



INLAND DESERT
NURSERY

Kevin Judkins

OWNER



Grafting & Rootstocks

What you do and why you do it

1. Our journey into grafted vines
2. How grafted vines differ from own-rooted?
3. What is a rootstock?
4. What are grafted vines?
5. How do I decide which rootstock is best for me?

Our Journey Into Grafted Vines

- Inland Desert was founded over 40 years ago to serve Washington State Growers
- Washington State's climate and soil are unique from other winegrape growing regions
- As we began to grow our business, so did our awareness of grafted vines and rootstock



Washington Wine | A State of Transition

<u>Nursery Process</u>	<u>Product/s</u>
Nursery Certification	Self-Rooted & Grafted
Clean Vine Mgmt Practices	Greenhouse and Field-Grown
Source Traceability	Clonal Diversity
	Proprietary Options ENTAV-INRA®
	Tall Vines 2X & 3X Lengths

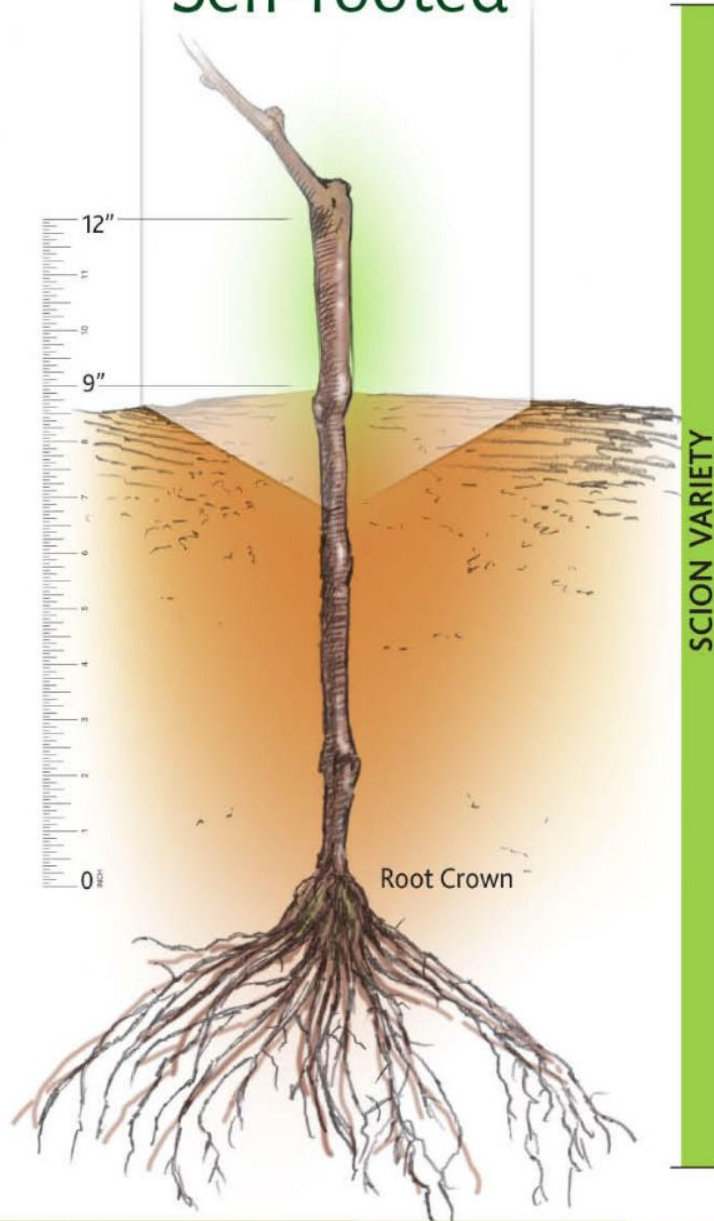
<u>Production Year</u>	<u>2015</u>	<u>2021</u>	<u>Change</u>
Mother Block Acres	80	150	70
Selection Count	140	275	135
Unique Nursery Items	200	987	787
Average Item Size	20,000	3,500	-16,500
Self / Graft Ratio	98% / 2%	75% / 25%	23%

IDN | A Reflection of the Industry...

