

# Sustainable Grape Growing for the Southeastern United States

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TEXAS A&M  
**AGRILIFE**  
EXTENSION

**Viticulture  
and Fruit Lab**

# *Muscadines are a Low Maintenance Crop With An Established Market*

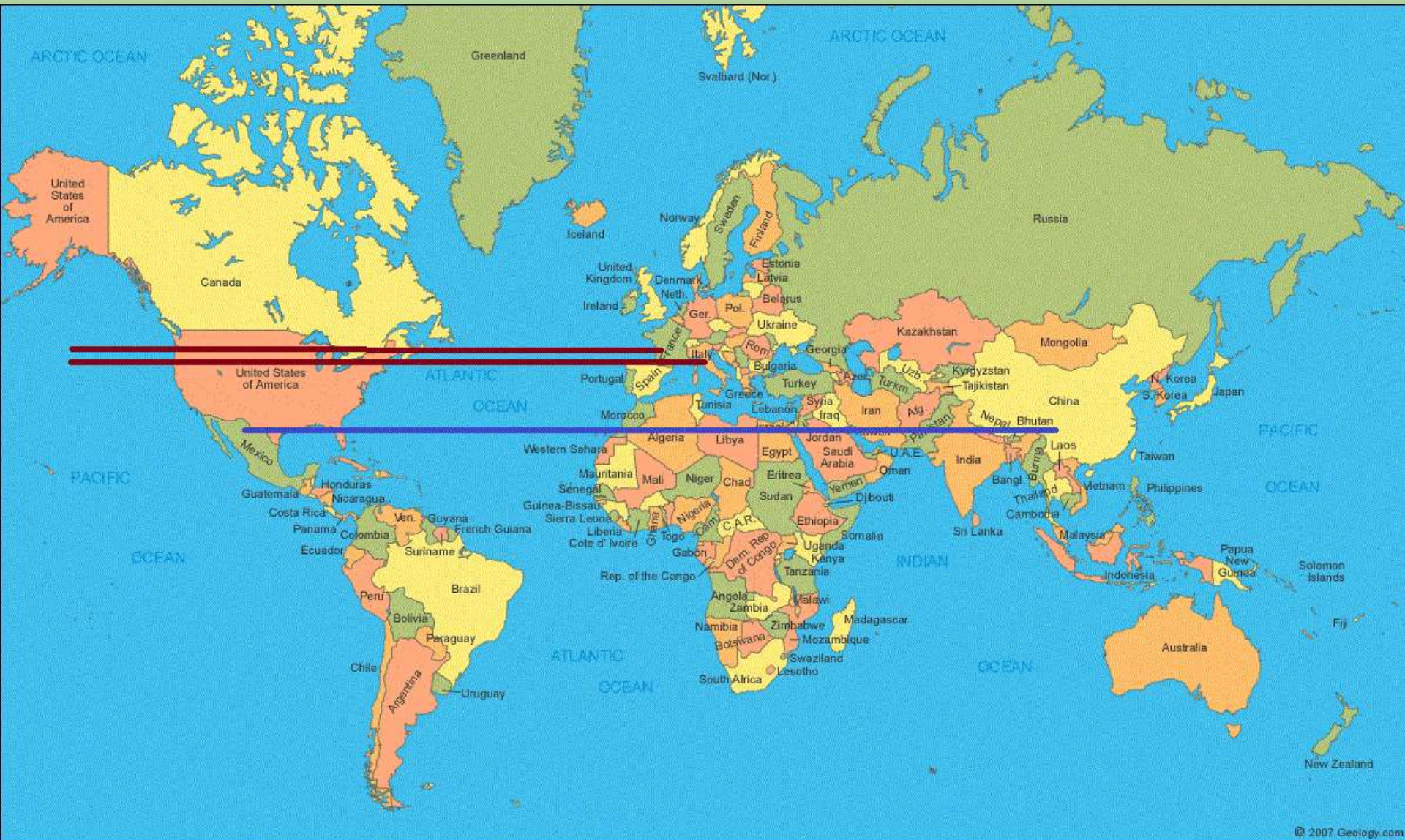
- Large Fruited, High Quality Varieties
- Disease Resistant
- Insect Resistant
- Adapted to Southeastern Soils & Climate



There is a Distinct Demand for Bunch Grapes for Both Wine & Fresh Market But.... There Are Serious Limitations



# Geographic Reality



# VIGNOBLES D'EUROPE

Bay of Biscay

Adriatic Sea

Ionian Sea

Tyrrhenian Sea

Balearic Sea

Mediterranean Sea

Alboran Sea



# Hurricane Ike

10 PM CDT Fri Sep 12 2008

Position 28.6 N 94.4 W

Maximum Winds 110 mph

Gusts 130 mph

Movement NW at 11 mph

Minimum Pressure 952 mb (28.10 inches)

Blue Marble basemap imagery courtesy NASA

Satellite 3:42 AM UTC





# ① *Pierce's Disease*

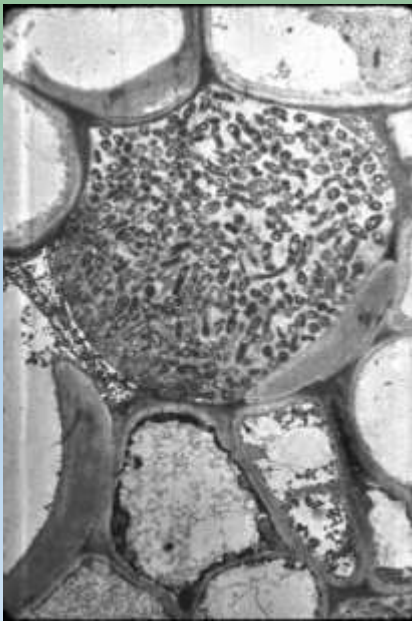
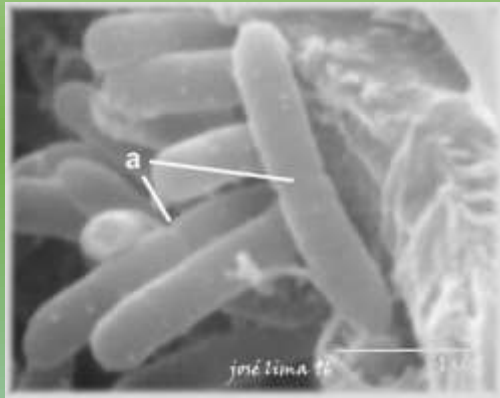
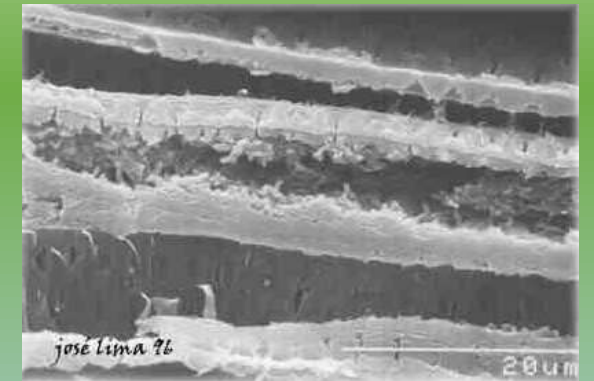
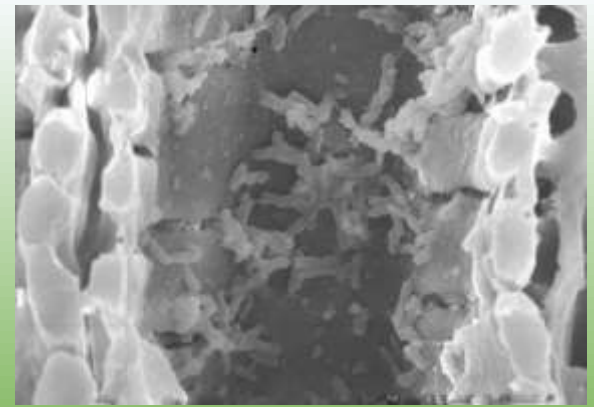
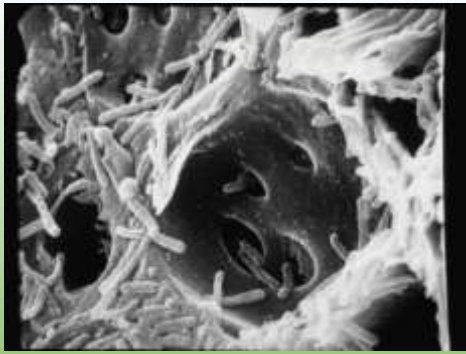




