



What we've learned about sour rot: An update on research

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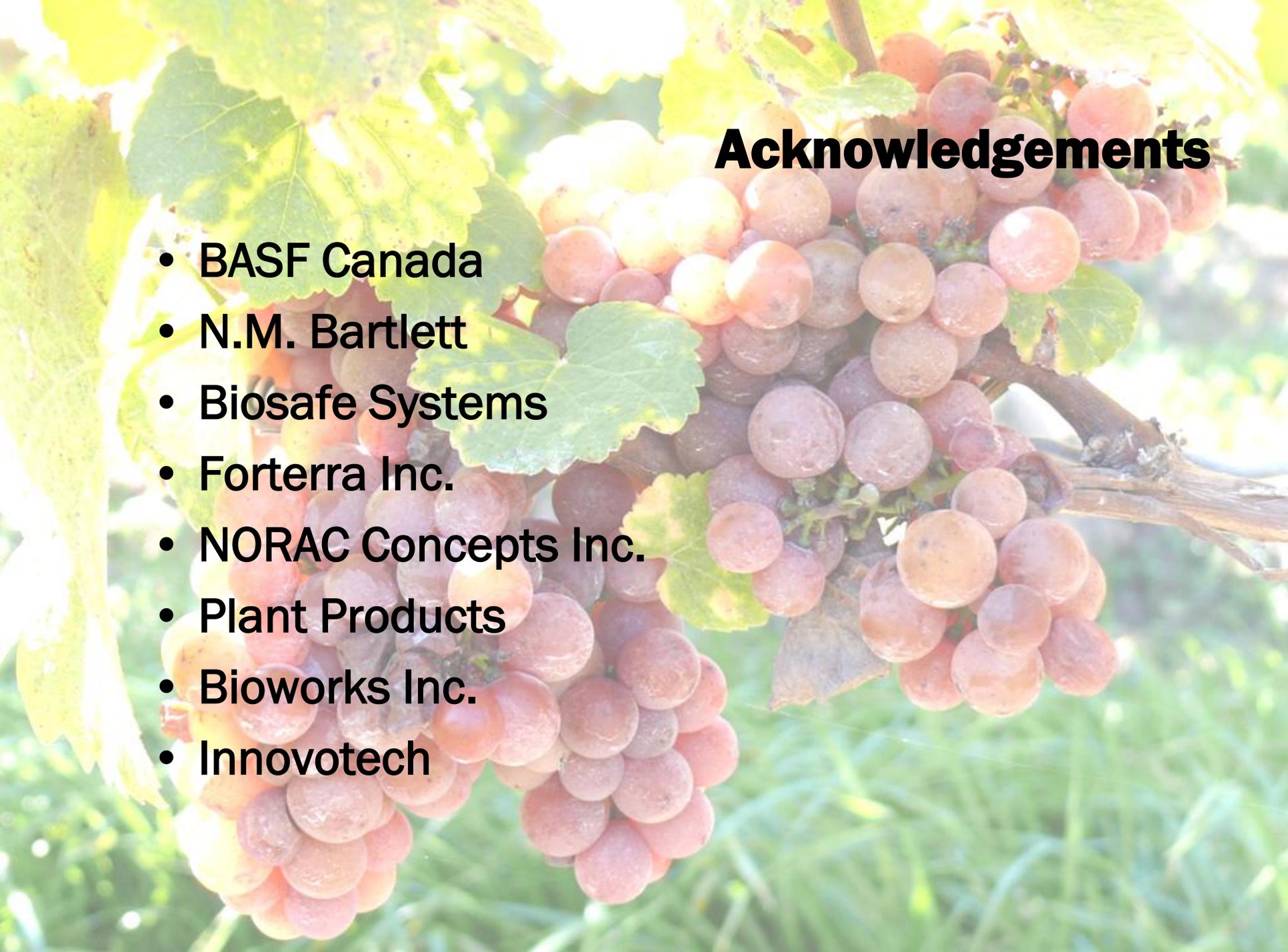


Acknowledgements

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- **Vincor Canada**
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- **Bioworks Inc.**
- **Innovotech**

