

General Information

- Deep rooted (2' - 5')
- Relatively tolerant of saline soils
- Woody vine can live for many years
- Need strong, permanent support
- Low fertilizer input
 - 0.7 ounces of N/plant/year (30 pounds n/acre)
 - About ½ cup of ammonium sulfate 21-0-0
 - May need chelated iron



USU Grape Growing Resources



Grape Trellising and Training Basics

Tiffany Mangham, Brent Black and Mike Pico



Grape Vine Management

Tiffany Mangham, Mike Pico, and Brent Black



Utah State University Extension YouTube Channel



Grape Varieties for Utah

Tiffany Mangham, Mike Pico, and Brent Black

Grapes: Types

Vitis vinifera

- European wine and table grape
- Characteristics
 - Semi-Hardy
 - Non-slip skin (clingskin)
- Popular varieties
 - 'Thompson Seedless'
 - 'Black Corinth'
 - 'Zinfandel'
 - 'Tokay'
 - 'Chardonnay'
 - 'Reisling'



Thompson Seedless grape. Picture by Julie Knittel

Grapes: Types

Vitis labrusca

- American bunch grape
- Characteristics
 - Hardy
 - Slip skin
- Popular varieties
 - 'Concord'
 - 'Delaware'
 - 'Himrod'
 - 'Niagara'

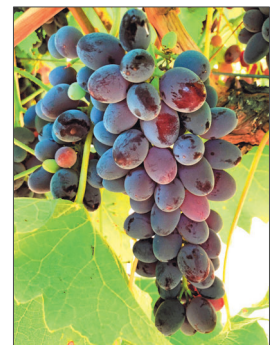


Concord grape. Picture by Julie Knittel

Grapes: Types

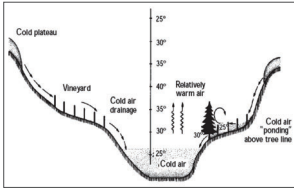
French/American Hybrids

- *V. vinifera* x American species
- Characteristics
 - Hardy
 - Insect/disease resistant
 - Some are slip skin
- Popular varieties
 - Reliance
 - Jupiter
 - Vanessa
 - Valiant
 - Canadice



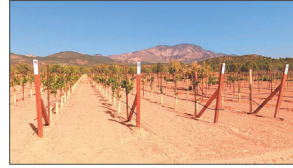
'Jupiter'

Climate considerations



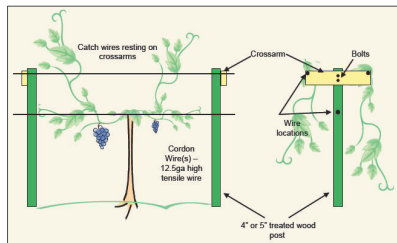
- 120-150 frost-free days (ffd)
- American type grapes and French Hybrids
- 170-180 ffd
- Early Maturing European and French Hybrids
- 180+ ffd
- European and Hybrids
- 200+ ffd
- late maturing European and Muscadine grapes

Support systems



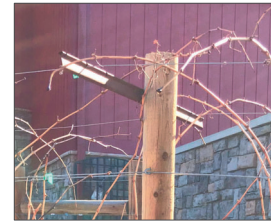
Simple Trellis System

- Treated wood posts installed 6-8' above ground
- Wire for irrigation 16" above ground
- Cordon wire 42-60 inches above ground
- Canopy wires 12-18" above cordon wire



Trellis

- End posts 6" + dia.
- 2-3 feet deep
- Use ground anchors or "H" brace
- Line posts
- Crossarms?



Posts

- Line posts
 - Set in rows between end posts
 - Every 3 plants or up to 21 feet apart
 - 2' deep
 - At least 3" in diameter
 - Or T-post or metal trellis post



Trellis Wire

- Wire
 - High-tensile vs. soft wire (low-carbon wire)
 - Stronger
 - Less stretch
 - Longer runs without support posts
 - Better corrosion resistance
 - 12.5 gauge or heavier
 - Tensioning system



Hardy (Hybrid) Wine Grapes

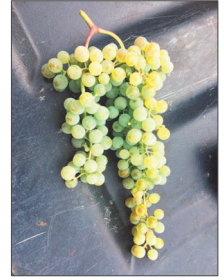
- AKA non-vinifera wines
 - Some have some vinifera genetics
- Crossings of different grape species
 - *V. labrusca*, *V. riparia*, *V. rupestris*, *V. aestivalis*
- Used for their hardiness and phylloxera resistance
- Can make good wines
 - marketing