# *Xylella fastidiosa*

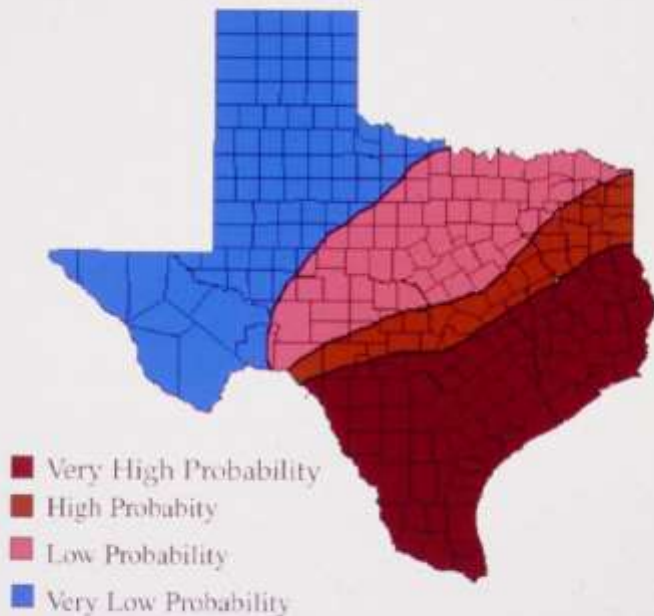
## Biology

- **Xylem-limited Bacterium**
- **Native to SE United States**
- **Directly Occludes Vascular Tissue (Xylem)**
- **Obligately Vectored by Insects**
- **Intolerant to Cold Climates**
- **Enlargement of Tyloses Adds Additional Blockage**

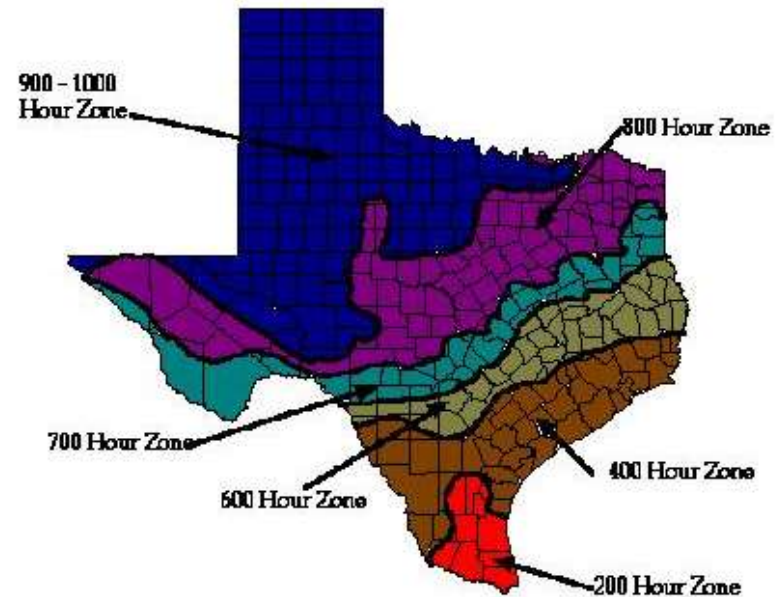


# Where is Pierce's Disease & Why?

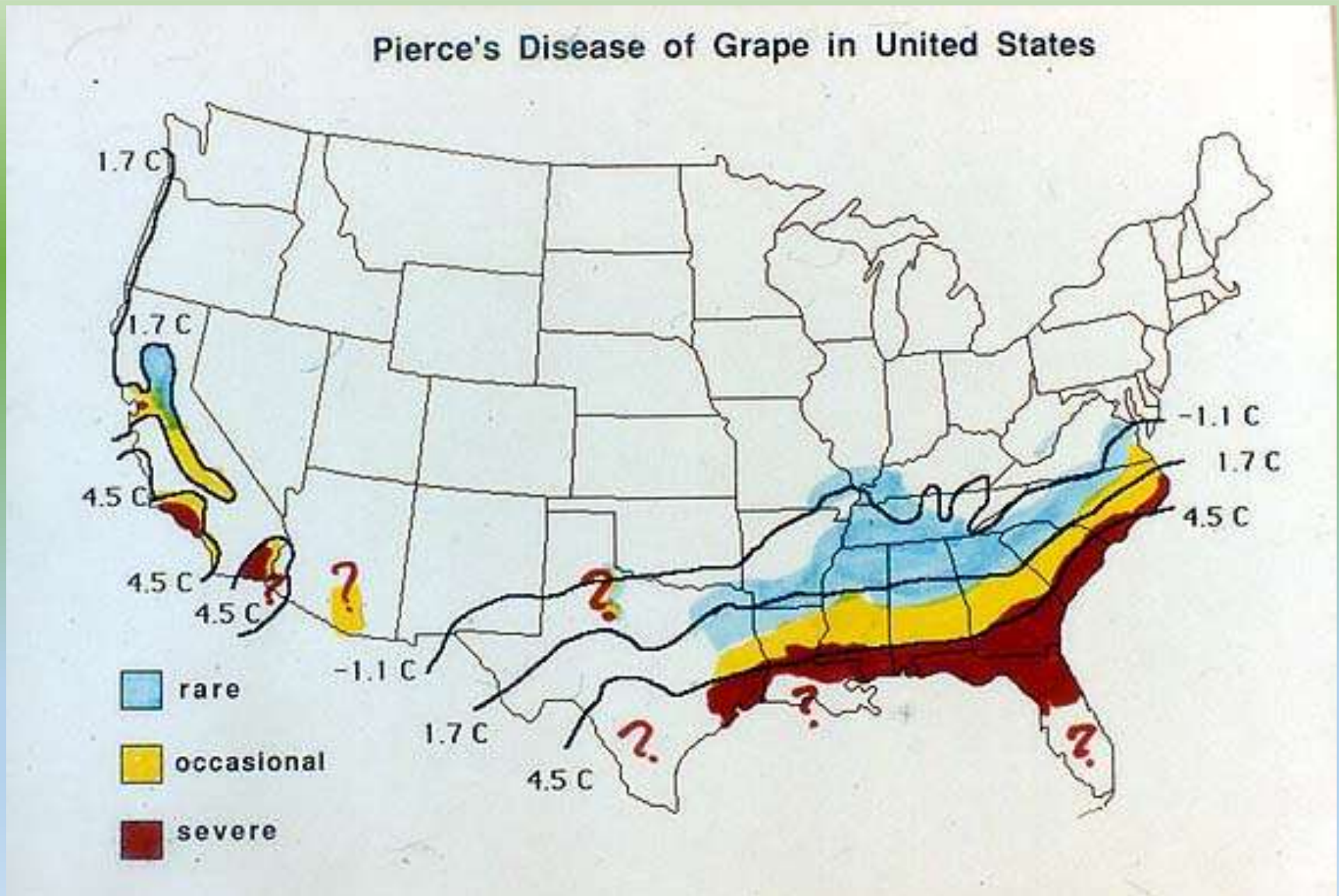
Expected Probability of Pierce's Disease in Texas



