No “Wining”— Just Growing Grapes & Brambling Along Too…

Erik Draper, Commercial Horticulture Educator
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THE OHIO STATE UNIVERSITY
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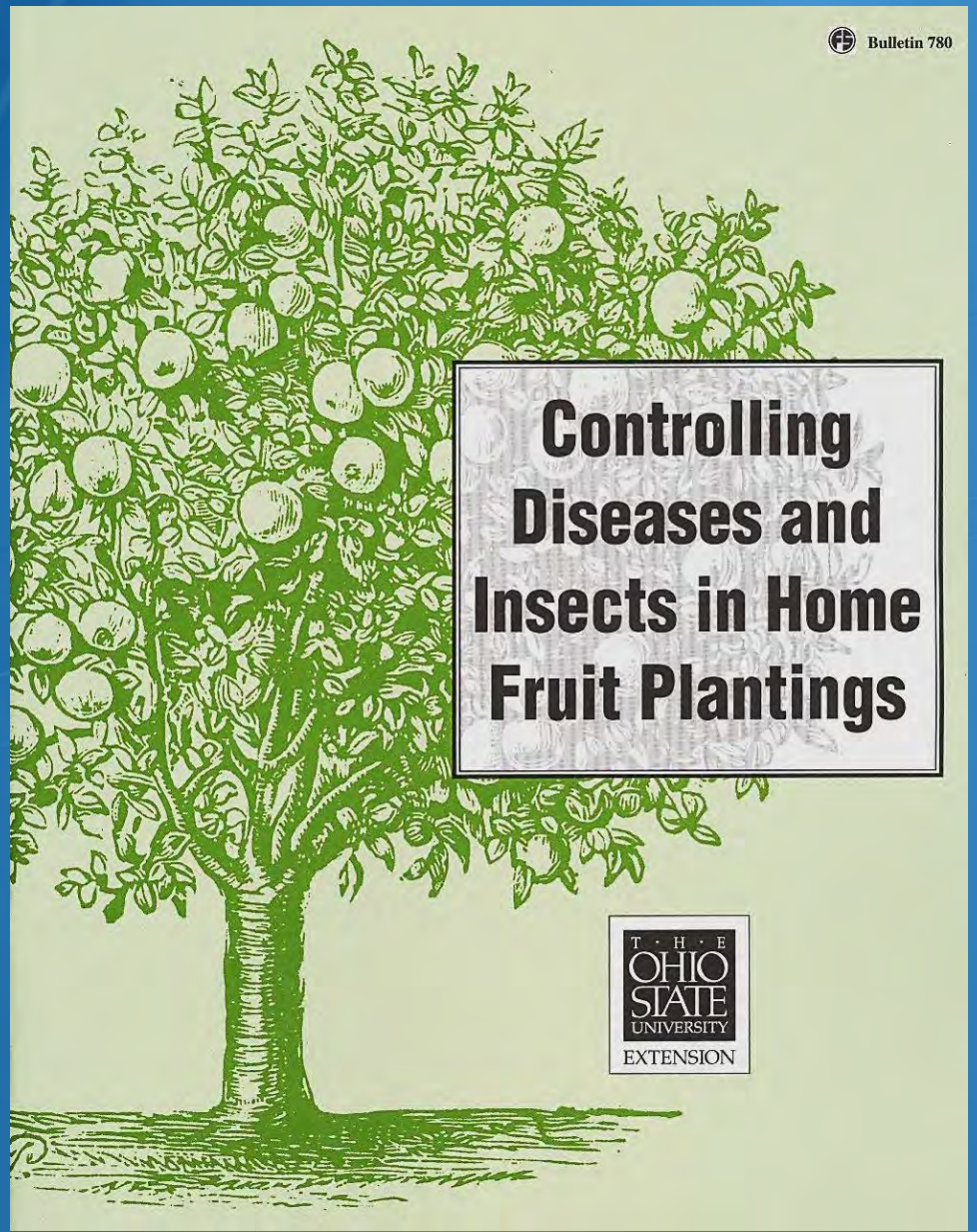
We want to discuss...

- What grapes need to thrive
- Sorting out soil
- Types of Grapes
- Grape physiology & growth
- Get a sense of how to prune grapes
- Making the cuts
- Critical diseases of grapes

Really GREAT Resources...OSU Extension Bulletin-780



Commercial Guide also…

https://ag.purdue.edu/hla/Hort/pages/sfg_sprayguide.aspx

Midwest Fruit Pest Management Guide .pdf

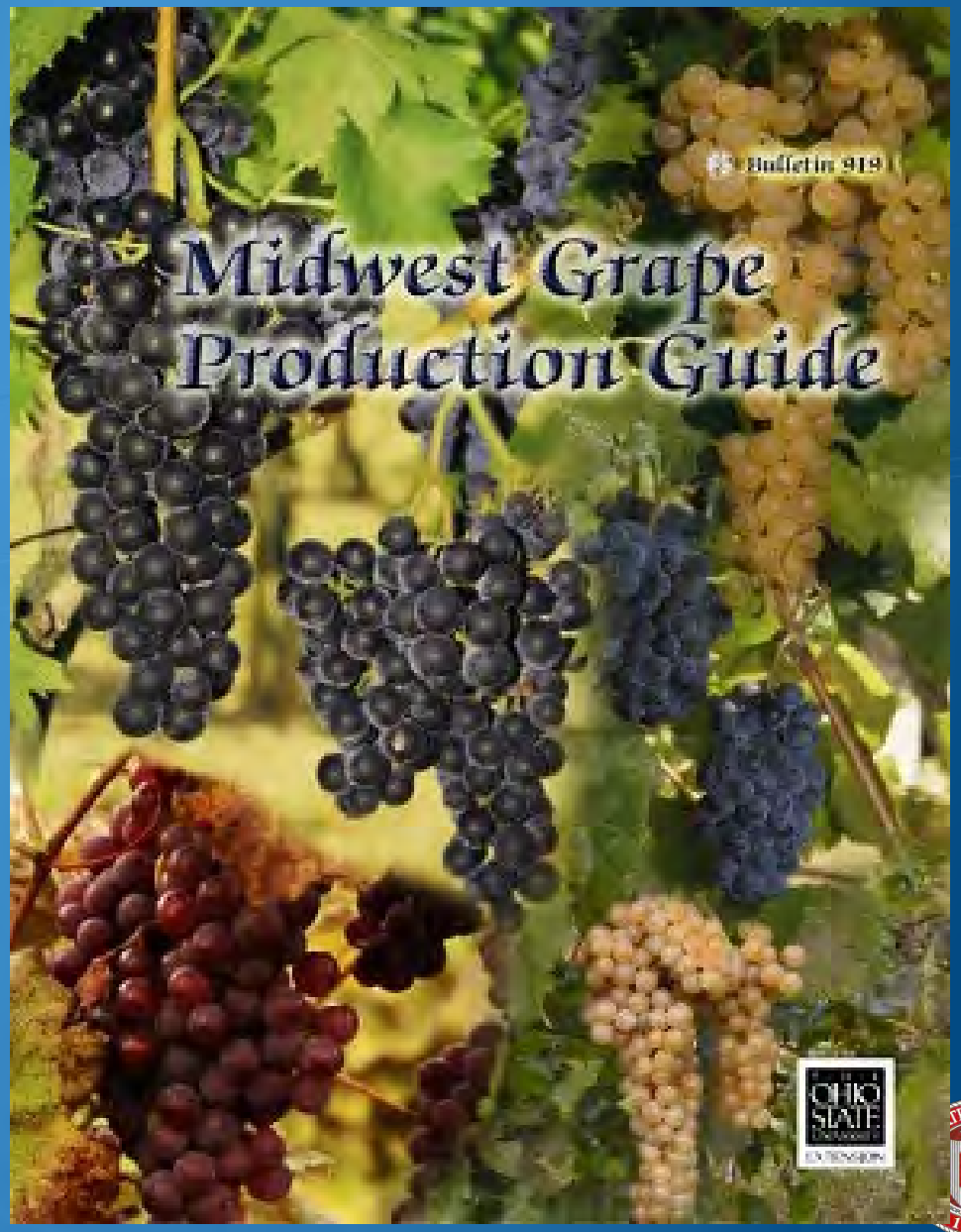
The *Midwest Fruit Pest Management Guide* was developed by the Midwest Fruit Workers Group.

This publication combines two longtime guides that have become familiar to countless growers: the annual *Midwest Small Fruit and Grape Spray Guide* and the annual *Midwest Tree Fruit Spray Guide*.

Print copies of the publication are available from the Purdue Extension Education Store. **Single copies** cost $15 each, **boxes of 10** cost $135 each.

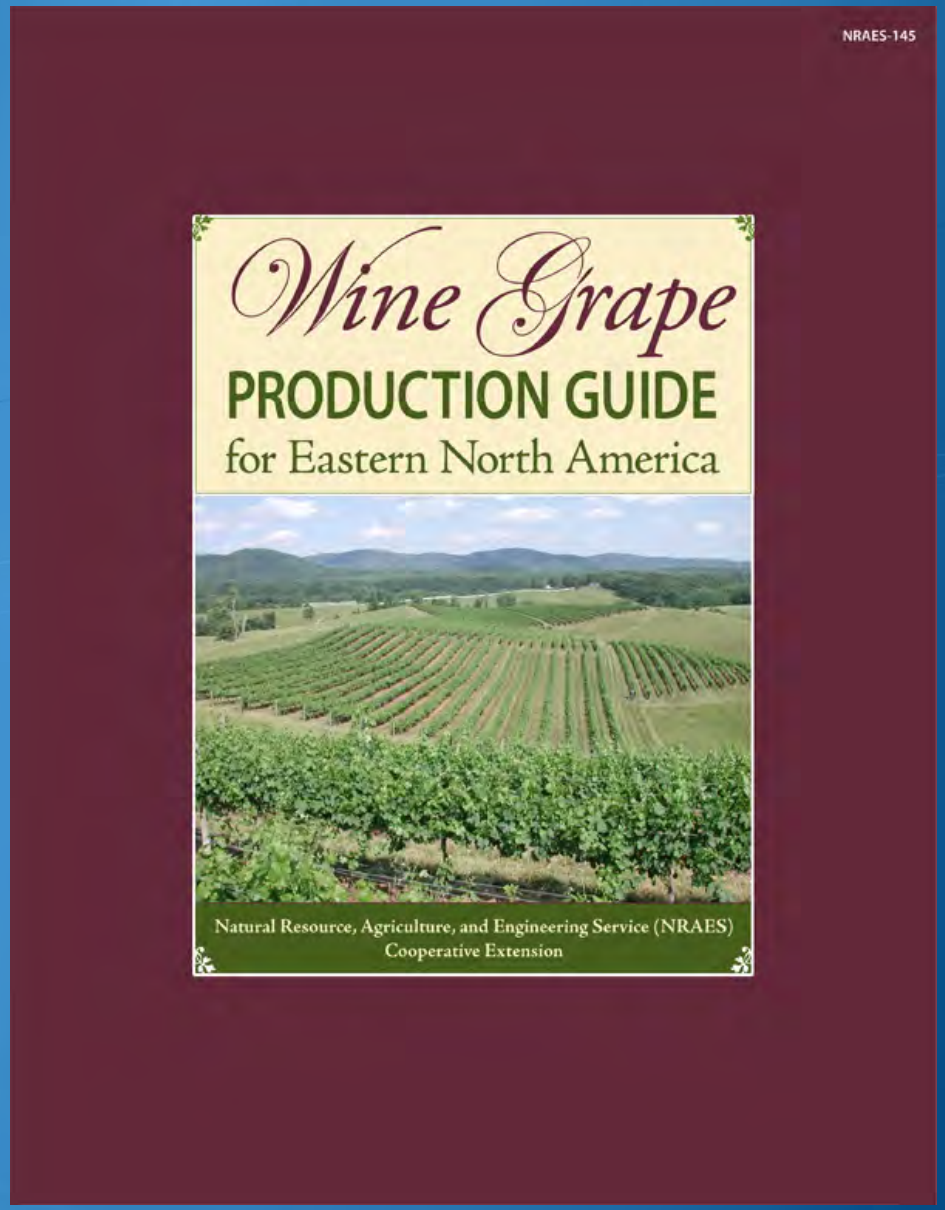
Really GREAT Resources…

- Ohio State University Extension
- Midwest Grape Production Guide- Collaborative effort
- Currently FREE & available https://plantpathology.ca.uky.edu/files/mw_grape_productn_b919.pdf



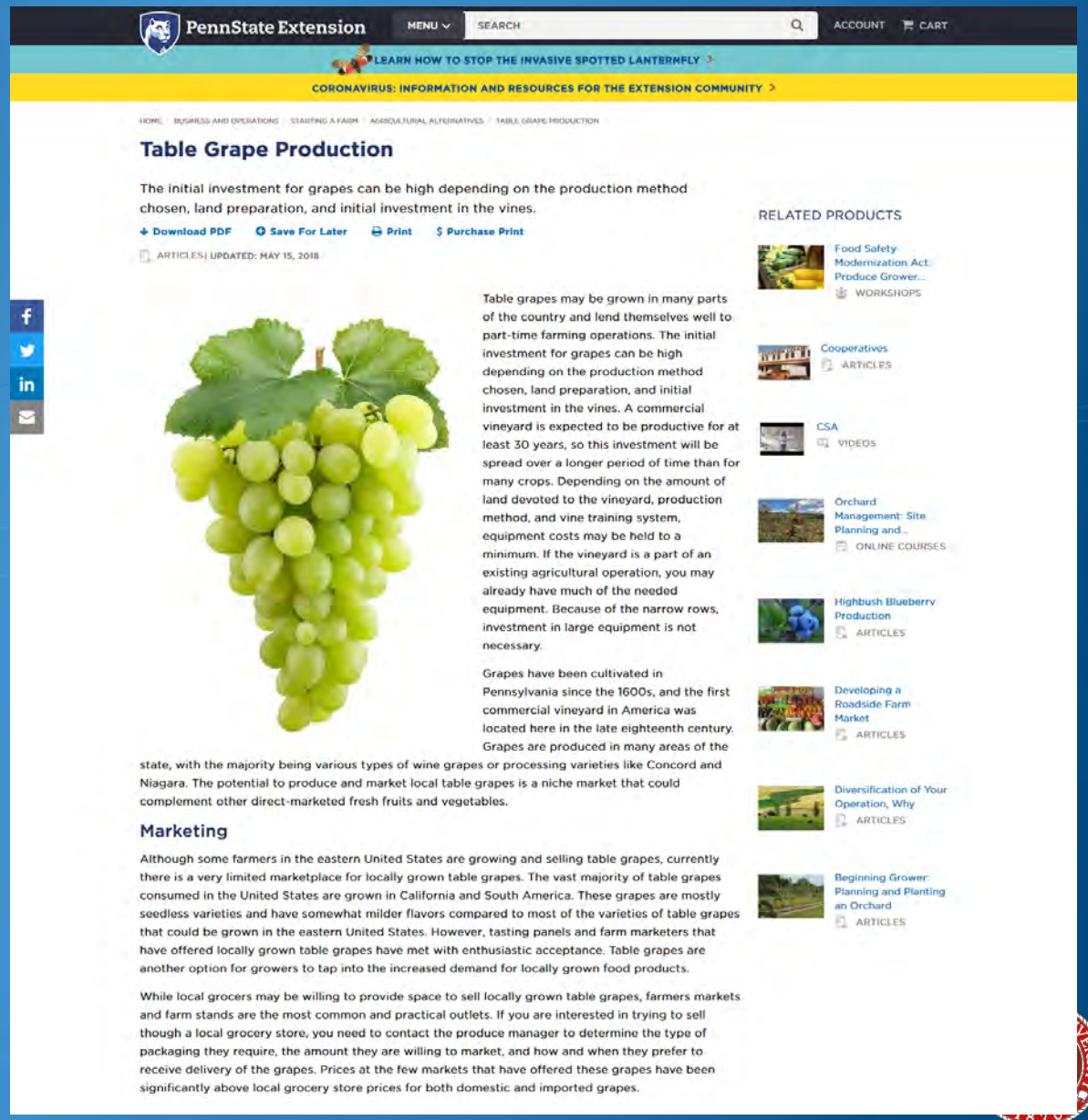
Really GREAT Resources…

- Natural Resource, Agriculture, and Engineering Service Cooperative Extension- NRAES-145
- Wine Grape Production Guide for Eastern North America
- Brief View online PDF
- Purchase for $90- S&H $6