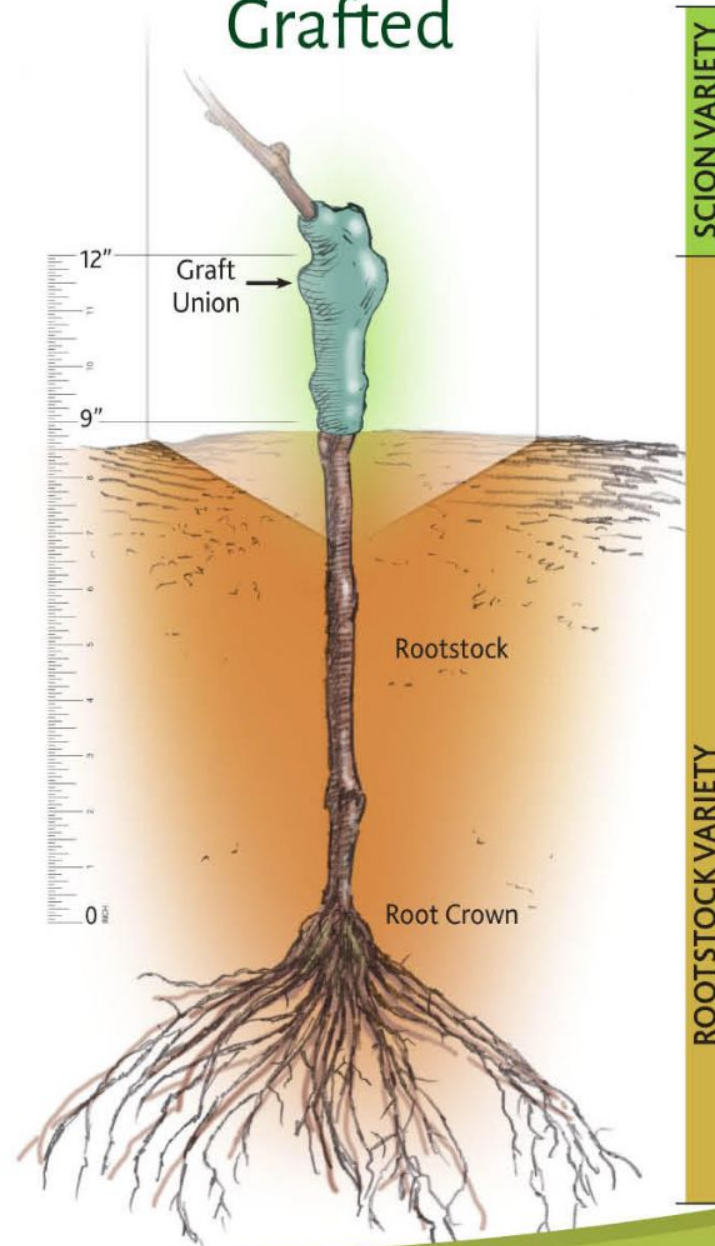
- Processes are more complex
- Product formats are more diverse
- Item batch sizes are smaller
- Clean and trusted raw materials short in supply
- Increased interest in grafted vines...

Plan Ahead | Custom Order!

Self-rooted



Grafted

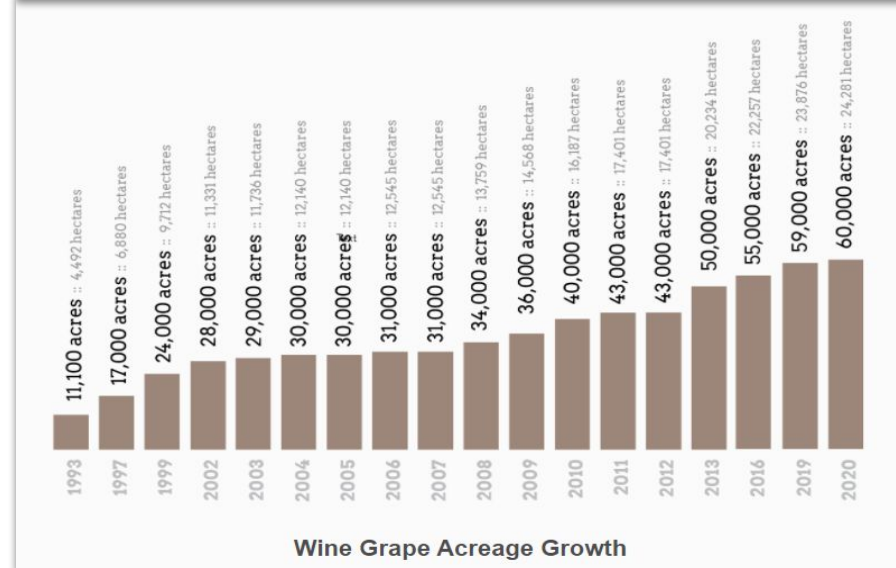


Why Should I Consider Grafted Grapevines?