Frontenac grape. Picture by Julie Knittel

Hardy (Hybrid) Wine Grapes

- Examples:
 - Marquette – 2006 Minnesota
 - Frontenac – 1996 Minnesota
 - La Crosse – 1983 Swenson
 - Aromella – 2014 Cornell
 - Enchantment – 2016 Arkansas
 - Opportunity – 2016 Arkansas
- Breeding programs
 - University of Minnesota
 - Cornell University
 - University of Arkansas
 - Elmer Swenson (Wisconsin)



LaCrosse grape. Picture by Julie Knittel

Spacing

- Based on training style and plant vigor
- GENERALLY
 - Table, juice grapes
 - 8 foot in-row plant spacing
 - 8-9 feet between rows
 - Wine grapes
 - 3-8 feet in-row plant spacing
 - 8-9 feet between rows



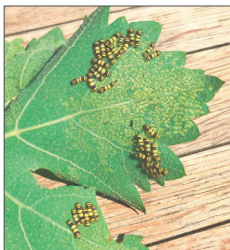
Irrigation

- Grapes do well with drip
- Pipe hung on low wire
- Pre-installed emitters
- User-installed emitters
- Irrigated 2x/week for 90 minutes
 - Clay loam soil
 - More often, less time for sandy soil



Typical Problems

- Grapeleaf skeletonizer
- Leafhopper injury
- Herbicide injury
- Iron deficiency
- Birds and wasps
- Powdery Mildew



Leafhopper Injury

- Small jumping/flying insects
- Pierce cells and suck contents
- Reduce photosynthesis capacity
- Grapes can handle pretty high populations



Herbicide Injury



Images by Essie Fallahi, University of Idaho

2,4-D injury



Image by Essie Fallahi, University of Idaho

Glyphosate injury

Iron Deficiency

- Usually caused by
 - Compacted soil
 - Waterlogged soil
 - SOMETIMES by low iron in soil
- Herbicide injury can also make this worse



Birds



- Birds are the most destructive pest we have
 - Deer are second
- We found bird netting most effective
 - Can be reused for several years
- Automated moving lasers work too
 - Good for large vineyards

Bird Damage



Powdery Mildew

- White powdery spots that eventually merge on leaves
- Powdery mycelium
- Also damages canes and fruit



Grape Trial Results



Cultivar	# Planted	# Surviving Plants	Percent Survival
Aldon	12	9	75
Aromella	9	8	89
Beta	14	14	100
Bluebell	15	12	80
Canadice	15	14	93
Concord	12	12	100
Delaware	14	7	50
Elielweiss	13	8	62
Frontenac	12	10	83
Himrod	13	12	92
Jupiter	14	14	100
La Crosse	10	10	100
Marquette	8	4	50
Marquis	16	16	100
Niagara	18	18	100
Relliance	15	14	93
Swenson Red	14	9	64
Thompson Seedless	11	8	73
Valiant	14	14	100

Table 1. Survival performance summary of grapes in 2020

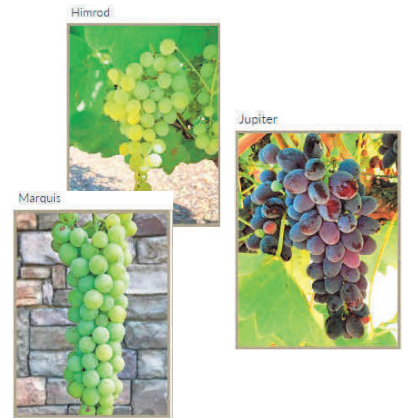
Grape Trial Results

Grape harvest data and characteristics summary. Harvest dates can be plus or minus up to 2 weeks from the average date due to seasonal variations.

Cultivar	Avg. Harvest Date	Crop load range (lbs./plant)			Estimated yields (lbs./acre) ¹	Fruit size (grams/ berry)	Sugar content (% Brix)
		High	Low	Avg.			
Alden	Aug. 29	13.1	8.6	10.9	7,400	4.1	17.1
Aromella	Sept. 9	24.0	8.6	15.9	10,800	0.8	21.7
Beta	Sept. 1	13.6	12.6	13.1	8,900	1.2	25.2
Bluebell	Aug. 30	11.3	12	11.7	8,000	3.0	21.1
Canadice	Sept. 1	11.0	12.5	11.7	8,000	1.6	25.9
Concord	Sept. 22	16.2	10	12.9	8,800	2.9	22.5
Delaware	Sept. 6	9.3	12.3	10.8	7,400	1.0	24.7
Edelweiss	Sept. 1	8.9	7.4	8.1	5,500	1.9	19.2
Frontenac	Sept. 3	17.2	15.3	16.2	11,000	0.8	26.9
Himrod	Aug. 22	32.3	19.1	23.8	16,200	2.4	22.9
Jupiter	Sept. 9	25.3	15.3	21.0	14,300	3.8	23.3
La Crosse	Sept. 1	8.2	16	12.7	8,600	1.2	23.6
Marquette	Sept. 5	15.0	15.0	15.0	10,200	-	27.6
Marquis	Sept. 6	38.3	18.9	31.1	21,200	3.7	19.1
Niagara	Sept. 6	14.1	8.4	12.5	8,500	1.2	17.7
Reliance	Sept. 1	15.0	12.0	13.3	9,100	2.0	21.8
Swenson Red	Sept. 1	12.6	10	11.5	7,800	1.8	23.6
Thompson Seedless	Sept. 6	14.1	8.4	12.2	8,300	1.4	23.4
Valiant	Sept. 1	24.3	13.5	19.3	13,100	1.2	23.3