Really GREAT Resources…

- Penn State Table Grape Production
- https://extension.psu.edu/table-grape-production



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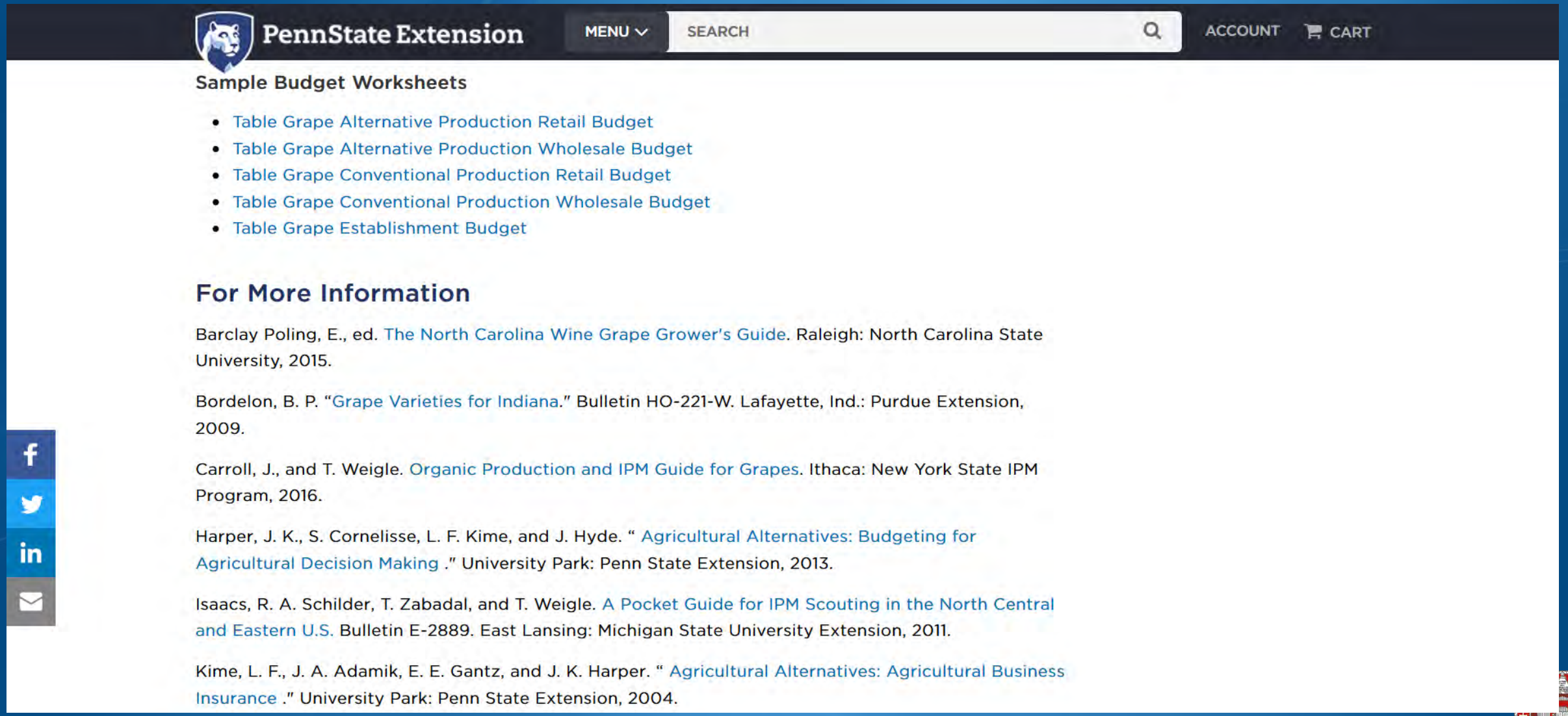


Sample Budget Worksheets

- Table Grape Alternative Production Retail Budget
- Table Grape Alternative Production Wholesale Budget
- Table Grape Conventional Production Retail Budget
- Table Grape Conventional Production Wholesale Budget
- Table Grape Establishment Budget

For More Information

Barclay Poling, E., ed. The North Carolina Wine Grape Grower's Guide. Raleigh: North Carolina State University, 2015.

Bordelon, B. P. "Grape Varieties for Indiana." Bulletin HO-221-W. Lafayette, Ind.: Purdue Extension, 2009.

Carroll, J., and T. Weigle. Organic Production and IPM Guide for Grapes. Ithaca: New York State IPM Program, 2016.

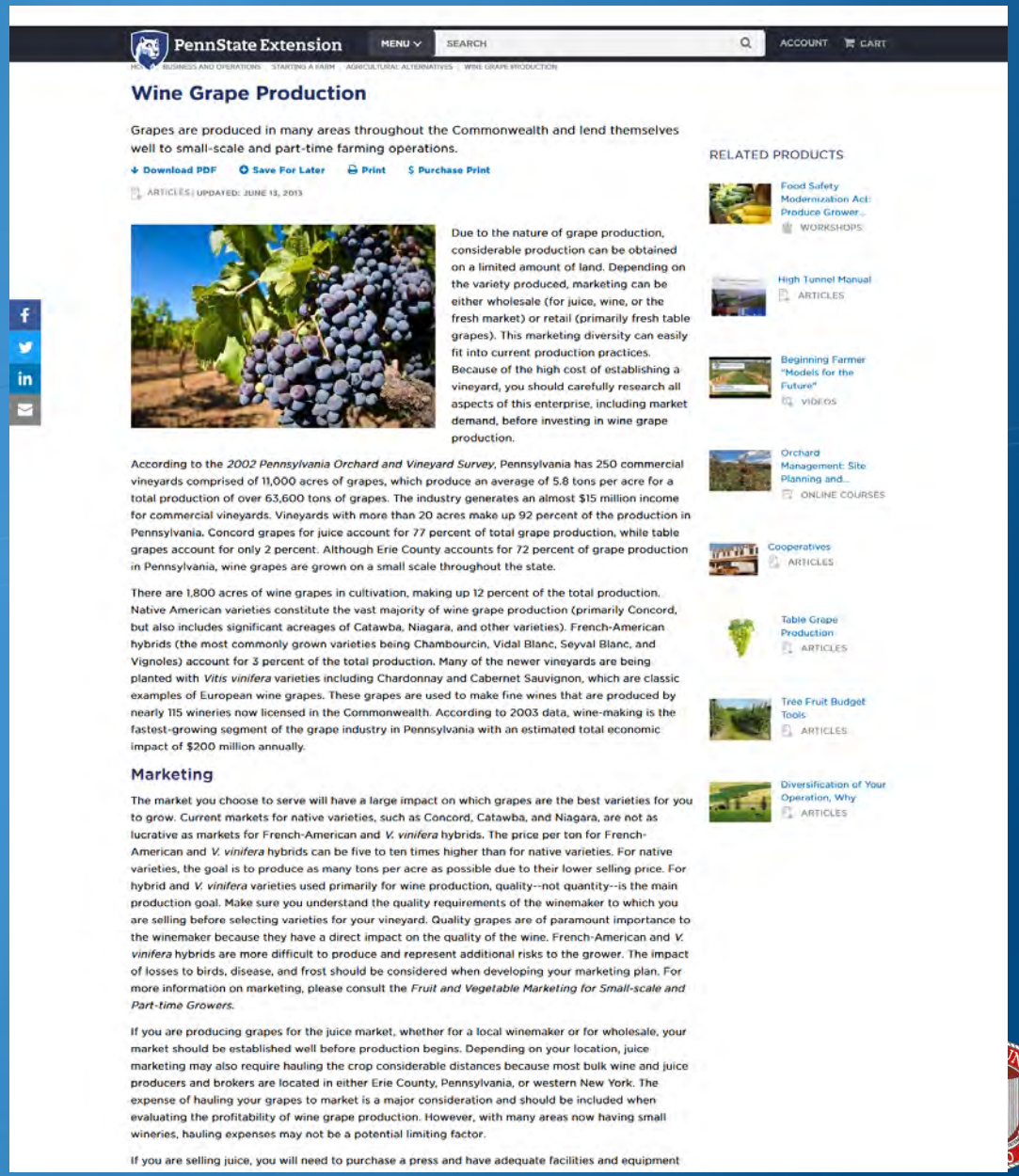
Harper, J. K., S. Cornelisse, L. F. Kime, and J. Hyde. " Agricultural Alternatives: Budgeting for Agricultural Decision Making ." University Park: Penn State Extension, 2013.

Isaacs, R. A. Schilder, T. Zabadal, and T. Weigle. A Pocket Guide for IPM Scouting in the North Central and Eastern U.S. Bulletin E-2889. East Lansing: Michigan State University Extension, 2011.

Kime, L. F., J. A. Adamik, E. E. Gantz, and J. K. Harper. " Agricultural Alternatives: Agricultural Business Insurance ." University Park: Penn State Extension, 2004.

Really GREAT Resources…

- Penn State Wine Grape Production
- https://extension.psu.edu/wine-grape-production



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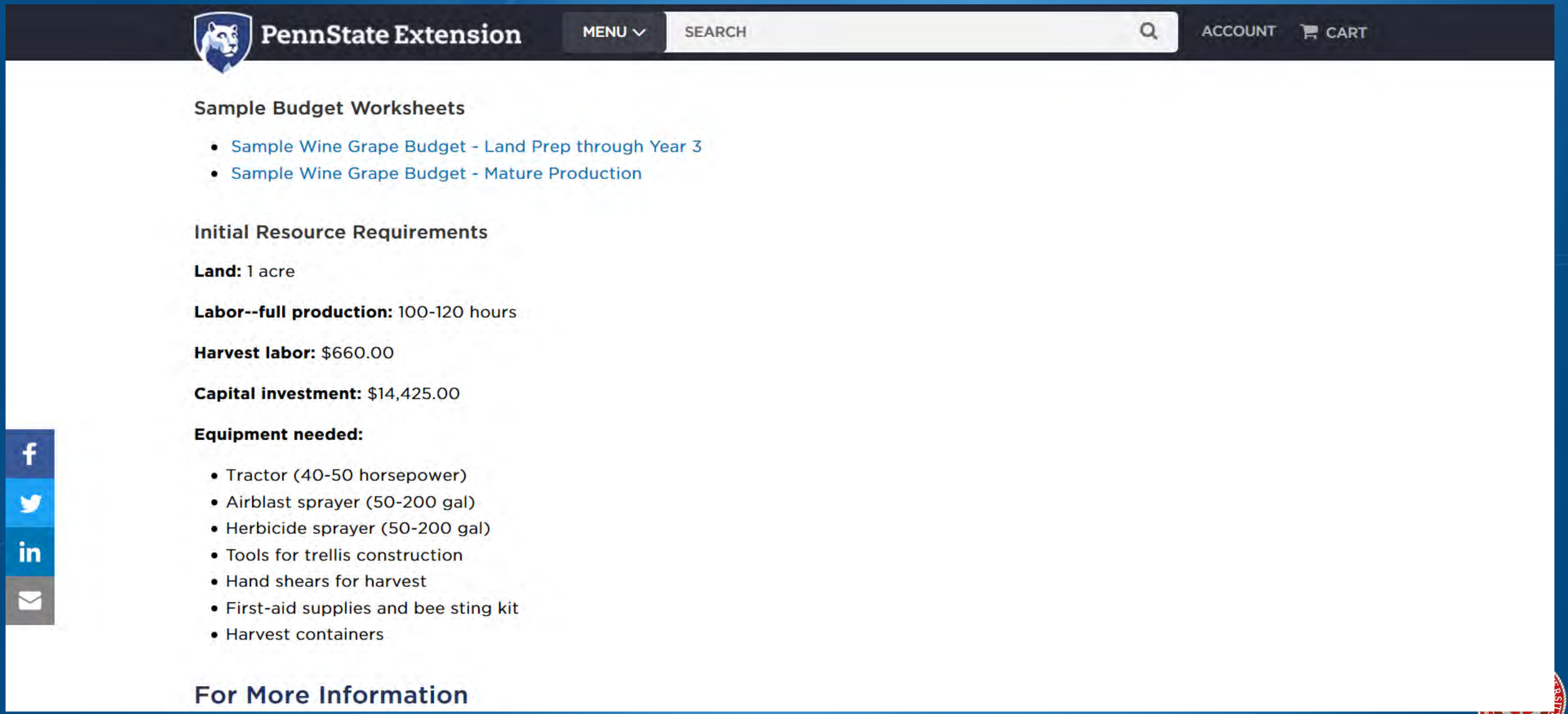


Hierarchal Scale of Plant Resource Allocation

- 1°- SURVIVE: Plant life processes consume all photosynthates
- 2°- New twig extension or growth
- 3°- Flower initiation & production
- 4°- Fruit production & ripening

Fruit Bearing Wood…

- 1st year wood- any **mature** wood or growth of twig/cane/branch extension, produced the previous season (one year old wood)

- 2nd year wood- any **mature** wood or growth of twig/cane/branch extension, produced two full seasons preceding bloom (two-year old wood)

What GRAPES want…

- Types
  - Dessert/Table
  - Wine
- Lifespan
  - 60-100 years
- Propagation- tip layering & grafting
- Soil pH 5.5-7 (6-6.5)
- Self-fruitful
- Raised bed (4 inches)
- Hillside- air drainage
- Pruning systems
  - 4-arm Kniffin
  - Cordon
  - Geneva Double Curtain
- No fertilizer until < 6 ft. of new cane growth
- Fruit on 1st year wood

Don’t Guess… Soil Test!