- A vineyard management tool
 - Consistent performance
 - Better defenses = longer life
- Washington State is evolving
 - No longer a young winegape region
 - Pest pressures are changing
 - We know more today



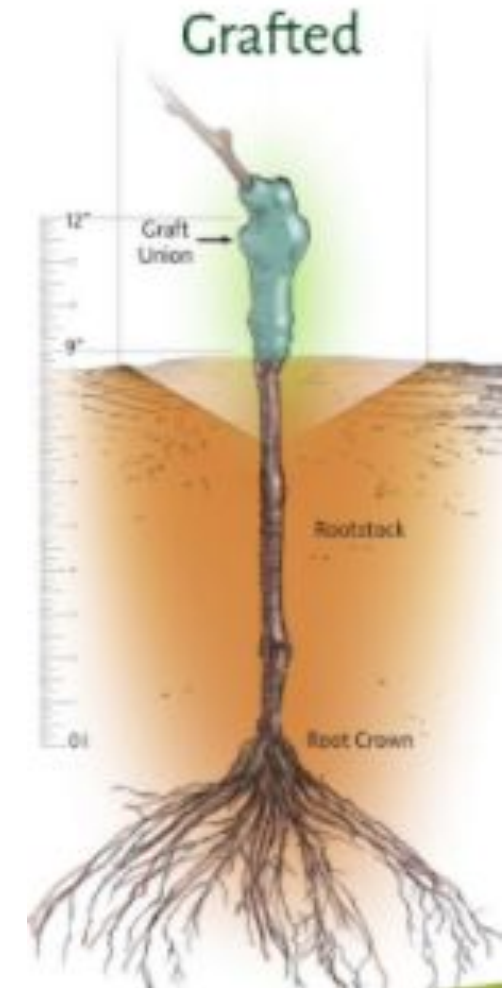
Consistency
is key!



2020 Acres =
60,000!

What is a Rootstock?

- A root system and stem that supports the fruit production part of the plant (scion)
- Most commonly used with fruiting plants and trees
- Selected for its interactions with the soil, water, canopy, fruit and pests and disease resistance



Rootstock Processing

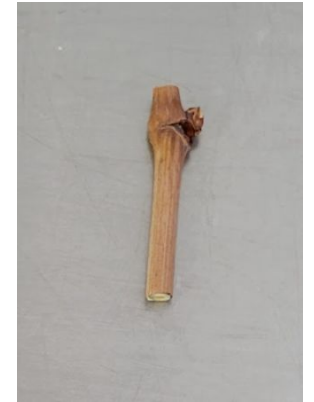


What is Scion?

- Contains the bud for flower or fruit production
- Supported by a root system and stem provided by the rootstock
- In winegrape production, its chosen for fruit flavor and grape cluster formation characteristics

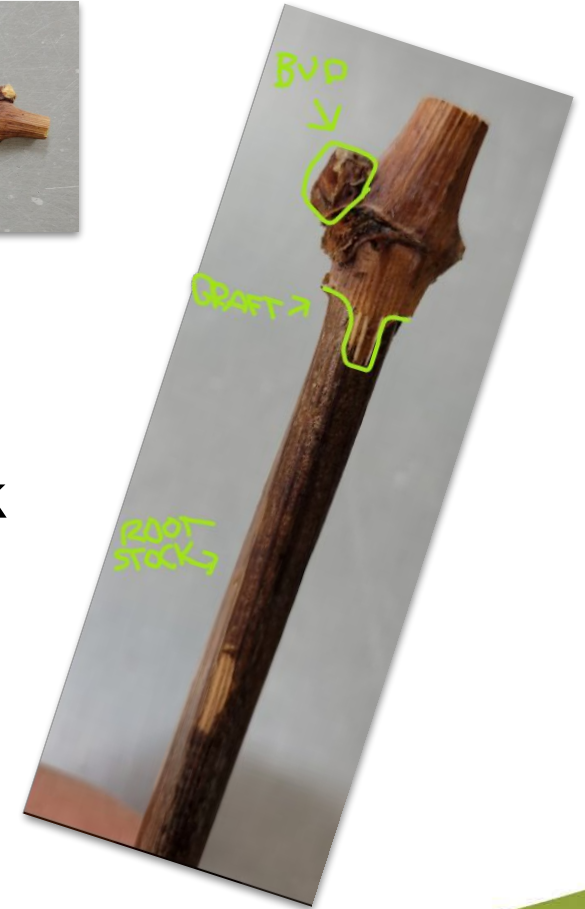


Scion Processing



What is a Grafted Grapevine?

