



Presentation Outline

- Rootstock use in Burgundy, Oregon and Central Coast
- 2. Rootstock use in Australia
- 3. Considerations for the selection and management of rootstocks for premium pinot noir production



History of phylloxera and rootstocks

1862- Phylloxera imported into Rhone Valley

1864- Widespread damage in Rhone valley

1866- First symptoms in Bordeaux

1868- Phylloxera confirmed as the cause

Early 1870's- Experimentation on methods of control:

- Flooding
- Fumigating with CS2
- Cows urine(!),
- Beating wheelbarrows to drive them out to sea.

1872 (approx.) - First *V. vinifera* grafted onto American *vitis* sp.

Despite success there was considerable resistance

1874- decree passed in Burgundy to prohibit import of vine material into the region.



Spread of phylloxera in France

Source: Wine and the Vine by Tim Unwin

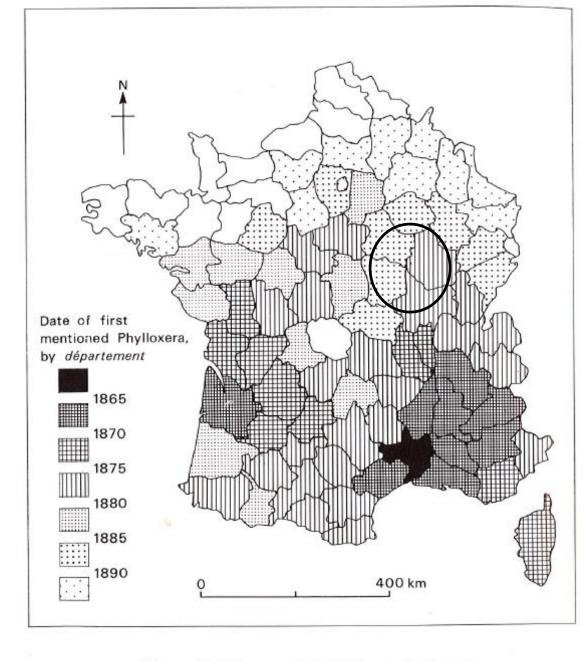


Figure 37 The spread of phylloxera in France Source: derived from data in Lachiver (1988)

History of phylloxera and rootstocks

- 1878- practically all vineyard regions in France infested -370,000 ha destroyed (Galet, 1979)
- 1879- Montpellier School of Agriculture set up a grafting course
- 1881- at the International Phylloxera congress it was accepted that best control method was to graft onto American rootstock
- 1890- Phylloxera recorded in Australia (1877) California, New Zealand and South Africa
- 1880's-1930- intense period of rootstock breeding

Further reading:

"Phylloxera" by Christy Campbell

"The Great Wine Blight" by George Ordish

"Wine and Vine" by Tim Unwin

Rootstock Breeding

Rootstock	Parentage	Year of Development
Riparia Gloire	riparia	1870
St George	rupestris	1870
3309C	riparia x rupestris	1881
101-14	riparia x rupestris	1882
Schwarzmann	riparia x rupestris	1891
110 Richter	rupestris x berlandieri	1889
1103 Paulsen	rupestris x berlandieri	1895
SO4	berlandieri x riparia	1896
5C Teleki	berlandieri x riparia	1922

Adapted from table in Walker, A. (1992) Future Directions of Rootstock Breeding. ASEV.

Rootstock use in Burgundy

(pers. comm. Laurent Audeguin, IFV)

- 3309C is most widely planted rootstock.
- 161-49C (ber x rip) mainly in Grand Cru's,
- → HOWEVER 161-49 is <u>no longer</u> used due to young vines declines (starting sometimes when vineyards are 6, 7 years old).
- It has been a challenge to replace 161-49C because it has good resistance to lime, medium vigour = a "qualitative" rootstock.
 - → instead of 161-49, growers are using 5C Teleki or 420A
- Also used in small proportions: SO4, 101-14, Fercal, 41B

Rootstock use in Oregon

(pers. Comm. Jerry Judkins, Inland Desert Nursery)

Riparia x rupestris parentage (mostly 101-14 and 3309) are the most commonly planted primarily because these rootstocks impart:

- a shorter phenological cycle (i.e. cause earlier ripening and hardening off)
- low vigor and high fruit set
- Good at nutrient uptakes (especially Potassium which can be low in OR soils).
- 3309 is the most drought tolerant which maybe the reason it is the most widely planted of the three.