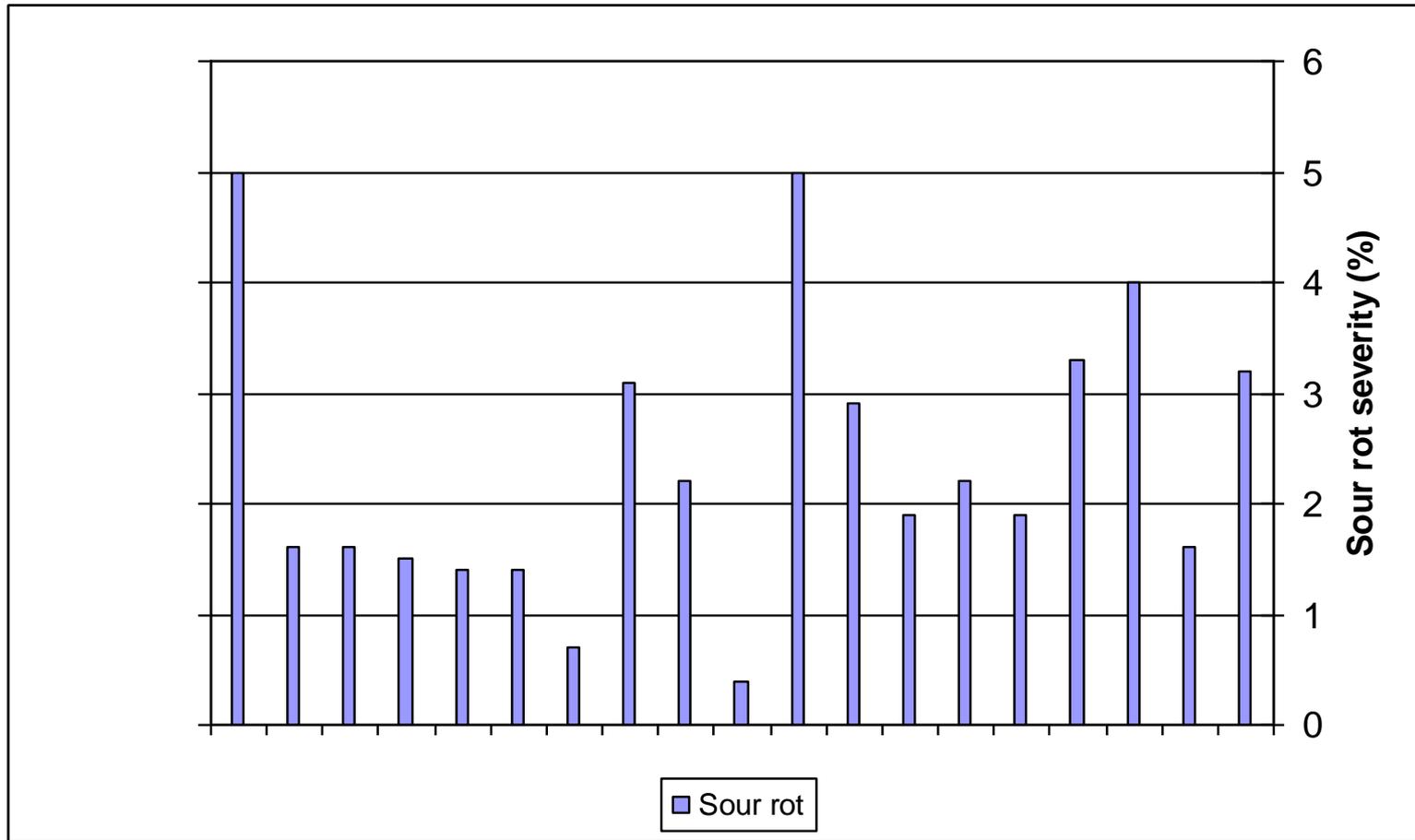






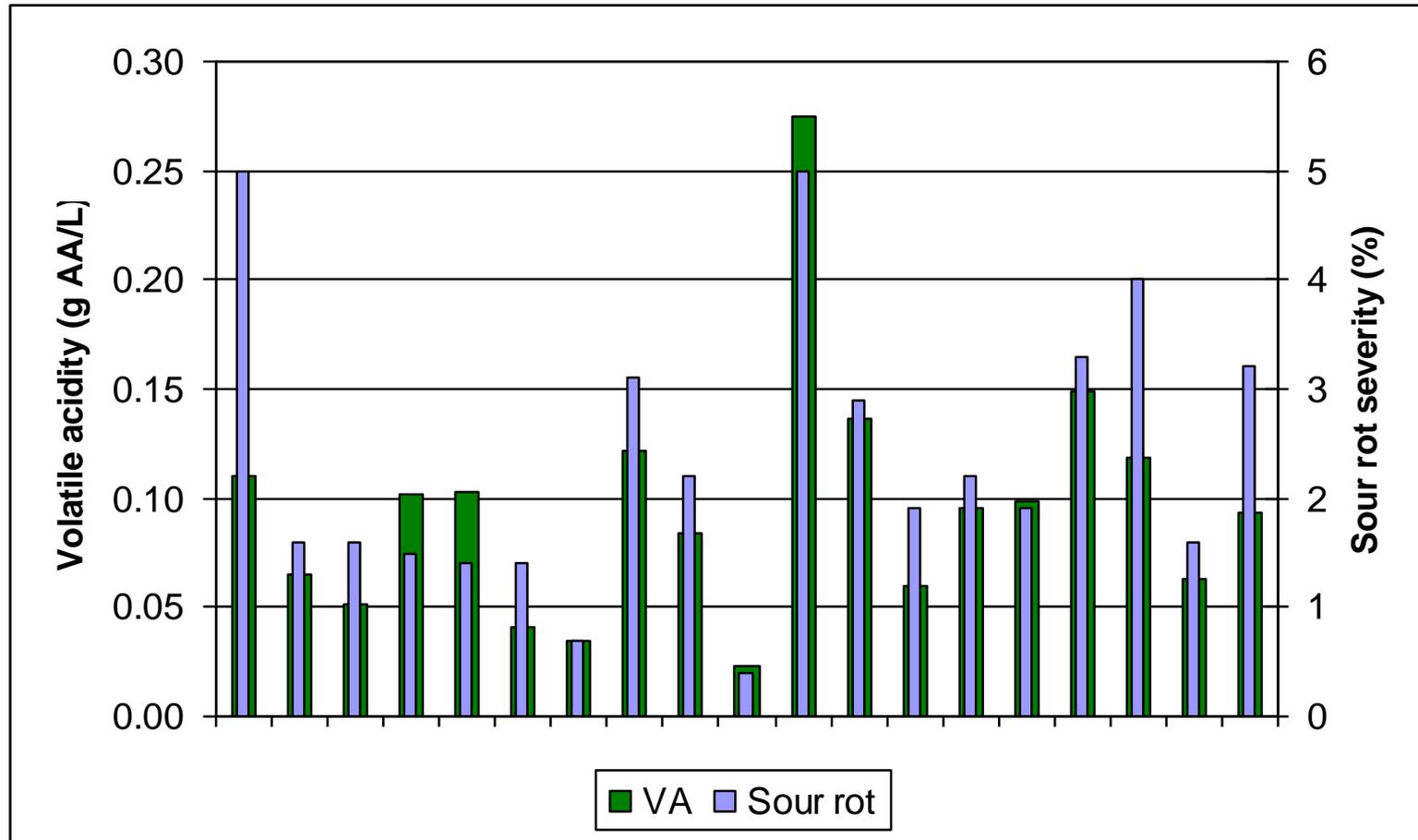
Relationship between Sour Rot Severity and VA

