Apple Rootstocks.

Selected Current Licensees for Geneva Series Grafted Trees

- Cameron Nursery, LLC
- Consorcio Viveros Sacramento
- Copenhaven Farms
- **Cummins Nursery,** 1408 Trumansburg Rd, Ithaca, NY 14850
- Domaine deCastan, SAS
- Fruit growing Equipment and Service SRI
- Helios Nursery
- Janssen Brothers Nurseries Ltd.
- Kit Johnston Farms
- SAPO Trust
- SNC ELARIS
- Treco, Inc.
- Uni-Viveros
- **Wafler Nursery** 10748 Slaght Road, Wolcott, NY 14590 877-397-0874
- Willamette Nurseries, Inc.
- Willow Drive Nursery, Inc.



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White
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CHERRIES
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Self Fertile Cherries
Sweet Cherry
Tart/Pie
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Size class
Stock
Alkmene Apple G.222 Semi-dwarf 1
Arkansas Black Apple G.41 Dwarf 4
Arkansas Black Apple G.935 Dwarf 1
Ashmead's Kernel Apple G.11 Dwarf 91
Ashmead's Kernel Apple G.935 Dwarf 29
Ashmead's Kernel Apple G.210 Semi-dwarf 14
Ashmead's Kernel Apple G.890 Semi-dwarf 1
Ashmead's Kernel Apple M.7 Semi-dwarf 71
Baldwin Apple G.935 Dwarf 3
Black Oxford Apple G.935 Dwarf 97
Blenheim Orange Apple M.7 Semi-dwarf 5
Calville Blanc Apple G.11 Dwarf 21
Campfield Apple G.11 Dwarf 47
Elstar Apple G.935 Dwarf 3
Frostbite (MN 447) Apple G.210 Semi-dwarf 1
Frostbite (MN 447) Apple P.18 Full-size 12
Golden Nugget Apple G.41 Dwarf 1
Golden Russet Apple B.9 Dwarf 159
Golden Russet Apple G.11 Dwarf 109
Golden Russet Apple G.222 Semi-dwarf 54
Golden Russet Apple G.202 Semi-dwarf 26
Golden Russet Apple MM.111 Semi-standard 1
Grimes Golden Apple G.11 Dwarf 1
Grimes Golden Apple G.41 Dwarf 9
King David Apple G.11 Dwarf 7
King David Apple G.41 Dwarf 33

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- Perry pears
- Self-Fertile Pears

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- Cold Hardy Peaches
- Disease Resistant Peaches
- Flat Peaches (Peentos)
- White

NECTARINES

CHERRIES

- Cold Hardy Cherries
- Self Fertile Cherries
- Sweet Cherry
- Tart/Pie

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- Self-Fertile Plums

ROOTSTOCKS

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Sub-categories: Antiques & Exotics Cider Crabapples Disease- Resistant For the North For the South Wildlife Planting

Previous Next

Baldwin

Baldwin is also known as Woodpecker, Pecker and Butters. It was first discovered as a chance seedling in Wilmington, Massachusetts, USA, 1740. It was the most popular all-purpose dessert apple in the United States until it was killed during harsh winters between 1934-1935 and was replaced by McIntosh. The original tree died in the mid 1800's, but is marked by a monument to the Baldwin apple.

The apple is smaller than McIntosh, medium sized but dense and heavy, with yellow to flushed/striped brick red and bronze. This heirloom is crisp, juicy, with sweet to subacid flavor, aromatic, and firm. It is very hard and thick skinned, good for shipping. Good cider base, and great for pies. The fruit contains 13.64% sugar which ferments to 6% alcohol.

The tree is slow to bear, long-lived, and usually a productive and vigorous tree. Can tend towards biennial or even triennial production. Triploid. Susceptible to apple scap and Baldwin spot, but resistant to Cedar Apple Rust. Ripens in October in upstate New York and will keep till February. Hardy to zone 4.

G.935 Dwarf rootstock (40% of standard)

#1 grade	11/16 grade	9/16 grade	7/16 grade	5/16 grade	
Sold out	$27.75 each 4 in stock	Sold out	Sold out	Sold out	Add to cart

GENEVA® Apple Rootstocks

Traits	D1148 G.11	D1147 G.16	D3610 G.41[(a)]	D3539 *New!* G.213	D4950 G.214	D6263 *New!* G.814	D3609 G.935	D4190 G.222	D2737 G.202	D4951 G.969	D3785 G.30	D3540 G.210	D5107 G.890
Arranged in order by size (smallest to largest)	M.9 T337	M.9 T337	M.9 T337	M.9 T337	M.9/M.26	M.9/M.26	M.26	M.26	M.26	M.7	M.7	M.7	M.7/ MM.106
Woolly Apple Aphid Resistance	No	No	High	High	High	No	No	High	High	High	No	High	High
Fire Blight Resistance	Resistant	Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant	Very Resistant
Replant Disease Complex Resistance	Partial	Partial	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	No	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant
Crown and Root Rots (Phytophthora)	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant	Tolerant
Cold Hardiness	Yes	Partial: Good Mid-winter, Bad early-cold	Yes	TBD	Yes	Yes	Yes	Yes	Yes- Good, Mid-winter	Yes	Yes	Yes	Yes
Productivity/Yield Efficiency- as good or better than M.9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Low suckering and burr knots	Yes	Yes	Yes	Yes	Yes	Medium	Yes	Medium	Yes	Yes	Yes	Yes	Yes
Susceptibility to latent viruses	No	Yes	No	No	No	Yes	Yes	No	No	No	No	No	No

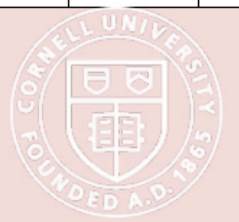
TBD: To Be Determined.

(a) Remarks: G.41 has presented weak graft unions with the following scions: Cripps Pink, Scilate, and Honeycrisp. The well feathered trees are prone to breakage in strong winds in the first 2-3 years and additional care needs to be taken to prevent breakage. Breakage risk decreases with time.

Recommendation: Use plant materials that have been tested and are "clean" of viruses.

Licensing for all varieties is available as exclusive or non-exclusive in selected Domestic and International Territories.

Chart data valid as of September 20, 2018, and supplied by Cornell University apple rootstock breeding team members, Gennaro Fazio, PhD., USDA Breeder, Terence Robinson, PhD, Cornell Breeder, and Herb Aldwinckle, PhD., Professor Emeritus.



USDA United States Department of Agriculture Agricultural Research Service

Esopus Spitzenburg apple

Features | Tasting | Photos | Reviews | Tree register | Buy

One of the great American apple varieties, thought to be Thomas Jefferson's favourite. Noted for its spicy flavour, and for its susceptibility to any and every disease afflicting apples.

Origins

- Species: **Malus domestica**
- Parentage: **Unknown**
- Originates from: **Esopus, New York, United States**
- Introduced: **Early 1800s**
- Orange Pippin Cultivar ID: **1193**
- UK National Fruit Collection accession: **1950-033**
- Some historical details taken with kind permission from 'The New Book of Apples' by Joan Morgan and Alison Richards , illustrated by Elisabeth Dowle, published by Ebury Press, 2002.

Identification

- Fruit colour: **Red / Orange flush**
- Flesh colour: **White to Cream, pale yellow**
- Flesh colour: **White to Greenish to Greenish Yellow**
- Flesh colour: **Yellow to Very Yellow**
- Fruit size: **Variable**
- Fruit size: **Small**
- Fruit size: **Medium**
- Fruit size: **Large**
- Fruit shape: **Round-conical**
- Fruit shape: **Conical**
- Fruit shape: **Long-conical**
- Fruit shape: **Oblong-conical**
- Bultitude apple group: **7. Flushed / striped, some russeting, sweet**

Using

- Uses: **Eat fresh**
- Uses: **Cooking**
- Uses: **Juice**
- Uses: **Drying**
- Flavour quality: **Exceptional**
- Flavour quality: **Very good**
- Flavour style: **Honeyed / Scented**
- Flavour style: **Sweeter**
- Flavour style: **Aromatic**
- Harvest period: **Mid-Late season**
- Harvest period: **Late season**
- Use / keeping: **3 months or more** Should be stored for at least a month before eating.

Growing

- Cropping: **Heavy**
- Flowering period: **Mid-Late season**
- Flowering group: **4**
- Fertility: **Self-sterile**
- Ploidy: **Diploid**
- Vigour: **Slightly large**
- Bearing regularity: **Biennial tendency**
- Gardening skill: **Some skill needed**
- Fruit bearing: **Spur-bearer**
- General disease resistance: **Poor**
- Period of origin: **1800 - 1849**

Climate

- Climate suitability: **Warm climates**
- Climate suitability: **Temperate climates**
- Climate suitability: **Tolerates cold winters**

Diseases

- Canker - Very susceptible
- Scab - Very susceptible
- Fireblight - Very susceptible
- Cedar apple rust - Some susceptibility

Relationships to other varieties

Offspring of this variety:

- Jonathan

Also known as

- Spitzenburg

References and further reading about this variety

- **Apples for the 21st Century**
  Author: Manhart
  Listed as Spitzenberg
- Some Antique Apples for Modern Orchards, (2008)
  Author: Merwin I.A.

Honeycrisp (votes: 181) - rating: 4.56

Fuji (votes: 160) - rating: 4.42

Granny Smith (votes: 152) - rating: 4.37

Red Delicious (votes: 151) - rating: 2.79

Jazz™ (votes: 149) - rating: 4.43

Gala (votes: 89) - rating: 4.02

Golden Delicious (votes: 85) - rating: 4.05

McIntosh (votes: 78) - rating: 4.56

Jonagold (votes: 77) - rating: 4.12

OUR TOP 10 MOST POPULAR VARIETY DESCRIPTIONS

View the list of our top 10 most popular variety pages.

Fruit Quarterly

Fruit Quarterly

Published by NYSHS New York State Horticultural Society

The Fruit Quarterly is printed 4 times a year, in the Spring, Summer, Autumn and Winter and is a joint effort of the New York State Horticultural Society, Cornell University's New York State Agricultural Experiment Station at Geneva, and the New York State Apple Research and Development Program.

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Update on New Apple Varieties, Managed Varieties and Clubs

Susan Brown and Kevin Maloney
Horticulture Section, School of Integrative Plant Science, Cornell University, Geneva, NY

Keywords: branding, apple marketing, apple cultivars, exclusive licensing, patents

This is the third in a series of updates on club varieties. Readers are encouraged to review the earlier series for additional information (Brown and Maloney 2009, 2013). In this article, we are stressing some of the managed or new varieties being tested in New York (such as 'Koru' or 'Smitten'), or those gaining attention on an international scale (such as the scab-resistant apples 'Natyra' and 'Bonita'). The trademarked or marketing names of the apples are used, and the varietal names follow, as the trademarked names are best known by consumers and growers. If you are interested in testing some of these selections, we encourage you to read the plant patent, which is available and may be downloaded from the US plant patent database at www.uspto.gov. Plant patents provide details that are not always featured in variety release notices. Where possible, the US plant patent number is included in the write-up. Anyone with comments on varieties they are testing, that differ from these reports, are encouraged to contact Susan at skb3@cornell.edu.

> "In this article, we are stressing some of the managed or new varieties being tested in New York, or those gaining attention on an international scale."

There are two commercialization entities detailed below, which provide information on new offerings on their website.
Midwestern Apple Improvement Association (MAIA): This group is best known for their 'EverCrisp' apple, but recently released more varieties. Contracts require a one- time payment, a $1 per tree royalty and trademark fees of 20 cents per tree in years four through 10; and 30 cents per tree in years 11 through 20. The website offers candid discussions on the strengths and weakness of the selections and varieties, and testers are encouraged to stay informed.

It is important to stress that brief descriptions of each variety may be based on MAIA test plot experiences over the last five years, so any discussions about field resistances should be interpreted with caution. Their Ortet newsletters are an excellent source of information. http://www.midwestapple.com/midwest-apple-improvement-association-about.htm

Arctic Apples: The first transgenic apples offered in the US, these apples have silencing of polyphenol oxidase (PPO), to reduce flesh browning after cutting. Three apples are available: 'Arctic Granny, 'Arctic Golden', 'Arctic Fuji', and an 'Arctic Gala' is in development. Further information is available at www.arcticapples.com/arctic-apples-r/arctic-apples-varieties/. A New York Fruit Quarterly article reviewed this technology (Xu 2013).

Apples in the News

'Antietam Blush': US plant patent 28,595 was granted in 2017. University of Maryland Professor Chris Walsh and then graduate student Julia Harshman were the creators. This apple is a hybrid of 'Cripps Pink' x an unknown advanced selection of 'McIntosh Wijcik' (columnar habit) x 'Gala'. It ripens about the first week of October and seems to tolerate the heat. The narrow canopy may reduce pruning needs.

'Autumn Glory' ('Huaguan'): A cross of 'Fuji' x 'Golden Delicious' made in 1976. 'Autumn Glory' is bi-color, with a striped red blush over yellow. The fruits are large and slightly ribbed. The flavor is sweet, with some reports of caramel and cinnamon notes, while others do not perceive those flavors. 'Autumn Glory' is exclusive to Domex Superfresh Growers® in Washington State. https://www.superfreshgrowers.com/our-fruit/apples/autumn-glory. Unfortunately, two samples purchased in Geneva NY on April 17 had internal disorders, yet this was traced back by the company to very young trees and a late harvest. Their customer service was excellent.

'Baker's Delight' (MAIA8): A 'Goldrush' x 'Sweet 16' cross, with a different flavor profile, with some suggesting a flavor similar to cherry or strawberry milkshakes. This apple tends to set a heavy crop, which may negatively impact its unique flavor profile. Fruits are medium in size and reported to have a tender texture. Fruits are said to hang well on the tree and be good for baking, due to sufficient acidity (Herrick 2017). MAIA8 ripens in early to mid-September — about a week after 'Honeycrisp'. Trees are available from Gurney's Seed and Nursery for the home market and commercially from Wafler Nursery (NY) and Early Morning Star Nursery (WA).

'Bonita': This scab-resistant variety from the Czech Republic is a hybrid of 'Topaz' x 'Cripps Pink' ('Pink Lady'®); it is being planted in Italy and represents 10% of new plantings. Bonita has 13°Brix and 0.7% titratable acidity and it ripens close to 'Golden Delicious'.

'Bravo' (ANABP-1): The marketing tag-line is "like no other". 'Bravo' is a cross of 'Royal Gala' x 'Cripps Red' (aka 'Sundowner') developed in Manjimup, Australia, 'There are 60 producers in Australia and testing is beginning in Singapore. 'Bravo' is an unusual, deep burgundy to black in color and has reduced flesh browning after cutting. It is sweet but with an acid balance. 'Bravo' is also late ripening, maturing about 2 weeks before 'Cripps Pink'. 'Bravo' has a narrow harvest window. The thicker skin is suggested to reduce bruising. https://www.fruitwest.com.au/bravo.htm

'Cosmic Crisp' (WA 38): USPP# 24,210 in 2014. This hybrid of 'Honeycrisp' x 'Enterprise' from Washington State University is set to make history in terms of rapid commercialization of an apple variety. 2019 will be the first commercial debut in supermarkets. The production goal of 10 million boxes within the first 5 years requires a massive push of new plantings. WA 38 has excellent storage and quality attributes. A team of researchers are aiding growers with recommendations on best practices for 'Cosmic Crisp'. All of this is detailed on the website. https://www.cosmiccrisp.com/the-facts/. Stay tuned!

'Crimson Snow': (AU): (MC28*) "Great Feeling" is the marketing tag-line. This chance seedling found in Australia will be managed by Kiku. Reported to have great coloration, white flesh and slow fresh browning after cutting. 'Crimson Snow' needs special production techniques to ensure annual bearing. http://www.kiku-partner.com/en/crimson-snow-mc38s/

'Crunch-a-Bunch' (MAIA7): USPP 29,126, granted in 2018. This yellow apple is an open-pollinated 'Honeycrisp' seedling, with 'Goldrush' suggested as a potential parent. Trees are prone to oversetting and can become biennial, but the quality is said to be retained with a heavy crop. That statement needs to be confirmed. This apple's flavor is said to have hints of pineapple and tropical fruits, and the fruits have a light texture. The patent for MAIA7 indicated that it is susceptible to powdery mildew and to soft rot (*Penicillium*) in storage.

'Dazzle' (PremA129): The US plant patent application was filed in 2016. The pedigree of PremA129 is 'NZ Queen'/'Scired' (which is a cross of 'Gala' x 'Splendour') x 'Sweetie' (a hybrid of 'Royal Gala' x 'Braeburn'). The cross was made in 1997. FruitCraft in New Zealand, formed by three of NZ's largest growers (Mr. Apple, Bostock and Freshmax) obtained the worldwide rights to premA129 from Prevar, Ltd. Fruitcraft is forecasting that 1 million cartons will be exported from NZ by 2028. 'Dazzle' is a large red and very sweet apple (Figure 1), with about 14.5°Brix and low acidity (0.26–0.32). More information may be found at www.dazzleapple.com.