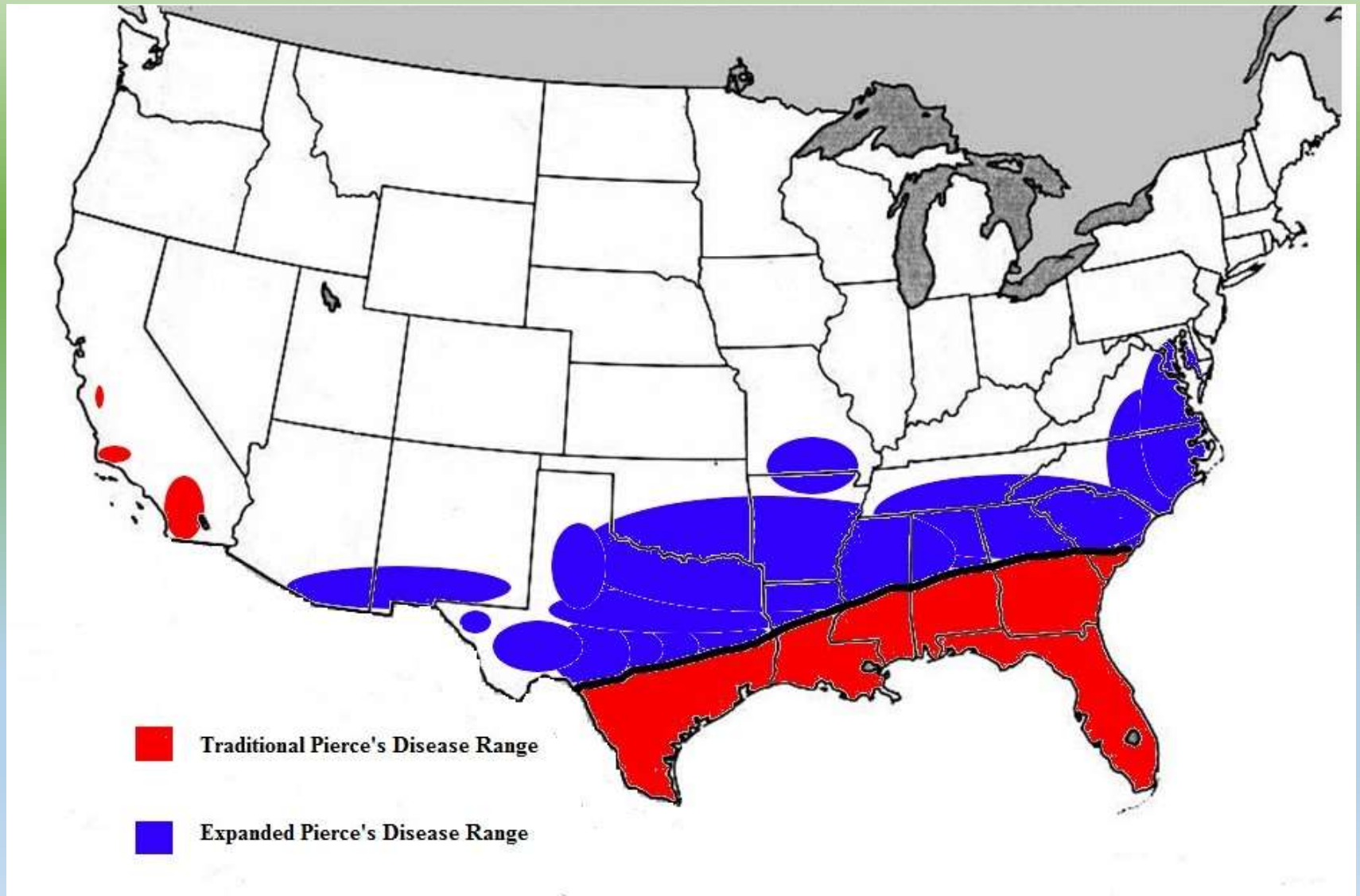
Winter Chilling Zones  
Average Number of Hours at or Below 45 deg. F



# Where is Pierce's Disease & Why?



# And Today.....



# Traditional Vectors of Pierce's Disease in California



**Red-headed sharpshooter**



**Green Sharpshooter**



**Blue-green sharpshooter**

# The Game Changer in California

- Introduced From Texas on Nursery Stock
- Distant Flyer
- Feeds on Woody Tissue
- Vine to Vine Disease Spread



*All Sharpshooters are Voracious Feeders  
and Need to Change Feeding Hosts  
Frequently*