P. noir, 2011



Relationship between Sour Rot Severity and VA

P. noir, 2011

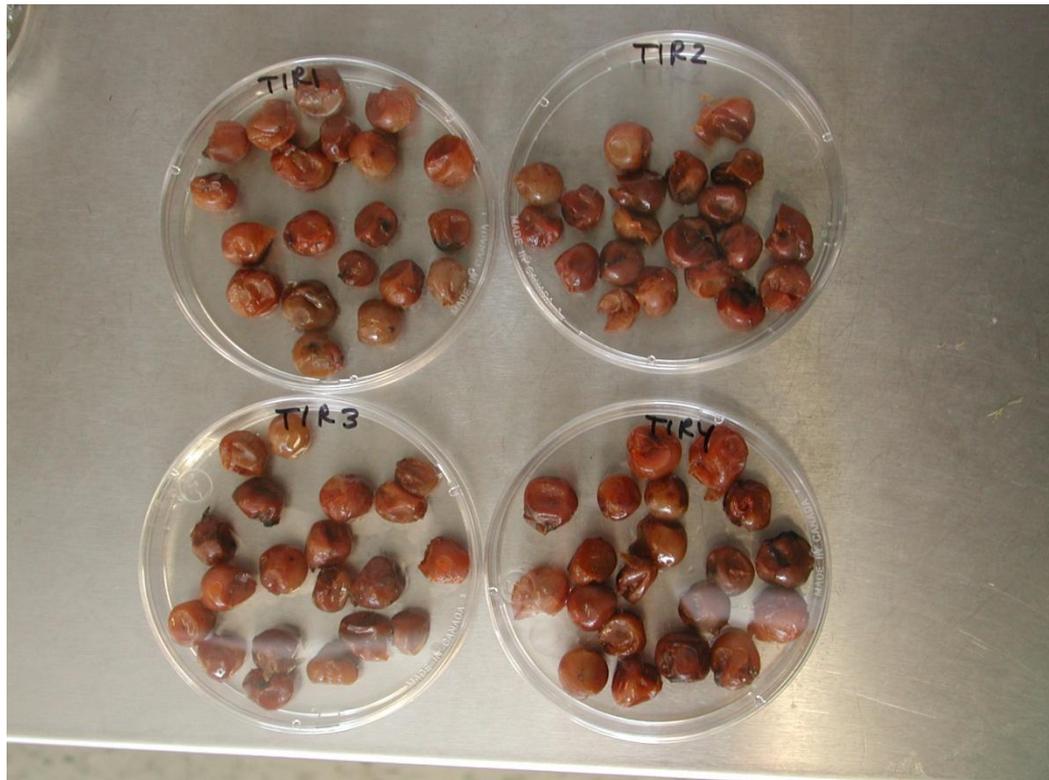


What's causing it????