Rootstock use in Oregon

(pers. Comm. Jerry Judkins, Inland Desert Nursery)

Because of increasing issues with water growers are experimenting with other rootstock choices including:

- Schwarzmann maybe more drought tolerant than other rip x rup crosses
- 420A (ber x rip) low vigour but longer season, good free lime tolerance, favourite for wine quality in other regions (Napa)
- 1616C unique parentage, low vigor/short season, very good in wet soils and tolerant of nematodes
- 4453 different parentage, restricts Mg uptake which can be very high in some Some Oregon soils, good drought tolerance
- "All that said, I don't see 3309 and 101-14 being replaced as the #1 and #2 choices anytime soon"

Rootstock use in Central Coast

(pers. comm. Larry Bettiga, UCD extension officer)

For Pinot noir planted on the central coast Larry estimates the following:

Rootstock	% of use
101-14	40
1103 Paulsen	30
SO4	20
5C Teleki	5
110 Richter	5

% Rootstock use for Pinot Noir in Australia based on Yalumba Nursery supply

Rootstock	2016	2017	2018 forecast supply
101-14 MGT	34	20	36
Paulsen 1103	22*	25*	32*
Own Roots	24	22	11
Teleki 5C	11	11	11
Richter 110	5	5	6
3309C	1	8	3
Others	3	9	1

*Does not include sparkling end-use

Rootstock use for Pinot Noir in Australia-Commentary

 101-14 and 1103 Paulsen still the dominant rootstocks across all regions- why?

 Upward trend towards moderate vigour rootstocks; 110 Richter and 5C Teleki

3309C under represented because of issues with supply



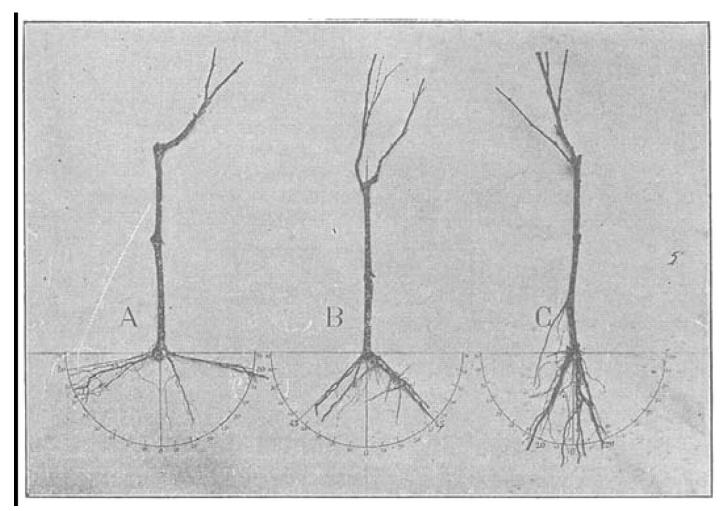


Figure 1Emergence angles of adventitious roots produced by cane cuttings of, from left to right, Riparia Gloire de Montpelier (*V. riparia* Michaux), *V. riparia* x *V. rupestris* cv. 3309C, and Rupestris du Lot (*V. rupestris* Scheele) (**Guillon 1905**); reproduced with the permission of Masson Publishers/Dunod, Paris