Figure 1. 'Dazzle' apple (PreA129) [photo: FruitCraft, NZ]

'Envy' ('Scilate'): USPP in 2008. Tag line: "Bite and believe" and also "When you are this good they call you Envy." Envy has won the US Apple playoffs each year, yet many ask where can they find 'Envy' in the US. In searching the literature, 'Scilate' is not the easiest apple to grow, with reports of susceptibility to *Neonectria*, with infected trees sometimes symptomless (Amponsah et al. 2015). Reports submitted to Enza by researchers also mention russet and shrivel (Breen et al. 2008), bitter pit, and internal browning. Bulls eye rot infections are not frequent, but given it is a quarantine pathogen, it was studied proactively (Everett et al. 2017). Van Hooijdon et al. (2014) suggested specific pruning techniques to maximize fruit quality. https://envyapples.com/en/about-envy

'EverCrisp'® (MAIA1): USPP 24,579, granted in July 2014. This hybrid of 'Honeycrisp' x 'Fuji', resembles 'Fuji' and the quality is a mix of the parents, with excellent storage life. Comments from the patent and website include: russet extending out over stem cavity, with tendency to crack, modest susceptibility to watercore, susceptible to scab, powdery mildew, soft rot (*Penicillium*). Fire blight was reported in Massachusetts with MAIA1 on B9. Fruit are late ripening and tree vigor is low to medium. Calyx cracking (about 30%) was reported on 3rd-leaf trees in Maryland. There is excellent information on issues to watch for, as well as suggestions for mitigation, on the website. MAIA is partnering with the International Pome Fruit Alliance for global marketing rights.

'Gala' sports

'Foxtrot': USPP 24,664, July 2014. A whole-tree mutation of 'Tenroy Gala' with early ripening and intense coloration.

'Wildfire Gala'™ (PPAF): This sport is said to ripen 3 weeks earlier than standard 'Gala'. It is available from Helios Nursery.

'First Kiss' (MN 55): The name for MN 55 when grown in Minnesota. More details on this apple are covered in the 'Rave' section, the name used outside of Minnesota.

'Franklin' ('Mayo'): USPP 28,791. This partially russeted apple was named for its discovery in Franklin, VT. It is suggested for use by the sweet and hard cider industry, yet it is unclear how extensively it has been tested for horticultural attributes and cider production, so those interested in 'Franklin' might want to start with a small test planting.

'Honeycrisp' sports

'Cameron Select Honeycrisp': From Cameron Nursery in Washington State, this sport has redder color.

'Firestorm Honeycrisp': This sport is reported to color well, even in heat. Tree loss has been reported on Geneva 935 rootstock (Courtney 2017).

Honeycrisp (MINB42): USPP#26,644. This sport originated as a limb mutation in the University of Minnesota's research block. It is said to allow excellent red coloration in regions not prone to good coloring of 'Honeycrisp', with the patent indicating southern NY and Southern Pennsylvania as two such regions.

'New Zealand Honeycrisp': For retailers wanting 'Honeycrisp' at the end of the domestic crop, it is said to be superior to other sources (Wheat 2016).

'Premier Honeycrisp' (DAS 10): This sport received its US plant patent #24,833 in 2011. This sport ripens three weeks before 'Honeycrisp'. Available from Adams County Nursery.

'Royal Red Honeycrisp'™ (LJ-1000): This sport was discovered in Washington State and was granted USPP# 22,244 in November 2011. LJ-1000 is said to color earlier and have higher sugar than standard 'Honeycrisp'. 'Royal Red Honeycrisp'™ is offered exclusively by Willow Drive Nursery, and sales started in

http://nyshs.org/wp-content/uploads/2018/10/Brown-Pages-5-10-from-NYFQ-Book-Summer-5-27-2018.pdf

Site Selection

Soil

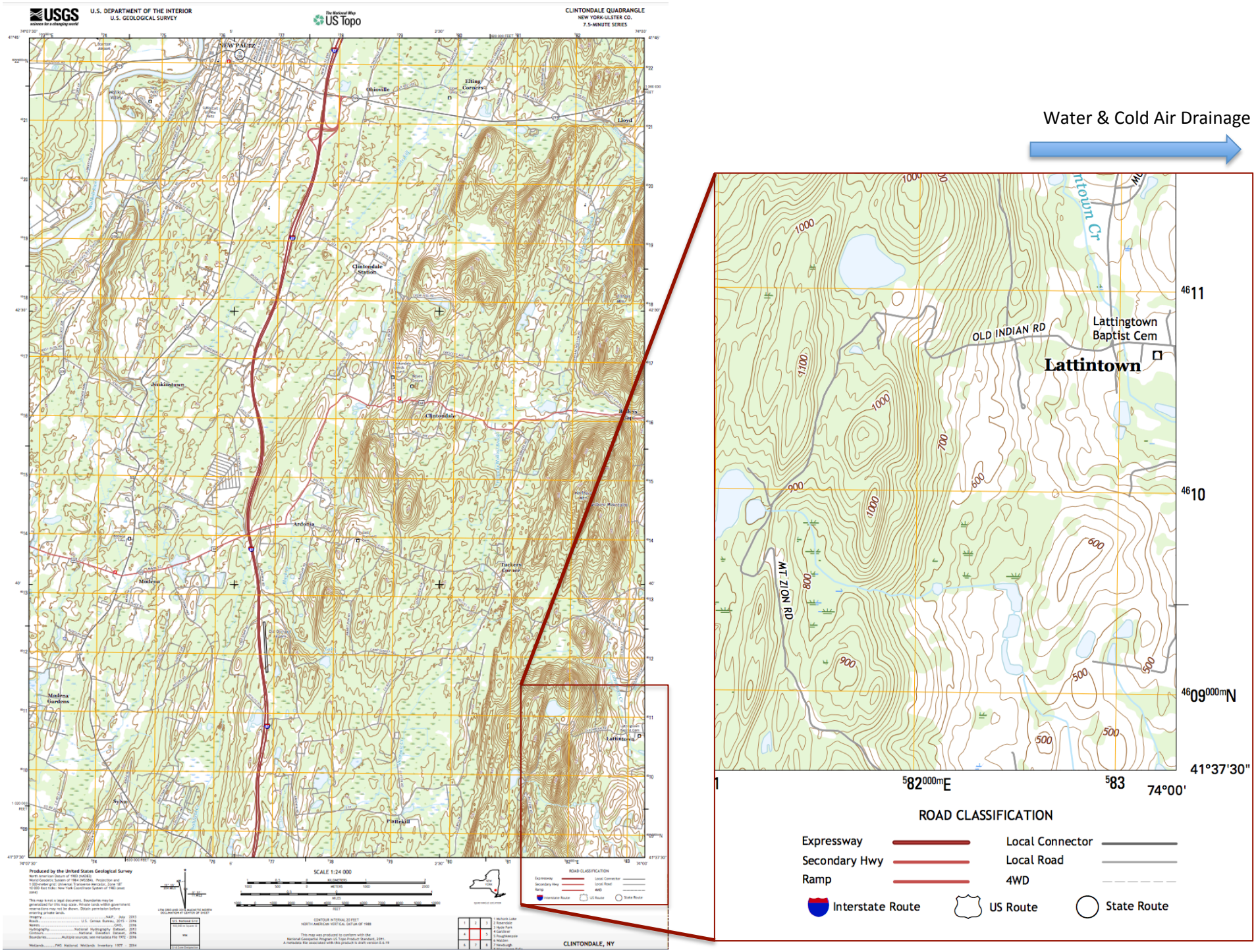
- USGS Mapping & Soil Definition
- Water Drainage

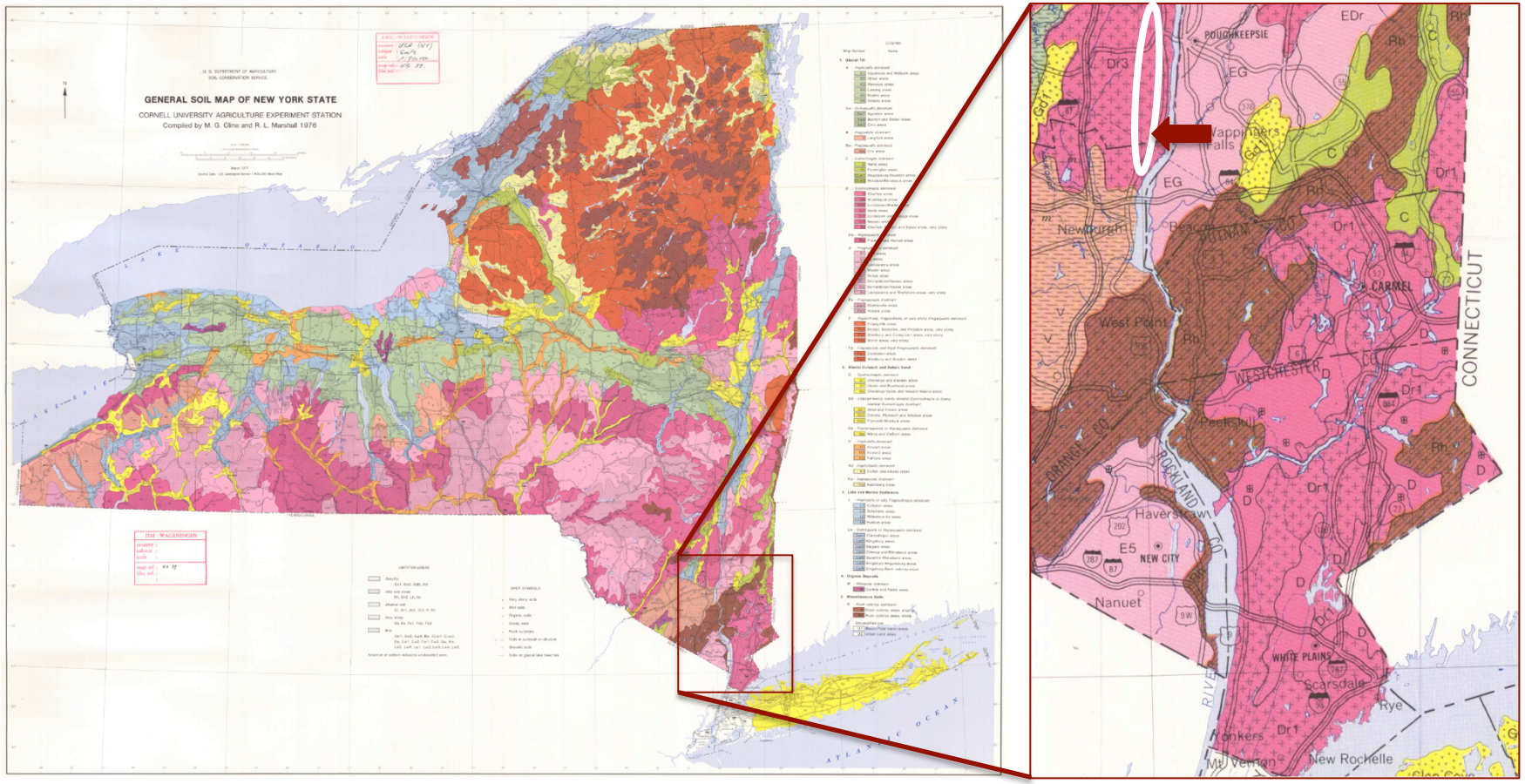
Slope

- Air Drainage

Orientation

- Sunlight
- Forest / ornamental deciduous & conifer tree shading
- North / South rows


USGS
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
US Topo
CLINTONDALE QUADRANGLE
NEW YORK-ULSTER CO.
7.5-MINUTE SERIES
NEW PALTZ
Ohioville
Eltings Corners
Lloyd
Clintondale Station
Jenkinsville
Clintondale
Ardonia
Tuckers Corner
Modena
Modena Gardens
Sylvia
Plattekill
Lattintown
Water & Cold Air Drainage
OLD INDIAN RD
Lattingtown Baptist Cem
Lattintown
MT ZION RD
4611
4610
4609000mN
582000mE
583
41°37'30"
74°00'
ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route
SCALE 1:24 000
CLINTONDALE, NY

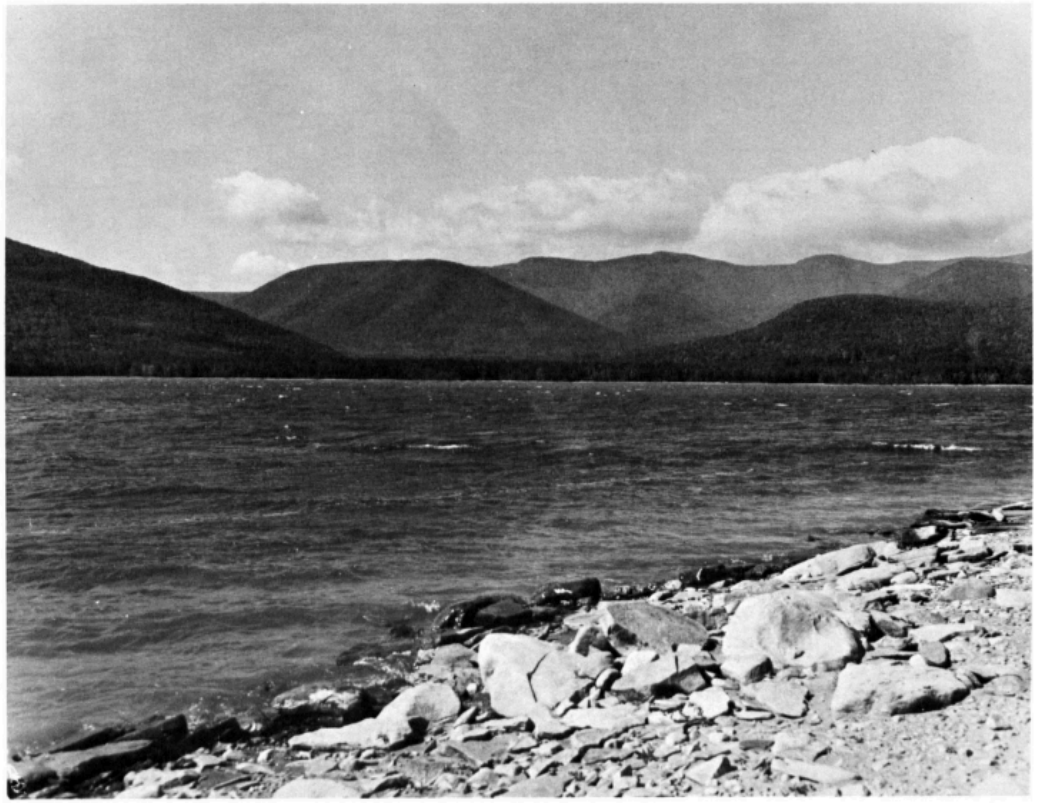


D - Dystrochrepts dominant

- D Charlton areas
- Dh Muskingum areas
- DhE Lordstown-Mardin areas
- Dr1 Hollis areas
- Dr2 Lordstown and Oquaga areas
- Dr3 Nassau areas
- Ds Charlton, Paxton, and Essex areas, very stony

SOIL SURVEY OF

Ulster County, New York



United States Department of Agriculture
Soil Conservation Service
in cooperation with
Cornell University Agricultural Experiment Station

Nassau series

The Nassau series consists of loamy-skeletal, mixed, mesic Lithic Dystrochrepts. These soils are shallow (fig. 11) and somewhat excessively drained. They formed in glacial till derived mainly from shale and slate. These soils are on bedrock controlled, glacially modified landforms. The bedrock is folded and tilted at various angles, and bedrock outcrops are common. These soils have a medium textured subsoil. Slope ranges from 3 to 65 percent, but is dominantly 8 to 60 percent.

Nassau soils are closely associated with the moderately deep, well drained to excessively drained Manlius soils and the deep, well drained Bath soils and moderately well drained Mardin soils. Nassau soils do not have the angular fragments and flagstones derived mainly from siltstone and sandstone that Arnot soils have. They have a lower base status and more coarse fragments in the solum than Farmington soils that are shallow to limestone bedrock.

Typical pedon of Nassau shaly silt loam, in an area of Bath-Nassau complex, 8 to 25 percent slopes, in the town of New Paltz, 2,300 feet northwest on Jansen Road from its intersection with N.Y. Route 32 and 20 feet north, in an apple orchard:

Ap—0 to 6 inches; brown (10YR 4/3) shaly silt loam; moderate fine granular structure; very friable; many fine roots; 25 percent shale fragments; strongly acid; abrupt smooth boundary.