# Texas Sharpshooters- Proconiini

*Cuerna costalis*



*Oncometopia orbona*



*Oncometopia sp. (undescribed)*



*Homalodisca vitripennis*



*Homalodisca insolita*



*Paraulacizes irrorata*



# Texas Sharpshooters- Cicadellini

*Sibovia occatoria*



*Ciminius harti*



*Graphocephala versuta*



*Xyphon sagittifera*



*Draeculacephala navicula*



*Graphocephala hieroglyphica*



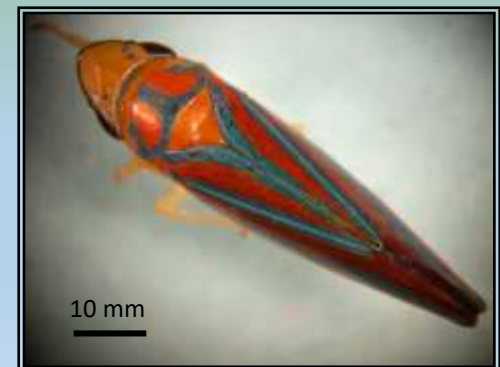
*Xyphon flaviceps*



*Draeculacephala robinsoni*



*Graphocephala coccinea*





# Other Texas Xylem Feeders- Clastopterini

*Clastoptera lineatocollis*



*Clastoptera lawsoni*



*Clastoptera xanthocephala*



## Lepyroniini

*Lepyronia quadrangularis*

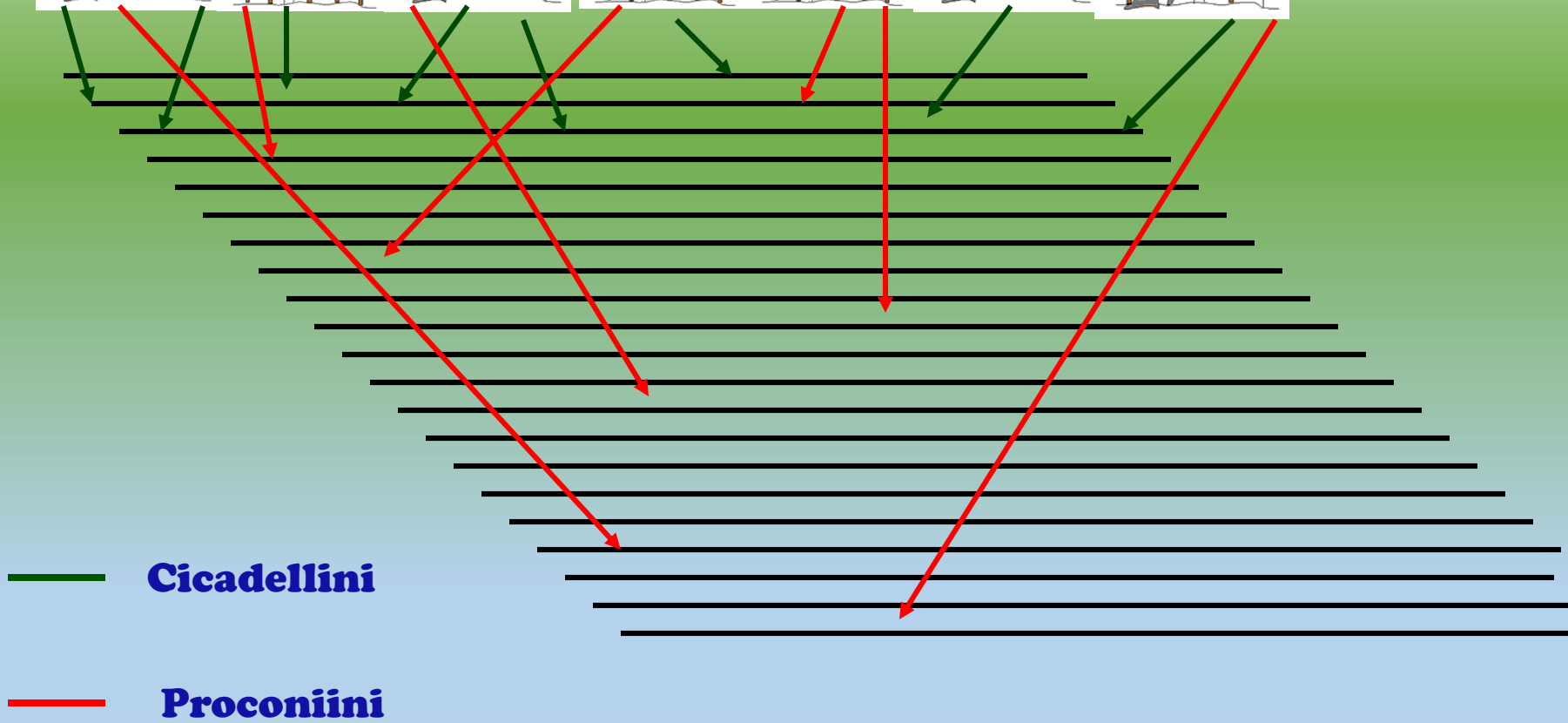
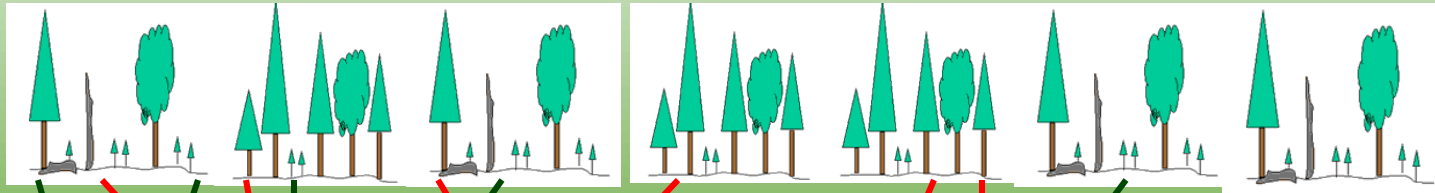


## Fidicinini

*Pacarina puella*



# These Two Subfamilies have Very Different Flight Patterns



# *Xylella fastidiosa*

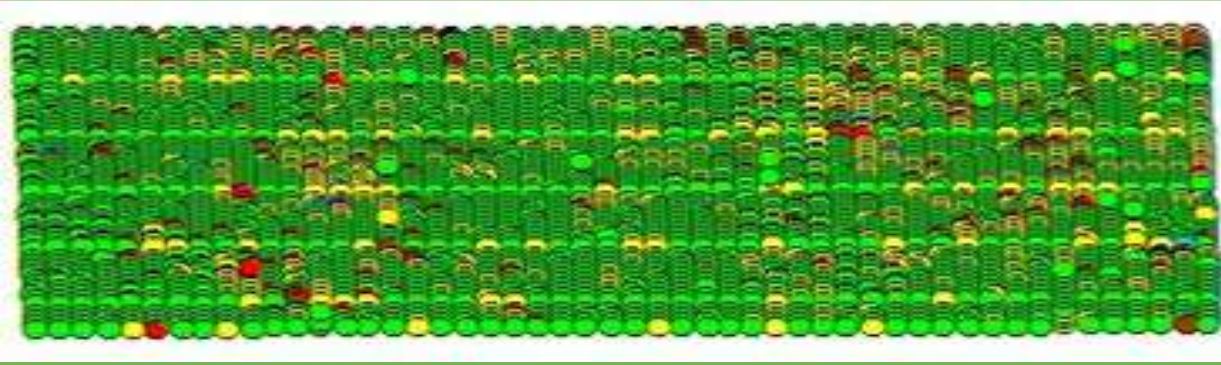
## *Concepts in Host Responses*



- **Susceptibility** – the lack of resistance mechanisms.
  - *V. labrusca*, *V. vinifera*, Fr./Am. Hybrids.  
Great differences in field longevity
- **Resistance** – the ability of the host to limit colonization by the pathogen.
  - *V. smallii* derived hybrids and others?
- **Tolerance** - the ability of host to sustain infection by the pathogen with no reduction in yield.
  - ‘Black Spanish’, ‘Blanc du Bois’, ‘MisBlanc’, most wild *Vitis* species native to Gulf Coast and S.E. United States



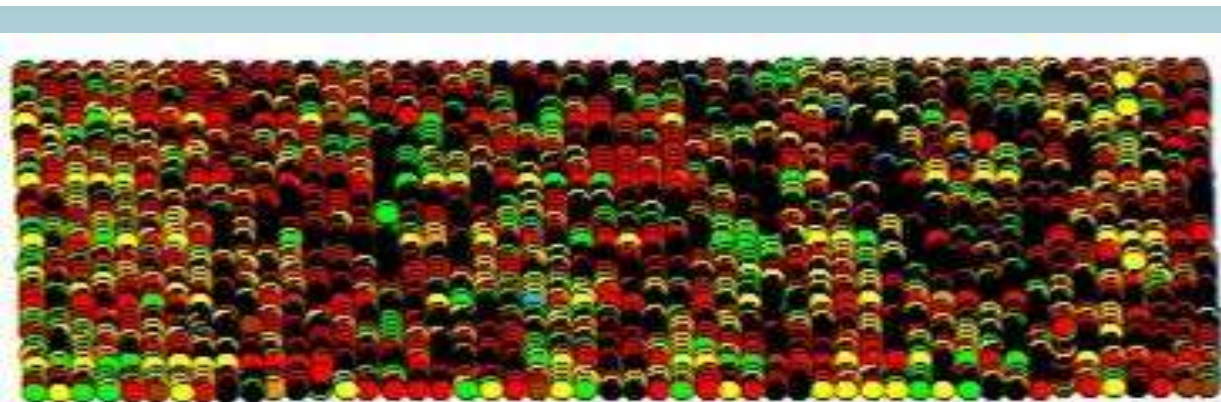
# Maps of Disease Progress in a Viognier Vineyard Over a Three Year Period



Year 1



Year 2



Year 3

- 1= Healthy
- 2= Incipient
- 3= Advanced
- 4= Dead
- 5= Dieback
- 6= No Plant
- 7= Stump