- Soil pH
- Nutrient deficiencies
- Nutrient excesses
- Potential nutrient holding capacity of the soil
- Recommendations to modify potential soil nutritional issues

pH affects nutrient availability…

Nutrient Goals for soils with fruits…

Soil Test Results: Ideal Values

pH	Phosphorus P lbs. / A*	Potassium K lbs. / A*	Calcium Ca lbs. / A*	Magnesium Mg lbs. / A*	Cationic Exchange Capacity C.E.C. meq./100 gms	Base Saturation		
						% Ca	% Mg	% K
5.5 to 6.5	50 to 100	250 to 400	800 plus	150 to 250	7 to 10 or higher	40 % to 80%	10% to 40%	3% to 5%

* To convert ppm (parts per million) to lbs/A (pounds per acre) multiply by 2.
Example: 50 ppm X 2= 100 lbs/A (Hint: 2 P's in PPM)

Origin of Grapes in United States…

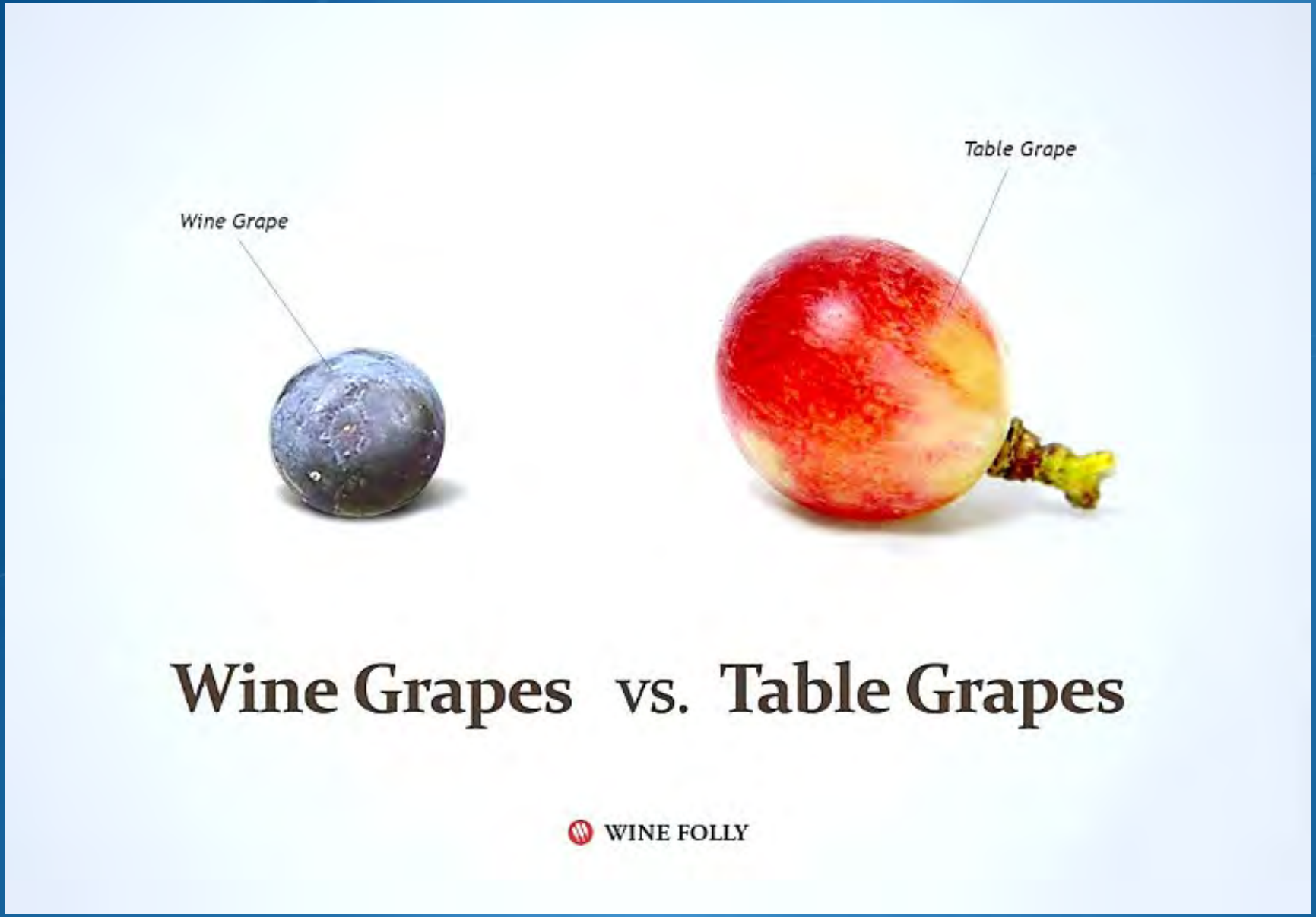
- Well adapted American native species
- Late 18th century…
- Spanish missionaries likely brought European varieties
- When moved north from Mexico…
- Established vineyards in California
- California produces majority of European grape varieties in US

Grape..ling with grape terms…

- Table grapes
- All derived from European species- *Vitis vinifera*…
- Characterized by-
  - Very thin skinned
  - Skin closely adheres to berry flesh
  - Seeds if present- slip out of flesh easily
  - Some varieties seedless
- Seedless grapes easier to eat but are less flavorful than seeded table grape varieties!
- Also commonly called “Dessert” grapes

Seedless Table Grape Cultivars for Ohio						
Cultivar	**Color**	**AverageCluster Wt. (lbs)**	**WinterHardiness***	**Days fromBloom to Harvest****	**RipeningDate**	**Remarks**
Canadice	Red	0.28	Moderately Hardy	75	Very Early	Productive; good clusters.
Einset	Red	0.20	Hardy	75	Very Early	Slip skin; mild strawberry flavor; may shatter.
Himrod	White	0.22	Moderately Hardy	75	Very Early	High quality; straggly clusters.
Marquis	White	0.50	Hardy	105	Midseason	Highly productive; high quality; loose clusters; resists cracking; susceptible to downy mildew in wet years.
Mars	Blue	0.29	Hardy	80	Early	High productivity; medium clusters; disease resistant.
Reliance	Red	0.33	Hardy	90	Early Midseason	High quality; productive; uneven color; susceptible to berry cracking.
Vanessa	Red	0.24	Hardy	105	Midseason	Adherent skin; compact clusters; firm, crisp flesh; requires girdling for berry sizing.
Lakemont	White	0.50	Moderately Hardy	80	Early	Adherent skin; firm flesh.
Jupiter	Blue	0.29	Moderately Hardy	85	Early	Muscat flavor; oval berries; large, 4.3 g; very susceptible to downy mildew.
Neptune	White	0.53	Moderately Hardy	97	Midseason	Compact clusters; low vigor; adherent and thick skin; oval berry, 3.2 g.
Suffolk Red	Red	0.24	Moderately Hardy	90	Midseason	Loose clusters; good flavor.
* Winter hardiness rating: tender, 0°F to -10°F; slightly hardy, -5°F to -15°F; moderately hardy, -10°F to -20°F; hardy, -15°F to -25°F; and very hardy, -20°F to -35°F.						
** Bloom occurs four to six weeks after bud break. **Tablegrapes can be grown in all regions in Ohio.**						

Table vs Wine berries…



Grape..ling with grape terms…

- Wine grapes
- *Vitis vinifera*- European origin
- Typically, European species less cold tolerant
- *Vitis labrusca* & *V. rotundifolia*- American origin
- French- American hybrids
  - Hybrid crosses of wild American grape (primarily *V. rupestris*, *V. lincecumii*, & *V. riparia*) & European (*V. vinifera*)
  - Called French-American hybrids because most of the breeding work was done in France

Clarify cluster of grape species…

- *Vitis labrusca* also called “fox grape”
- Characteristic "foxy musk” best identified in flavors
- “Musk” not mammalian fox- rather unique, earthy & sweet muskiness perceived in fresh Concord grapes
- *Vitis rotundifolia* also called “muscadine”
  - First cultivated wine grape in this country…
- Familiar American varieties- Concord & Catawba

Clarify cluster of grape species…

- American grape varieties ripen in fall
- Therefore, fresh only available September & October
- American varieties also called “slip-skin” grapes
- Skins (thick) separate readily from the flesh
- Although seeds are tightly embedded into flesh

Pay attention to U of Minn program…

- New winter hardy, disease-resistant selections based on Minnesota's native grape
  - *Vitis riparia*
- U of Minn has developed five cold wine grape varieties: Frontenac (red/rose/port), Frontenac gris (white), Frontenac blanc (white), La Crescent (white), and Marquette (red)
- U of Minn released in 2017 newest cold-hardy grape, Itasca, after a 20-year breeding program

Uof Minn & Arkansas releases sold…

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Grapevines
- Grapevine Collections
- American Varieties
- Hybrid Varieties
- Seedless Grapes
- Grafted Vinifera
- Grafted Hybrids
- Southern Varieties

Grapevines by Use
- Wine
- Table
- Juice
- Jelly
- Decorative
- Raisin
- Rootstock

Grapevines by Zone
- Hardiness Zone 3
- Hardiness Zone 4
- Hardiness Zone 5
- Hardiness Zone 6
- Hardiness Zone 7
- Hardiness Zone 8

Grapevines by Rootstock
- 101-14 Rootstock
- 3309 Rootstock
- Riparia Rootstock
- 1103P Rootstock
- 420A Rootstock
- SO4 Rootstock

Berries & Hops
- Berry Collections
- Aronia Berries
- Blackberries
- Blueberries
- Currants
- Elderberries
- Goji Berries
- Gooseberries
- Hops
- Raspberries

Willow
- Privacy Screens
- Snow Fence
- Streambank Restoration
- Rabbit
- Biomass
- Riparian
- Ornamental

https://doubleavineyards.com/plants-for-sale

Which grape is which…

https://ohioline.osu.edu/factsheet/HYG-1429-2004

Pruning Backyard Grapevines in the First Three Years

Maurus Brown, Ph.D., Associate Professor Emeritus, OSU South Centers
Gary Gao, Ph.D., Associate Professor and Small-Fruit Extension Specialist, OSU South Centers; and Adjunct Associate Professor, Department of Horticulture and Crop Science, The Ohio State University

Grape gardeners often become confused as to what should be pruned off and when. Proper pruning will help maintain a grapevine's potential of producing a good quality fruit crop, develop good vine structure, increase sunlight exposure into the canopy, promote the development of next year's fruiting wood, and potentially reduce disease and insect pressure. The key to good pruning is learning how to select good quality fruiting wood to leave for cropping.

As green shoots mature in the late summer and fall, they will begin to harden-off by developing a periderm (bark layer) that is reddish-brown in color. Healthy shoots will harden-off the full length of the shoot. Any green growth (generally at the tip) remaining at frost will be killed.

Proper pruning can help to reduce the amount of unproductive wood and balance the level of fruit crop with the overall vegetative growth each year. Once pruning is completed, the remaining fruiting wood should be spread out over the entire allotted space for the vine on the trellis.

How do I prune my grapevines after the first year of growth?

In the first growing season, remove all fruit and unwanted lateral shoots from the young vines throughout the growing season. Grapevines tend to grow rapidly from the apical end (main growing point) when lateral shoots and fruit are removed. Vines should be staked and tied (using twine or string) to allow the new shoot to form a straight trunk (Figure 1). The leaves should remain on the developing trunk to produce necessary carbohydrates to feed the plant; all lateral shoots, however, should be removed. Only lateral shoots at the top wire will be left. New growth may reach the top wire (around 5 to 5½ feet) during the first year. If this occurs, pinch off the end