B21—6 to 10 inches; yellowish brown (10YR 5/4) very shaly silt loam; weak very fine subangular blocky structure; very friable; many fine roots; many fine pores; 35 percent shale fragments; strongly acid; abrupt smooth boundary.

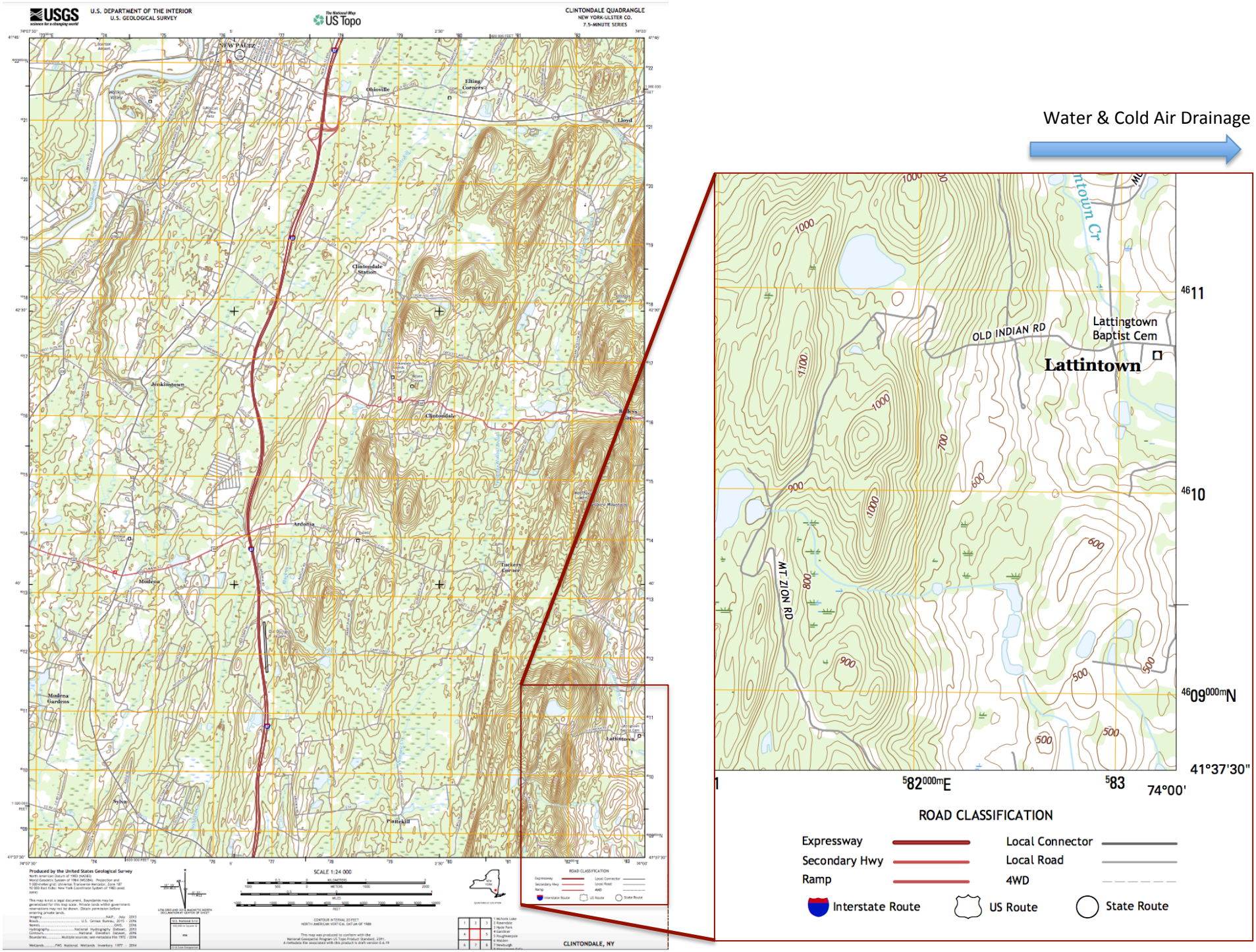
B22—10 to 16 inches; brown (7.5YR 4/4) very shaly silt loam; weak fine and medium subangular blocky structure; friable; many fine roots; many fine pores; 50 percent shale fragments; strongly acid; abrupt irregular boundary.

IIR—16 inches; dark gray (N 4/0) shale with cleavage planes tipped almost vertically.

The thickness of the solum ranges to a depth of 10 to 20 inches and coincides to the depth to bedrock. Rock fragments are derived mainly from shale and slate. They range from 15 to 50 percent, by volume, in the Ap horizon and from 35 to 70 percent in the B horizon. Reaction, in unlimed areas, is very strongly acid or strongly acid throughout.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. Structure is weak or moderate, medium or fine granular.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The fine earth is silt loam or loam. The B horizon has weak subangular blocky structure, or it is massive. Consistence is friable or very friable. In some profiles, a thin horizon above the bedrock has more than 90 percent loose shale fragments.


USGS
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Tuckers Corner
Modena
Modena Gardens
Sylvia
Plattekill
Lattintown
Water & Cold Air Drainage
OLD INDIAN RD
Lattingtown Baptist Cem
Lattintown
MT ZION RD
4611
4610
4609000mN
582000mE
583
41°37'30"
74°00'
ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route
SCALE 1:24 000
CLINTONDALE, NY

Site Selection

Soil

- USGS Mapping & Soil Definition
- Water Drainage

Slope

- Air Drainage

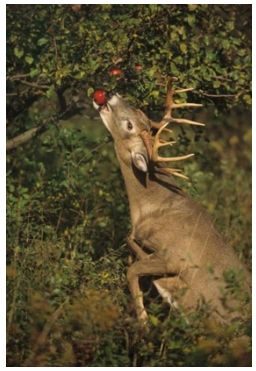
Orientation

- Sunlight:
  - Full all day sun, south slope ideal

- Forest / ornamental deciduous & conifer tree shading
  - Wildlife management
    - Deer Fencing
    - Grey Squirrel
    - Woodchuck
    - Birds

- North / South rows for best light penetration

- Maintain tree height to limit shading



Managing the Hudson Valley Insect Pest Complex Using Homeowner Toolbox

Insect Pest Biology & Management

The Hudson Valley Insect Pest Complex

Plum Curculio

Apple Maggot

European Apple Sawfly

Comstock Mealybug

Plant Bug Complex

*Tarnished Plant Bug

*Mullein Plant Bug

Leafhopper complex

*White Apple Leafhopper

*Rose Leafhopper

*Potato Leafhopper

Lepidopteran Complex

*American Plum Borer

*Apple Blotch Leafminer

*Codling Moth

*Cutworms

*Dogwood Borer

*European Corn Borer

*Green Fruitworm

*Lesser Appleworm

*Obliquebanded Leafroller

*Oriental Fruit Moth

*Redbanded Leafroller

*Sparganothis Fruitworm

*Spotted Tentiform Leafminer

*Tufted Apple Budmoth

*Variegated Leafroller

Scale Complex

*San Jose Scale

*Oystershell Scale

*Pernicola White Scale

Phytophagous Mite Complex

*European Red Mite

*Two Spotted Spider Mite

*Apple Rust Mite

Aphid Complex

*Woolly Apple Aphid

*Apple & Spirea Aphid

*Rosy Apple Aphid

Stink Bug Complex

The Hudson Valley Insect Pest Complex

Plum Curculio

Apple Maggot

European Apple Sawfly

Comstock Mealybug

Plant Bug Complex

*Tarnished Plant Bug

*Mullein Plant Bug

Leafhopper complex

*White Apple Leafhopper

*Rose Leafhopper

*Potato Leafhopper

Lepidopteran Complex

*American Plum Borer

*Apple Blotch Leafminer

*Codling Moth

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Scale Complex

*San Jose Scale

*Oystershell Scale

*Pernicola White Scale

Phytophagous Mite Complex

*European Red Mite

*Two Spotted Spider Mite

*Apple Rust Mite

Aphid Complex

*Woolly Apple Aphid

*Apple & Spirea Aphid

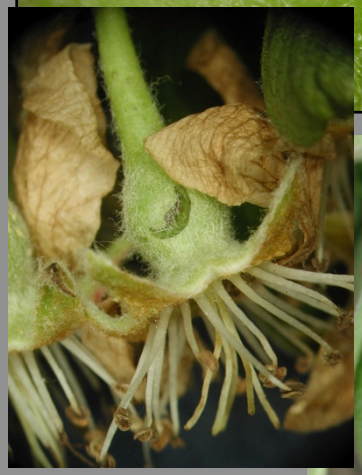
*Rosy Apple Aphid

Stink Bug Complex

SEASONAL ACTIVITY OF 3 MAJOR PESTS OF APPLES IN THE HUDSON VALLEY OF NEW YORK STATE

April May June July August Sept. Oct.

H. Reissig



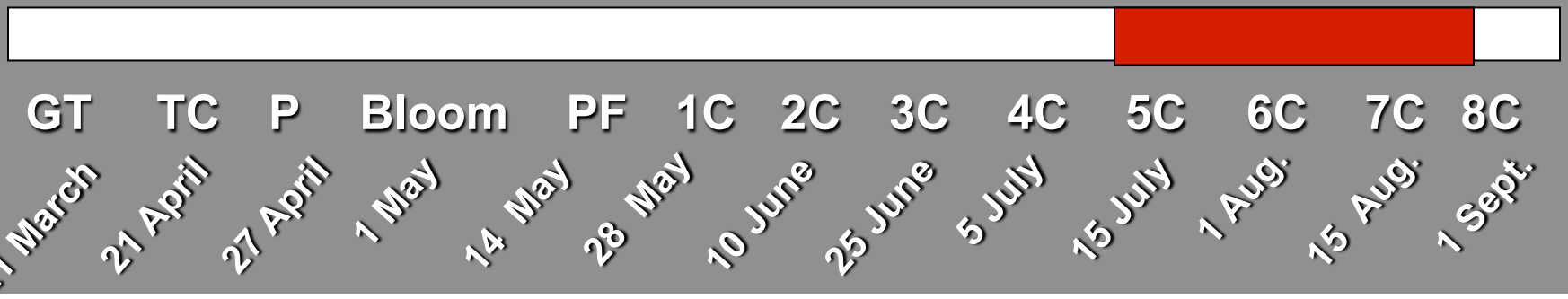
Plum Curculio

- Adult overwinter in woodland, stone walls
- Adults emerge after 2-3d @ 70°F
- Migrate into orchard from bloom to 2C
- Adults cut and lay eggs in fruitlet
- Can cause up to 100% fruit injury & drop

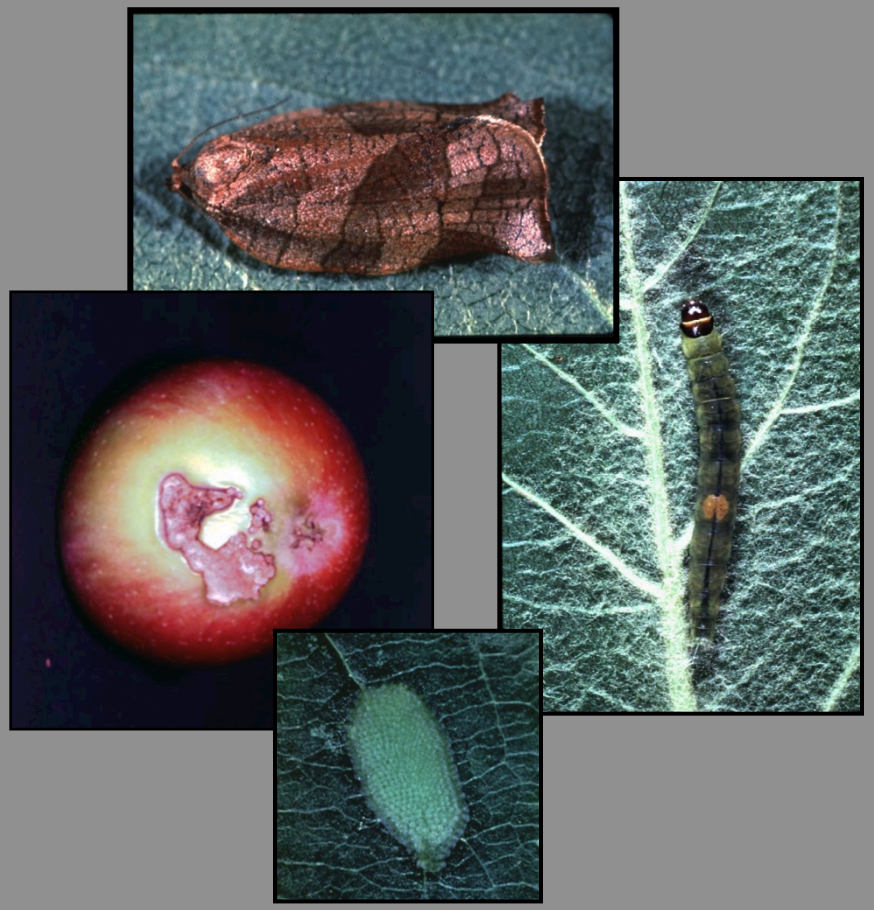
- Management: pre-bloom – 2C
  - 2-3 appl. of pyrethroid, carbaryl
  - End applications at 308 DD 50°F

Apple Maggot

- Overwinters as pupa in the soil
- Adults emerge in June in moist soil
  - Adults feed for 7-10 d prior to mating and egg laying into fruit
  - Individual eggs are lain within fruit
  - Developing larva feed on the interior flesh of the apple causing oxidized trails ('Trail Worm')
  - Management: Carbaryl & Pyrethroid

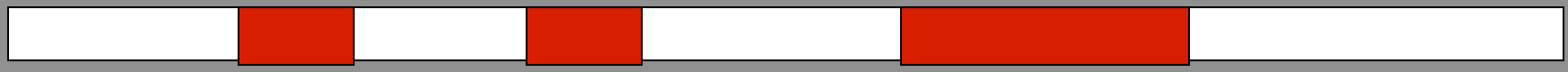


Obliquebanded Leafroller

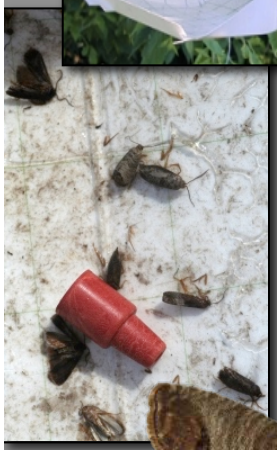


- Overwinter as a late instar larva that causes injury to fruit through bloom to 1C
- Adults emerge in June, mate and and begin egg laying
- Larva emerge 350 DD base 43F after first adult sustained flight (biofix)

- Management: Bt at bloom, low rate multiple applications



GT	TC	P	Bloom	PF	1C	2C	3C	4C	5C	6C	7C	8C
	21 April	27 April	1 May	14 May	28 May	10 June	25 June	5 July	15 July	1 Aug.	15 Aug.	1 Sept.