# *Integrated Management of Pierce's Disease*

- Site Selection
- Vineyard Floor & Adjacent Vegetation Management
- Monitor Vector Movement
- Diagnostic Testing of Grapevines Suspected of Being Infected With *X.f.*
- Rouging of Infected Vines
- Use of Systemic Nicotinoid Insecticides Through Drip System



***Under Moderate Disease Pressure, These Tactics Work, But In the Hot Zone....***

# ② *Fungal Pathogens of Fruit & Foliage*

Axioms to Live By:



- Great Wine is Only Made From Sound, Ripe Fruit
- Optimal Maturity Depends on Disease Free Clusters & Canopy
- Vine Health is Dependent on Effective Crop Control and a Healthy Canopy

# *Phomopsis Cane & Leaf Spot* (*Phomopsis viticola*)



- Cool, Wet Season Disease
- Overwintering Structures
- Latent Rachis Infections
- Infections Become Systemic



# Powdery Mildew

- Problematic in All Grape Growing Regions
- 0.1" Rain & 50°F Needed for Primary Infection
- No Rainfall Needed for Secondary Infection
- Key Period of Susceptibility is 2 Weeks Pre-bloom to 30 Days Post-bloom





# Black Rot



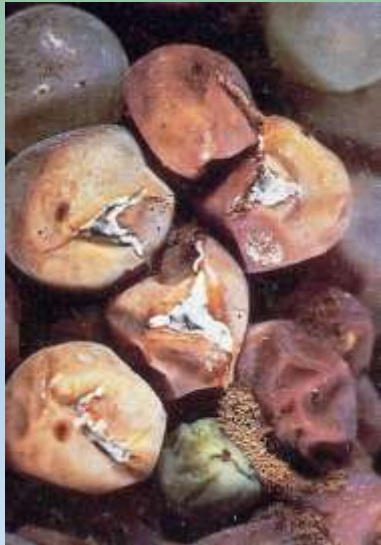
- Overwinters as Mummified Fruit or Cane Lesions
- Infection Periods are Temperature and Leaf Wetness Driven
- Key Periods of Susceptibility 2 Weeks Pre-bloom to 30 Days Post-bloom
- Achilles Heel of Organic Grape Production

# Downy Mildew



- Overwinters in Leaf Litter on Vineyard Floor
- Spores Disseminated by Splashing Rain
- Primary Infection Takes Place During Wet Nights
- Fruit/Rachis Infections Become Systemic

# *Bunch Rot Organisms*



# Periods of Greatest Fruit/ Rachis Infection Potential

**Blackrot**



**Powdery**



**Downy**



**Phomopsis**



**Leaf Blight**



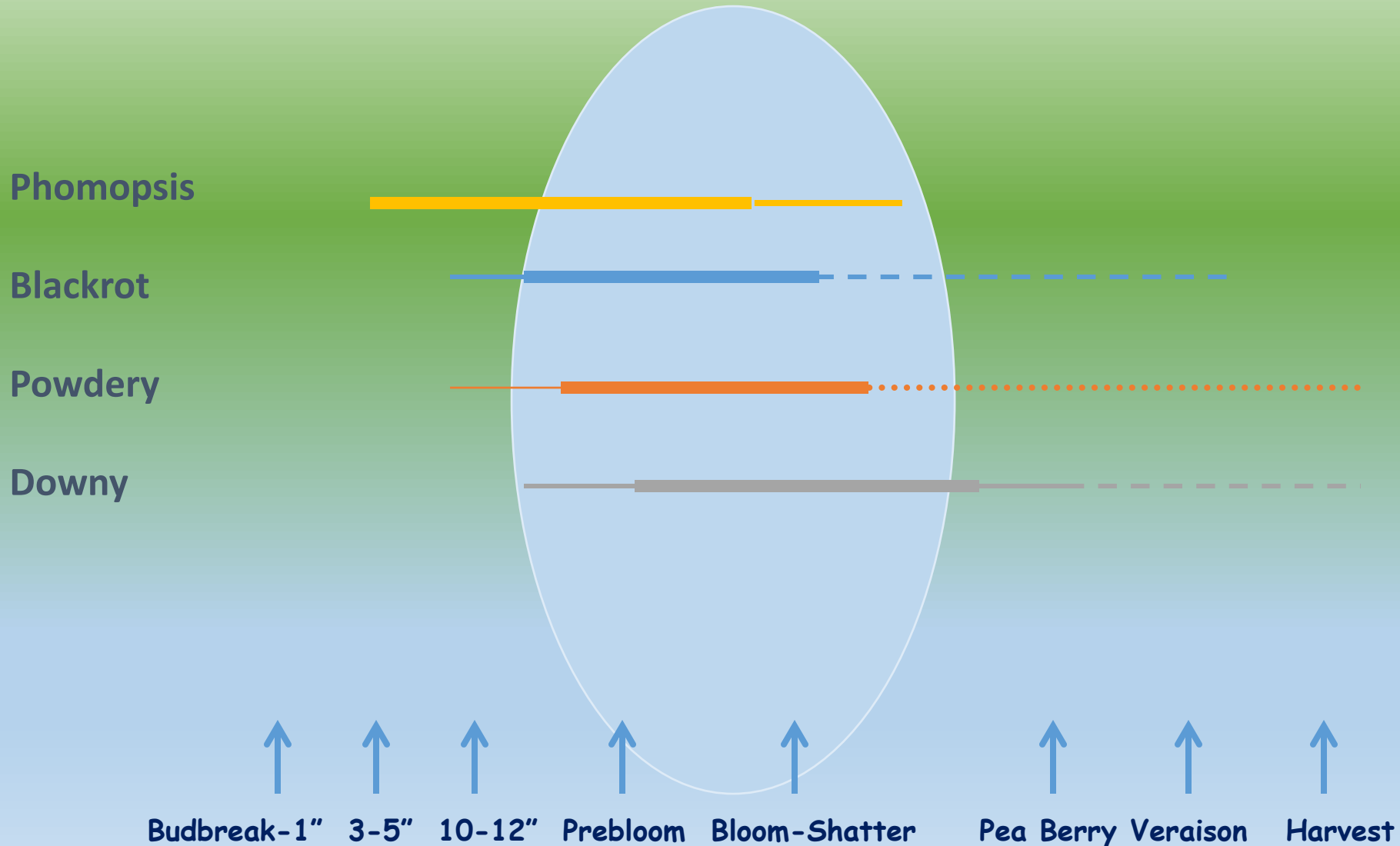
**Bunch Rots**



Budbreak-1" 3-5" 10-12" Pre-bl Bl.-Shatter Pea Berry Véraison Harvest

# Management of the Primary 4 Fungal Pathogens

Focus the Use of Systemic, Highly Effective Materials During Periods of High Susceptibility