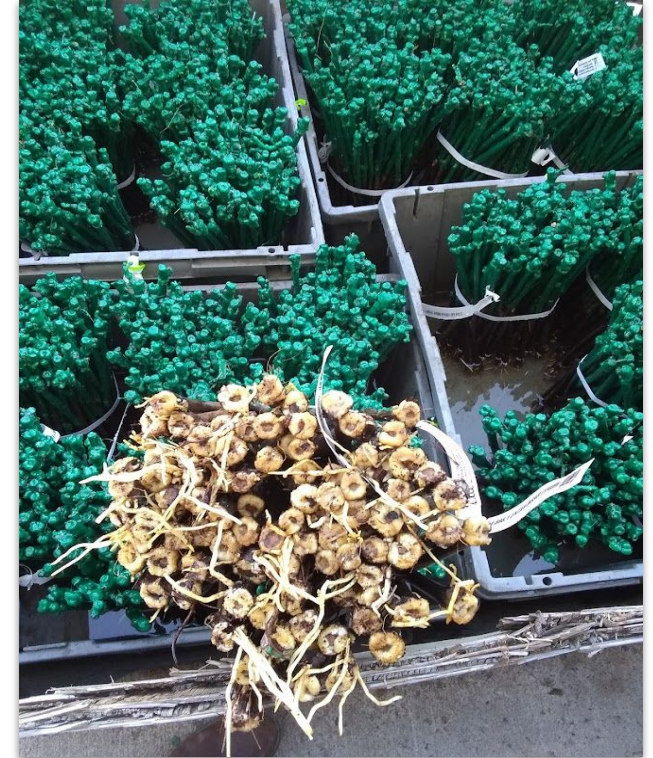
- Scion + Rootstock = Grafted grapevine
 - Scion = canopy and fruit production
 - Rootstock = Root system and supportive stem
- Grafting -> the process of combining Scion to a Rootstock



Grafting Video



Healing the Graft Union



GRAFTED VINE PLANTING INSTRUCTIONS

DORMANT VINES

Keep vines moist and cool to avoid bud push until planting

Plant just before spring for best results

Dig holes 12" deep and width of trimmed roots - avoid J-Rooting



GREEN POTTED VINES

Keep vine hydrated and protected until planting

Plant after last frost, before summer heat

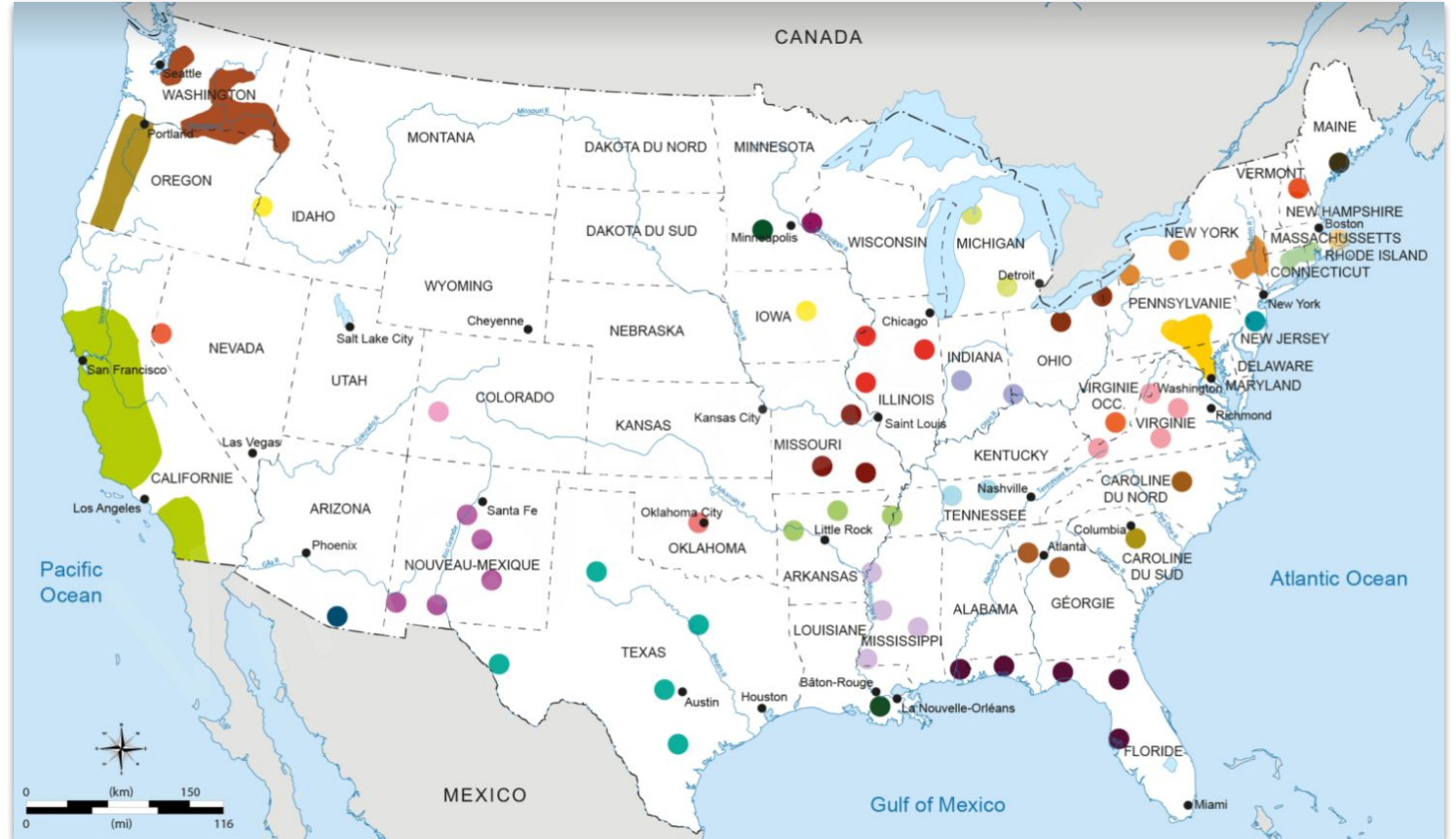
Dig holes slightly taller/wider than root ball