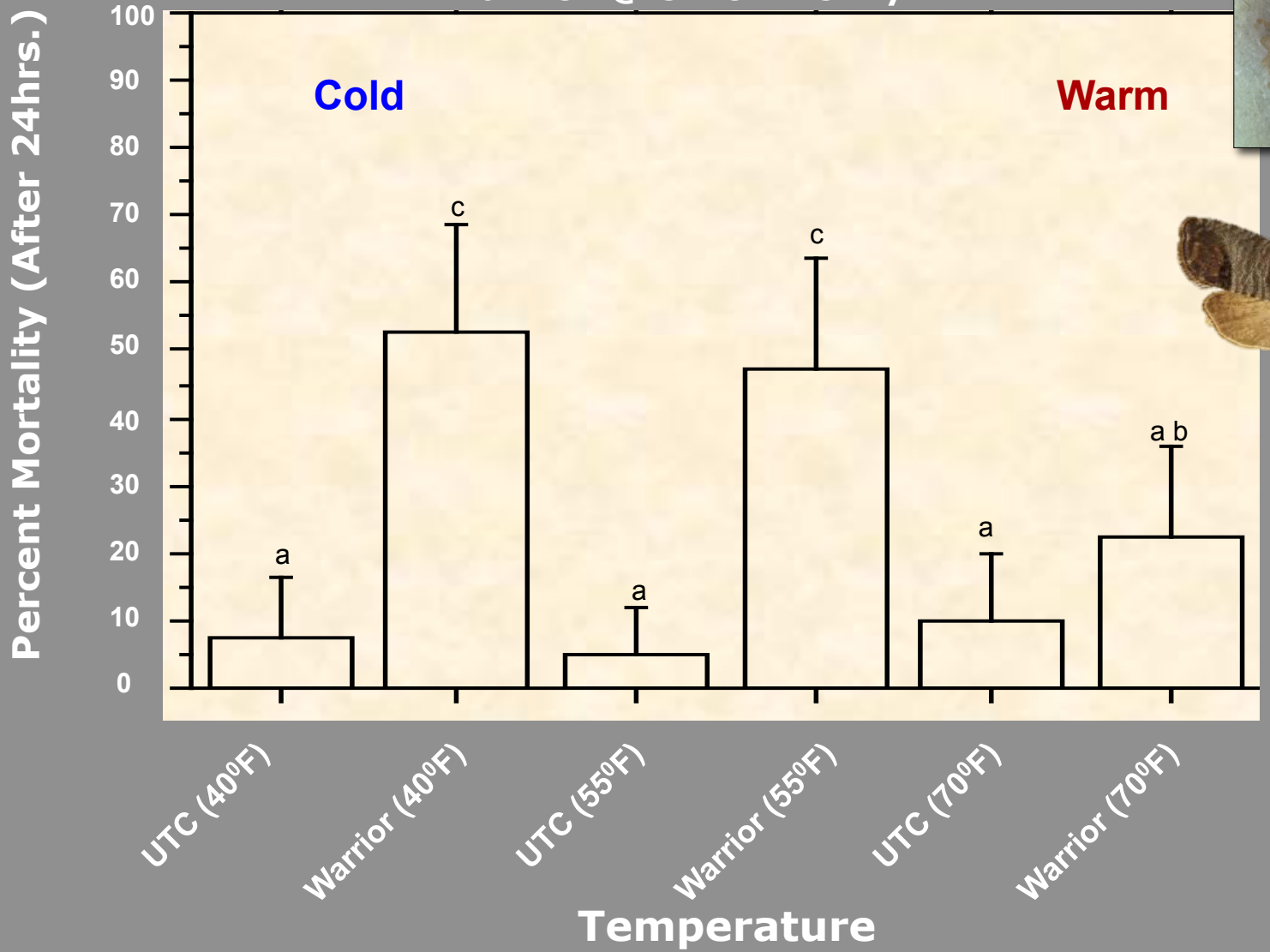


Codling Moth, *Cydia pomonella*

- Overwinters as pupa under tree bark
- Adults emerge during late bloom
- Eggs are lain on foliage and fruit
- Larva evacuate fruit skin as they burrow
- Then feed directly on seeds in carpels
  - Management: Granulosis virus plus mating distruption at first hatch
    - Use NEWA modeling to obtain timing of CM hatch

Codling Moth Larvae Bioassay (UTC susceptible 'Benzon' Colony)
NYSAES, Highland NY 2009[1]

Warrior @ 0.16 fl. oz. /A

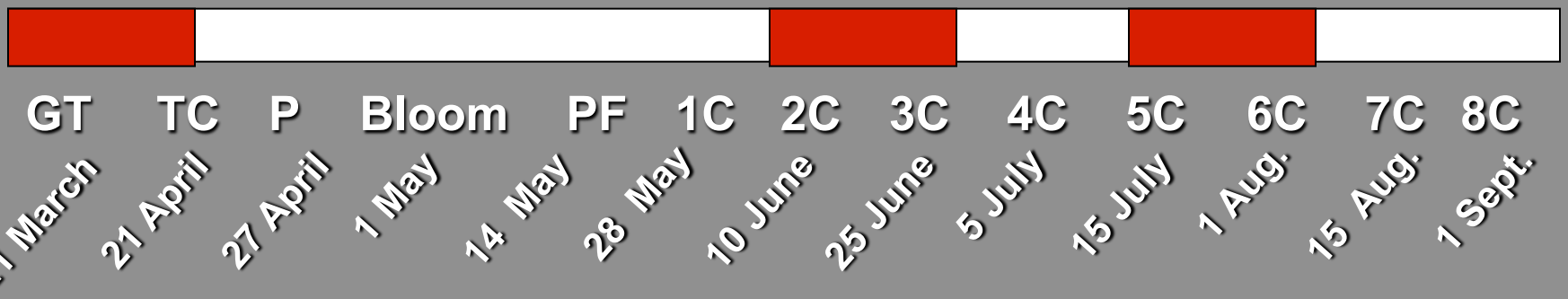


[1] Bioassay conducted on 1st instar codling moth larva topically treated with 1µL droplet of lamda-cyhalothrin at 0.0005 µg A.I./ 1000 mL or 0.0005 ppm [**3% of the labeled field rate**] placed in temperature controlled chambers over 24 hours. (df = 3, F-value = 8.648, P-value = 0.0001).

San Jose Scale

- Overwinter as adult on bark
- Adults produce live young
- Crawlers emerge at 2C
- Damage fruit & bark cambium

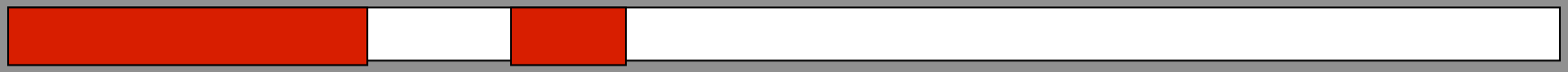
- Management: pre-bloom
  - 1% Horticultural oil



Rosy Apple Aphid

- Overwinter as eggs
- Adults produce live young
- Begin feeding on folage and developing fruit clusters
- Damage fruit post bloom

- Management @ Pink
  - Pyrethroids



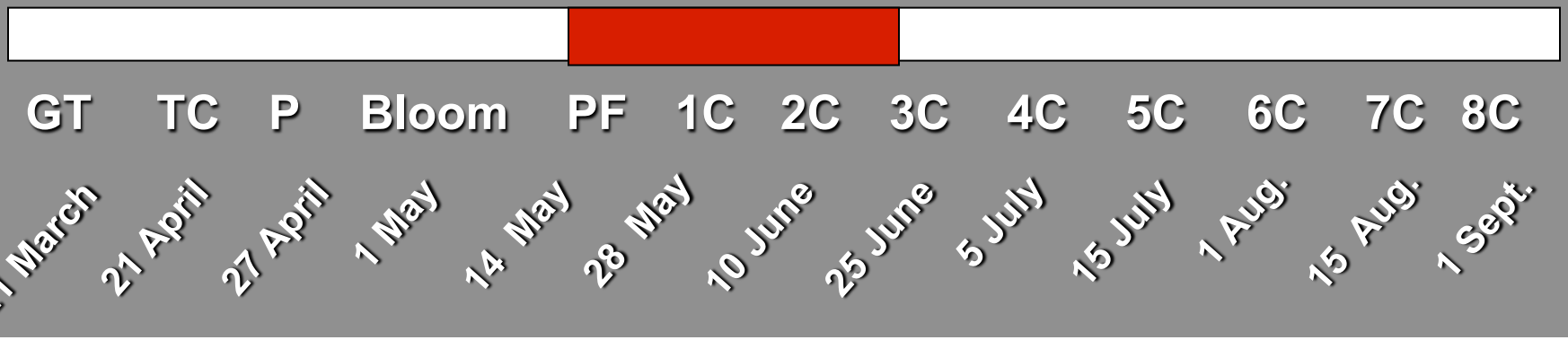
GT TC P Bloom PF 1C 2C 3C 4C 5C 6C 7C 8C

21 March 21 April 27 April 1 May 14 May 28 May 10 June 25 June 5 July 15 July 1 Aug. 15 Aug. 1 Sept.

Green Aphid Complex

- Overwinter as eggs
- Adults produce live young
- Begin feeding on folage and developing fruit clusters during spring & summer
- Produce blackened leaves

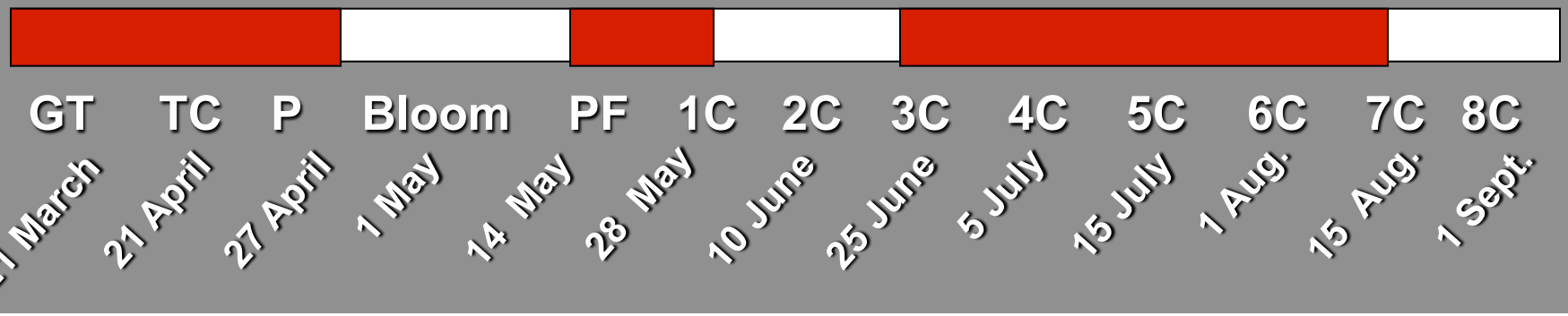
- Management @ Pink
  - Pyrethroids
- Management @ PF and summer
  - Azadirect



European Red Mite

- Overwinter as egg
- Motiles emerge pre-bloom
- Adults after bloom cause foliar injury
- High populations with increasing temperatures >80^{o}F & drought
- Reduced fruit size, color, Lf. bronzing

- Management Pink, Petal Fall, 1-2C:
  - Horticultural Oil @ 1%
  - Avermectin plus 0.25% oil



Tarnished Plant Bug

- Nymphs / adults cause fruit injury beginning at tight cluster with 2d above 75°F
- Pre-bloom – 15mm fruit size
- Scout: yellow sticky cards, flowers
- Feeding and oviposition in fruit

- Management: Pre-bloom, @ Petal Fall, 1C:
  - Pyrethroids

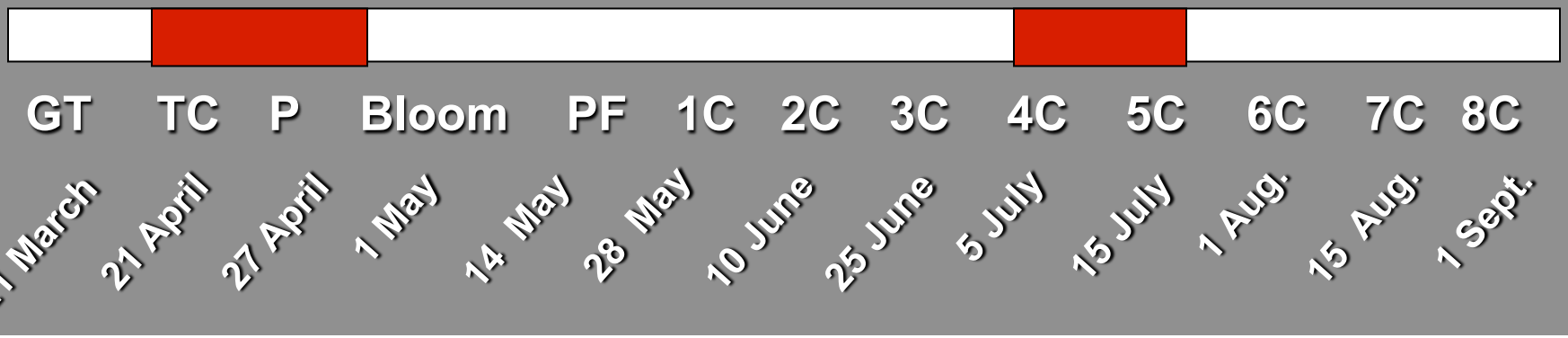
GT TC P Bloom PF 1C 2C 3C 4C 5C 6C 7C 8C

21 March 21 April 27 April 1 May 14 May 28 May 10 June 25 June 5 July 15 July 1 Aug. 15 Aug. 1 Sept.

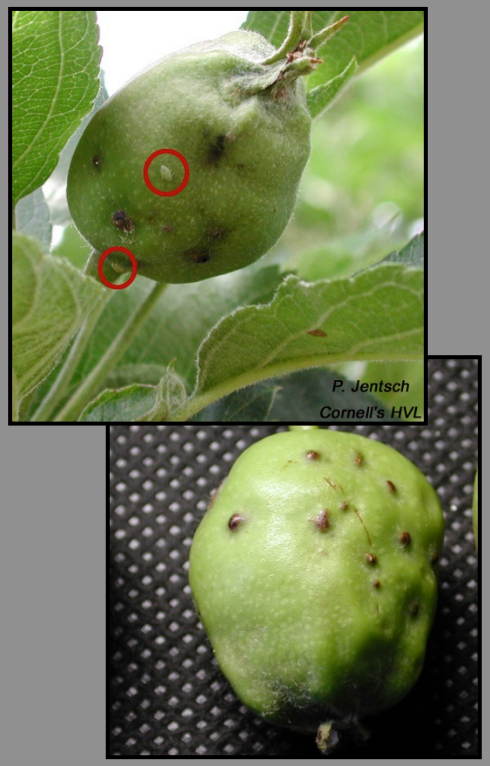
Dogwood Borer

- Overwinter as larva beneath bark
- Adults emerge at 2C
- Girdles bark cambium
- Adults lay eggs in bark scales

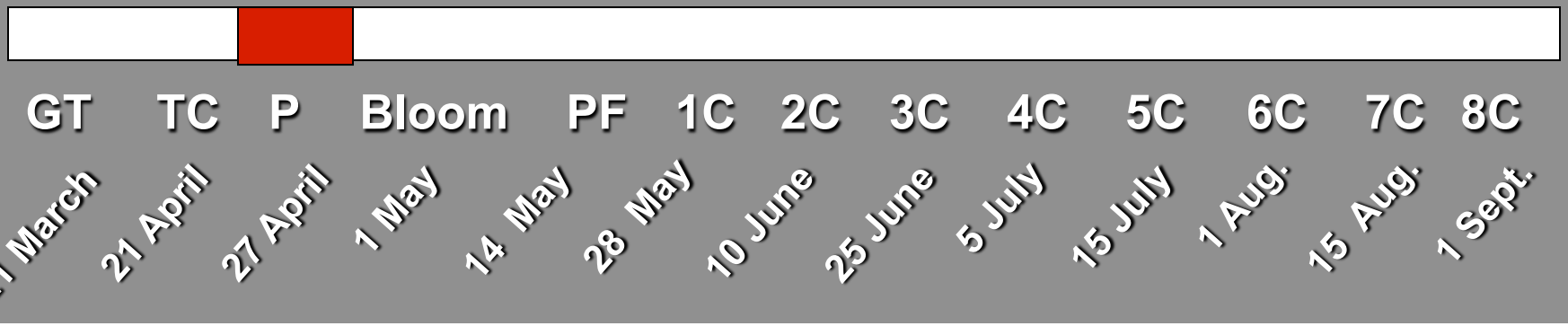
- Management: pre-bloom
  - Multiple appl. of neonicotinoid or Spinosad (Spintor)



Mullein Plant Bug Campylomma verbasci (Meyer)
Apple Brown Bug Atractotomus mali (Meyer)

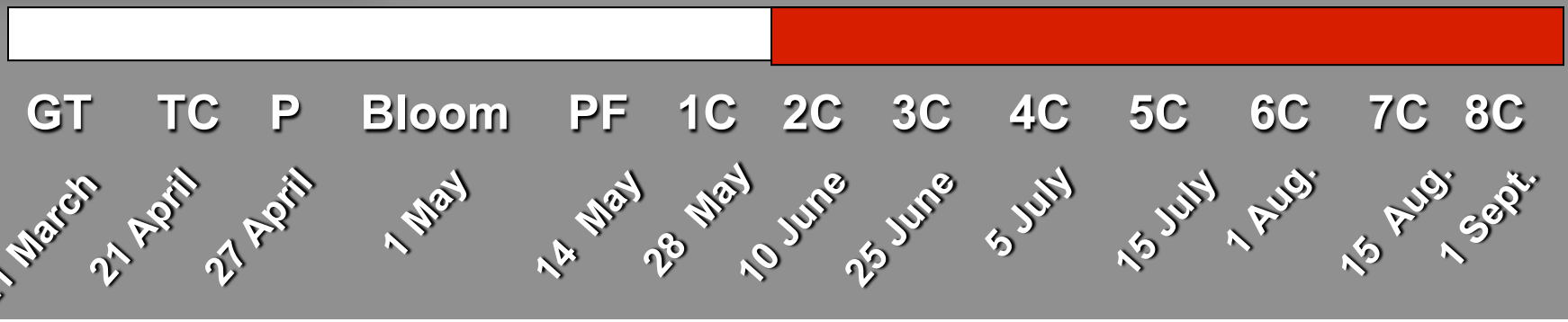


- Sporadic orchard pests on both pear and apple. Both species occur simultaneously; collectively called “mirid bugs”.
- Pre-bloom, they are considered beneficial, feeding on mite and aphid species.
- Management: Pyrethroid at Pink



Green Stink Bug *Acrosternum hilare* (Say). Brown Stink Bug *Euschistus servus* (Say)

- Sporadic orchard pests on both pear and apple. Most often occurs on Hudson Valley fruit late in the season during dry periods or drought.
- Management: Pyrethroid upon scouting for adults.