Fungicide- common name, trade name	Phomopsis cane and leaf spot	Anthracnose	Black rot	Downy mildew	Powdery mildew	Leaf Blight	Summer Rot Complex	Botrytis bunch rot	Fungicide Group	REI (hours)	PHI (days)
azoxystrobin (Abound)	++	+++	++++	++++	++++	++	+	+	11	4	14
azoxystrobin + difenoconazole (Quadris Top)	++	+++	++++	++++	++++	++	+	+	11, 3	12	14
boscalid (Endura)	0	?	0	0	++++	0	0	++/++++ <sup>a</sup>	7	12	14
boscalid + pyraclostrobin (Pristine)	+++	++++	++++	++++	++++	++	++	++/++++ <sup>a</sup>	7, 11	TVSL <sup>b</sup>	14
calcium polysulfide (limed sulfur)	?	++++	0	0	+	0	0	0	N/A	48	dormant only
captan (Captan, Captec)	++++	+	+	+++	0	0	++	+	M4	TVSL <sup>b</sup>	0
cyazofamil (Ranman)	0	0	0	+++	0	0	0	0	21	12	30
cyprodinil (Vanguard)	0	0	0	0	+?	0	0	++++	9	12	7
cyprodinil + difenoconazole (Inspire Super)	0/+?	+	++++	0	++++	?	0	+++	9,3	12	14
cyprodinil + fludioxonil (Switch)	0	0	0	0	0	0	+++	+++	19,12	12	7
dihydrogen potassium phosphate (Nutrol)	0	0	0	0	++	0	0	0	N/A	4	0
fenamidone (Reason)	0	?	0	++++	0	0	?	0	11	12	30
fenarimol (Rubigan, Vintage)	0	0	++	0	+++	0	0	0	3	24	21
fenhexamid (Elevate)	0	?	0	0	+	0	0	++++	17	12	0
fixed copper (several formulations) and lime	+	0	+	+++	++	0	0	0	N/A	TVSL <sup>b</sup>	TVSL <sup>b</sup>
fluopicolide (Presidio)	0	0	0	++++	0	0	0	0	43	12	21
fluopyram + tebuconazole (Luna Experience)	+	?	+++	0	++++	?	?	++++	7, 3	TVSL <sup>b</sup>	14
iprodione (Rovral)	0	0	0	0	0	0	0	+++	2	48	7
kresoxim-methyl (Sovran)	++	++	++++	++	++++		++	++	11	12	14
mancozeb (Dithane, Manzate, Penncozeb)	++++	++	+++	+++	+	0	+++	0	N/A	24	66
mandipropamid (Revus)	0	0	0	++++	0	0	0	0	40	4	14
mandipropamid + difenoconazole (Revus Top)	0/+?	0	++++	++++	++++	?	0	0	40, 3	12	14
mefanoxam + mancozeb (Ridomil Gold MZ)	+	0	+	++++	0	0	0	0	4, M	48	66
mefanoxam + copper hydroxide (Ridomil Gold Copper)	+	0	0	++++	0	0	0	0	4, M1	48	42

### Three to Five Inch Shoot Growth

#### **Phomopsis cane and leaf spot**

This is a critical spray for control of rachis infections on susceptible varieties in wet springs. On highly susceptible varieties, this can also be an important time to prevent the establishment of infections on young berry stems, which can move into the fruit and rot them later in the season. The maximum rates of the listed products should not be necessary at this growth stage IF sprays are thoroughly applied.

	Captan 50W	2-4 lb
OR	Captan 80WDG	1.25-2.5 lb
OR	Captan 4L	1-2 qt
OR	Dithane DF, <i>or</i> Dithane M45, <i>or</i> Manzate 75DF, Penncozeb 75DF	2-4 lb
OR	Dithane F-45	1.6-3.2 qt

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#### **Black rot**

Black rot sprays are rarely needed this early in the season unless serious disease occurred the previous year and warm, wet conditions are anticipated well before the next spray.

	Dithane DF, <i>or</i> Dithane M45, <i>or</i> Manzate 75DF, <i>or</i> Penncozeb 75DF	2-4 lb
OR	Dithane F-45	1.6-3.2 qt
OR	Rally 40WSP	3-4 oz
OR	Orius 45DF <i>or</i> Tebuzol 45DF	3-4 oz
OR	Revus Top 4SC	7 fl oz

Inspire Super, Orius, Revus Top, Tebuzol, and Rally have some protective activity but are most effective when applied after the start of an infection period. The duration of post-infection activity is incompletely characterized, but sprays applied up to 3-7 days after the start of an infection period

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# 2018 Texas Grape Pest Management Guide



TEXAS A&M  
**AGRILIFE**  
EXTENSION

<http://www.agrilifebookstore.org/Texas-Grape-Pest-Management-Guide-p/ht-085.htm>



# ③ Grapevine Trunk Diseases





# Trunk Disease Complex Includes:

- Bot Dieback (*Botrospheria* spp., *Diplodia* spp., *Lasiodiplodia* spp.)
- Esca, Black Measles (*Phaeomoniella* spp., *Phaeoacremonium* spp.)
- Eutypa (*Eutypa lata*)
- Others (Aspergillus)



# *Management of GTDs*

- Don't Prune in the Rain
- Double Pruning
- Spray Pruning Cuts with Mycobutanyl (Rally)
- Painting of Pruning Cuts
- Remove and Destroy Infected Tissue



# Grape Options for PD Hot Zone



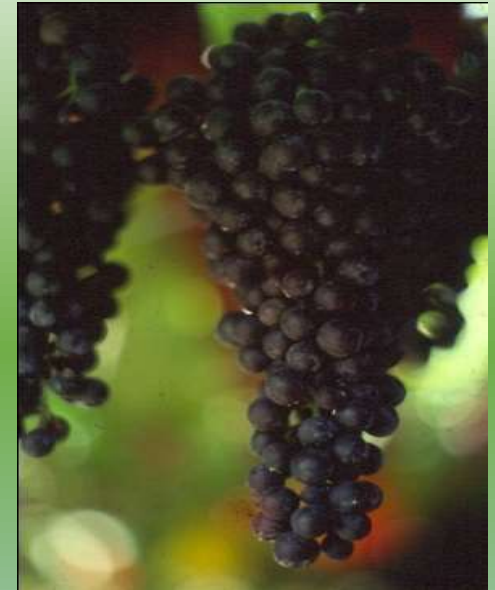
## **'Herbemont'**

Grown Commercially in Texas  
& Mexico Since 1830



## **'Blanc du Bois'**-

John Mortensen's 1988 Release  
Complex lineage: *V. vinifera*,  
*smalliana*, *simpsoni*, and perhaps  
*lincecumii*



## **'Black Spanish'**

Grown Commercially in  
Texas Since 1889

# Evaluation of T.V. Munson's Most Promising Varieties

'Carmen'  
'Lomanto'  
'Delicatessen'  
'Bailey'  
'Wine King'  
'M.H. White'  
'Ben Hur'  
'Wapanuka'  
'Nitodal'