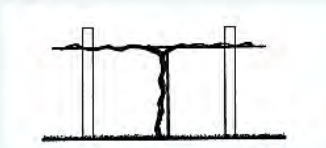
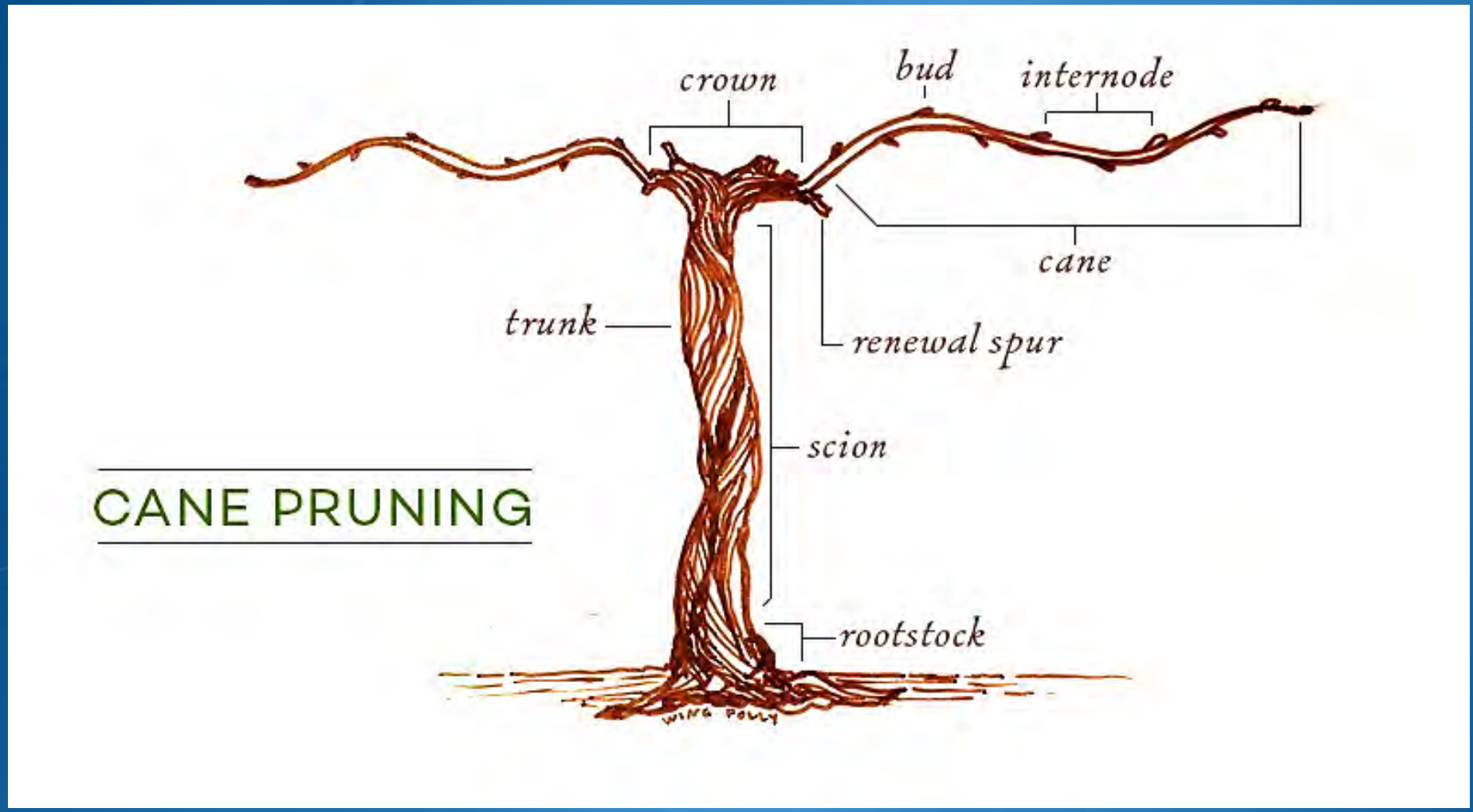
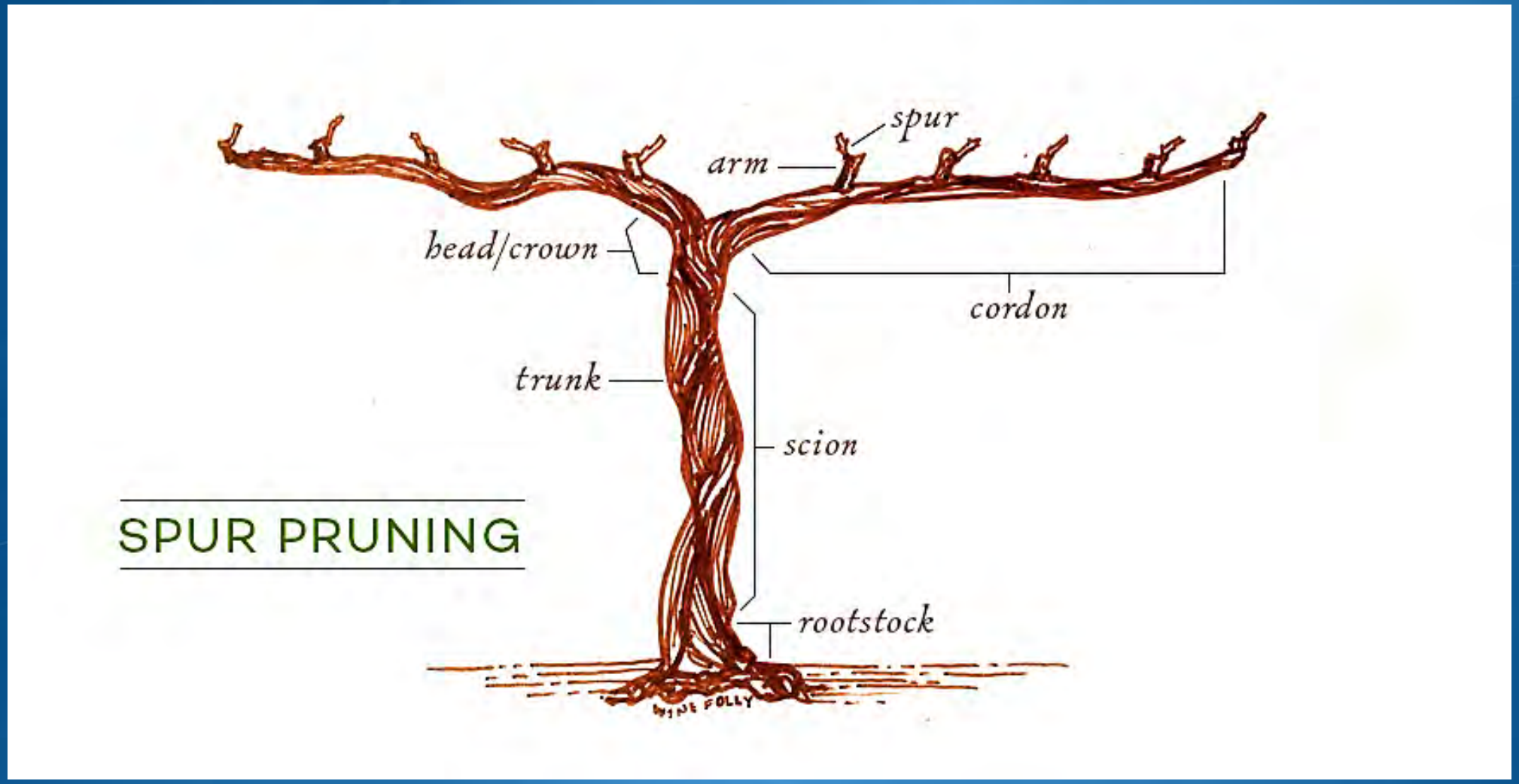


Figure 1. Grapes should be trained to an appropriate position on the trellis or arbor.

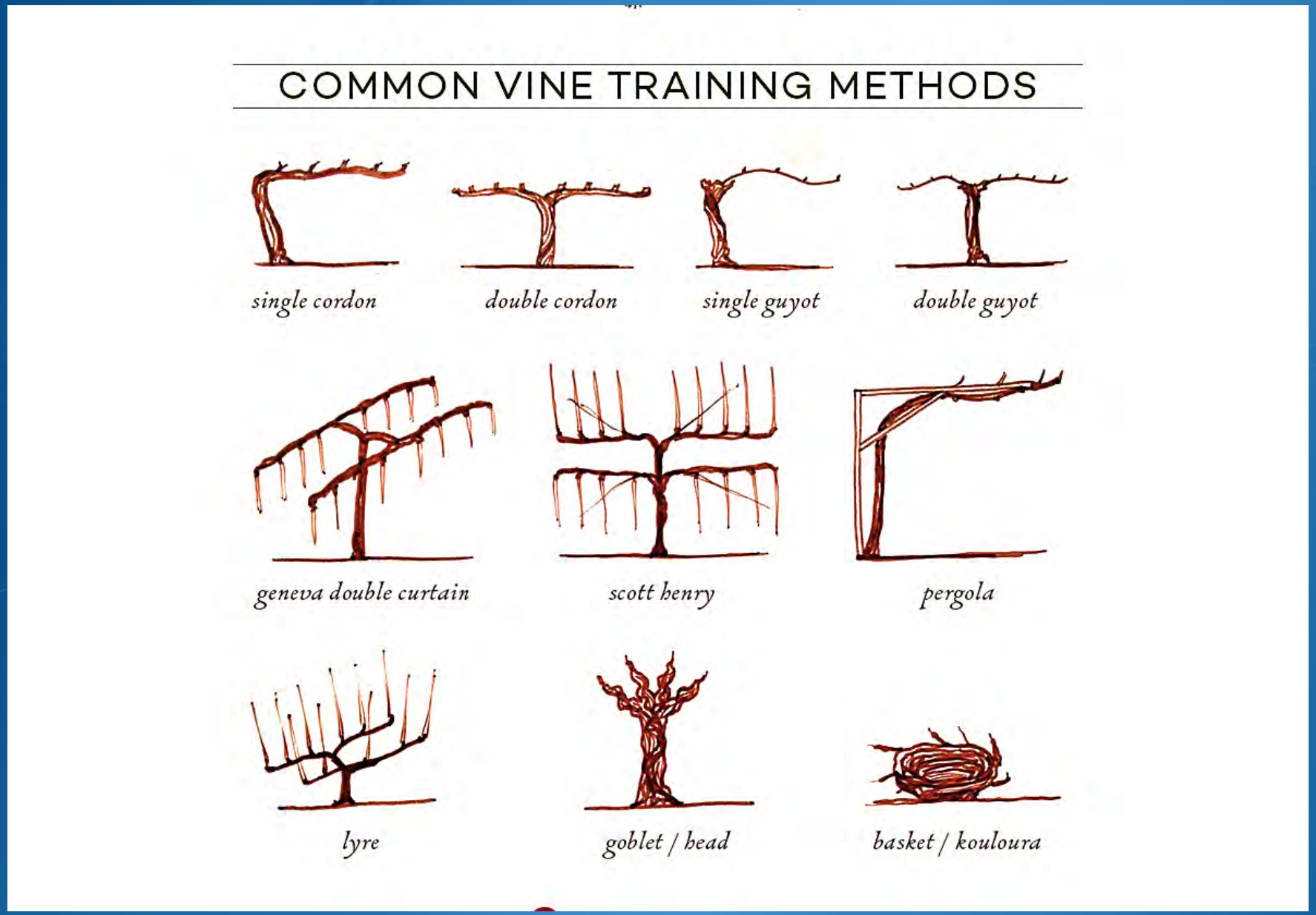
Common Grape Training bases…



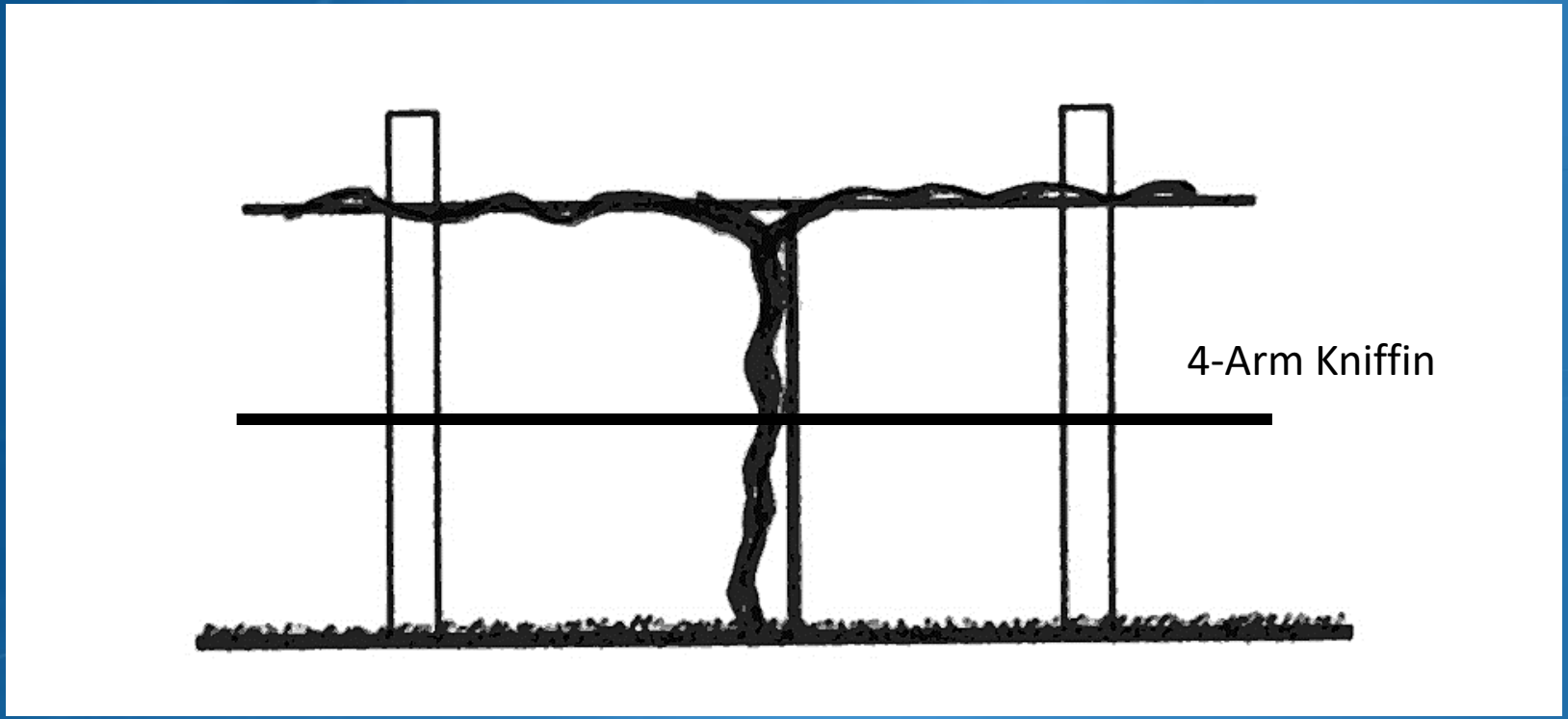
Cordon or Spur…



Wine grape trellis/training systems…



1st year vine- cordon training system…



Grapes should be trained to an appropriate position on the trellis or arbor

Great Grapes = Proper Pruning

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Dastardly Diseases of Grapes

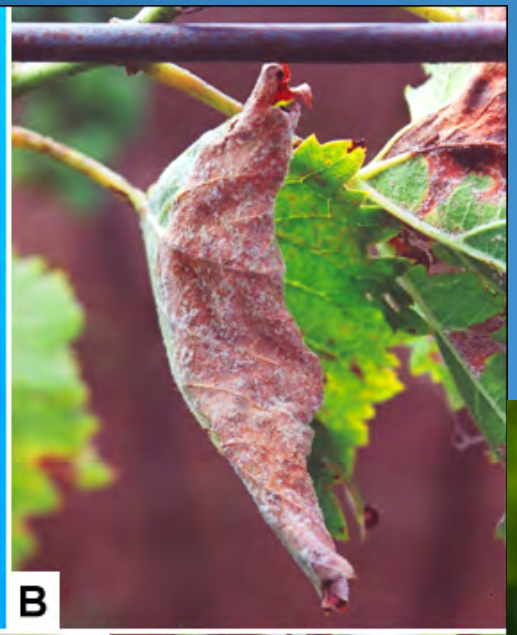
- Black Rot- *Guignardia bidwellii*
- Downy Mildew- *Plasmopara viticola*
- Powdery Mildew- *Uncinula necator*