Eggs
Feeding damage

Stink Bug Injury To Pear

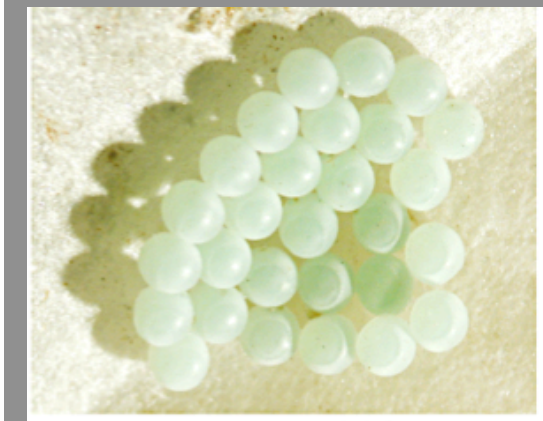
Stink Bug Injury To Apple
Typically To Shoulder Of Fruit

Depressions With Ccorking Up
To The Skin Surface

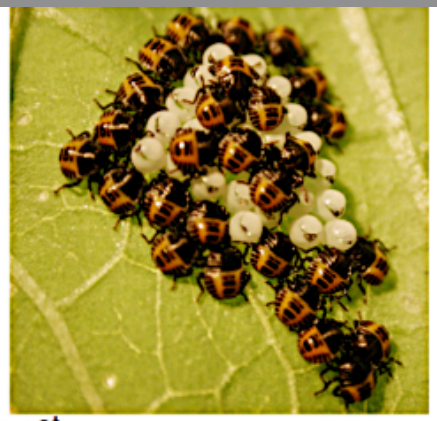
Brown Marmorated Stink Bug, *Halyomorpha halys* Stål

- Overwinter as adults
- 1-2 generations / year
- Eggs lain late May
- Nymphs and adults feeds on leaves, branches and through skin of fruit
- Causines dimpling, corking

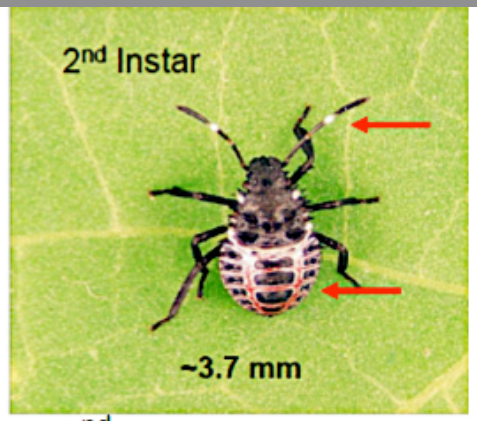
- Management: pyrethrouds



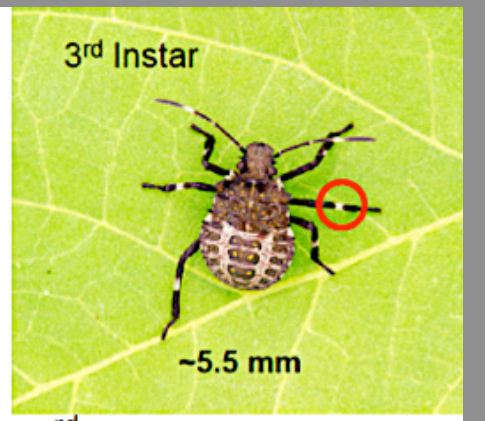
Eggs: Average 28/cluster; light green to white



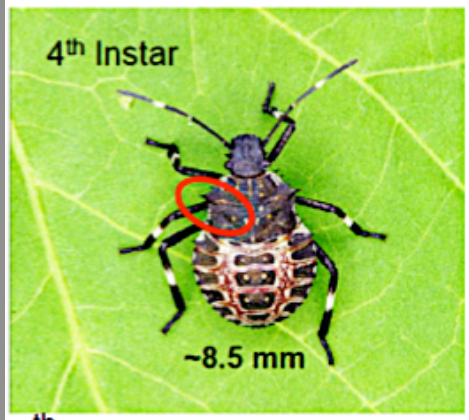
1st instar: black & red; cluster near eggs



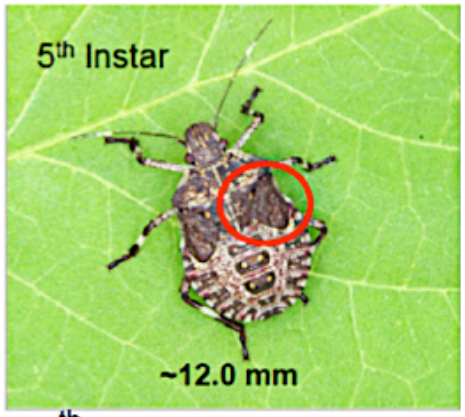
2nd instar: striped antennae



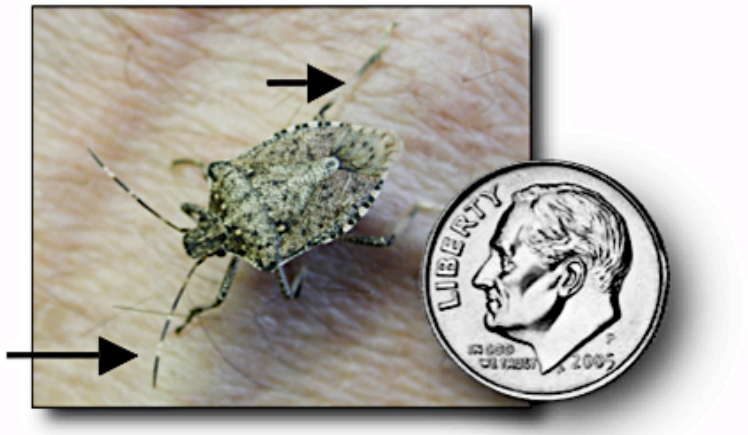
3rd instar: striped antennae and legs



4th instar: thoratic spur striped antennae & legs



5th instar: wing pads striped antennae & legs



BMSB Adults: red eyes, 4 cream colored dots on shoulders; banding on legs and antenna, smooth blunt shoulders. Banded abdomen; 14 -17 mm in length.

Homeowner Insecticides Available Locally In Stores or Internet Based Suppliers (Amazon and Direct Distributors.

IPM Commercial

- Organophosphates
- Carbamates
- Pyrethroids
- Spinosad
- Neonicotinoids

Biologicals

- Bt's (Bacterial)
- Fungi (Beauvaria)
- Virus (CM Granulosis)
- IGR (Insect Growth Regulators)

Barrier Films

- Horticultural Oil
- Kaolin Clay

Malathion: Bonide

Broad Spectrum

Organophosphate insecticide

ACTIVE INGREDIENT:

Malathion .... (CAS No. 121-75-5) . 50.00%

OTHER INGREDIENTS: 50.00%

TOTAL: 100.00%

This product contains petroleum distillate.

1 gallon contains 4.37 lbs. of malathion

EPA Est. No. 4-NY-1 EPA Reg. No. 4-99

Crop	Insects	When to Apply	Amount/Gal. Water	Comments
Apples	Woolly apple aphid, bud moth, Forbes scale, green apple aphid, rosy apple aphid, mealybug, codling moth, plum curculio, red banded leaf roller, tent caterpillar	Start to spray early in season. Make up to 2 applications per year - at least 7 days apart. Do not spray during blossom period. Do not apply within 1 day of harvest.	½ to 1½ fl. oz. to cover 1,000 to 3,500 sq. ft.	Do not exceed 1½ fl. oz./1000 sq. ft. per single application. May cause injury to Cortland and McIntosh varieties.
Apricots	codling moth, orange tortrix, terrapin scale, soft brown scale, aphids	Start to spray early in season. Make up to 2 applications per year – at least 7 days apart. Do not spray during blossom period. Do not apply within 6 days of harvest.	½ to 1½ fl. oz. to cover 1,000 to 3,500 sq. ft.	Do not exceed 1½ fl. oz./1000 sq. ft. per single application.
Cherries	black cherry aphid, fruit tree roller, cherry fruit fly, bud moth, mealy plum aphid	Start to spray early in season. Make up to 4 applications per year – at least 3 days apart. Do not spray during blossom period. Do not apply within 3 days of harvest.	½ to 2 fl. oz. to cover 1,000 to 3,500 sq. ft.	Do not exceed 2 fl. oz./1000 sq. ft. per single application.
Peaches	oriental fruit moth, plum curculio; green peach, black cherry, black peach, rusty plum aphids, Japanese beetle; terrapin, cottony peach scales	Start to spray early in season. Make up to 3 applications per year – at least 11 days apart. Do not spray during blossom period. Do not apply within 7 days of harvest.	1 to 3 fl. oz. to cover 1,000 to 3,500 sq. ft.	Do not exceed 3 fl. oz./1000 sq. ft. per single application.

Carbaryl: 22.5% (Lowes/ Home Depo)

- <u>Insecticide & Apple Crop Load Reduction*</u>
- Pink (P) Plum Curculio, Leafroller
- Petal Fall (PF) Plum Curculio, Leafroller
  - 2 appl. At 10d intervals (1st & 2nd Cover)

* May overthin some varieties including Cortland

Imidacloprid: Translaminar / Systemic Soil Drench

SOIL DRENCH TO APPLE, PEAR, PEACH, PLUM, CHERRY AND PECAN TREES Cont.

For best results, use this product as part of a preventative treatment program before insect damage occurs. Use one soil drench treatment per year during early spring to early fall. This product can be applied anytime except when the ground is saturated or frozen. These conditions will make movement of the product down into the root zone difficult. When applying this product during dry periods, generously water the tree or shrub the night before treatment.

RESTRICTIONS:

- Do not apply pre-bloom or during bloom or when bees are foraging.
- Do not apply to soil that is frozen or waterlogged.
- **For apple, pear, peach, plum and cherry - A.** Allow twenty-one (21) days between the final application and harvest. **B.** Do not apply more than 3 gallons of this product per acre per year.
- **For pecans - A.** Allow seven (7) days between the final application and harvest. **B.** Do not apply more than 3.2 gallons of this product per acre per year.

Trees that are already heavily infested may not survive due to the existing pest damage and the resulting stress.

Determining Amount of This Product to Use

Measure the circumference (distance around the tree trunk) in inches at chest height or at 4.5 feet from the soil using a flexible tape. Or, measure the diameter of the tree trunk in inches at chest height or at 4.5 feet from the soil.

Mix 1 oz. of this product per inch of circumference of the tree trunk to one (1) gallon of water. Refer to the mixing chart for the amounts of this product needed.

How to Apply

Apply the solution to the root zone as a band around the base of the tree. Apply one (1) gallon of solution in a circular band from the base of the tree outward for two (2) feet. For trees with trunk diameters more than 16 inches at chest height, apply two (2) gallons of solution in a circular band from the base of the tree outward for three to four (3-4) feet.

Imidacloprid: Translaminar / Systemic Soil Drench

ACTIVE INGREDIENT:

Imidacloprid	1.47%
OTHER INGREDIENTS	98.53%
TOTAL	100.00%

EPA Est. No. 4-NY-1 EPA Reg. No. 53883-205-4

Pests Controlled		
Adelgids	Bronze Birch, Alder Borers, and Emerald Ash Borers)	Pine Tip Moth Larvae
Aphids	Japanese Beetles (adult)	Psyllids
Armored scales (suppression)	Lacebugs	Royal Palm Bugs
Black Vine Weevil Larvae	Elm Leaf Beetles	Sawfly Larvae
Borers: Roundheaded Borers (incl. Eucalyptus Longhorned Borers and Asian Longhorned Beetles)	Viburnum Leaf Beetles	Soft Scale (suppression)
	Leafhoppers	Thrips (suppression)
	Leafminers	White grub larvae
Flatheaded Borers (incl.	Mealybugs	Whiteflies

Permethrin:
Pyrethroid Broad Spectrum

ACTIVE INGREDIENT:
Permethrin . . (Cas No. 52645-53-1) . . .2.50%
OTHER INGREDIENTS: 97.50%
TOTAL 100.00%
EPA Est. No. 4-NY-1 EPA Reg. No. 4-408

FRUIT & NUT TREES

USE DIRECTIONS
Use 2 fl. oz. in 1 gal. of water. Apply when insects appear. Wet the plants to the dripping point. Try to hit underside of leaves and penetrate dense foliage.

	Pests:	How to use:
Almonds, Pecans	Navel orangeworms, Peach twig borers	Do not make more than 2 applications during hull split and 5 applications per season. Can be applied up to 7 days prior to harvest.
Apples	Green fruitworms, Aphids, Leafrollers (Oblique-banded, Redbanded), Plum curculio, Rosy apple aphids, Spotted tentiform leafminers, Tarnished plant bugs, White apple leafhoppers, Japanese Beetles	Repeat as required to maintain control. Do not make more than 3 applications. Do not apply after petal fall.
Peaches	Borers (Lesser peachtree, Peach twig), Green fruitworms, Plum curculio, Oriental fruit moths, Tarnished plant bugs	Do not apply within 7 days of harvest. Do not make more than 8 applications per season.
Pears (dormant through delayed dormant)	Pear psylla	Apply during the dormant through delayed dormant growth period only. Do not make more than 2 applications per season.
Pears (summer)	Codling Moths, Green fruitworms, Pear psylla, Aphids	Do not make more than 3 applications per season. Can be applied up to 14 days prior to harvest.

Lowes/ Home Depo
Zeta-cypermethrin: 0.35%
14 DTH

Pest Complex:
Apple Maggot, Codling Moth, European Apple Sawfly, Green Fruitworm, Japanese Beetle, Lesser Appleworm, Oblique Banded Leafroller, Oriental Fruit Moth, Pandemis Leafroller, Pear Psylla, Plum Curculio, Potato Leafhopper, Redbanded Leafroller, Rosy Apple Aphid, Spirea Aphid, Spotted Tentiform Leafminer, Stink Bugs, Tarnished Plant Bug, Tufted Apple Bud Moth, Variegated Leafroller, White Apple Leafhopper

$49.97 / gallon

Spectracide Malathion Insect Spray Concentrate

Lowes/ Home Depo

Malathion: 50 %

Pest Complex:
Aphids
Red Spider Mites
Mealybugs
Thrips
Scale

Peaches only:
Make up to 3 applications per year
- 11 days apart.
- Do not apply within 7 days of harvest.

ACTIVE INGREDIENTS
Malathion50%
Other Ingredients*50%
Total:100.00%
*Contains Xylene range aromatic solvent.