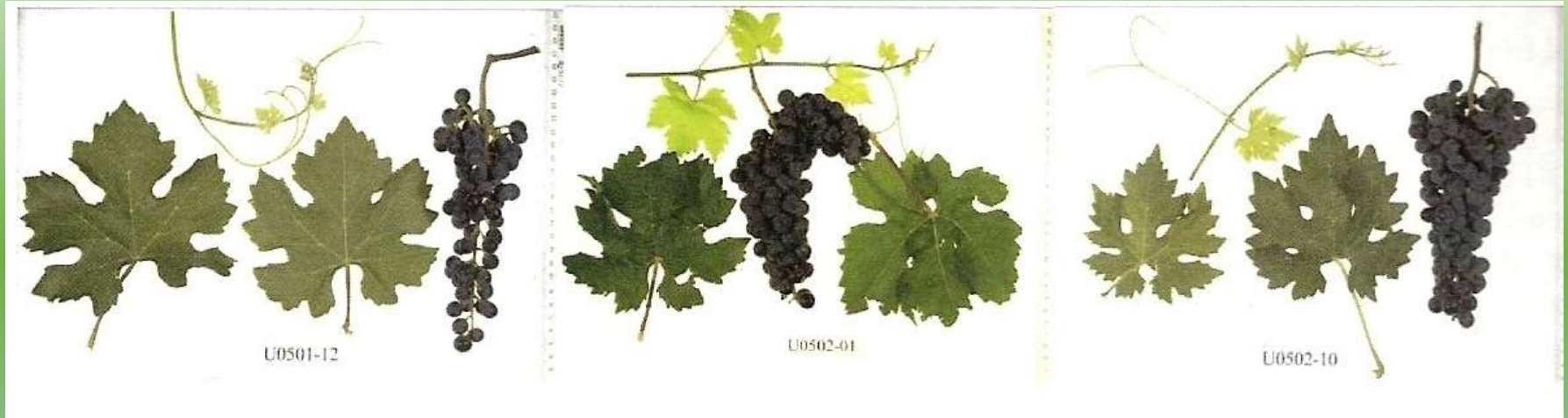
T. Volney Munson  
1843-1913



1909

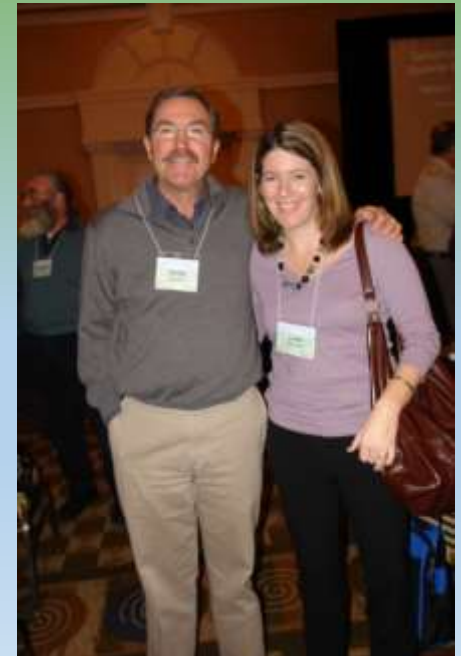


# Andy Walker's 88% *V. vinifera* Selections



<u>Genotype</u>	<u>% Vinifera</u>	<u>Berry Color</u>	<u>° Brix</u>	<u>pH</u>
U0501-12	87.5	Black	29.4	3.87
U0502-01	87.5	Black	25.9	3.77
U0502-10	87.5	Black	23.7	3.48

*Selected Progeny with the PdR1 Resistance Source*





## Jiang Lu- Florida A&M Breeding Program

A14-8-1      A24-6-6

D16-13-1     D16-16-4

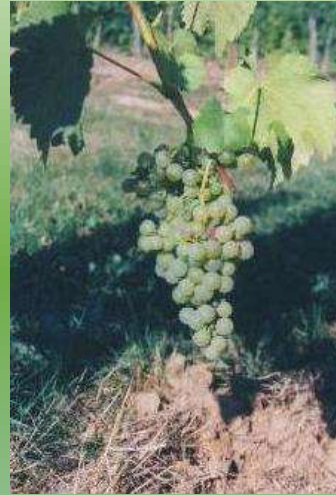
C30-7-1      O44-6-5

C30-5-1      D6-12-4



# Other Varieties Under Evaluation

- Ark 1475 (Victoria Red)
- Miss Blanc
- Miss Blue
- Mortensen Hardy
- Edsal
- Phoenix ('Bacchus' x 'Villard Blanc')
- Orion ('Optima' x Villard Blanc')
- Sirius ('Bacchus x Villard Blanc')



Phoenix



Victoria Red



Orion

The Institute for Grapevine Breeding Geilweilerhof

# Texas grapevine evaluations

## Focus on traditional breeding



# 2012 Harvest Data for Industry, Texas Experimental Vineyard

Variety	Harvest Date	Brix	pH	TA (g/L)	Berry weight (g)	Cluster weight (kg)	Berries / Cluster	Tons / Acre
U0505-35	6/27	21.2	3.62	7.83	*	0.08	*	1.18
Phoenix	6/27	18.0	3.79	5.27	*	0.11	*	2.28
Orion	6/27	19.0	3.5	5.80	*	0.11	*	2.33
Blanc du Bois	7/3	19.6	3.46	6.35	2.62	0.11	41.6	4.21
U0502-20	7/10	18.6	3.59	6.45	1.77	0.17	93	0.96
U0502-38	7/10	22.6	3.98	6.75	1.62	0.06	34.2	1.3
044-6-5	7/10	18.0	3.29	5.27	1.19	0.09	71.9	1.22
Victoria Red	7/10	19.2	4.06	3.60	6.53	0.36	55.2	1.84
U0502-26	7/17	20.0	3.48	6.60	2.41	0.14	58.08	1.8
A24-6-6	7/17	18.0	3.45	5.55	2.08	0.12	57.69	4.59
Edsal	7/17	19.8	3.54	4.05	1.55	0.09	57.69	2.29
Bailey	7/24	14.0	3.43	6.00	3.83	0.18	47.5	3.49
Carmen	7/24	19.4	3.65	4.60	2.29	0.15	65.07	2.94
U0502-10	7/24	19.0	3.64	6.00	1.7	0.18	102.9	*
Lomanto	7/24	14.6	3.45	7.20	2.13	0.95	44.6	2.34
MH White	7/24	17.2	3.59	4.50	3.6	0.26	72.22	3.6
D6-12-1	7/24	18.0	3.64	4.80	1.08	0.06	50.93	1.48
Miss Blanc	7/26	17.0	3.60	7.35	2.6	0.12	46.15	2.48

# U0505-35

- Breeder: Dr. Andy Walker (UC Davis)
- Parentage: A81-138 x Cabernet Sauvignon



**U0505-35**

June 15, 2012  
Industry, Texas

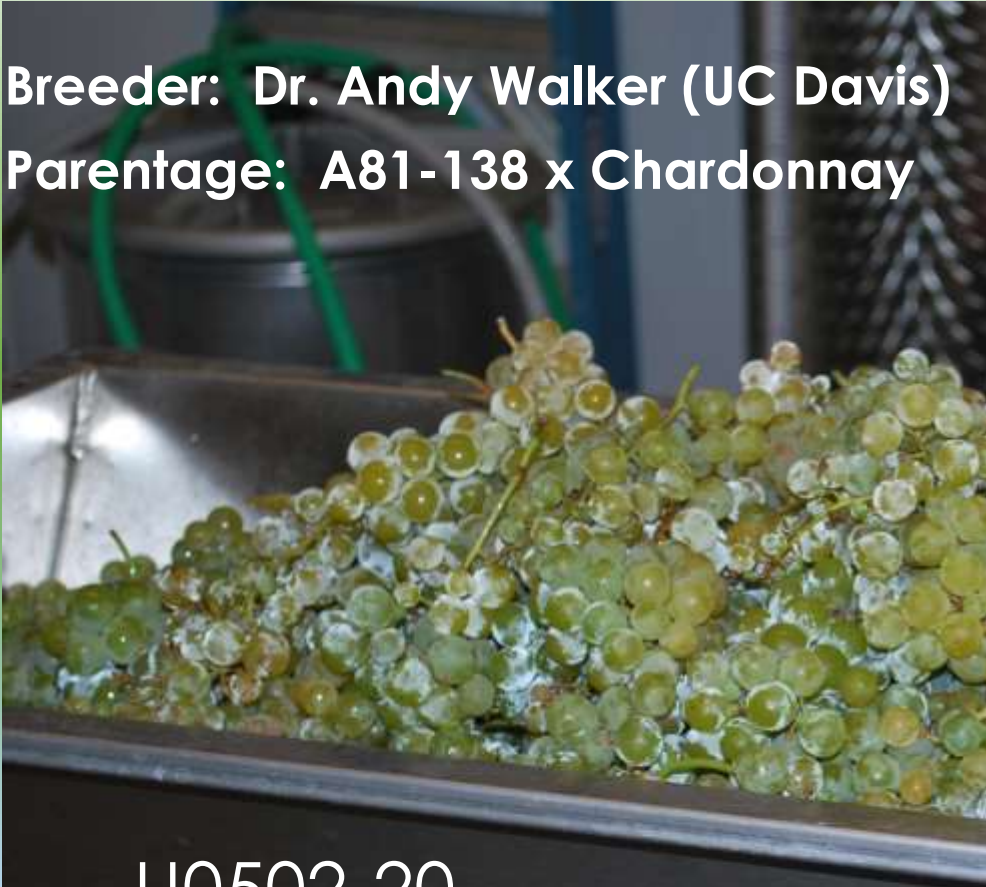
U0502-38



- Breeder: Dr. Andy Walker (UC Davis)
- Parentage: A81-138 x 'Chardonnay'