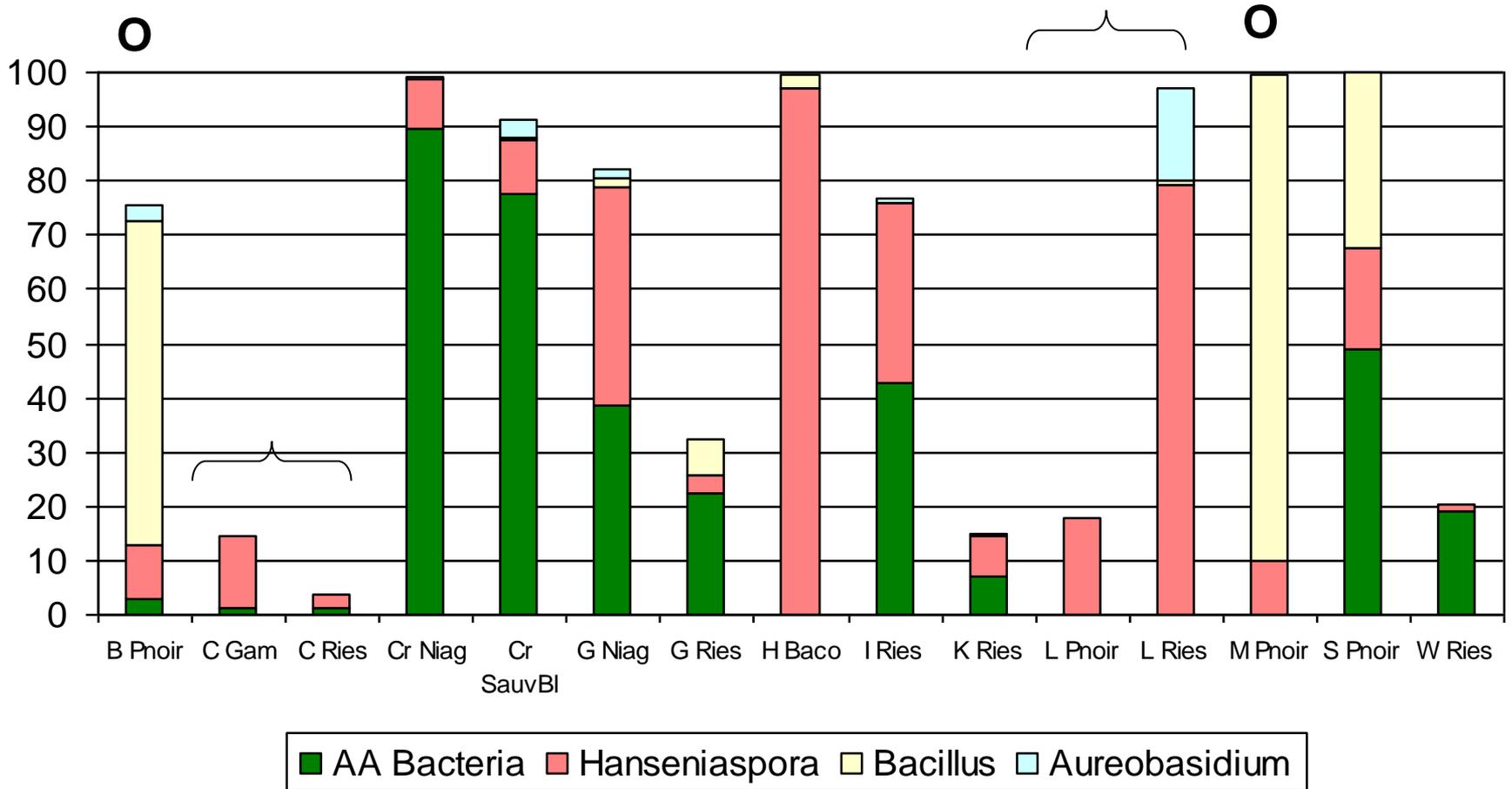


What's causing it?

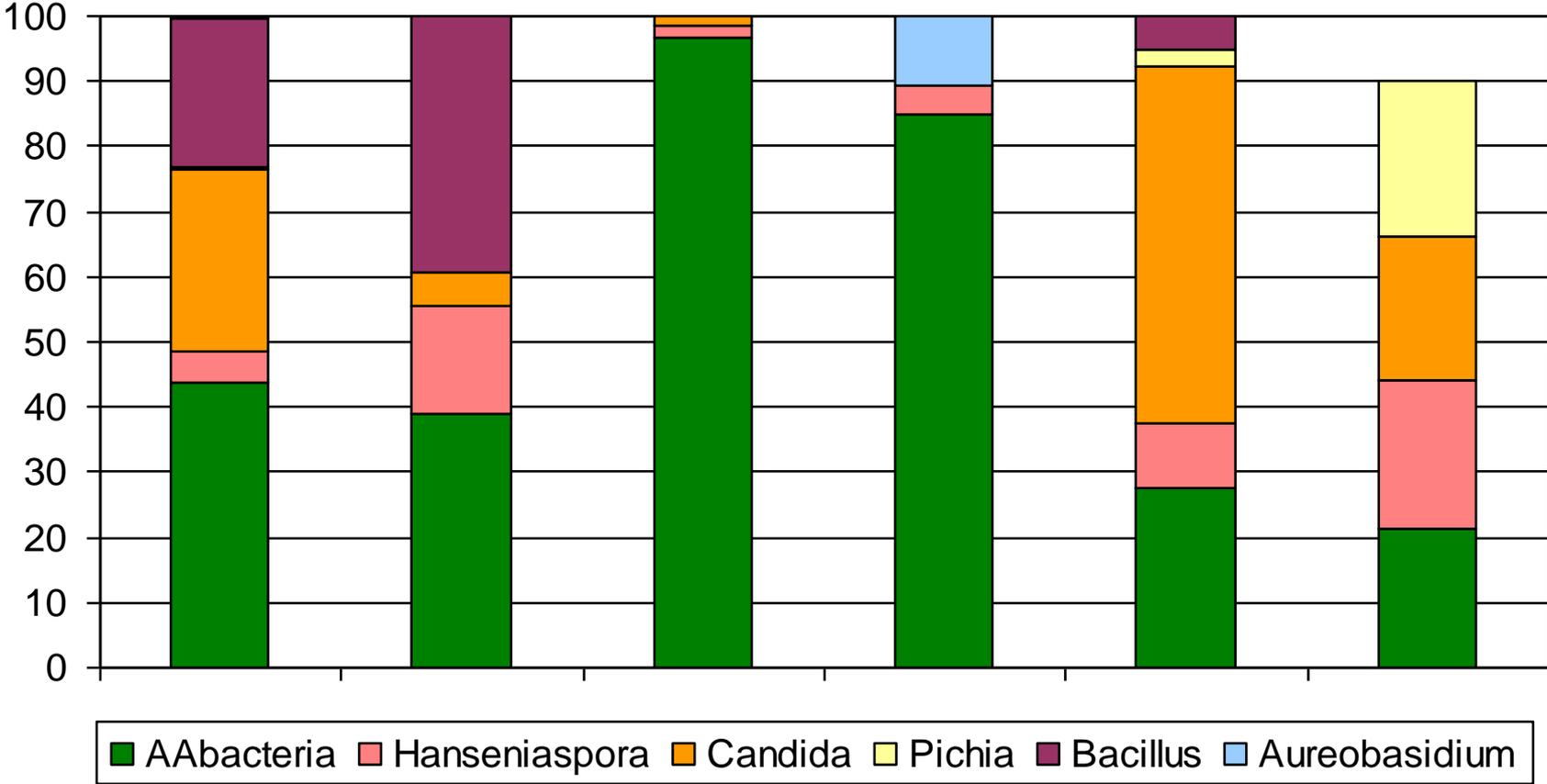
- Samples of sour rotted berries
- Flamed to remove surface organisms