Spinosad: Lepidopteran Insecticide

Kills bagworms, borers, beetles,

caterpillars, codling moth, gypsy moth, loopers, leaf miners, spider mites, tent caterpillars, thrips

ACTIVE INGREDIENT:
spinosad (a mixture of spinosyn A and spinosad D) . . 0.5%
OTHER INGREDIENTS: 99.5%
TOTAL: 100.0%
Contains 0.04 lb of active ingredient per gallon.
EPA Reg. No. 4-471 EPA Est. No. 4-NY-1

Crops	Pests Controlled	Maximum Number of Applications per Calendar Year	Minimum Days to Wait Before Reapplying	Minimum Days to Wait from Last Application to Harvest
apple and other pome fruits including: crabapples, mayhaw, pears, and quince	codling moth, European grapevine, moth, leafminers, leafrollers, light brown apple moth, oriental fruit moth, thrips, tufted apple budmoth	6	10	7
asparagus (post-harvest to protect ferns)	asparagus beetles	3	7	60
bulb vegetables including: dry bulb onion, garlic,	armyworms, dipteran leafminers, European corn borer, flea beetle,	5	4	1

Bacillus thuringiensis: kurstaki
Lepidopteran Larvae

ACTIVE INGREDIENT:
*Bacillus thuringiensis subspecies *kurstaki* strain SA-12solids, spores and Lepidopteran active toxins (At least 6 million viable spores per mg.)* 15.0%
OTHER INGREDIENTS 85.0%
TOTAL 100.0%

EPA Est. No. 4-NY-1
EPA Reg. No. 4-226

VEGETABLES, FRUITS & NUTS

Crop	Pest	Rate (tsp./gal. water)
Almonds	redhumped caterpillar, tent caterpillar	2 - 4
Apples, Pears Apply when eggs or newly hatched larvae first appear	redbanded leafroller, tufted apple budmoth, variegated leafroller, tent caterpillar, fruit tree leafroller, gypsy moth	2 - 4
Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Collards, Kale, Mustard Greens, Turnip Greens	cabbage looper	2 - 4
	imported cabbage worm, green cloverworm	1 - 3
	diamondback moth	1 - 2
Beans, Beets, Carrots, Celery, Chard, Chinese Cabbage, Endive, Escarole, Garlic, Kohlrabi, Lentils, Lettuce, Onions, Parsley, Radishes, Spinach, Squash	cabbage looper	2 - 4

Commercial & Private License Availability of Insecticides Through Direct Distributors Crop Protective Services (CPS), Helena,

IPM Commercial / Class

- Organophosphates (1B)
- Carbamates (1A)
- Pyrethroids (3A)
- Neonicotinoids (4A)
- Spinosad (5)
- Other groups (6-28)

Biologicals

- Bt's (Bacterial - 11)
- Fungi (Beauvaria)
- Virus (CM Granulosis)
- IGR (Insect Growth Regulators - 7)

Barrier Films

- Horticultural Oil
- Kaolin Clay

https://cropandpestguides.cce.cornell.edu/Guidelines/2018/TreeFruit/index56.aspx

SEASONAL ACTIVITY OF 3 MAJOR PESTS OF APPLES IN THE HUDSON VALLEY OF NEW YORK STATE

April May June July August Sept. Oct.

H. Reissig

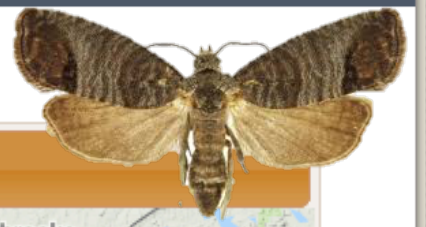
New York State Integrated Pest Management Program

NEWA Network for Environment and Weather Applications

Website status:
No issues reported
12/15/2018 7:41:31 PM

Weather Data | Pest Forecasts | Station Pages | Crop Management | Crop Pages | Weather Stations | Help

Apple Insects



NEWA Apple Insect Models

Select a pest:
Codling Moth

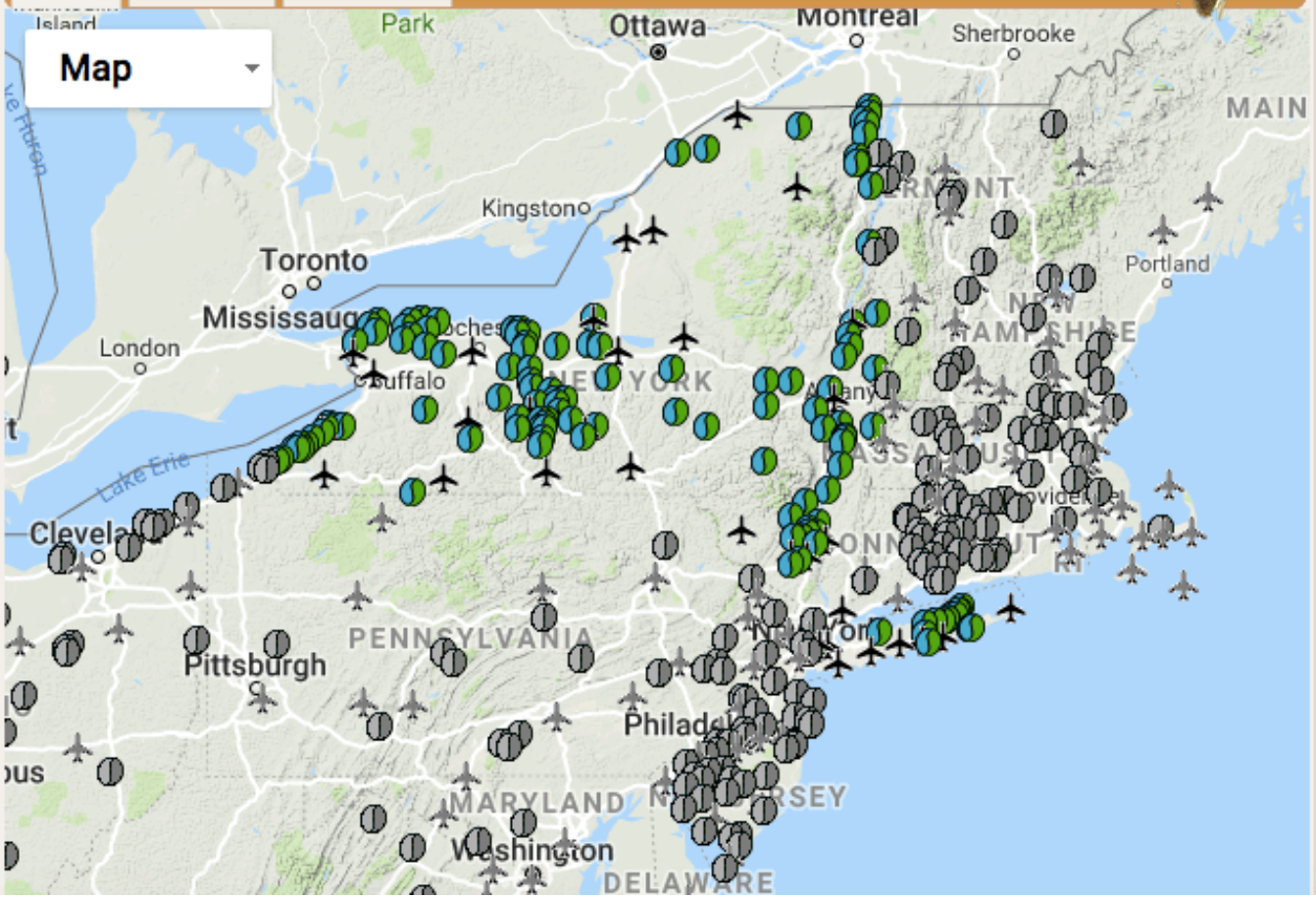
State:
New York

Weather station:
Highland HVL 2

Accumulation End Date:
12/15/2018

Calculate

Map | Results | More info



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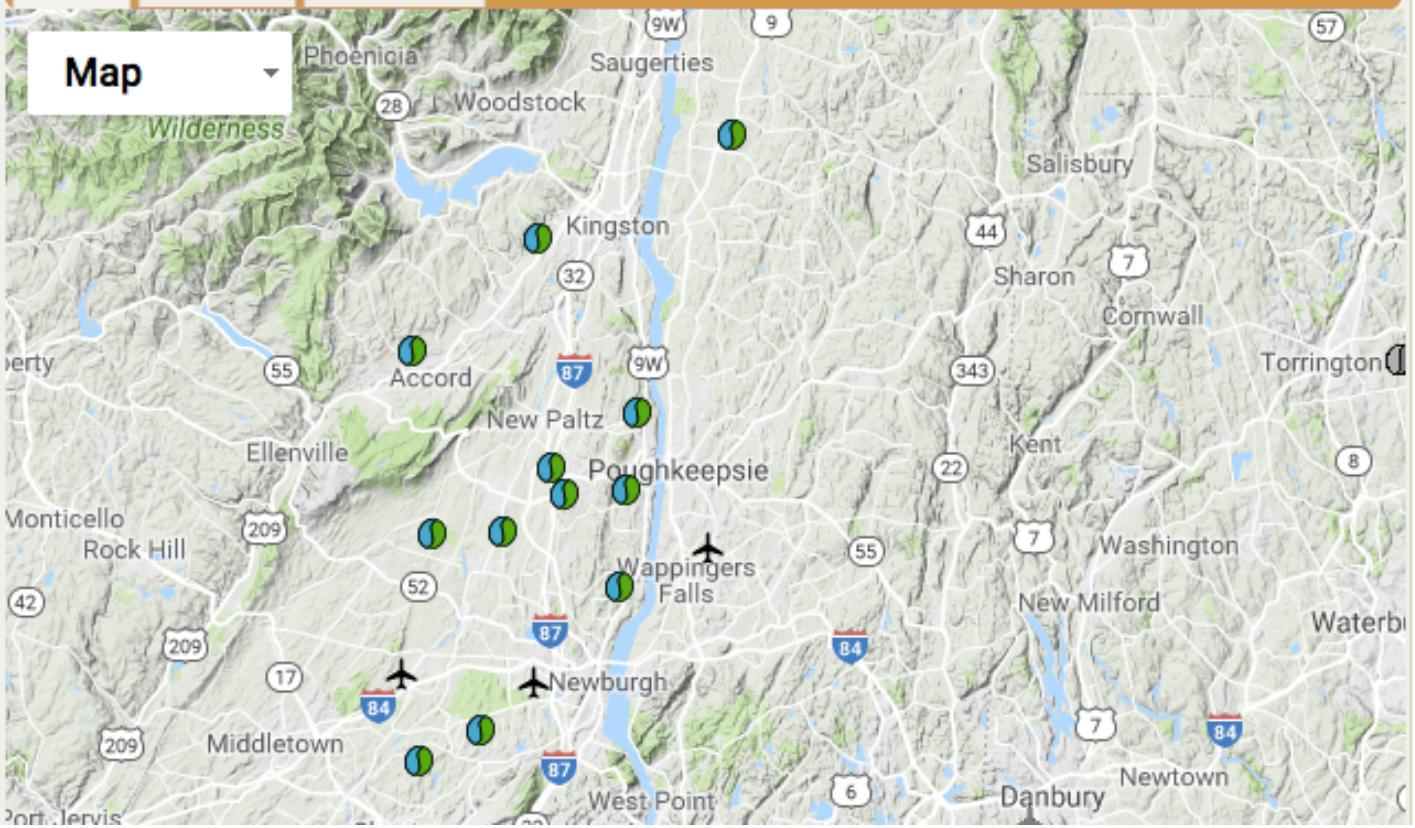


NEWA Apple Insect Models

Select a pest:

Codling Moth

State:

New York

Weather station:

Highland HVL 2

Accumulation End Date:

06/01/2018

Calculate

Map | Results | More info

Codling Moth Results for Highland HVL 2

First Trap Catch: 5/24/2018

First Trap Catch date above is estimated based on degree day accumulations or user input. Enter the actual date for blocks of interest and the model will calculate the protection period after first trap catch more accurately.

Accumulated degree days (base 50°F) first trap catch through 6/1/2018: 185 (0 days missing)

	Past	Past	Current	5-Day Forecast				Forecast Details
Date	May 30	May 31	Jun 1	Jun 2	Jun 3	Jun 4	Jun 5	Jun 6
Daily Degree Days (Base 50BE)	23	16	26	24	13	11	10	8
Accumulation since January 1	542	558	584	607	620	630	640	648

Show Degree Day Graph

Pest stage: Moths flying & first eggs laid

The pest stage above is estimated. Select the actual stage and the model will recalculate recommendations.

Pest Status	Pest Management
First eggs are laid at about 50 DD and the first eggs usually hatch after about 220 DD.	Apply insecticides that need to be present before egg laying at about 50-75 DD. Apply insecticides that target early egg laying period at 100-200 DD. Pesticide information

Disclaimer: ***These are theoretical predictions and forecasts.*** *The theoretical models predicting pest development or disease risk use the weather data collected (or forecasted) from the weather station location. These results should not be substituted for actual observations of plant growth stage, pest*

Crop and Pest Management Guidelines

A Cornell Cooperative Extension Publication

Cornell Cooperative Extension

HOME > CORNELL GUIDELINES > 2018 TREE FRUIT TABLE OF CONTENTS > 11 APPLES > 11.1 INSECTICIDES AND FUNGICIDES FOR APPLES > SILVER TIP

Your Purchased Guidelines

2018 Berry Crops

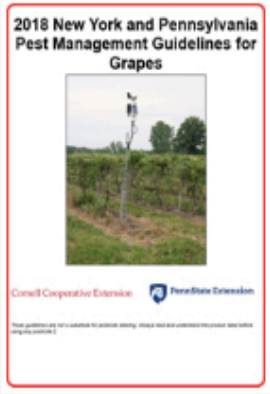
2018 Cornell Guide for the Integrated Management of Berry Crops

View Online | Buy Print

2018 Grapes

2018 New York and Pennsylvania Pest Management Guidelines for Grapes

View Online | Buy Print



2018 Tree Fruit

2018 Cornell Pest Management Guidelines for Commercial Tree Fruit Production

View Online | Buy Print

Carbamate Insecticides (IRAC 1A)
Organophosphate Insecticides (IRAC 1B)
Neonicotinoid Insecticides (IRAC 4)
Pyrethroid Insecticides (IRAC 3)
Spinosad Insecticides (IRAC

Carbamate Insecticides (IRAC 1A)

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
*Lannate (methomyl)	1A	2	2	1	3	3	3	2-3	2	0	1	3	2	3	1	-
Sevin (carbaryl)	1A	2	1	-	2	1	3	2	2	0	1	1	2	1	1	-
*†Vydate (oxamyl)	1A	0	2	-	0	-	2	0	0	0	2	-	-	3	1	-

Key to control ratings:

- = Unknown, unlabeled, or does not apply **0** = not effective **1** = poor **2** = fair **3** = good

* Restricted-use pesticide.

† Not for use in Nassau and Suffolk Counties.

§ = Potentially acceptable in certified organic programs

‡ = IRAC (Insecticide **R**esistance **A**ction **C**ommittee) Mode of Action Classification Group: Arthopod pest populations are more likely to exhibit cross-resistance to materials within the same group.

Organophosphate Insecticides (IRAC 1B)

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
*diazinon	1B	3	1	-	2	2	1	0	2	0	3	0	2	1	1	3
*dimethoate	1B	3	2	-	3	2	3	0	2	0	2	0	2	1	2	-
*Imidan (phosmet)	1B	3	1	3	3	1	1	1	3	0	1	3	2	1	1	-
Lorsban (chlorpyrifos)	1B	-	-	-	-	-	-	-	-	-	2	2	3	1	1	-
Malathion	1B	2	2	2	2	1	1	1	2	0	1	2	-	1	1	-

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Neonicotinoid Insecticides (IRAC 4)

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
*†Actara (thiamethoxam)	4A	1	3	3	1	-	3	0	3	3	3	0	0	2	2	-
*Admire Pro (imidacloprid)	4A	-	3	-	-	-	3	-	-	2	3	-	2	3	-	2
Assail (acetamiprid)	4A	3	3	2	3	-	3	0	2	2	3	0	2	3	2	2
*†Voliam Flexi (thiamethoxam/ chlorantraniliprole)	4A/28	-	3	3	3	3	3	3	3	3	3	-	-	2	-	-
*†Agri-Flex (abamectin/ thiamethoxam	6/4A	1	3	3	1	-	3	0	3	3	3	0	0	3	1	-

Key to control ratings:

- = Unknown, unlabeled, or does not apply **0** = not effective **1** = poor **2** = fair **3** = good

* Restricted-use pesticide.

† Not for use in Nassau and Suffolk Counties.

§ = Potentially acceptable in certified organic programs

‡ = IRAC (Insecticide **R**esistance **A**ction **C**ommittee) Mode of Action Classification Group: Arthopod pest populations are more likely to exhibit cross-resistance to materials within the same group.

Pyrethroid Insecticides (IRAC 3)

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
*Pounce (permethrin)	3A	3	2	2	-	3	3	2-3	2	2	2	3	1	3	3	-
*Asana XL (esfenvalerate)	3A	3	2	2	2-3	3	3	2-3	2	2	2	3	1	3	3	-
*Danitol (fenpropathrin)	3A	3	2	2	2-3	3	3	2-3	2	2	2	3	1	3	3	-
*†Endigo (thiamethoxam/ lambda-cyhalothrin)	3A/4A	3	2	2	2-3	3	3	2-3	2	2	2	3	2	3	3	-

Key to control ratings:

- = Unknown, unlabeled, or does not apply **0** = not effective **1** = poor **2** = fair **3** = good

* Restricted-use pesticide.

† Not for use in Nassau and Suffolk Counties.

§ = Potentially acceptable in certified organic programs

‡ = IRAC (Insecticide **R**esistance **A**ction **C**ommittee) Mode of Action Classification Group: Arthopod pest populations are more likely to exhibit cross-resistance to materials within the same group.