# U0502-20

- Breeder: Dr. Andy Walker (UC Davis)
- Parentage: A81-138 x Chardonnay



U0502-20  
Harvest 2012



**U0502-20**  
June 11, 2012  
Industry, Texas



**U0502-20**

June 3, 2012

Industry, Texas





# Variety Trial Harvest 2014

Variety	Parentage	Color	Vineyard	Date	Brix	pH	TA
U0502-20	50% Chardonnay	White	Leakey	7/26/14	24.4	3.72	6.4
			Hye	7/29/14	25.5	4.09	7.8
			Industry	8/6/14	18.0	3.42	-
U0502-38	50% Chardonnay	Red	Leakey	7/26/14	25.0	3.79	6.3
			Hye	7/25/14	24.0	4.02	8.0
			Industry	8/6/14	22.1	4.00	-
U0505-35	50% Cabernet Sauvignon	Red	Leakey	-	-	-	-
			Hye	7/29/14	24.9	3.97	8.4
			Industry	7/28/14	21.5	3.38	-
U0502-10	50% Chardonnay	Red	Leakey	7/26/14	24.4	3.72	6.4
			Hye	7/29/14	25.5	4.09	7.8
			Industry	8/19/14	19.8	3.81	-
U0502-26	50% Chardonnay	Red	Leakey	7/28/14	23.9	3.81	5.85
			Hye	-	-	-	-
			Industry	8/19/14	19.1	3.8	-
U0501-12	50% Syrah	Red	Leakey	-	-	-	-
			Hye	8/19/12	26.2	4.15	4.92
U0501-01	50% Chardonnay	Red	Leakey	8/5/14	25.1	3.86	4.85
			Hye	8/6/14	23.3	4.13	4.95

# 2014 Harvest – Hill Country

Merlot



Sangiovese



U0502-38



U0505-35



U0502-10



U0502-01



U0502-26

# Fruit Chemistry 2017

## 94% & 88% Selections



- 07355-75                      22.8 °B                      3.51 pH
- 07713-51                      23.7 °B                      3.61 pH
- 07370-84                      22.8 °B                      3.57 pH
  
- U0502-38                      27.5 °B                      3.66 pH
- U0505-35                      23.2 °B                      3.81 pH
- U0502-20                      22.0 °B                      3.47 pH



# First Releases from Andy Walker

50% Petite Sirah, 25% Cab  
Sauv P

Caymus, Sonoma,

Early bloom, early ripening

Relatively large berries,  
medium large clusters

Medium productivity

Thanks to ETS Labs



# First Releases from Andy Walker

50% Zinf, 25% Petite  
Sirah, 12.5% Cab Sauv P

Caymus, Temecula,  
Silverado

Late bloom, mid-season  
ripening

Relatively large berries,  
large clusters

Moderate-low  
productivity



# First Releases from Andy Walker

50% Sylvaner, 12.5%  
Cabernet Sauvignon,  
Carignane, Chardonnay  
N

Davis only

Mid-season bloom and  
ripening

Large berries, loose  
medium clusters

High productivity



**09356-235**

# First Releases from Andy Walker

62.5% Cab Sauv, 12.5%  
Carig, 12.5% Chard N

Temecula, Sonoma,  
Silverado

Early bloom, early  
ripening

Small - medium berries,  
medium large clusters

High productivity



# First Releases from Andy Walker

62.5% Cab Sauv,  
12.5% Carig, 12.5%  
Chard N

Davis only

Late bloom, mid-  
season ripening

Small berries, small  
clusters

Medium productivity





# Victoria Red, A High Quality Seeded Table Grape Fully Tolerant of Pierce's Disease



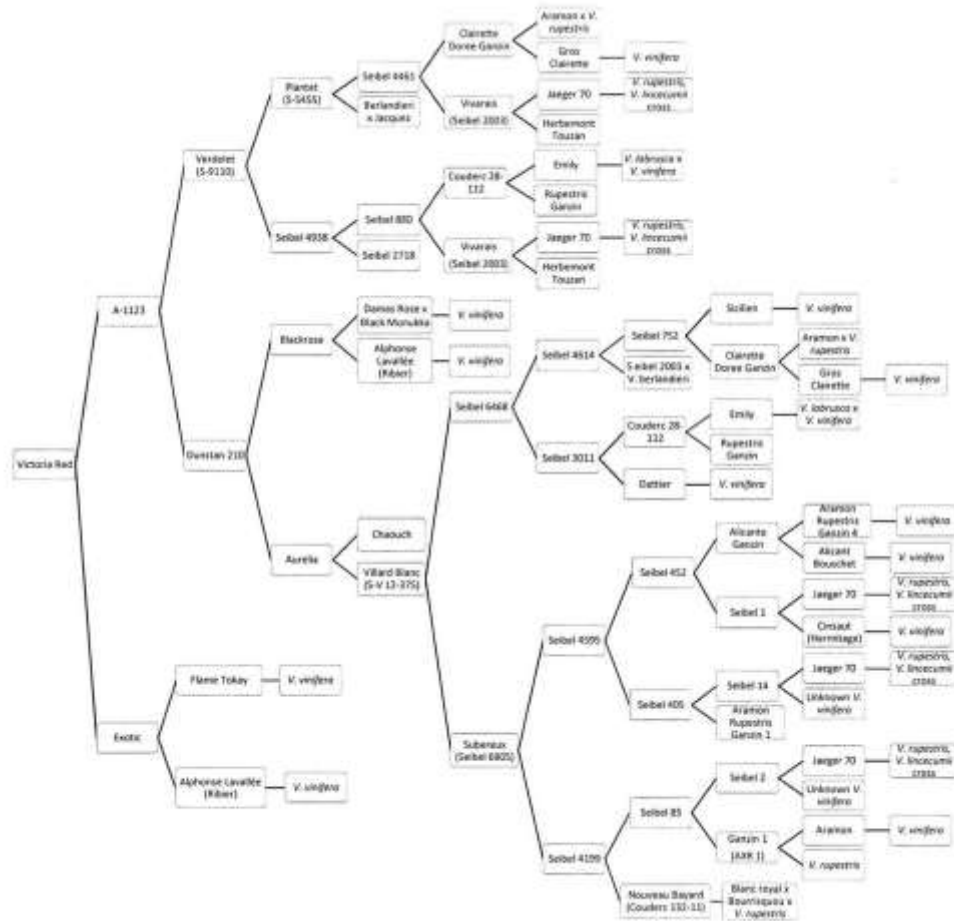


Fig. 1. Pedigree of "Victoria Red" grape.



# Nurseries Offering Victoria Red



**DOUBLE·A  
VINEYARDS**



# Anticipated 2020 Release, Ark 1400









A-1400

# *Sustainable Viticulture Means Training the Next Generation.... Questions?*