From: Smart, D. (2006) Grapevine Rooting Patterns a comprehensive review

Rootstock influence on root distribution

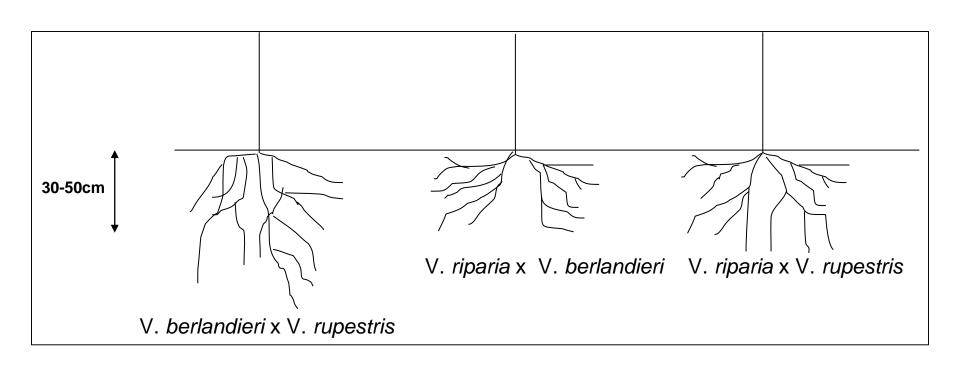
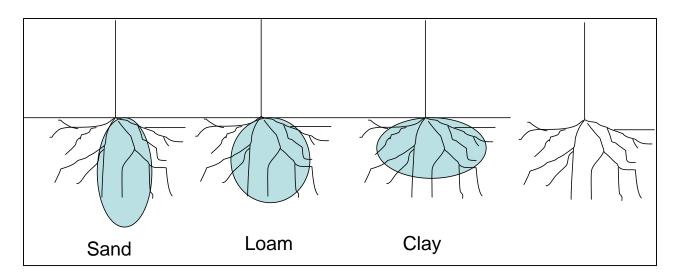


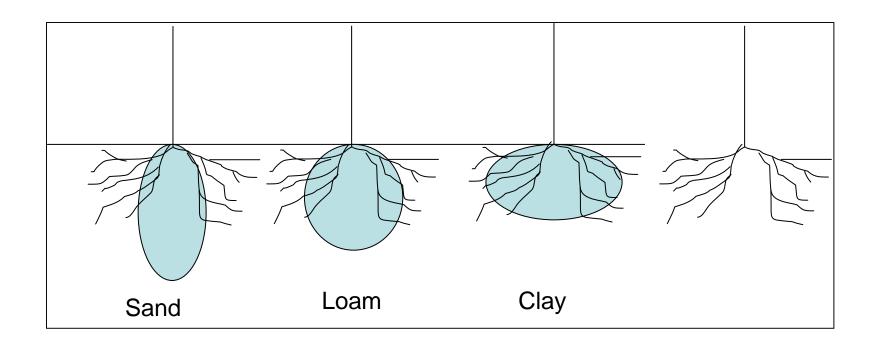
Figure 1. Hypothetical rootstock root distribution patterns adapted from Guillon (1905) and based on the emergence angles of American Vitis species.

Group A: *V. riparia x V. rupestris*



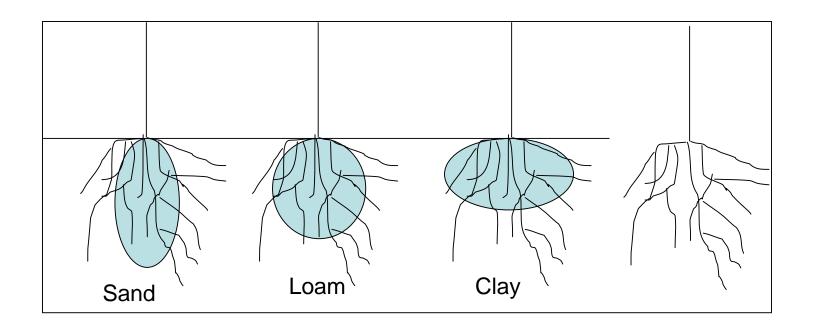
- Diagram suggests preference for loam and clay-loams
- Low proportion of roots in sand →
 - poor WUE in sandy soils, maximum WUE in loams-clay loams
 - may explain why prone to stress on sandy soils in the heat of summer

Group B: *V. riparia x V. berlandieri*



- Lateral root distribution makes them better suited to clay and clay loam soils (confirmed in literature)
- May explain why prone to stress on sandy soils in the heat of summer