Spinosad Insecticides

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
Delegate (spinetoram)	5	2	0	-	3	3	-	3	2	3	-	3	-	3	-	-
§Entrust (spinosad)	5	2	0	-	2	3	0	3	0	-	0	3	-	2	0	-

Key to control ratings:

- = Unknown, unlabeled, or does not apply | **0** = not effective | **1** = poor | **2** = fair | **3** = good

Other Insecticide Grouping

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
*†Altacor (chlorantraniliprole)	28	2	1	3	3	3	-	3	2	-	-	3	2	-	1	-
Avaunt (indoxacarb)	22	2	1	2	2	-	3	0	3	-	0	-	0	2	2	-
§Aza-Direct, §Neemix	18B	-	2	1	2	-	2	-	0	-	2	-	-	3	-	-
§B.t, (§Agree, §Biobit, §Deliver, §Dipel, §Javelin)	11A	0	0	-	2	3	0	3	0	0	0	3	-	0	0	-
Beleaf (flonicamid)	9C	-	3	-	-	-	-	-	-	-	-	-	-	-	3	2
*†Centaur (buprofezin)	16	-	-	-	-	-	2	-	-	3	-	-	3	-	-	-
Esteem (pyriproxyfen)	7C	0	0	-	2	0	0	0	0	3	3	0	3	2	0	-
*†Exirel (cyantraniliprole)	28	2	1	3	3	3	3	3	3	3	3	3	0	3	0	0

Key to control ratings:

- = Unknown, unlabeled, or does not apply | **0** = not effective | **1** = poor | **2** = fair | **3** = good

Other Insecticide Grouping

		Ratings for the Control of														
Trade Name (Active Ingredient)	**IRAC‡**	**AM**	**Aph**	**EAS**	**Int**	**GFW**	**LH**	**OBLR**	**PC**	**PPs**	**RAA**	**RBLR**	**SJS**	**STLM**	**TPB**	**WAA**
*†Minecto Pro (cyantraniliprole/abamectin)	28/6	2	0	0	3	3	3	3	3	3	3	3	0	3	0	0
Movento (spirotetramat)	23	-	3	-	-	-	-	-	-	3	-	-	3	-	-	3
†Nexter (pyridaben)	21	-	0	-	-	-	2	-	-	3	-	-	-	-	-	-
*Proclaim (emamectin benzoate)	6	0	0	-	2	3	0	3	1	2	0	3	0	3	0	-
*Rimon (novaluron)	15	-	-	-	3	-	2	3	-	-	-	3	-	3	2	-
§Surround (kaolin)	-	2	1	-	2	2	-	-	2	2	0	-	-	2	0	-
*†Voliam Flexi (thiamethoxam/ chlorantraniliprole)	4A/28	-	3	3	3	3	3	3	3	3	3	-	-	2	-	-
†Voliam Xpress/†Besiege (chlorantraniliprole/ lambda-cyhalothrin)	3A/28	3	2	3	3	3	3	3	3	2	2	3	2	3	3	-

Key to control ratings:

- = Unknown, unlabeled, or does not apply **0** = not effective **1** = poor **2** = fair **3** = good

Commercial & Private License Availability of Insecticides Through Direct Distributors Crop Protective Services (CPS), Helena,

Organic/ Class

- **Pyganic (3)**
- Spinosad (5)
- Other groups (6-28)

Biologicals

- Bt's (Bacterial - 11)
- Fungi (Beauvaria)
- Virus (CM Granulosis)
- IGR (Insect Growth Regulators - 7)

Barrier Films

- Horticultural Oil
- Kaolin Clay

https://cropandpestguides.cce.cornell.edu/Guidelines/2018/TreeFruit/index56.aspx

Organic Fungicide Program

- **Cedar-Apple Rust**
  [Bloom to 2nd cover] Regalia + JMS Stylet-Oil

- **Apple scab**
  [silver tip through midsummer] - copper
  [silver tip & green tip]; sulfur
  [tight cluster to midsummer] *Bacillus sp,* potassium bicarbonate, and peroxides

- **Powdery mildew**
  [tight cluster to midsummer]
  sulfur, potassium bicarbonate, peroxides, and white mineral oil

Organic Fungicide Program

Table 1. Control of quince rust on Golden Delicious.

	Treatment and rate/ 100 gal dilute	Timing	% fruit infected	% control
0	Non-treated control	---	36 d	---
1	Manzate Pro-Stick 75DF 12 oz	2 May	20 c	44
2	Rally 40WSP 0.6 oz	2 May	3 a	92
3	Topguard 1.04SC 1 fl oz	2 May	6 b	83
4	Inspire Super 2.82EW 1.5 fl oz	2 May	7 b	81
5	Regalia Biofungicide 5% 4 qt + JMS Stylet-Oil 1 gal	2 May	4 ab	89
6	Rally 40WSP 1.25 oz	5 May	5 ab	86
7	Rally 40WSP 0.6 oz	5 May	5 ab	86
8	Topguard 1.04SC 1 fl oz	5 May	7 b	81
9	Regalia Biofungicide 5% 4 qt + JMS Stylet-Oil 1 gal	5 May	2 ab	94

Mean separation by Waller-Duncan K-ratio t-test (p=0.05). Counts of 100 fruit per rep 3 Jun.

Table 2. Control of quince rust on Red Delicious.

	Treatment and rate/ 100 gal dilute	Timing	% fruit infected	% control
0	Non-treated control	---	35 b	---
1	Regalia Biofungicide 5% 4 qt + JMS Stylet-Oil 1 gal	16 May	16 a	54
2	Inspire Super 2.82EW 1.5 fl oz	16 May	14 a	60
3	Topguard 1.04SC 1 fl oz	16 May	10 a	71
4	Rally 40WSP 0.6 oz	16 May	13 a	63
5	Rally 40WSP 1.25 oz	16 May	15 a	57

Mean separation by Waller-Duncan K-ratio t-test (p=0.05). Counts of 50 fruit per rep 3 Jul.

Organic Fungicide Program

- **Fire blight**
  [pink to terminal budset] copper
  [pink to petal fall] *B. subtilis*, *B. amyloliquefaciens*
  [pink to terminal budset] *B.mycoides*, *Reynoutria sachalinensis*

- **Flyspeck and Sooty Blotch** -
  [petal fall to harvest] *B. subtilis*, *B. amyloliquefaciens*
  [petal fall to harvest] coppers

Organic Insecticide Program

Barrier Films

- Horticultural Oil
- Kaolin Clay

Biologicals

- Bt's (Bacterial)
- Fungi (Beauvaria)
- Virus
  (CM Granulosis)
- IGR (Insect
  Growth
  Regulators)

Organic Insecticide Program

- **Obliquebanded leafroller**

[bloom, summer cover sprays] - *Bacillus thuringiensis*/B.t.

- **Internal-feeding Lepidoptera** (codling moth, oriental fruit moth, lesser appleworm)

[petal fall + summer cover sprays] - mating disruption; spinosad, B.t.; granulosis virus *Chromobacterium subtsugae*

- **Plum curculio**

[petal fall, 1st cover] - kaolin clay; pyrethrin; entomopathogenic nematodes

- **Aphids, leafhoppers**

[midsummer] - azadirachtin; insecticidal soap

- **San Jose scale**

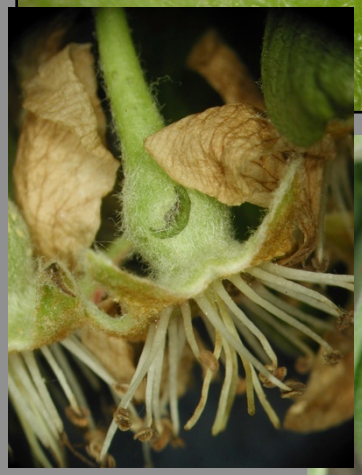
[midsummer] - pyrethrin; *Burkholderia*

- **Apple maggot**

[mid-July through August] - spinosad; pyrethrin

- **Mites**

[tight cluster] - highly refined mineral oil



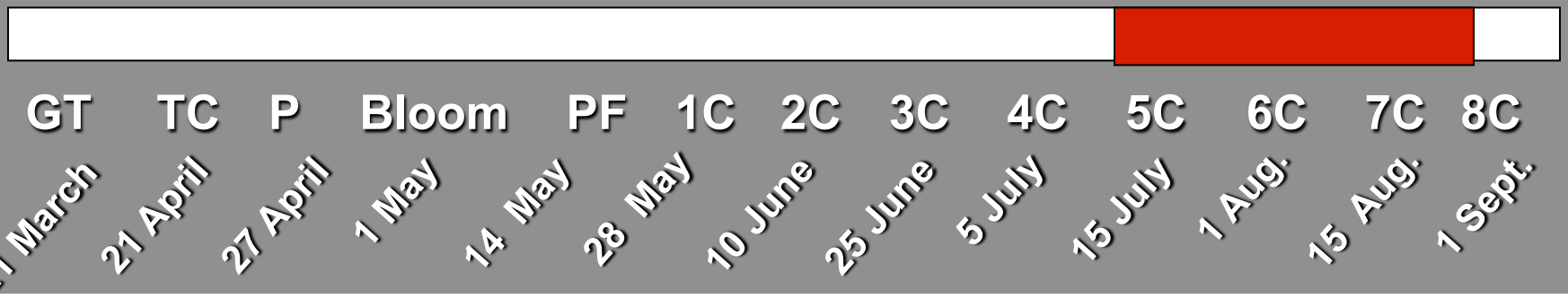
Plum Curculio

- Adult overwinter in woodland, stone walls
- Adults emerge after 2-3d @ 70°F
- Migrate into orchard from bloom to 2C
- Adults cut and lay eggs in fruitlet
- Can cause up to 100% fruit injury & drop

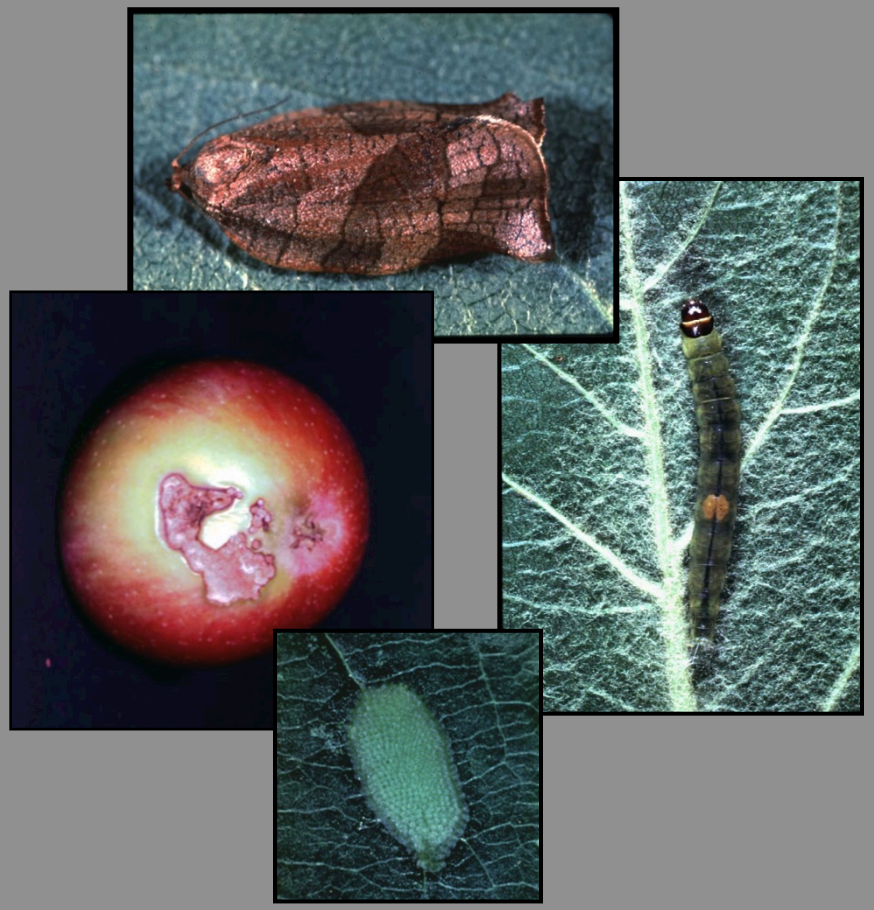
- Management: pre-bloom – 2C
  - 2-3 appl. of pyrethroid, carbaryl
  - End applications at 308 DD 50°F

Apple Maggot

- Overwinters as pupa in the soil
- Adults emerge in June in moist soil
  - Adults feed for 7-10 d prior to mating and egg laying into fruit
  - Individual eggs are lain within fruit
  - Developing larva feed on the interior flesh of the apple causing oxidized trails ('Trail Worm')
  - Management: Carbaryl & Pyrethroid

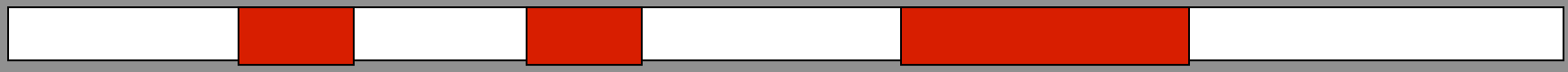


Obliquebanded Leafroller

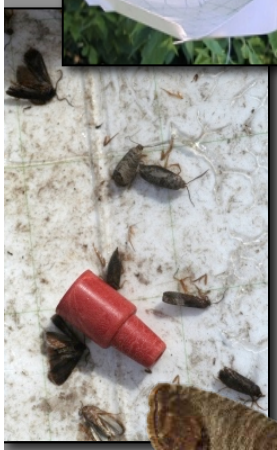


- Overwinter as a late instar larva that causes injury to fruit through bloom to 1C
- Adults emerge in June, mate and and begin egg laying
- Larva emerge 350 DD base 43F after first adult sustained flight (biofix)

- Management: Bt at bloom, low rate multiple applications



GT	TC	P	Bloom	PF	1C	2C	3C	4C	5C	6C	7C	8C
	21 April	27 April	1 May	14 May	28 May	10 June	25 June	5 July	15 July	1 Aug.	15 Aug.	1 Sept.

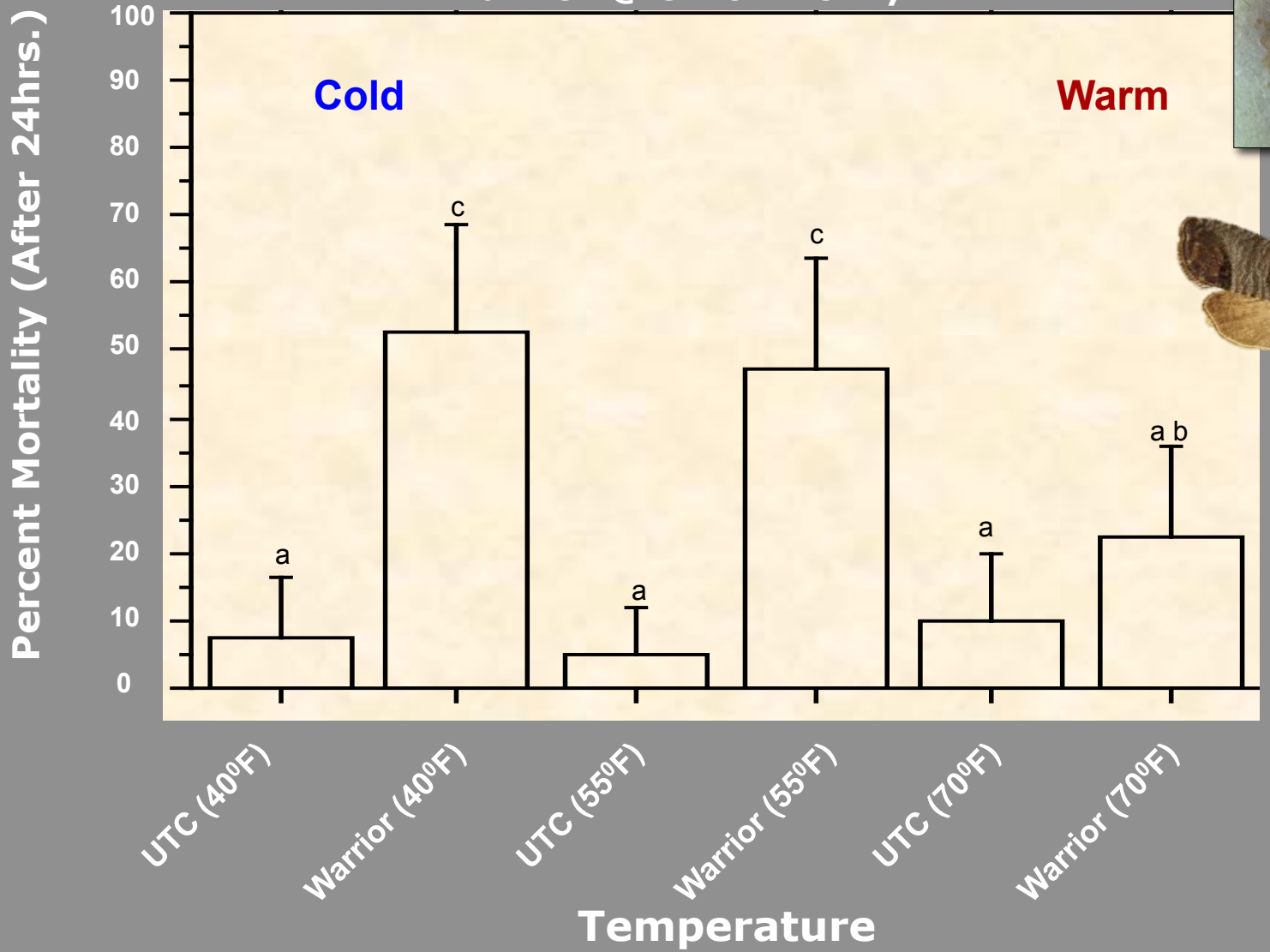


Codling Moth, *Cydia pomonella*

- Overwinters as pupa under tree bark
- Adults emerge during late bloom
- Eggs are lain on foliage and fruit
- Larva evacuate fruit skin as they burrow
- Then feed directly on seeds in carpels
  - Management: Granulosis virus plus mating distruption at first hatch
    - Use NEWA modeling to obtain timing of CM hatch