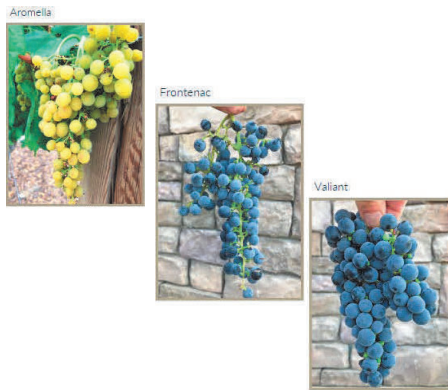
Top Producers

- Seedless Cultivars
 - Marquis – 31 lbs.
 - Himrod – 24 lbs.
 - Jupiter – 21 lbs.
 - Marquis and Himrod would be good replacements for Thompson Seedless as they are hardier and more productive
 - Jupiter has a long harvest window (about 3 weeks)



Top producers

- Seeded Cultivars
 - Aromella – 16 lbs.
 - Frontenac – 16 lbs.
 - Valiant – 19 lbs.



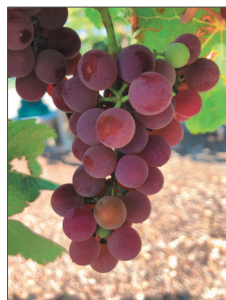
Didn't do so well

- Alden, Beta, Bluebell
 - Most problems with iron chlorosis
 - Bluebell was the worst
 - But had pretty good survival
- Swenson red
 - Five plants rapidly died during growing 2019 growing season
- Marquette, Delaware, and Edelweiss
 - Poor establishment and survival
 - 50%, 50%, and 62% respectively



Lowest Yields

- Alden – noted to be a vigorous plant
- Delaware – low vigor plant
- Edelweiss – noted to be a vigorous plant
- Swenson Red – noted to be a vigorous plant
- Not necessarily a problem, but they were for us
 - Increase/decrease vigor
 - Increase plant density?
 - Grow in better soil



Delaware grape cluster

Training and Pruning

- Myriad of training systems
 - Many will work for most grapes just fine. Pick one
 - Commercial growers will pick one they think will be most productive or easy to manage
- Only 2 main pruning systems
 - Cane Pruning
 - Spur Pruning
 - Based on if the grapes produce flowers on the 1st to 3rd buds or 3rd to 6th buds
 - Most methods will work fine for small growers



Guyot training system (cane-pruned system)

Early Training – Year 1

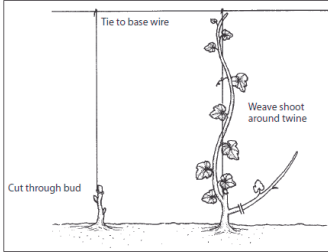


Figure 4. Training in the planting year (short parallel lines show pruning cuts).

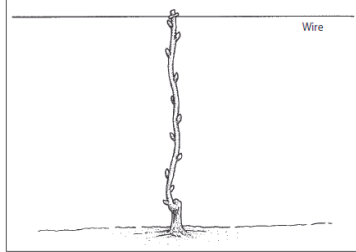


Figure 5A. Cane pruning, first winter.

Cane Pruning – Year 2

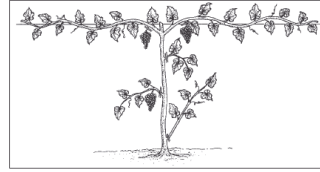


Figure 5B. Cane pruning, second growing season (double lines show pruning cuts).

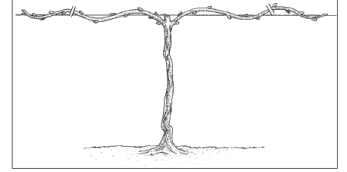


Figure 5C. Cane pruning, second winter (double lines show pruning cuts).

Cane Pruning – Year 3

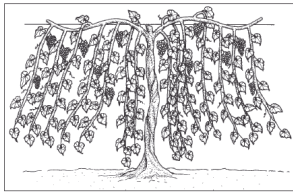


Figure 5D. Cane pruning, third growing season.