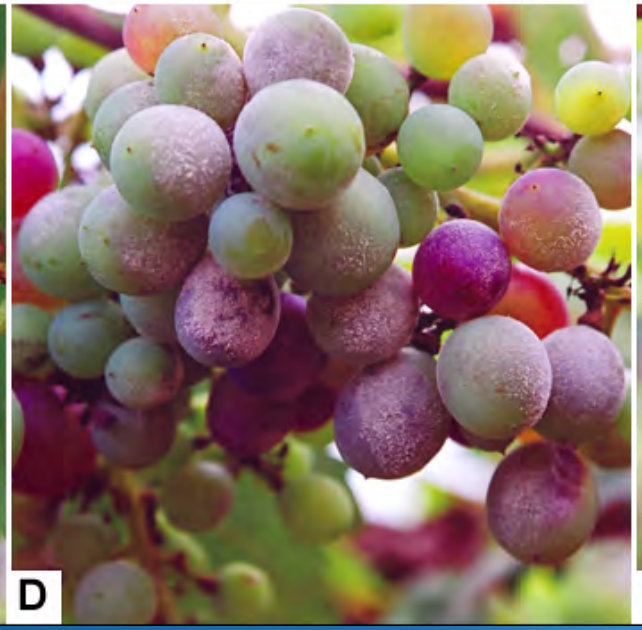
Black Rot of Grape- *Guignardi bidwellii*

Black Rot of Grape

Plasmopara viticola- Downy Mildew

Downy Mildew from APS.net





Powdery Mildew- *Uncinula necator*

When left unmanaged…

Just Bramblin' Along…

Erik Draper, Commercial Horticulture Educator
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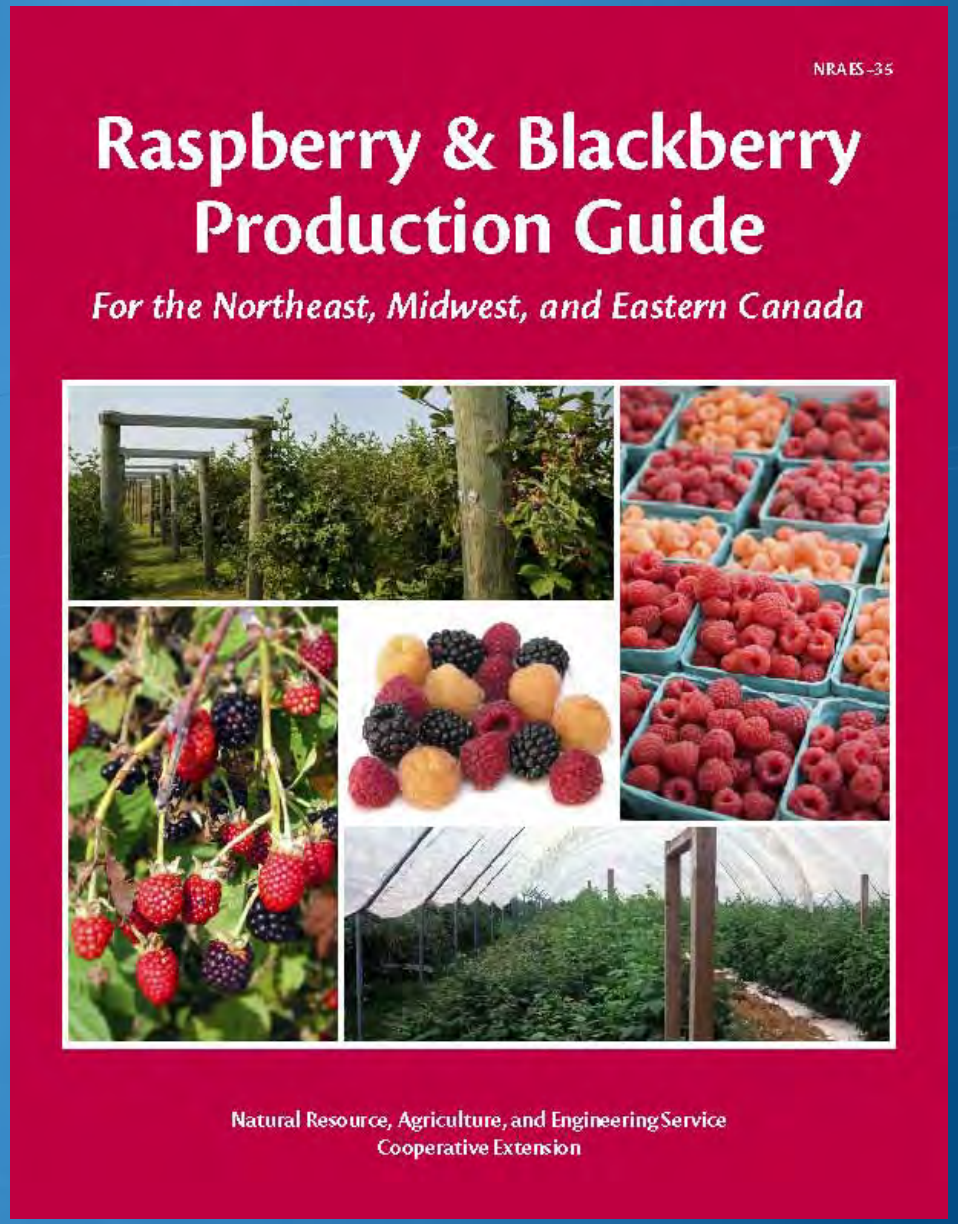
AND ENVIRONMENTAL SCIENCES

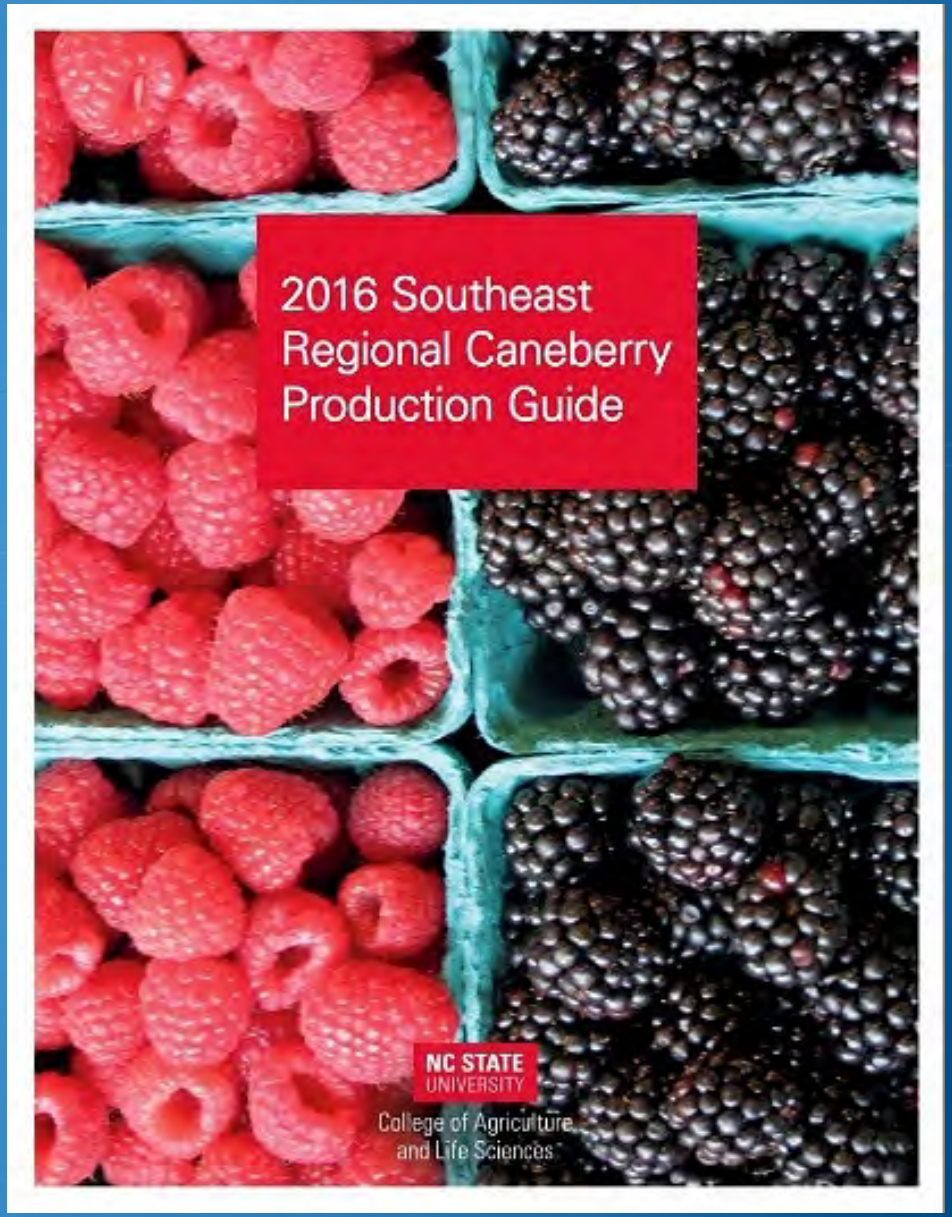
Really GREAT Resource…

- Natural Resource, Agriculture, and Engineering Service Cooperative Extension- NRAES-35
- https://www.canr.msu.edu/foodsystems/uploads/files/Raspberry-and-Blackberry-Production-Guide.pdf
- View online free via PDF
- Purchase for $37- S&H $6



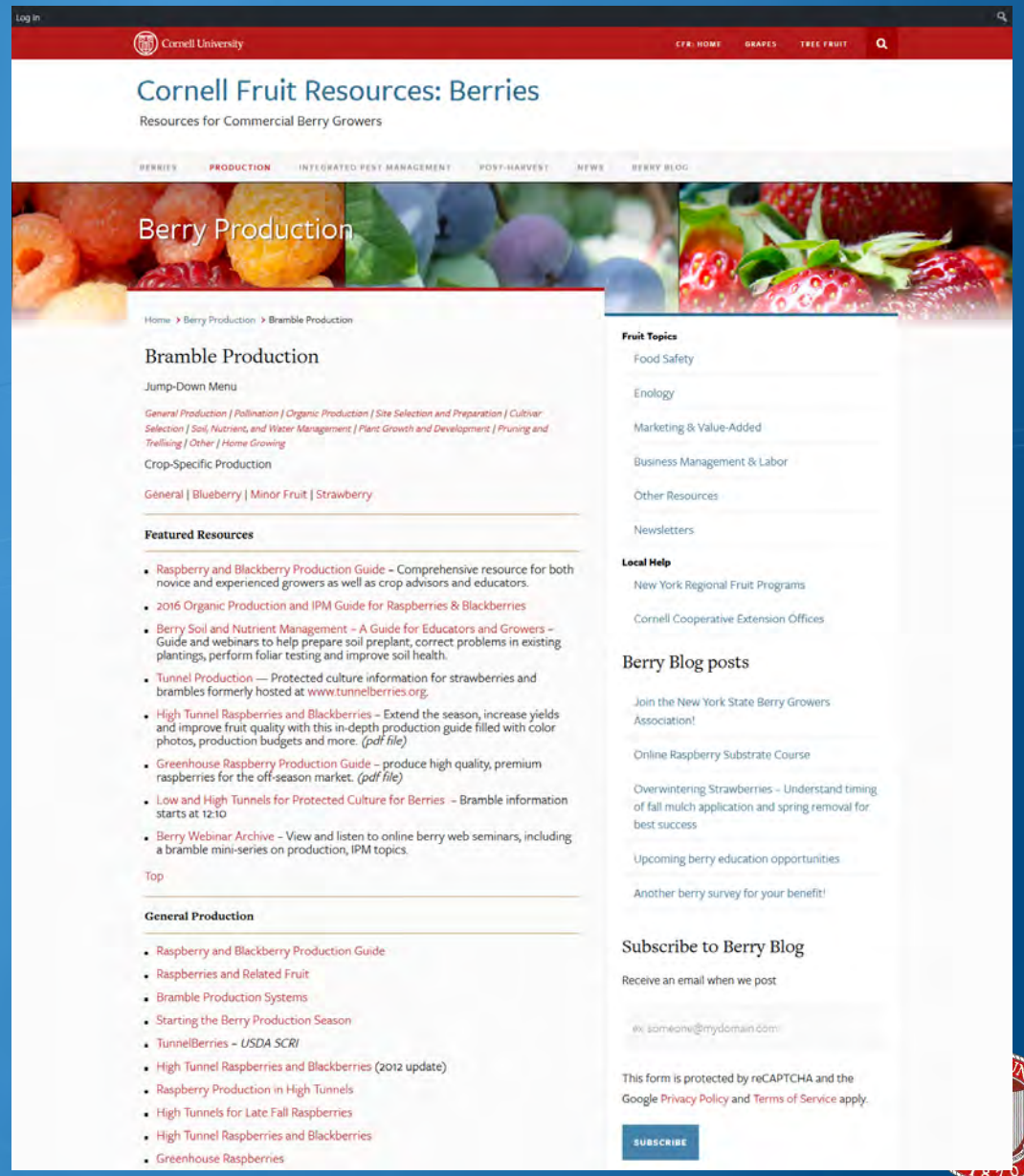
Really GREAT Resources…

- FREE as printable PDF
- https://content.ces.ncsu.edu/southeast-regional-caneberry-production-guide