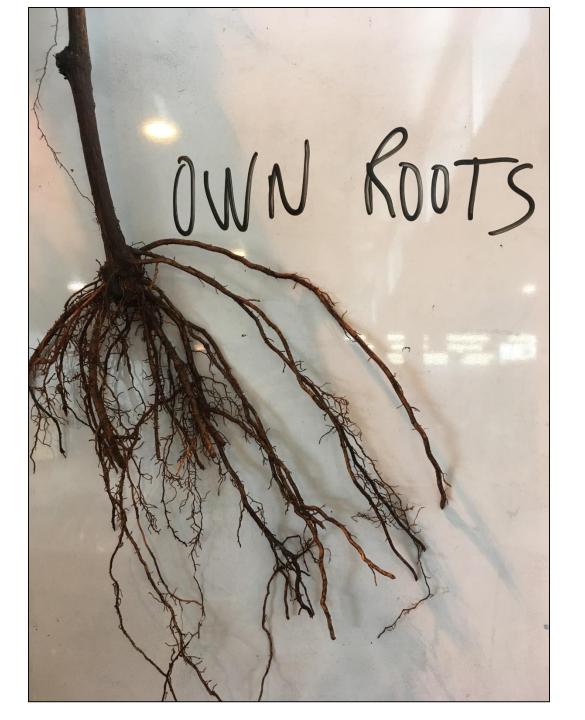
Group C. *V. berlandieri x V. rupestris*

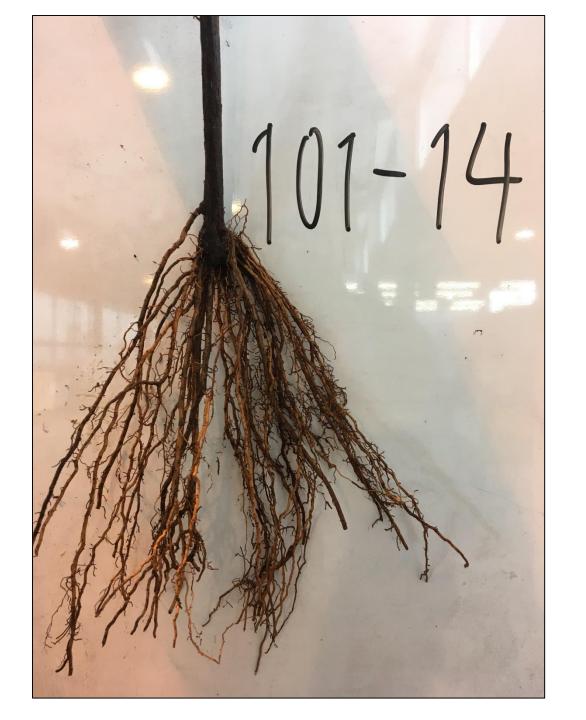


- Good proportion of roots in all three wetting patterns
- May explain adaptability to wide range of soils