Moisten soil prior to planting
Plant vine graft union 4" above soil line
Irrigate immediately after planting - keep root zone moist, but not too wet.
Install vine shelter 2 inches below soil line
Depending on site, fertilization may begin after planting
Shutdown vines in preparation for winter - back off fertilization and water
Hilling over graft union is recommended for cold climates
Complete one last long irrigation set prior to shut-down
Select trunks for training during dormant season

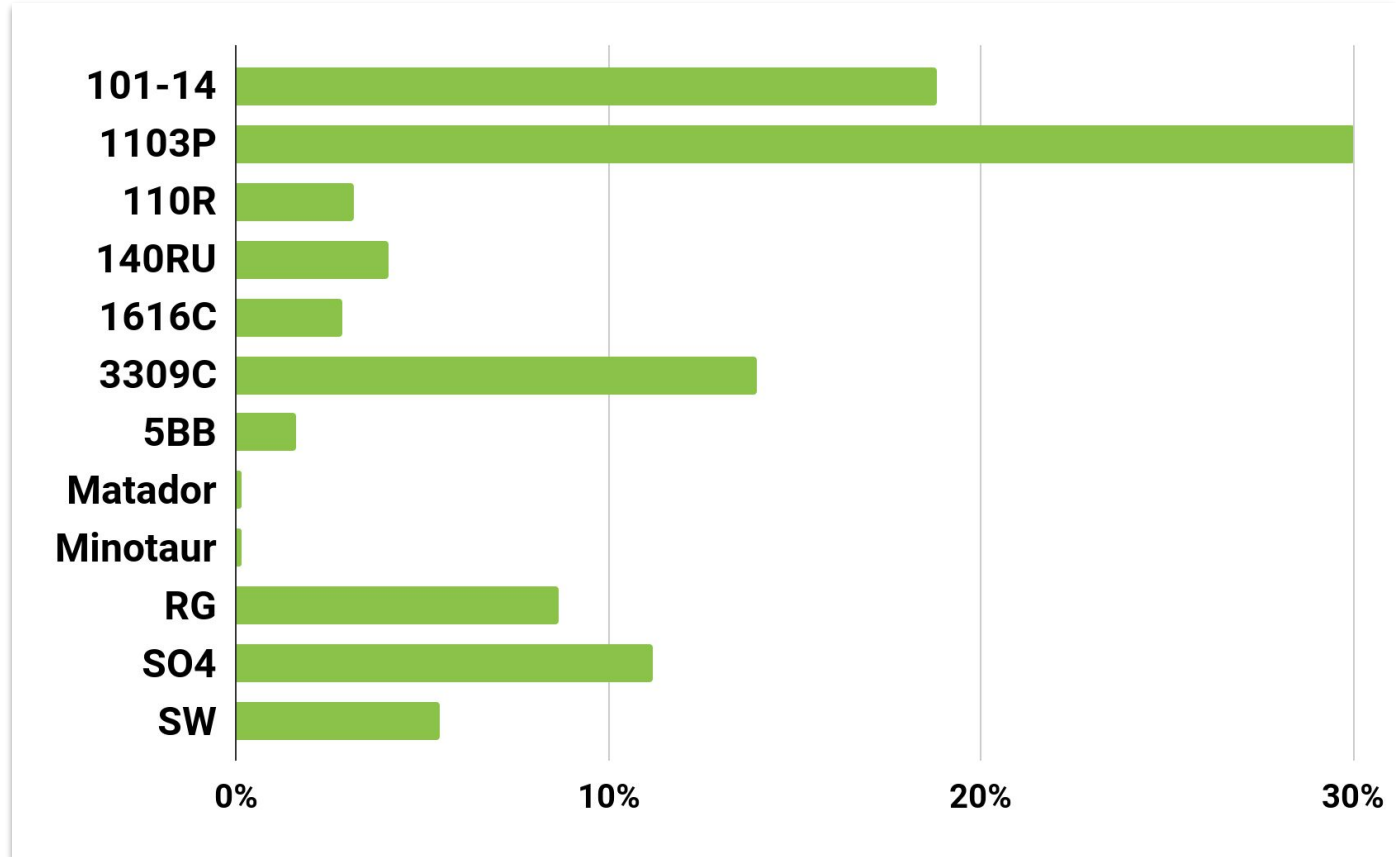
How do I choose the right Rootstock for me?