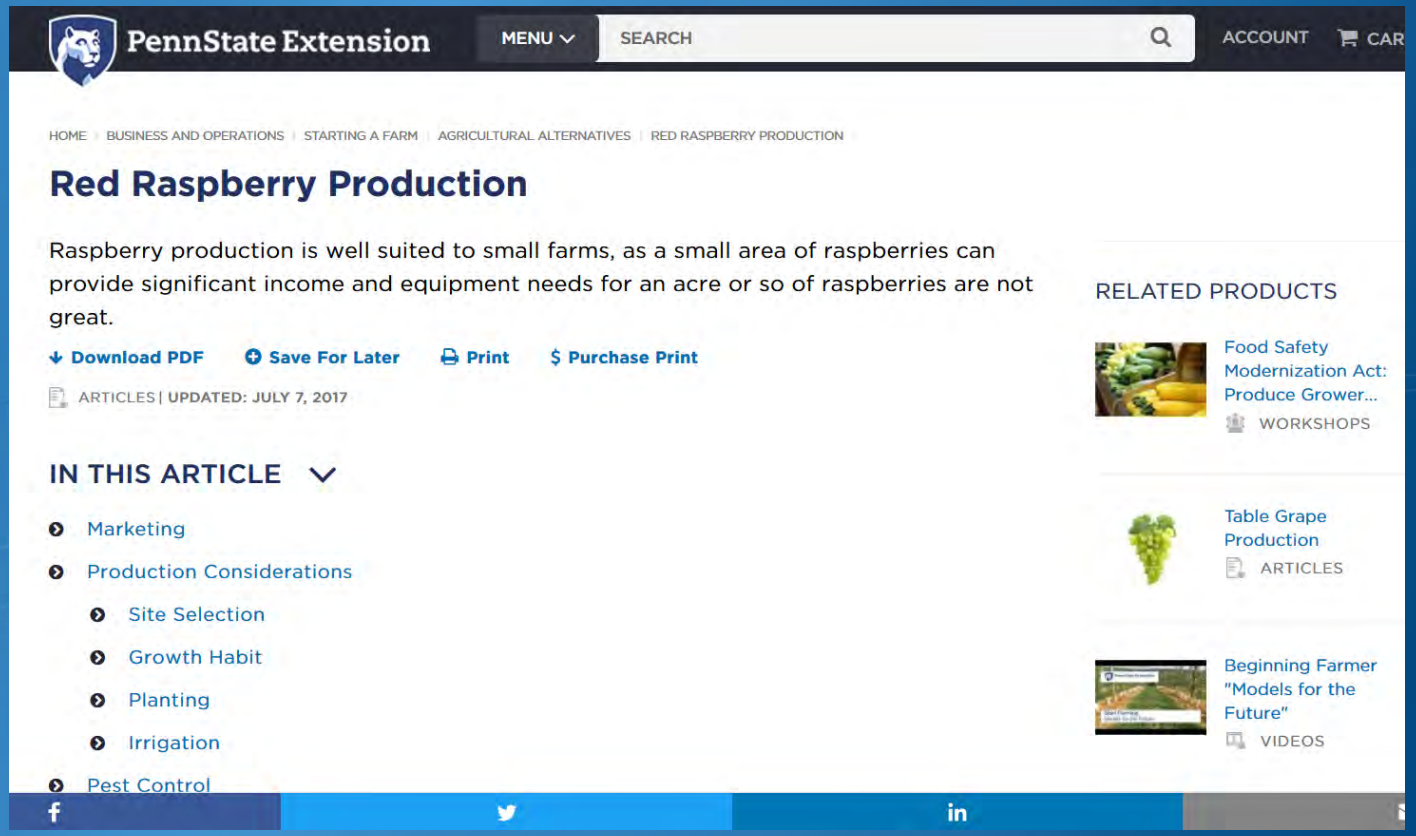
Really GREAT Resources

- Cornell Bramble Production
- https://blogs.cornell.edu/berries/productions/raspberry-and-blackberry-production/



Really GREAT Resources

- Penn State Red Rasberry Production
- https://extension.psu.edu/red-raspberry-production



Scroll down through to find…

PennState Extension MENU SEARCH ACCOUNT CART

SAMPLE BUDGET WORKSHEETS

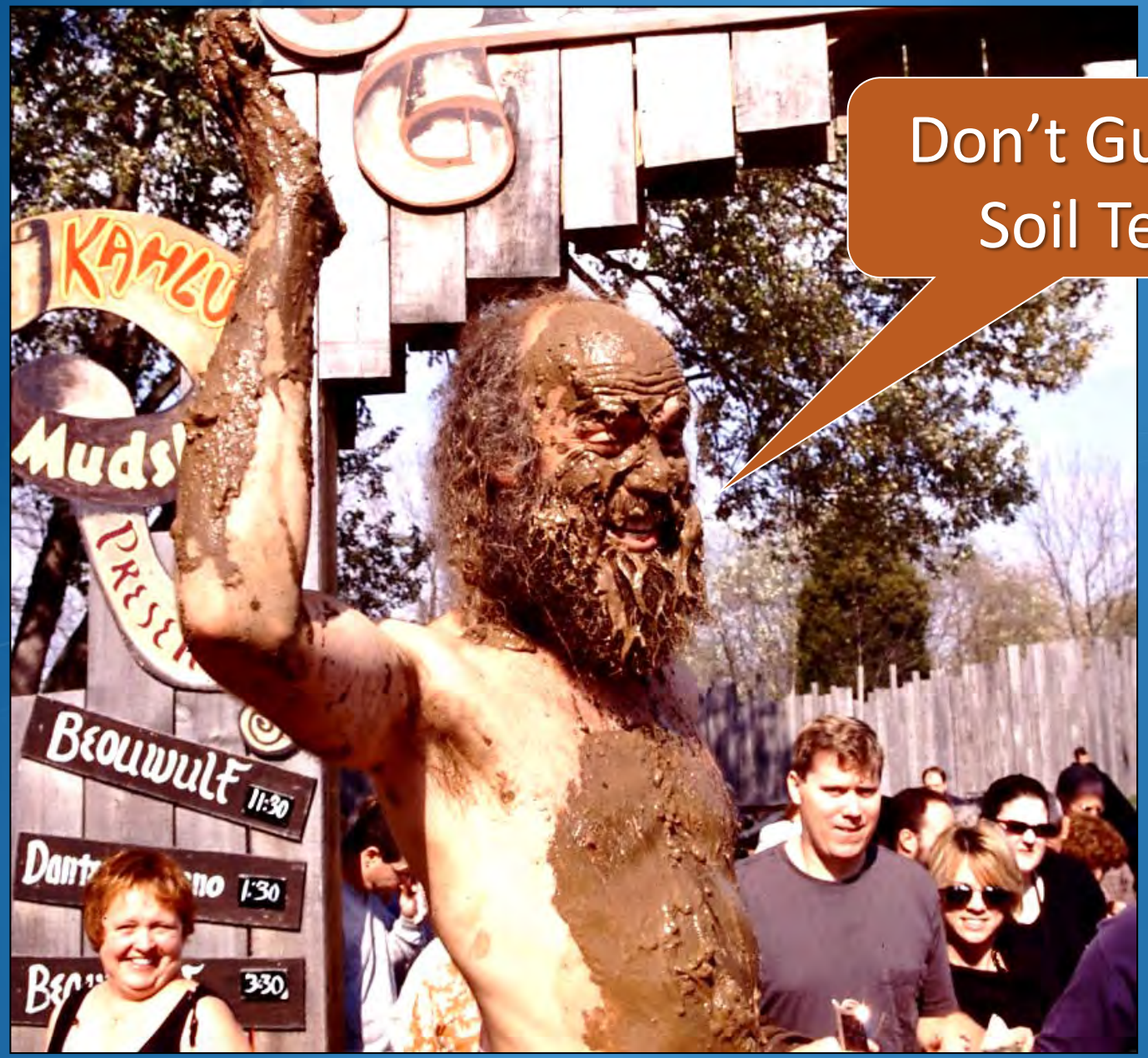
- Sample Red Raspberry Budget - Land Preparation Budget
- Sample Red Raspberry Budget - Planting Budget
- Sample Red Raspberry Budget - Second Year of Production Budget
- Sample Red Raspberry Budget - Retail Marketing Production Budget
- Sample Red Raspberry Budget - Pick-Your-Own Production Budget

Initial Resource Requirements

- Land: 1 acre
- Labor:
- Land preparation: 3 hours
- Establishment: 60-70 hours
- Production (year 1): 20-30 hours
- Production (mature): 45-55 hours
- Custom harvest labor (mature): $7,000-$7,500
- Capital:
- Land preparation: $200-$400
- Red raspberry plants: $1,800-$2,000
- Trellis: $3,500-$4,000
- Trickle irrigation: $800

For More Information

Soil Man Knows THE SECRET…



Yearly bramble Nitrogen guide…

Table 1: Estimates of Nitrogen Requirements for Bramble Crops.

Adapted from Bushway et al. (2008) and Fernandez et al. (2016).

Bramble Type	Growth Stage	Pounds per Acre of Nitrogen
Blackberries*	Establishment Year Second Year Third and Subsequent Years	25 to 50 50 to 80 60 to 80
Summer-bearing Raspberries	Establishment Year Second Year Third and Subsequent Years	25 to 55 40 to 80 40 to 80
Primocane-fruiting Raspberries	Establishment Year Second Year Third and Subsequent Years	25 50 to 80 70 to 100

* Primocane-fruiting blackberries may require higher N fertilization rates, but currently no specific recommendations exist. Monitor foliar nutrient levels and adjust fertilization strategy as needed.

Note that N fertilizer rates should fall on the high end of the range for sandy soils with low organic-matter content and fall on the low end of the range for heavy soils and/or soils with high organic-matter content.

Pre-plant brambles soil nutrients guide…

Table 2: Desired Soil-nutrient Content (pounds per acre) at Pre-plant

(Source: 2016 Southeast Regional Caneberry Production Guide, based on University of Arkansas recommendations)

Nutrient	Soil Nutrient Content (pounds per acre)
Phosphorus	40-60
Potassium	200-400*
Calcium	1000-2000**
Magnesium	100-250
Sulfur	21-40
Iron	101-200
Manganese	51-200
Zinc	1.1-3
Copper	1.1-3
Boron	1.0-2.0

* Recommendations from Oregon State for potassium are higher (300 to 600 pounds per acre). Because this mineral is not mobile in the soil, growers might want to use the higher rates, but take care not to cause salt injury to new plantings.

** Optimum calcium levels depend on soil type. Liming the soil usually supplies enough calcium.

BRAMBLES or CANEBERRIES

- Red raspberries
- Yellow raspberries
- Purple raspberries
  - red x black rasp hybrid
- Black raspberries- a.k.a. “black caps”
- Blackberries
  - Thornless
  - Thorned
    - Trailing- low growing
      - “dewberries”
    - Semi-erect
    - Erect
- Red raspberry X Blackberry hybrids
  - Tayberry
  - Loganberry
  - Boysenberry
  - Marionberry
  - Silvanberry (euro)
  - Tummelberry (euro)
- Red raspberry X Blackberry X dewberry hybrids
  - Youngberry

What BRAMBLES want…

- Types
  - Standard/Summer
  - “Everbearing” really…
  - Fall bearing
- Lifespan
  - site 2-15 years
- pH 5.5-7.5 (5.7-6)
- Shallow fibrous root system- 70% uptake < top 10” of soil
- Self-fruitful…but larger & better fruit w/bees
- Propagation- tip layering or basal buds @ crown
- Irrigation critical- soaker/ooze
- Encroach vs clump
- Encroachers- new buds on roots = suckers
  - Reds
  - Yellows
  - Thorned blackberries
- Clumpers- new buds on crown
  - Black raspberry
  - Purple raspberry
  - Thornless blackberry
- Cold Hardiness
  - Thorned Blacks tolerate -20 to -30F
  - Thornless tolerate -5 to -10F

Perennial, Biennial Plants…

- Perennial roots
- Biennial shoots
  - 1st year- new canes are "primocanes"
  - 2nd year- same canes are "floricanes"
- So what exactly is a "fruiting primocane" or everbearing bramble?
- Everbearing really late summer/early fall bearing

https://ohioline.osu.edu/factsheet/hyg-1421

Raspberries for the Home Fruit Planting

Gary Gao, Ph.D., Associate Professor and Small-Fruit Extension Specialist, OSU South Centers and Adjunct Associate Professor, Department of Horticulture and Crop Science, The Ohio State University
Erik Draper, Assistant Professor and County Extension Educator, OSU Extension, Geauga County
Rory Lewandowski, County Extension Educator, OSU Extension, Wayne County

Raspberries can be used in a variety of appealing and delicious ways. Freshly prepared and sugared raspberries are excellent when either served alone (Figure 1) or used to make a raspberry sundae. The fruit can also be used to make delicious jams, jellies, pies and other desserts. Besides their excellent flavor, raspberries are a nutritious food, contributing vitamins A and C and various minerals to the diet. Making a raspberry smoothie is a delicious treat and a nutritious way to enjoy this wonderful group of berries. Numerous studies have shown that raspberries are very rich in antioxidants and have anti-cancer properties.

Raspberry plants can also be easily incorporated into being a part of any edible landscape. Shown here is a black raspberry hedge at Longwood Gardens, Kennett Square, Pennsylvania (Figure 2). Healthy red raspberry stems are reddish-brown while black raspberry stems are greyish-white, and can add interest to the winter landscape.

Figure 1. Fresh red raspberries. *Photo by Ken Chamberlain.*

Figure 2. A black raspberry hedge. *Photo by Gary Gao.*

https://ohioline.osu.edu/factsheet/hyg-1431

Pruning Erect Blackberries in the Home Garden

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Blackberries can make a nice addition to the home fruit garden as a beautiful living hedge with nice flowers and tasty fruits. Gardeners can also enjoy blackberries as fresh fruit, jam or cobbler. Maintaining a neat, clean blackberry planting can be a considerable challenge. A good weed, fertility and pest control program can promote plant growth and quality fruit. Annual pruning of blackberry plants is also essential for high quality fruit production.

Proper establishment of blackberry plants is important. This fact sheet is intended to help gardeners better understand how blackberries should be pruned. Refer to the glossary of terms if you are not familiar with some of the words used in this fact sheet. Thorny, erect blackberries tend to be more aggressive in their vegetative growth than thornless varieties. Thornless, erect varieties tend to be slower to fill in rows and overall are more manageable than thorny blackberries. Blackberry vegetation can be managed through effective pruning practices and still maintain good quality fruit production.

Figure 1. Thornless blackberry bushes loaded with fruits. *Photo by Gary Gao, OSU South Centers.*

When is the best time to prune blackberry plants?

Since blackberry plants are not as cold hardy as our fruit crops, it is beneficial to conduct dormant pruning as late as possible. Late March or early April may be typical timing for most parts of Ohio. Floricane bearing cultivars can lose many canes to winter injuries. It is a good idea to wait until the full scope of winter injuries can be assessed.