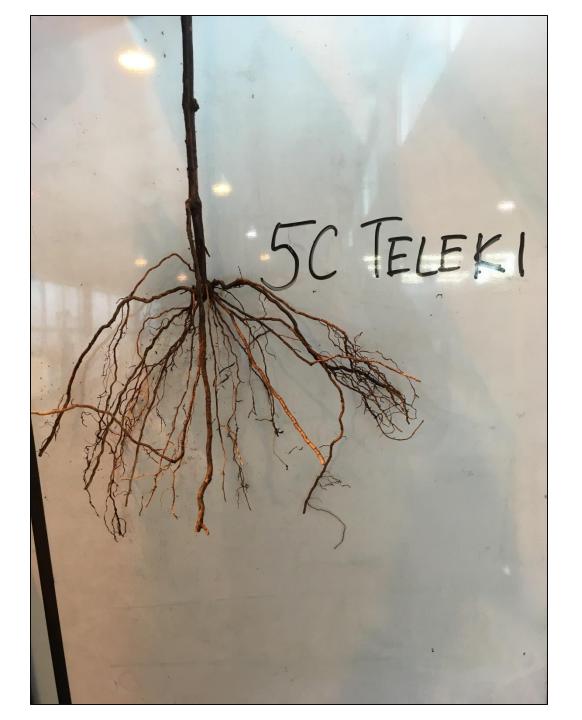


berlandieri x rupestris riparia x rupestris riparia x berlandieri

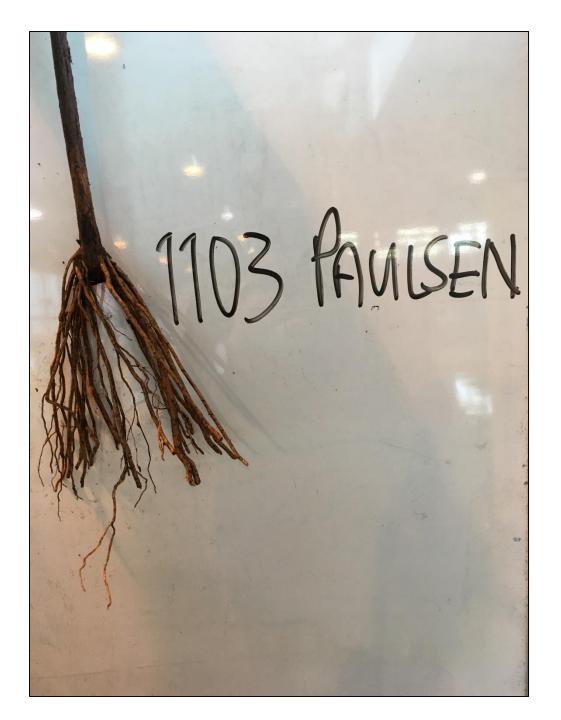




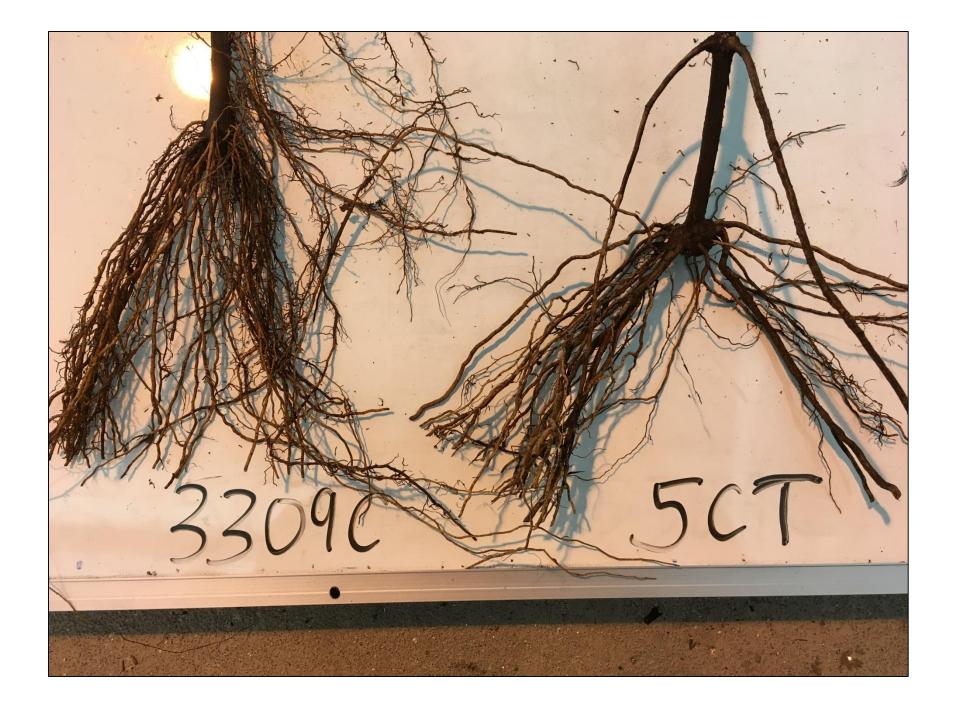












Key considerations for selecting rootstocks for pinot noir

Pinot noir is not-elastic

Climate Change

Farming practices: BD/Organics and close planting

Impact of farming Practices: Biodynamic and Organics

- Lower nitrogen levels = Lower vigour (but not lower yield- effects LA:fruit)
- More weed competition = less water availability
- → requirement for a 'deep-rooted' rather than fibrous, shallow rooted rootstock
- i.e. 110 Richter v 5C Teleki
- → Or a higher vigour rootstock with more efficient nitrogen and water uptake



Farming Practices: Close Planting

- Need to avoid high shoot number/m
- Can occur if vigour potential of rootstock x soil is too high for density

Consider the combination of factors on vine x vine competition:

root architecture and soil depth

Farming Practices: Close planting