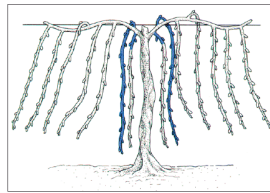


Figure 5E. Cane pruning, third winter before pruning (shaded canes will be retained for next season's fruiting wood).

Cane Pruning – Year 4

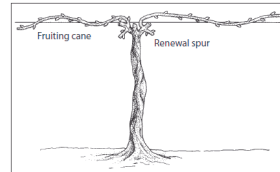


Figure 5F. Cane pruning, third winter after pruning.

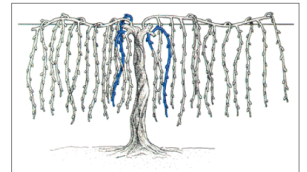


Figure 5G. Cane pruning, fourth winter before pruning (shaded canes will be retained for next season's fruiting wood).

Spur Pruning – Year 3

- Pruning for the first 2 years is the same as for cane method

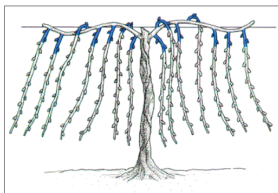


Figure 6A. Spur pruning, third winter before pruning (shading indicates fruiting spurs that will be retained for next season).

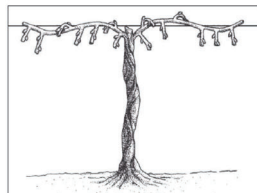


Figure 6B. Spur pruning, third winter after pruning.

Spur Pruning – Year 4

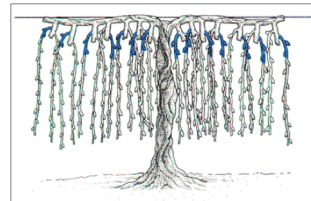


Figure 6C. Spur pruning, fourth winter before pruning (shading indicates fruiting spurs that will be retained for next season).

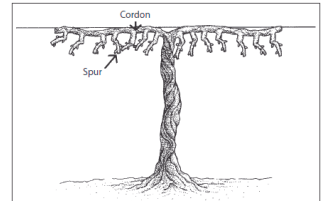


Figure 6D. Spur pruning, fourth winter after pruning.

Bilateral Cordon Pruning Example

Before Pruning



After Pruning



Bilateral Cordon Training and Pruning



Canes pruned to spurs on a bilateral cordon



Spur pruned to 3 buds

Pruning and Training Grapes Four-cane Kniffin System

Remember: Fruit is found on shoots growing from year old canes.

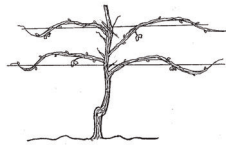
One main trunk trained to a 2 wire trellis system (24-30" apart)

4 canes (year old)

- 10-15 buds on each cane **or** 40-60 per plant
- Each bud will form 2-3 grape clusters

Renewal spurs

- 4 renewal spurs with 2 buds
- Next year's fruiting wood



FOUR-ARM KNIFFIN TRAINING SYSTEM

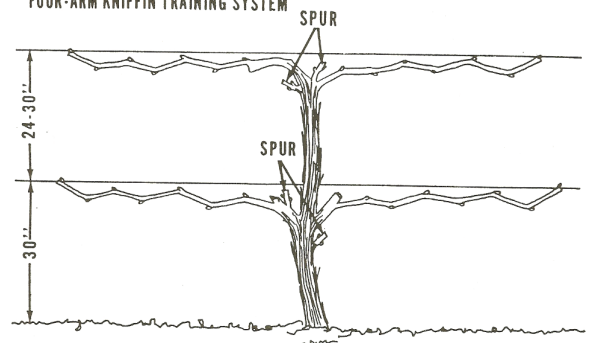


Figure 6.—The four-arm Kniffin training system is the most popular one for American bunch grapes.

Cane-pruned Grape - Before



Cane-pruned Grape - After



Fruit Management

- Remove all clusters in first 2 years
- Thin to two clusters per shoot
- Increases berry size, soluble solids, quality
- Just after fruit set
- Wine grapes are not thinned or shortened



Image by Essie Fallahi, University of Idaho

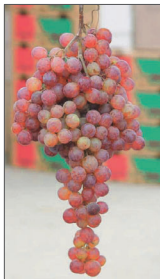
Shortening a cluster



Images by Essie Fallahi, University of Idaho

Fruit size increase

Uncut cluster



Cluster that was cut and from a plant that was cluster-thinned



Images by Essie Fallahi, University of Idaho

Thank you!



Take the survey & download handout



Survey



Handout