Codling Moth Larvae Bioassay (UTC susceptible 'Benzon' Colony)
NYSAES, Highland NY 2009[1]

Warrior @ 0.16 fl. oz. /A

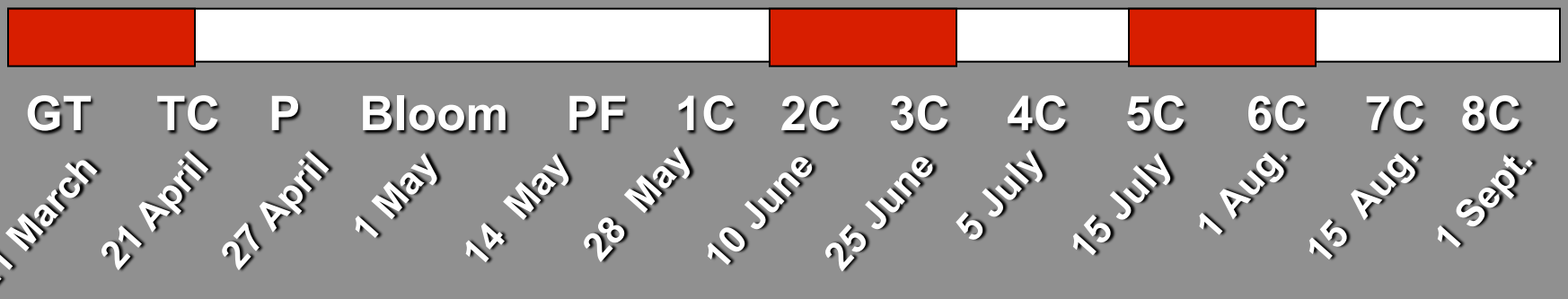


[1] Bioassay conducted on 1st instar codling moth larva topically treated with 1µL droplet of lamda-cyhalothrin at 0.0005 µg A.I./ 1000 mL or 0.0005 ppm [**3% of the labeled field rate**] placed in temperature controlled chambers over 24 hours. (df = 3, F-value = 8.648, P-value = 0.0001).

San Jose Scale

- Overwinter as adult on bark
- Adults produce live young
- Crawlers emerge at 2C
- Damage fruit & bark cambium

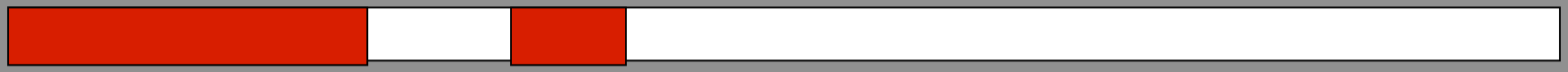
- Management: pre-bloom
  - 1% Horticultural oil



Rosy Apple Aphid

- Overwinter as eggs
- Adults produce live young
- Begin feeding on folage and developing fruit clusters
- Damage fruit post bloom

- Management @ Pink
  - Pyrethroids



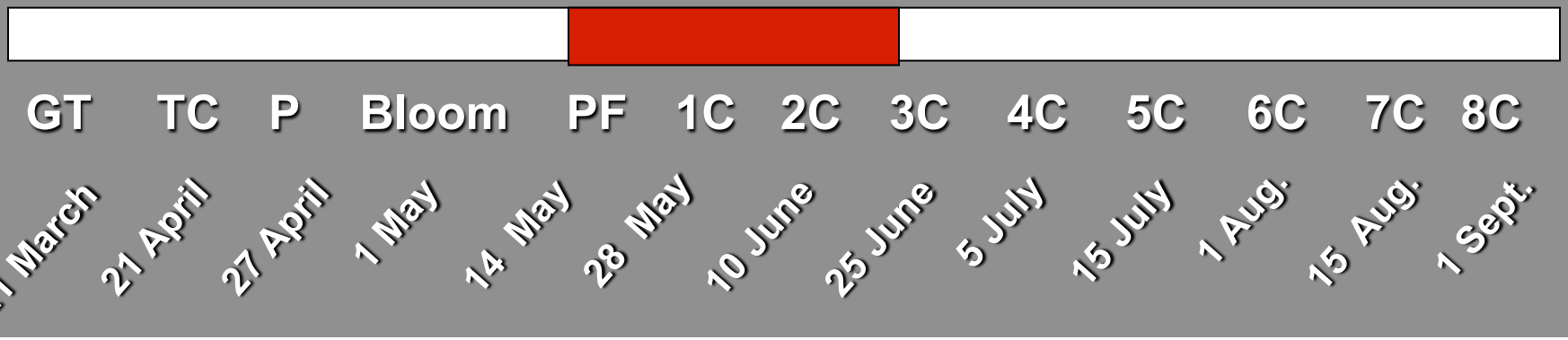
GT TC P Bloom PF 1C 2C 3C 4C 5C 6C 7C 8C

21 March 21 April 27 April 1 May 14 May 28 May 10 June 25 June 5 July 15 July 1 Aug. 15 Aug. 1 Sept.

Green Aphid Complex

- Overwinter as eggs
- Adults produce live young
- Begin feeding on folage and developing fruit clusters during spring & summer
- Produce blackened leaves

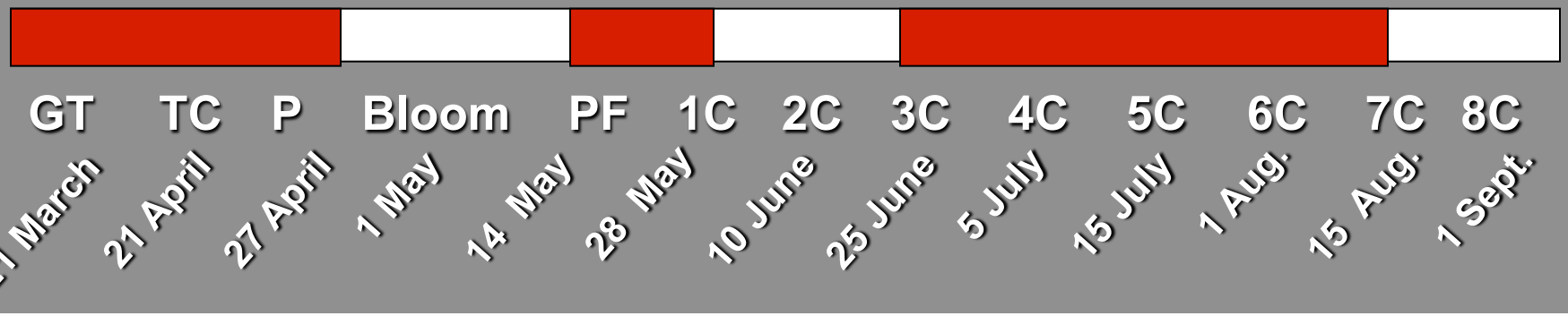
- Management @ Pink
  - Pyrethroids
- Management @ PF and summer
  - Azadirect



European Red Mite

- Overwinter as egg
- Motiles emerge pre-bloom
- Adults after bloom cause foliar injury
- High populations with increasing temperatures >80^{o}F & drought
- Reduced fruit size, color, Lf. bronzing

- Management Pink, Petal Fall, 1-2C:
  - Horticultural Oil @ 1%
  - Avermectin plus 0.25% oil



Tarnished Plant Bug

- Nymphs / adults cause fruit injury beginning at tight cluster with 2d above 75°F
- Pre-bloom – 15mm fruit size
- Scout: yellow sticky cards, flowers
- Feeding and oviposition in fruit

- Management: Pre-bloom, @ Petal Fall, 1C:
  - Pyrethroids

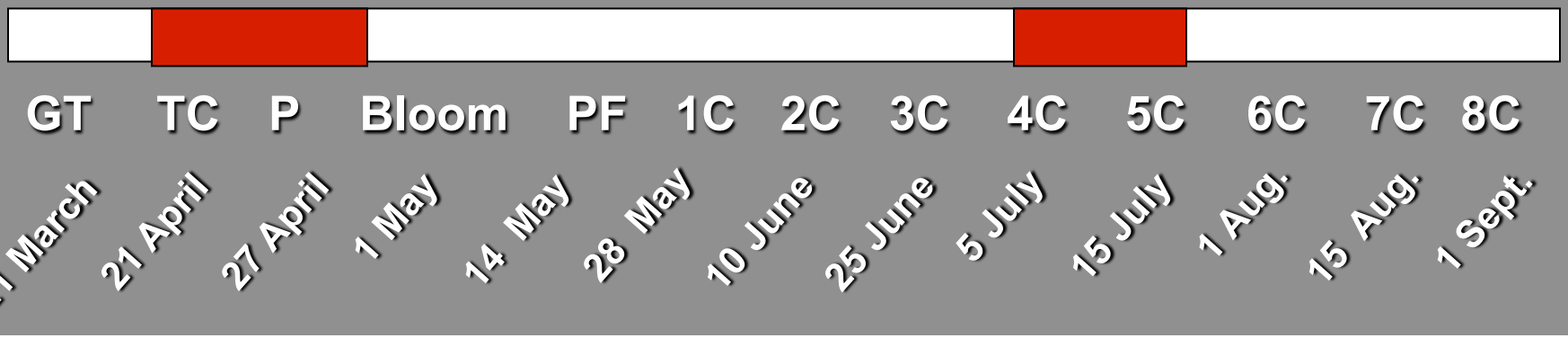
GT TC P Bloom PF 1C 2C 3C 4C 5C 6C 7C 8C

21 March 21 April 27 April 1 May 14 May 28 May 10 June 25 June 5 July 15 July 1 Aug. 15 Aug. 1 Sept.

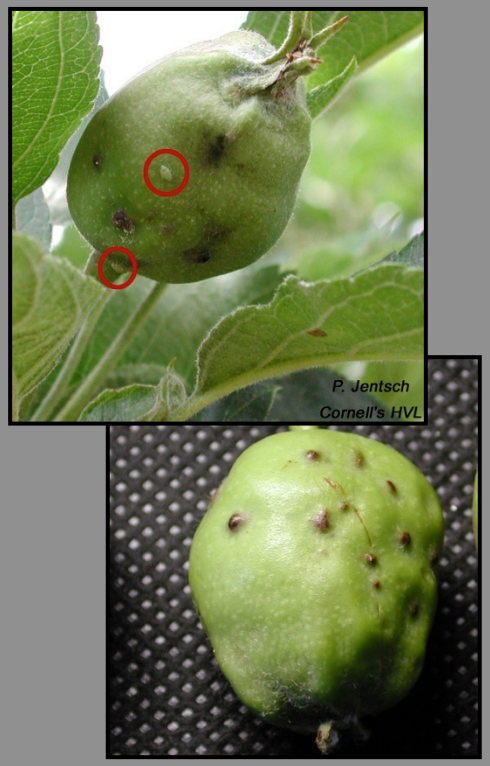
Dogwood Borer

- Overwinter as larva beneath bark
- Adults emerge at 2C
- Girdles bark cambium
- Adults lay eggs in bark scales

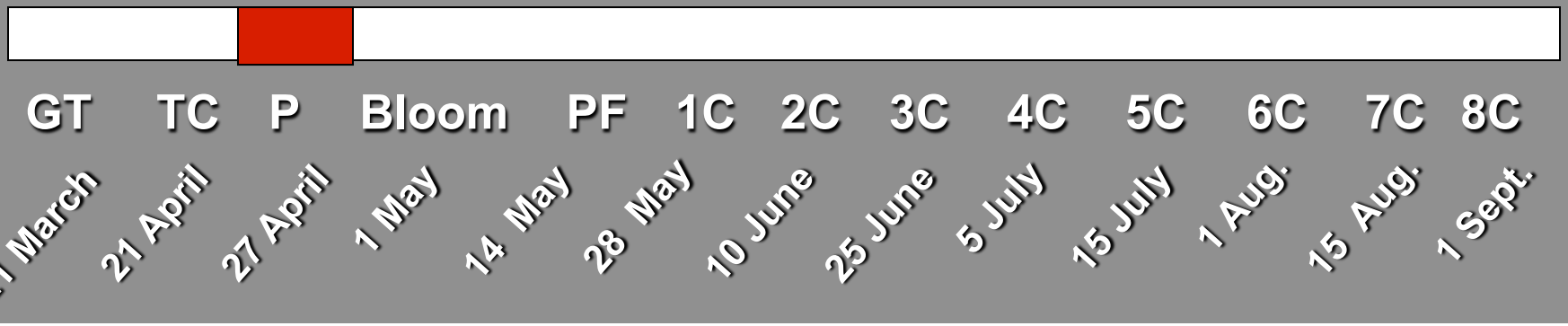
- Management: pre-bloom
  - Multiple appl. of neonicotinoid or Spinosad (Spintor)



Mullein Plant Bug Campylomma verbasci (Meyer)
Apple Brown Bug Atractotomus mali (Meyer)

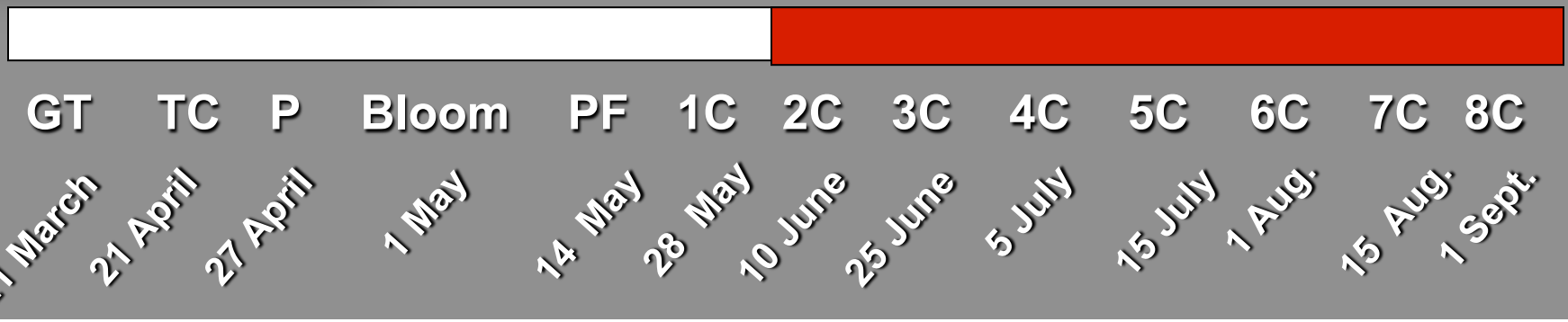


- Sporadic orchard pests on both pear and apple. Both species occur simultaneously; collectively called “mirid bugs”.
- Pre-bloom, they are considered beneficial, feeding on mite and aphid species.
- Management: Pyrethroid at Pink



Green Stink Bug *Acrosternum hilare* (Say). Brown Stink Bug *Euschistus servus* (Say)

- Sporadic orchard pests on both pear and apple. Most often occurs on Hudson Valley fruit late in the season during dry periods or drought.
- Management: Pyrethroid upon scouting for adults.




Eggs
Feeding damage

Stink Bug Injury To Pear

Stink Bug Injury To Apple
Typically To Shoulder Of Fruit

Depressions With Ccorking Up
To The Skin Surface

Brown Marmorated Stink Bug, *Halyomorpha halys* Stål

- Overwinter as adults
- 1-2 generations / year
- Eggs lain late May
- Nymphs and adults feeds on leaves, branches and through skin of fruit
- Causines dimpling, corking

- Management: pyrethrouds