- It's complicated!
- Find a local Viticulturist
- Do your homework
 - Rootstock Characteristics
 - Soil Mapping
 - Farming goals
 - Winemaking goals



Rootstock List | Current Mix at IDN

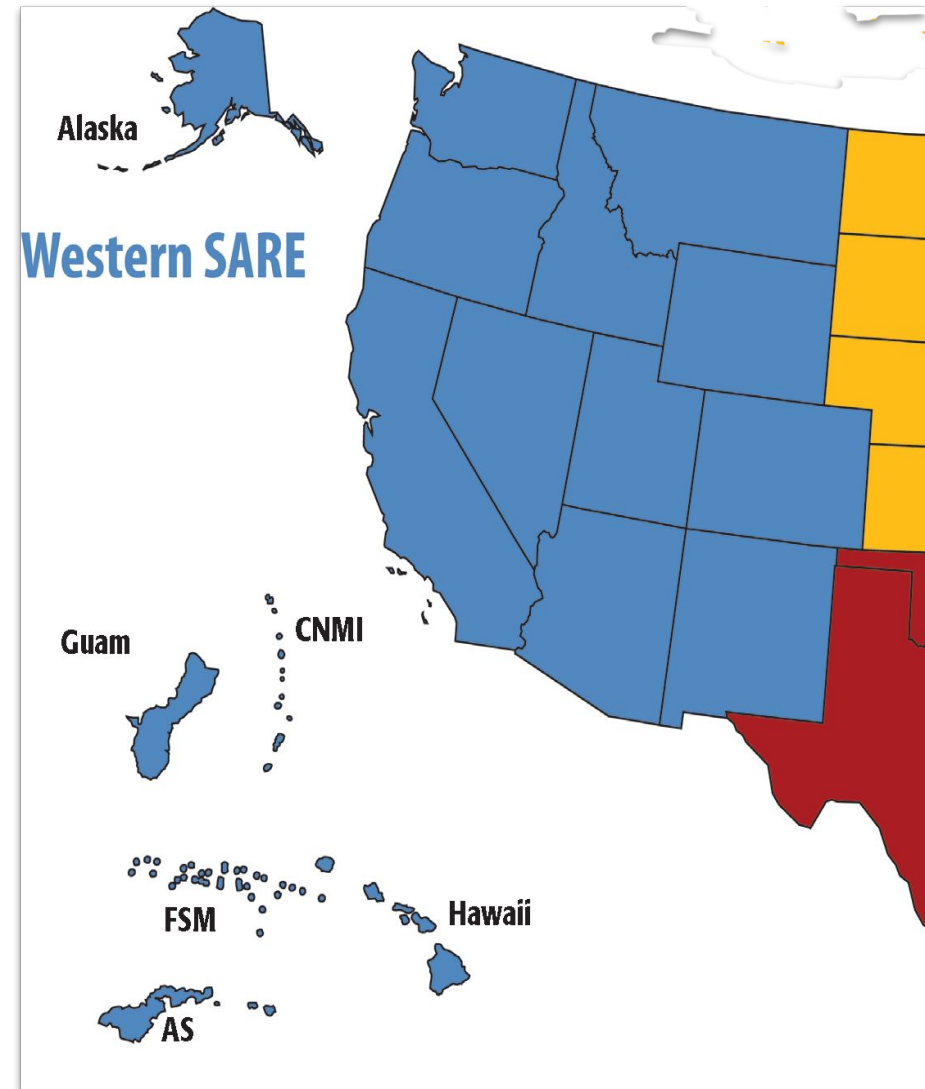
Rootstock	Synonym	Parentage	Vigor	Phylocera Resistance	Nematode X. Index (Dagger)	Resistance M. incognita (Root-Knot)	Soil Preference	Drought Tolerance	Wet Feet	Active Lime Tolerance	Salt Tolerance	Influence on Maturity	General Comments
Riparia Gloire	Gloire de Montpellier	V. riparia	Low/Moderate	High		Moderate	Deep/Fertile	Low	High	Low ~5%		Early	
Saint George	Rapensis du Lot	V. riparia	Very High	High		Susceptible but tolerant	Deep, Uniform Loam	High	Low	14%	Moderate	Late	Susceptible to oak root fungus. Suitable for deep, dry farmed sites. Tends to reduce fruit set on vigorous sites.
1616 Couderc	1616C	V. rotundifolia x V. riparia	Low	Moderate/High		Moderate	Deep/Fertile		High	11%	Moderate/High	Early	
3309 Couderc	3309C	V. riparia x V. riparia	Moderate/High	High	Susceptible	Susceptible	Deep Well-Drain	Low	High	11%	Low/Moderate	Mid	
44-51 Malegue	44-53M	V. riparia x 344M	Moderate	Moderate/High	Moderate	Susceptible	Loam/Good Fertility	Moderate	High	10%		Mid	Often suffers from Mg deficiency
101-14 Millardet Et De Cassat	101-14 Mgt.	V. riparia x V. rotundifolia	Low/Moderate	High		Moderate	Heavy Clay	Low/Moderate	High	9%	Very Low	Early	More vigorous than Riparia Gloire
Swazanzan	Swazanzan	V. riparia x V. rotundifolia	Low/Moderate	High	High	Some	Deep/Fertile	Low/Moderate		6-9%			
41B Millardet Et De Cassat	41B	V. berlandieri x V. vinifera		Low	Susceptible	Susceptible	Dry Lime	Low/Moderate	Low	40%	Very Low	Early	
420A Millardet Et De Cassat	420A	V. berlandieri x V. riparia	Low	Moderate		Moderate	Deep/Fertile	Low	Moderate	20%	Low	Late	Suitable for high density plantings. Less vigorous than 5C and 5BB. Susceptible to potassium deficiency. Suitable for high density plantings.
Oppenheim 84	SO4	V. berlandieri x V. riparia	Moderate	High	High	Moderate	Clay	Low	High	18%	Low	Mid	
5BB Kober	5BB	V. berlandieri x V. riparia	Moderate	High		Moderate	Clay	Low	High	20%	Very Low	Mid	Slightly more drought tolerant than 5C or 420A, yet less than 110R and St. George. Not recommended for sites with standing water or a history of phytophthora. Genetically identical to 5A.
5C Tadok	5C	V. berlandieri x V. riparia	Moderate	High	High	Moderate/High	Clay	Low	High	20%		Early	Similar to 5BB, more suitable for higher altitudes. Broad spectrum of nematode tolerance.
1103 Paulsen	1103P	V. berlandieri x V. rotundifolia	High	High	Susceptible	Moderate	Clay, Lime	High	High	18%	Moderate	Late	Vigor is between 90R and 110R