Blackberries- Thornless (erect)

- ‘Arapaho’- High yielding of the erect types with medium to large fruit
- ‘Apache’- A favorite in taste trials. Moderate yields of large fruits in mid-season
- ‘Ouachita’- Produces high yields of large fruit late in the season with good storability
- ‘Ponca’- (NEW) Ranked highest & sweet in taste trials. Fruit same size & as prolific as ‘Ouachita’
- All from Univ. Arkansas breeding program- ‘Caddo’, ‘Osage’, ‘Natchez’ & ‘Prime-Ark® Traveler’ (primocane)

https://aaes.uark.edu/fruit-breeding/blackberries/

Prime-Ark® Horizon

Released in 2020. Prime-Ark® Horizon is a primocane-fruiting variety with very high yield potential, particularly on floricanes. Berries are large and firm, with postharvest potential similar to Prime-Ark® 45. Prime-Ark® Horizon berries have good flavor and retain excellent firmness in storage, with limited leakage and decay.

Prime Ark® Horizon Flyer

Sweet-Ark™ Ponca

Released in 2019. High-yielding thornless, erect canes with medium-sized fruit with enhanced sweetness and good post-harvest handling traits. Sweet-Ark™ Ponca is the sweetest cultivar released to date. A commercial cultivar with good potential as an early-market berry for shipping, local market production and home garden use.

Sweet-Ark™ Ponca Youtube Video

Sweet-Ark™ Caddo

Released in 2018. High-yielding thornless, erect canes with medium-large fruit that are sweet with very good fruit flavor. A commercial cultivar with good potential for local market production and home garden use.

Sweet-Ark™ Caddo Release Flyer
Sweet-Ark™ Caddo Youtube Video

DASTARDLY DISEASES…

- Viruses
- Susceptibility varies
  - Reds> Blkberry> Blk Rasp> Yellows> Purple
- Anthracnose
- Spur blight
- Cane blight
- Crown gall
- Fruit rot- Gray mold (*Botrytis cinerea*)
- Root rot
  - Rhizoctonia
  - Phytophthora
  - Pythium
- Orange rust
  - Raspberries
    - Foliar only
  - Blackberries
    - Systemic

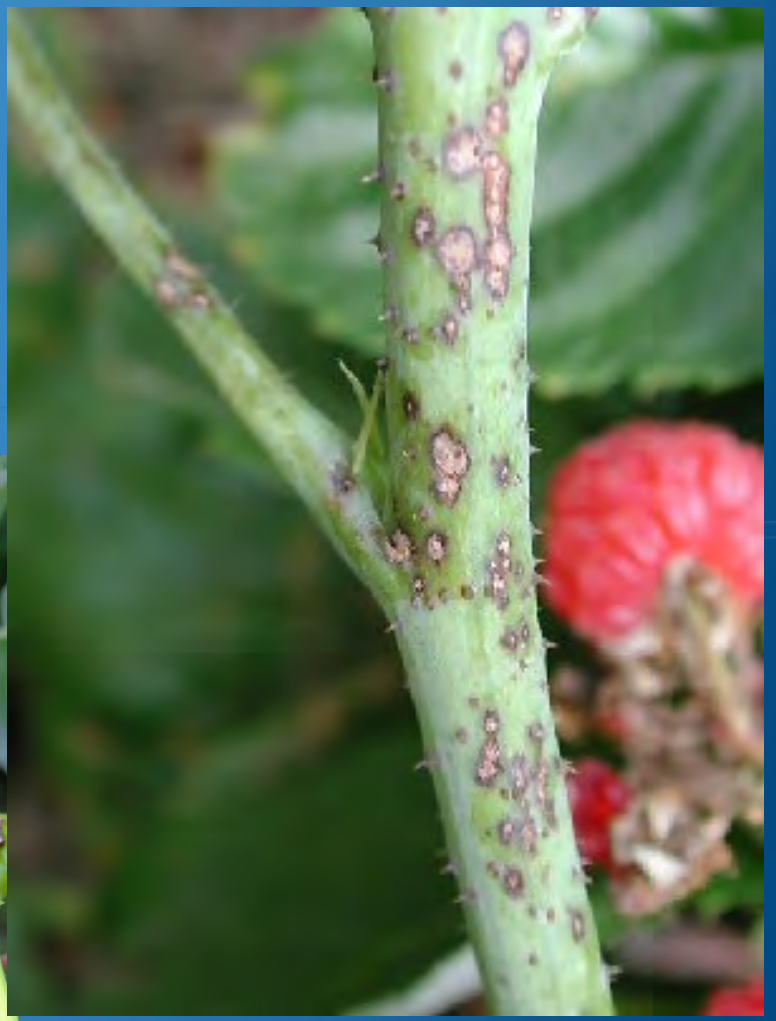
VILE VILLIANOUS VIRUSES…

- 15 known viruses infecting brambles
- raspberry bush dwarf
- tobacco ringspot
- tomato ringspot
- strawberry necrotic shock viruses
- Impatiens necrotic ringspot
- Blackberry yellow vein
- Unknown or uncharacterized

Virus infections...

Cane Blight

Anthracnose



Fruit rot Gray Mold- Botrytis

Root Rot Complex: Phytophthora, Pythium, Rhizoctonia

It all comes down to...

Orange rust- black & purp rasp & blackberries…

Red Raspberries- Late Leaf Rust…

Bramble culture

“Everbearing” brambles pruning…

ALL CANES ARE MOWED OFF!!!

Spotted Wing Drosophila (SWD)

How many have heard of and can recognize this problem?

This insect has changed EVERYTHING…

About growing small fruit!

Drosophila suzukii- Spotted Wing Drosophila a.k.a. Fruit fly or Vinegar fly

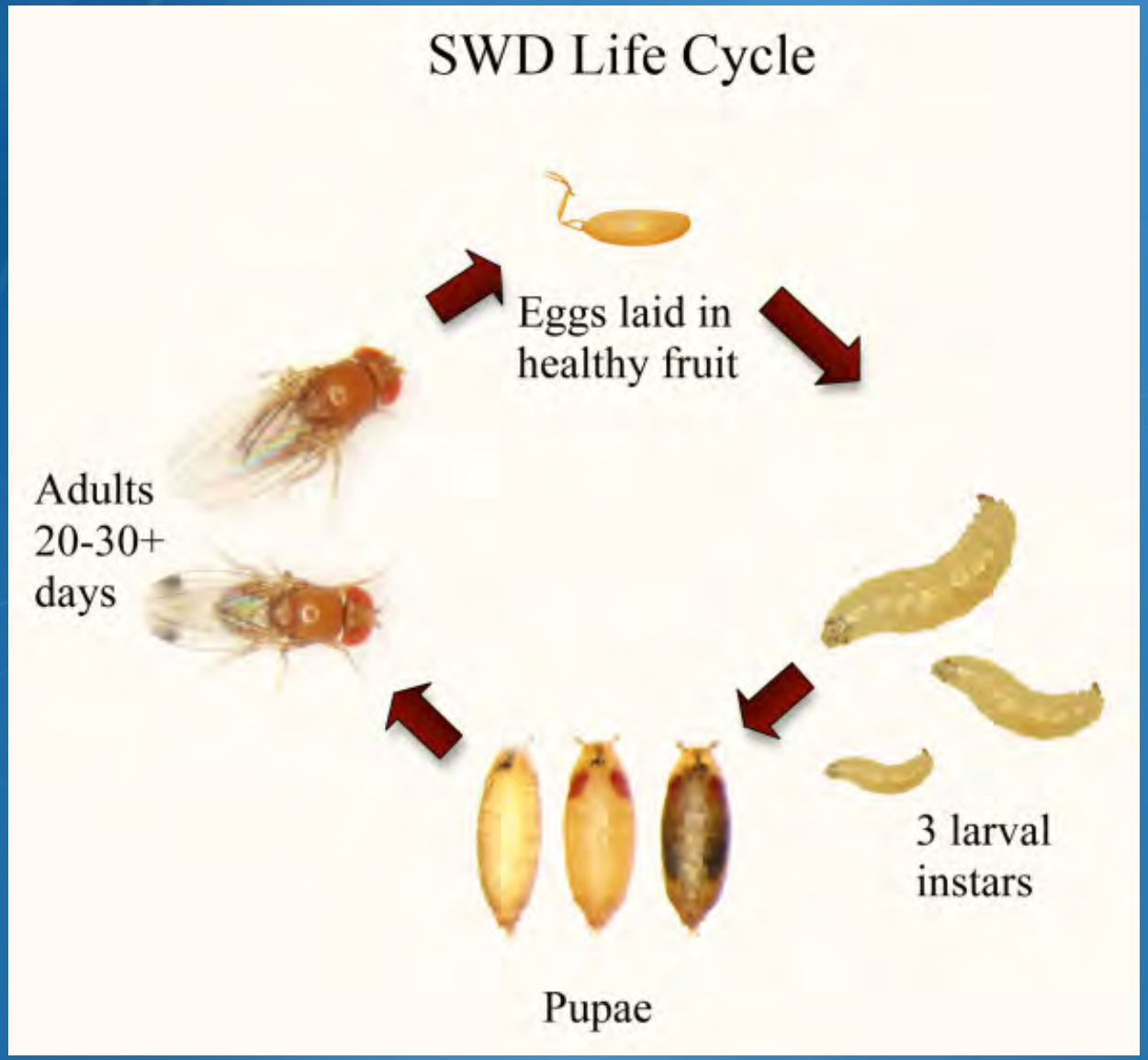
- http://www.ipm.msu.edu/invasive_species/spotted_wing_drosophila

BIG DIFFERENCES…

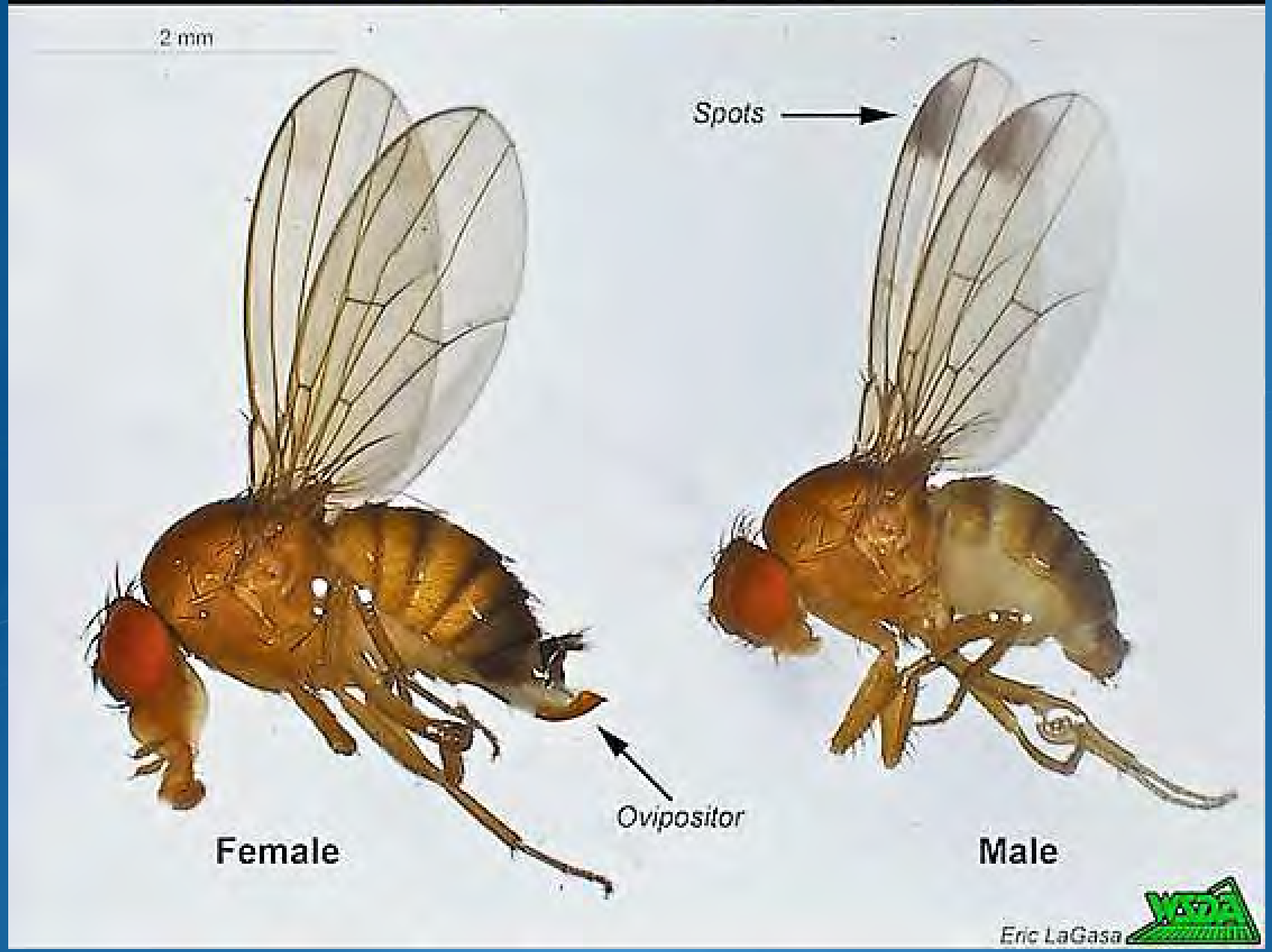
- Common fruit flies or vinegar flies
- Attracted to & attack damaged fruit
- Attracted to & attack overripe fruit

- SWD attacks HEALTHY, ripening fruit!
- Female cuts slits into fruit
- Lays eggs
- Larvae develop and eat fruit
- Fruit softens from larval feeding

Spotted Wing Drosophila…



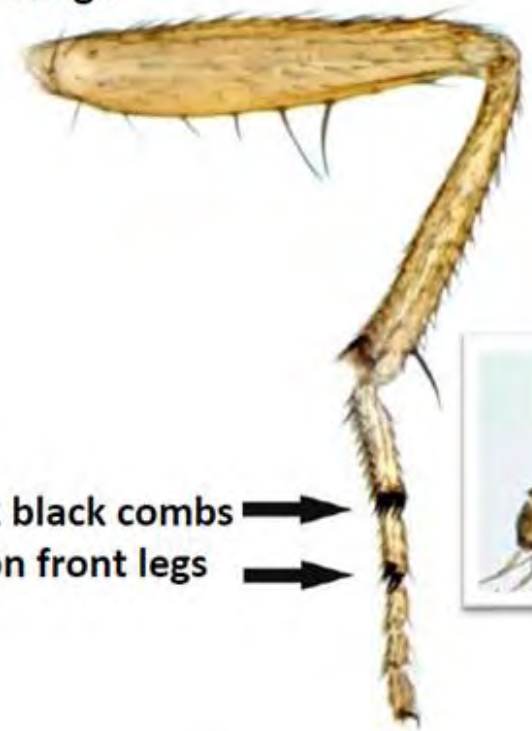
Spotted Wing Drosophila *(Drosophila suzukii)*



