

# Winter Injury in Grapevines

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## Weather-Related Disorders: Winter Cold Injury



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## Causes of Spring Shoot Stunting

- Winter cold
- Drought injury
- Overcropping/early cropping of young vines
- Anaerobic/restrictive soils
- Lack of chilling
- Low carbohydrate reserves
- Pest/pathogen induced
- Physiological disorders

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## Delayed Spring Growth

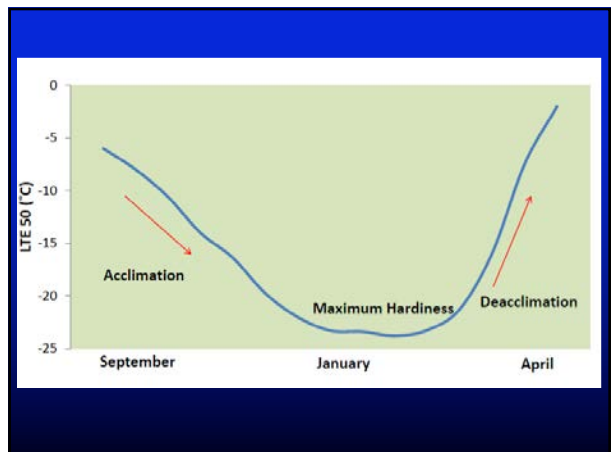


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## Factors Influencing DSG

- Dry soils in fall and winter
- Early fall frosts
- Fall/ winter high-low temperatures
- Planting date and material choice
- Excessive late season growth
- Lack of shoot wood maturity

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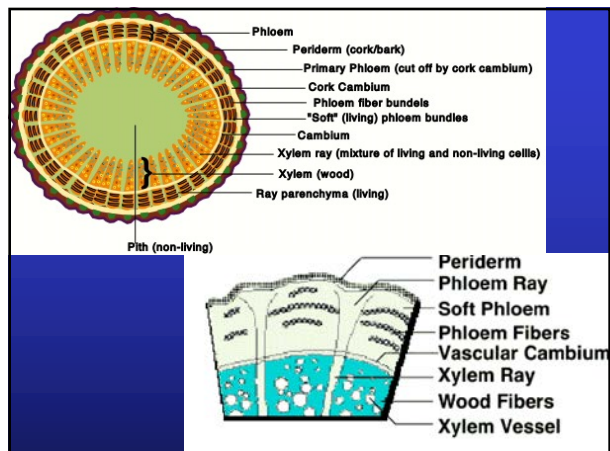


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## Winter Cold Damage

- Bud
- Phloem tissue
- Xylem tissue
- Vascular cambium

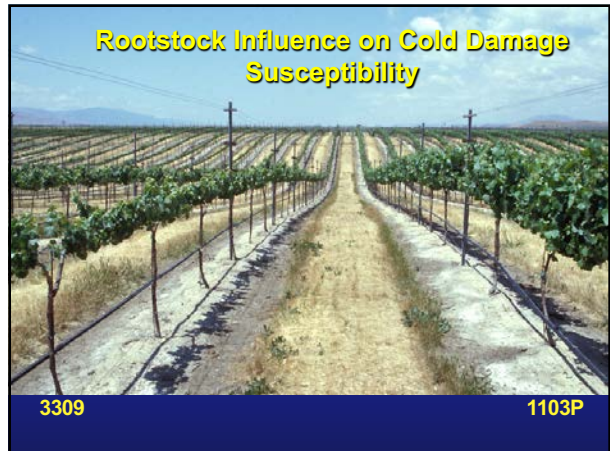
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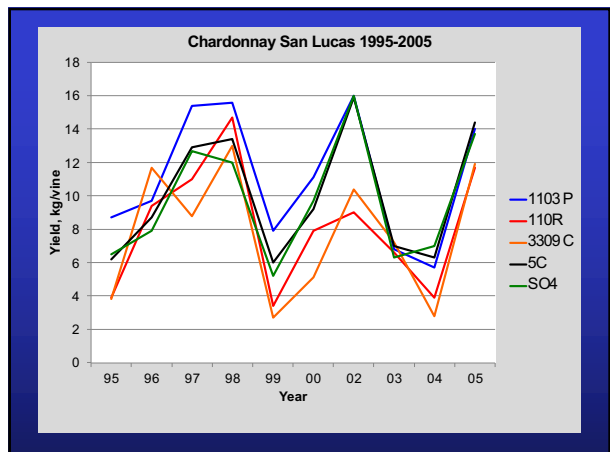


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## Effect of rootstock on shoot stunting Chardonnay, San Lucas, 1999

Rootstock	Average shoot length, cm	
	June 16	Sept 18
1103P	61 a	72 a
44-53	59 a	64 bc
140R	57 ab	68 ab
5C	55 abc	62 bc
5BB	54 abc	60 cd
SO4	50 bcd	58 cd
101-14	47 cd	63 bc
Salt Creek	42 de	62 bc
Freedom	39 ef	68 ab
110R	38 ef	53 d
420A	36 ef	45 e
3309	32 f	44 e

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### Vine Appearance in Spring

	<b>No symptoms,</b> ~20" shoots, active tips, normal crop	<b>Low to moderate,</b> <b>symptoms</b> ~12" shoots, some stunted shoots, some active tips, moderate crop load	<b>Moderate to</b> <b>severe symptoms,</b> Erratic budbreak and shoot growth with several dead spurs, ~8" shoots, some recovery with active tips, few clusters	<b>Severe symptoms,</b> Erratic budbreak and shoot growth, dead spurs with many dead shoots (3-4"). Active shoots ~4", no active tips, no clusters
Site of damage	None visible	None visible	12" above graft union	4" above graft union
Estimated % trunk damage cross- section area	None	none	20	40
Water content of the trunk (%)	60	50	50	30
Estimated trunk conductance	100% (unaffected)	98%	80%	65%
Total non- destructible carbohydrates (%)	8.7	9.3	6.0	5.2
Starch (%)	6.5	7.2	4.2	3.0

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### Management for young vineyards

- Plant early
- Avoid strong late season growth
- Consider scion and rootstock selection for sites with a history of cold winter temperature
- Avoid overcropping in the early production years
- If DSG occurs cut back and crop according to vine capacity

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### Managing developing vineyards



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May 2015



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**Management for Mature Vineyards**

- Avoid overcropping
- Maintain canopy health
- Post harvest irrigate to maintain soil moisture
- If DSG occurs crop based on canopy development

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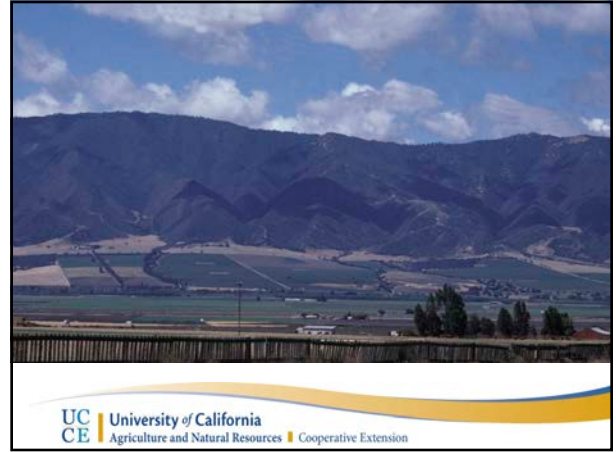
**Overcropping**

A photograph of a vineyard row showing a young vine on a metal support post. The ground is dry and sandy with sparse, low-lying vegetation. The vine is supported by a horizontal wire.

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