RS-3	RS-3	Ramsey x Swazanzan	Moderate		High	High	Sandy		Low-Moderate		Moderate	Moderate-High	RS-3 should not be over-irrigated. Fairly tolerant and broad nematode resistance.
RS-9	RS-9	Ramsey x Swazanzan	Low		High	High			Low-Moderate		Moderate	Low	Seeded for close plantings, broad nematode resistance
Kingfisher	PC01126-29	V. champinii x V. rotundifolia x Riparia Gloire	High		Resistant	High							
Matador	PC0188-151	101-14 Mgt x (V. musangensis x V. rotundifolia)	High		Resistant	High							
Minotaur	PC0188-32	101-14 Mgt x (V. musangensis x V. rotundifolia)	High		Resistant	High							
GRN-1	8909-05	V. Riparia x Muscadina	Moderate/High	Very High	Very High	Very High		Moderate	Tolerant	Low	Low	Moderate/High	Highly resistant to ring, citrus and lesion nematodes
GRN-2	9163-36	V. rotundifolia x V. Champinii	Low/Moderate	Very High	Very High	Very High		Moderate	Moderate	Moderate	Moderate/High	Low/Moderate	Highly resistant to lesion nematode and moderately resistant to citrus and ring nematode
GRN-3	9165-43	V. rotundifolia x V. Champinii	Moderate/High	Very High	Very High	Very High		Moderate/High	Moderate	Moderate/High	Moderate/High	Moderate/High	Also resists citrus and lesion nematodes, but not ring
GRN-4	9165-45	V. rotundifolia x V. Champinii	Moderate/High	Very High	Very High	Very High		High	Moderate	Moderate/High	Moderate/High	Moderate/High	Also resists citrus and lesion nematodes, low to moderate ring resistance
GRN-5	9407-34	V. Champinii x V. berlandieri x V. Riparia	High	Very High	Very High	Very High		High	Low/Moderate	Moderate/High	Moderate/High	High	Also resists citrus and lesion nematodes, moderate ring resistance, moderately difficult to propagate
110 Ridge	110R	V. berlandieri x V. riparia	High	High		Moderate	Moderate Fertility	High	High	17%	Moderate	Late	Suitable for hill-side-sand, dry-farmed sites can be overly vigorous on deep fertile soils.
140 Ridge	140R, Ru 140	V. berlandieri x V. riparia	Very High	High		Moderate	Sandy Moderate Fertility	High	Moderate	20%	Moderate	Late	Tolerates a wide variety of soil.
Freedom	Freedom	1613 C x V. Champinii	High	Moderate	Very High	High	Sandy Moderate Fertility	Moderate/High	Low		Low	Late	Must use virus free scion material. More vigorous than Harmony, but less than Dog Ridge and Salt Creek.
Harmony	Harmony	1613 C x V. Champinii	High	Low	Some	High	Sandy Moderate Fertility	Moderate/High					More vigorous than 1613C, less than Dog Ridge and Salt Creek.
Ramsey	Salt Creek	V. champinii	Very High	Moderate	High	High	Light Sand Low Fertility	High	Moderate		High	Late	Tends to have Zn deficiency. Less vigorous than Dog Ridge. Reduced fruit set.
VR 039-16	039-16	V. vinifera x V. rotundifolia	High	Low	Very High	Susceptible		Low				Late	Highly recommended for vineyard sites infested with grape leaf virus.