SWD Identification – key characters

Male

Black spot
on wings



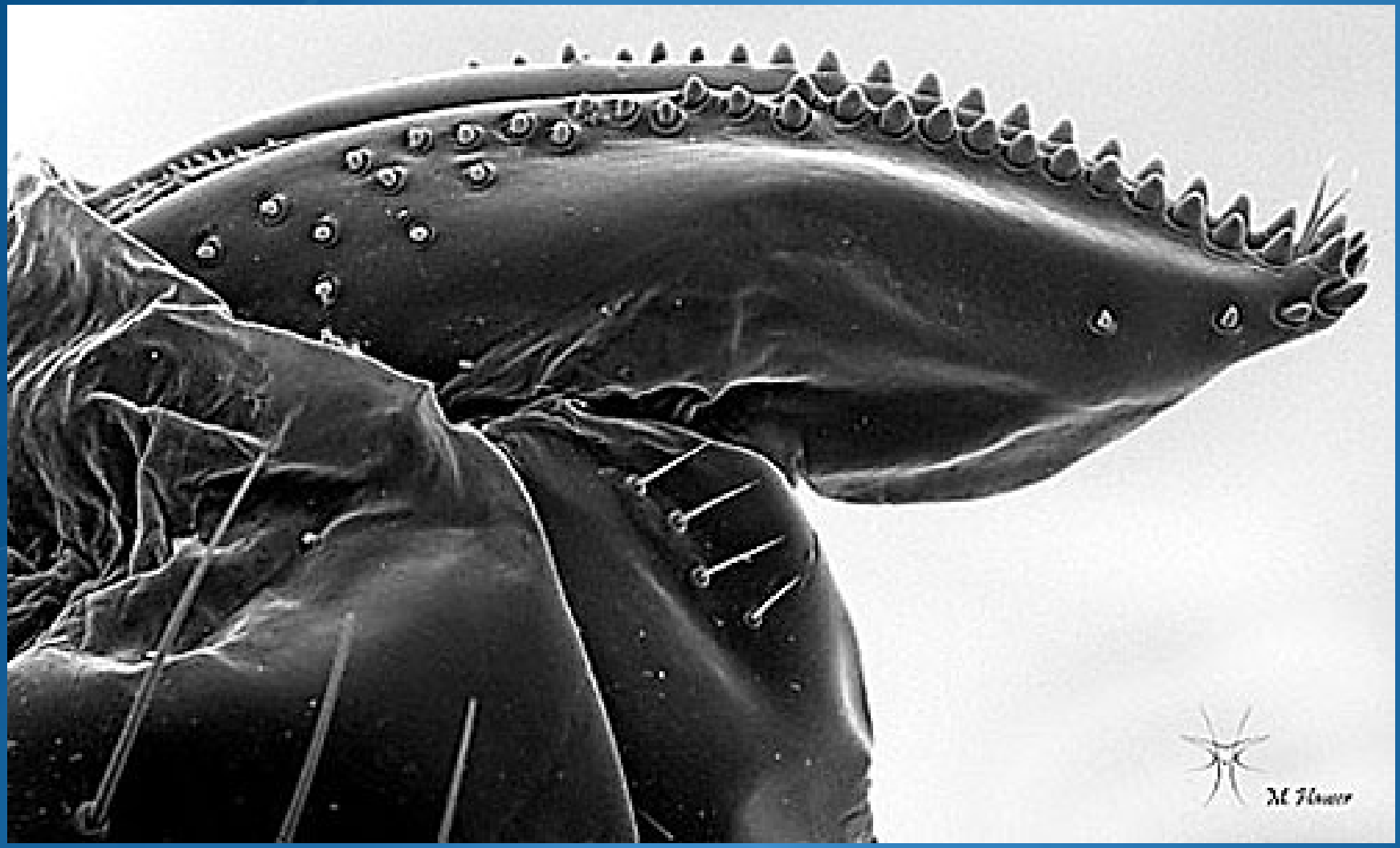
2 black combs
on front legs

Female

She inserts saw-like device (ovipositor) into fruits and lays eggs

Note… Distinct ovipositor on female

SEM of SWD ovipositor…



SWD Larvae in Strawberry…

Potential Hosts for SWD

Crop Host	Crop Host	Wild Host
Apple	Grapes	American Pokeweed
Asian Pear	Italian Plums	Autumn Olive
Asian Plum	Mulberries	Beach Plum
Blackberries	Nectarines	Climbing Nightshade
Blueberries	Peaches	Crabapple
Boysenberries	Persimmons	Fox Grape
Cherries	Plumcots	Japanese Yew
Cold Hardy Kiwis	Raspberries	Kousa Dogwood
Elderberries	Strawberries	Porcelainberry
	Tomatoes	Wild Rose

Control is Imperative so...

SWD ovipositing on Blackberry…

SWD Eggs in Blackberry…

SWD Pupa in cherry…

Why the Concerns…

- Short life cycle (8-16 days based on temperature)
- As many as five generations per year
- Overlapping & asynchronous hatches of generations
- 7-16 eggs laid per day
- Average 384 eggs laid per female

Biology of SWD…

- Eggs hatch in 2-72 hours
- Larvae mature in 3-13 days
- Pupae reside in fruit or outside of fruit for 3-15 days
- In constant temperature, one generation takes 50 days at 54°F (12°C)
  - 21-25 days at 59°F (15°C)
  - 19 days at 64°F (18°C)
  - 8.5 days at 77°F (25°C)
  - 7 days at 82°F (28°C)

SWD Management Brambles…

- Scout using vinegar or yeast traps weekly
- If SWD in traps, start spray program when berries begin to color
- Spray every 7 days!
- Alternate products
- Weekly- salt test ripe fruit
- 1 cup water & 1 Tbs salt
- Place fruit in brine & look for wigglers!

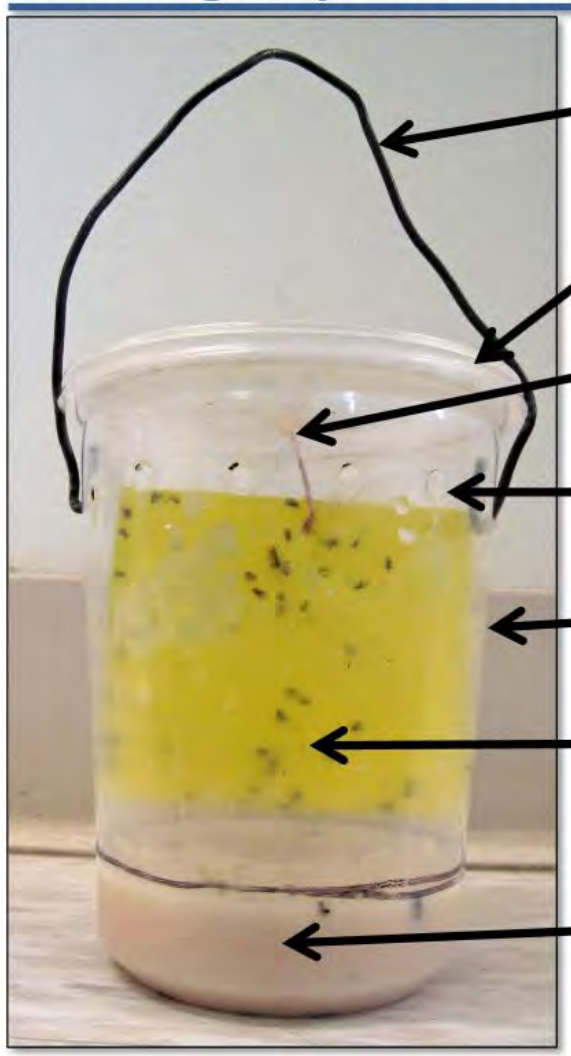
SWD Larvae in Raspberry…

If not…YUMMO!!

SWD Traps- Michigan State University

Building a spotted wing drosophila trap

MICHIGAN STATE UNIVERSITY EXTENSION



12” of 14 gauge solid core wire.

Deli cup lid

Plastic-coated paper clip poked through lid; hole sealed with hot glue to prevent water leaking in trap.

Melt 3/16” diameter holes in side of cup using a soldering iron.

32 oz plastic deli cup

Yellow sticky insert cut down to 3.5”x3”

5 oz of yeast bait. Recipe:
1 Tablespoon active dry yeast
4 Tablespoons white table sugar
12 oz water

Making SWD Scouting Traps…

- https://extension.oregonstate.edu/pests-weeds-diseases/insects/monitoring-vineyards-spotted-wing-drosophila

Apple Cider Vinegar & Yellow Sticky Card

Yeast, Sugar & Yellow Sticky Card

Pure Apple Cider Vinegar

Select Product(s) to Use…

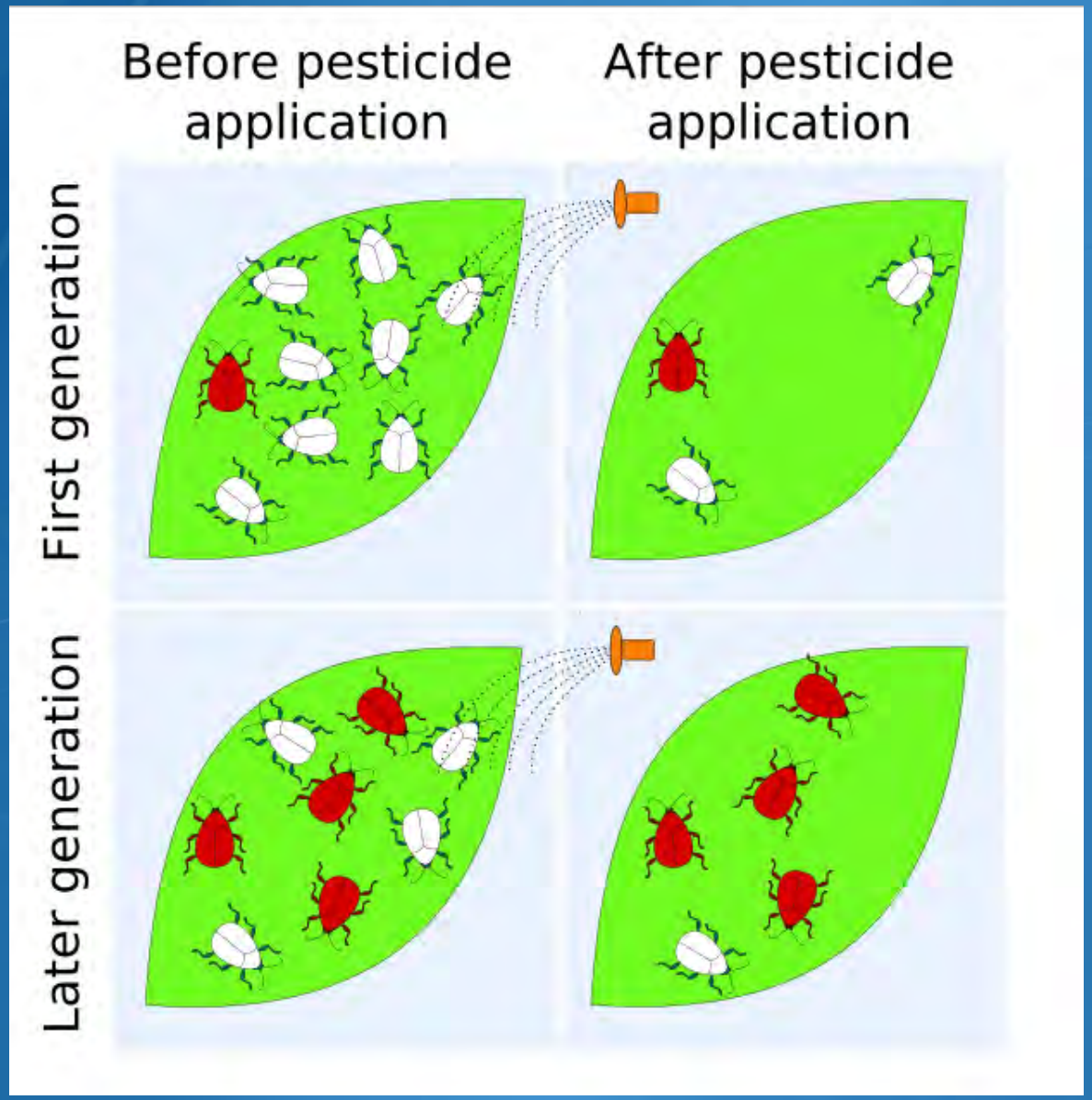
Spotted wing drosophila in home fruit plantings: Insecticide options
(extrapolated from data for control in commercial fruit production in OR, WA, CA, MI, NJ, NC, FL in 2011 and 2012):

Efficacy rating	Active ingredient[1]	Residual activity (days)	Pre-harvest interval (PHI)[2]						
			raspberry, blackberry	blueberry	straw-berry	grape	cherry	peach	plum
Very effective	bifenthrin	7-10	3 days	X	X	X	X	X	X
	cyfluthrin	7-10	X	X	X	3 days	X	X	X
	permethrin	7-10	14 days	14 days	14 days	X	X	7 days	X
	esfenvalerate	7-10	21 days	14 days	X	X	14 days	14 days	14 days
	gamma-cyhalothrin	7-10	X	X	X	X	14 days	14 days	14 days
Effective	malathion	5-7	1 day	1 day	X	X	3 days	7 days	X
	spinosad	3-5	3 days	3 days	1 day	7 days	14 days	7 days	7 days
Moderately effective	carbaryl	10	7 days	7 days	7 days	7 days	3 days	3 days	3 days
	acetamiprid	1-3	1 day	1 day	1 day	7 days	7 days	7 days	7 days
Unrated but likely to be effective	pyrethrins + PBO	1-3	0 days	0 days	0 days	0 days	0 days	0 days	0 days

[1] *Color code: For resistance management, rotate among products from different chemical groups: spinosyns (yellow in chart below), pyrethroids (pink in chart), organophosphates (blue in chart), carbamates (green in chart), and neonicotinoids (gray in chart).*

[2] *The pre-harvest interval (PHI) is the minimum number of days required to wait after application of the pesticide, before it is safe to harvest. An 'X' in chart means that the product is* ***not allowed*** *for use on that crop.*

Who Cares?


Before pesticide application
After pesticide application
First generation
Later generation