Western SARE

- SARE | Sustainable Agriculture Research and Education
- What | Competitive grant foundation, founded in 1988 to fund projects across 17 distinct states and territories
- Mission | Advancing Innovation in Sustainable Agriculture

IDN | Awarded a Farmer/Researcher Grant in 2021 for our RS Trial Block





id
INLAND DESERT

Variety:
Chard/SO4

Clone:
15

Foundation Source:
CRCNW

Western SARE Rootstock Trial for Washington State

Rootstock Trial Block | Project Details

Plot Summary

Planting Date:	5/15/2021
Planting Location:	Benton City
Total plot area:	1.191
Row Spacing:	8
Vine Spacing:	5
# of Rows	31
Length of Rows	200
Qty of Plants	1267

- Yakima Valley AVA, 900 ft
- Thin & variable Soils, fractured basalt/rock
- Nearby phylloxera pressure
- Chardonnay CPCNW 15 Scion
 - Full Rows!
 - 5 Rootstocks w/ Self-Root Control
 - 5 Repetitions
- Cab Sauv 412 ENTAV-INRA®
- Single Irrigation Set per combination

Planting Outline | (5) Unique Rootstocks + Self-Root Control

Rows	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Repetition
1	1616C		Riparia Gloria		110R		SO4		3309C		101-14		1103P		Self														CS Salad Bar												
2													Self Chardonnay 15																		Rep 1										
3													1103P																												
4													101-14																												
5													3309																												
6													Schwarzman																												
7													SO4																												
8													Self Chardonnay 15																			Rep 2									
9													1103P																												
10													101-14																												
11													3309																												
12													Schwarzman																												
13													SO4																												
14													Self Chardonnay 15																		Rep 3										
15													1103P																												
16													101-14																												
17													3309																												
18													Schwarzman																												
19													SO4																												
20													Self Chardonnay 15																			Rep 4									
21													1103P																												
22													101-14																												
23													3309																												
24													Schwarzman																												
25													SO4																												
26													Self Chardonnay 15																		Rep 5										
27													1103P																												
28													101-14																												
29													3309																												
30													Schwarzman																												
31													SO4																												

5 Rootstocks We Are Trialing

		Inherent Characteristics				Resistance			Tolerance	
RS Variety	Parentage	Vigor	Rooting Depth	Soil Preference	Influence on ripening	Phylloxera	Dagger Nematode	Root-knot Nematode	Drought	Wet Soil
1103 Paulsen	V. berlandieri x V. rupestris	High	Deep	Clay, Lime	Delays	High	Low	Moderate/High	Moderate/High	Moderate/High
101-14	V. riparia x V. rupestris	Low/Moderate	Moderate	Deep/Fertile	Advances	High (historically)	Low	Moderate/High	Low/Moderate	Moderate/High
3309	V. riparia x V. rupestris	Low/Moderate	Moderate	Deep/Well Drained	Mid	High	Low	Low	Low/Moderate	Moderate
Schwarzmann	V. riparia x V. rupestris	Low/Moderate	Moderate	Deep/Fertile	Advances	High	Moderate/High	Moderate/High	Low/Moderate	Moderate/High
SO4	V. berlandieri x V. riparia	Low/Moderate	Moderate	Moderate Fertility	Mid	High	Low/Moderate	Moderate/High	Low/Moderate	Moderate/High

Western SARE | Grant Objectives

RS Trial Grant Assignments	Year 1 (2021-2022)				Year 2 (2022-2023)				Year 3 (2023-2024)			
	May-Jul	Aug-Oct	Nov-Jan	Feb-Apr	May-Jul	Aug-Oct	Nov-Jan	Feb-Apr	May-Jul	Aug-Oct	Nov-Jan	Feb-Apr
Objective 1 – Vine Growth												
Site preparation (pre-project)	✓											
Grafting (pre-project)	✓											
Site planting	75%				25%							
Plant survival ratings	99.5%											
Phenology ratings	✓											
Tissue nutrient assessment		✓										
Lignification status		✓										
Pruned cane ratings												
Cold hardiness assessments												
Objective 2 – Fruit Quality												
Cluster and berry assessments												
Objective 3 – Education and Outreach												
Field Days												
Regional Meetings Education												
Article in VEEN												
Vineyard Trial Workshop												



509.588.6615
inlanddesert.com

ENTAV  INRA[®]