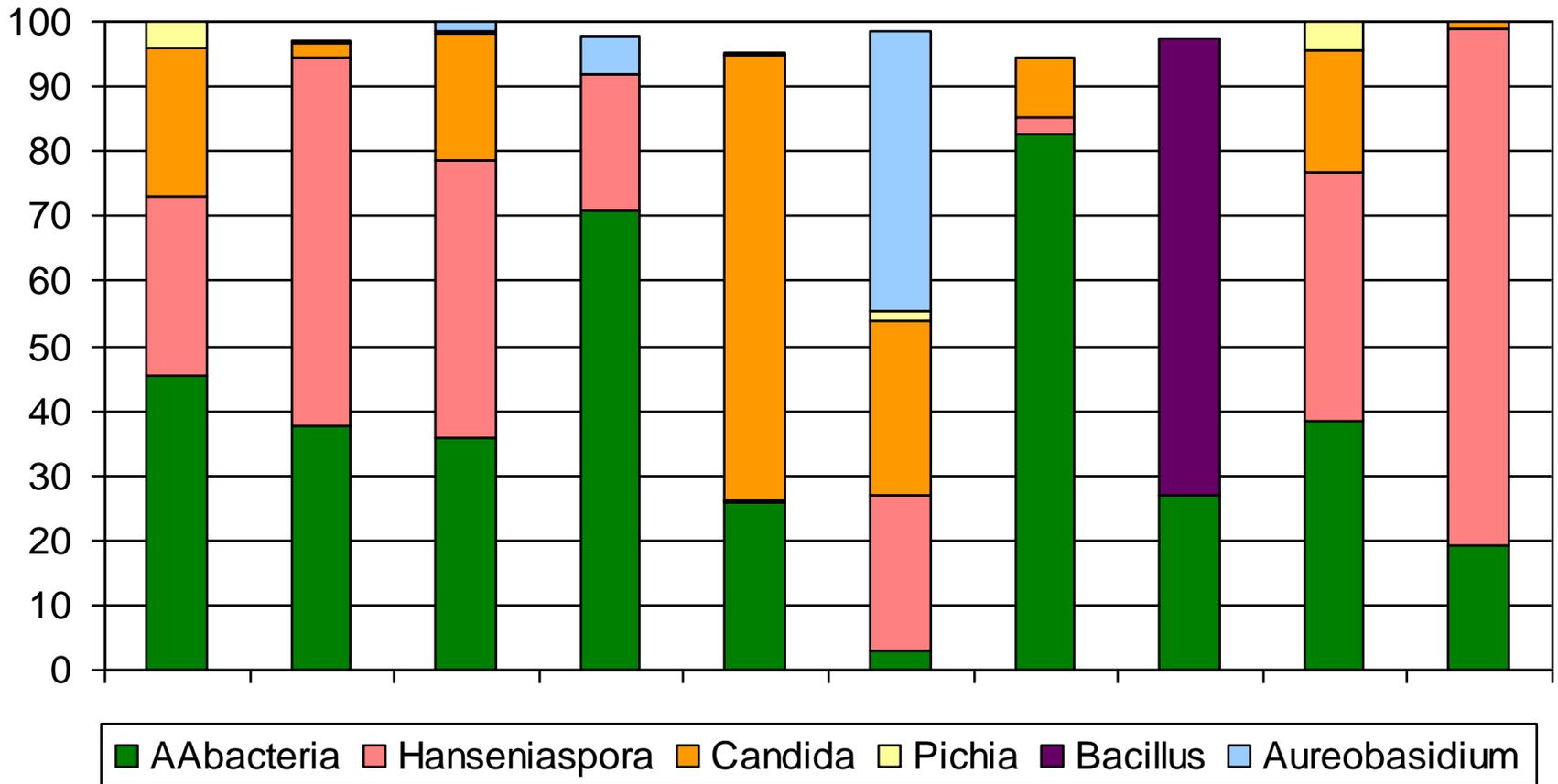
Isolations from rotted berries, 2010



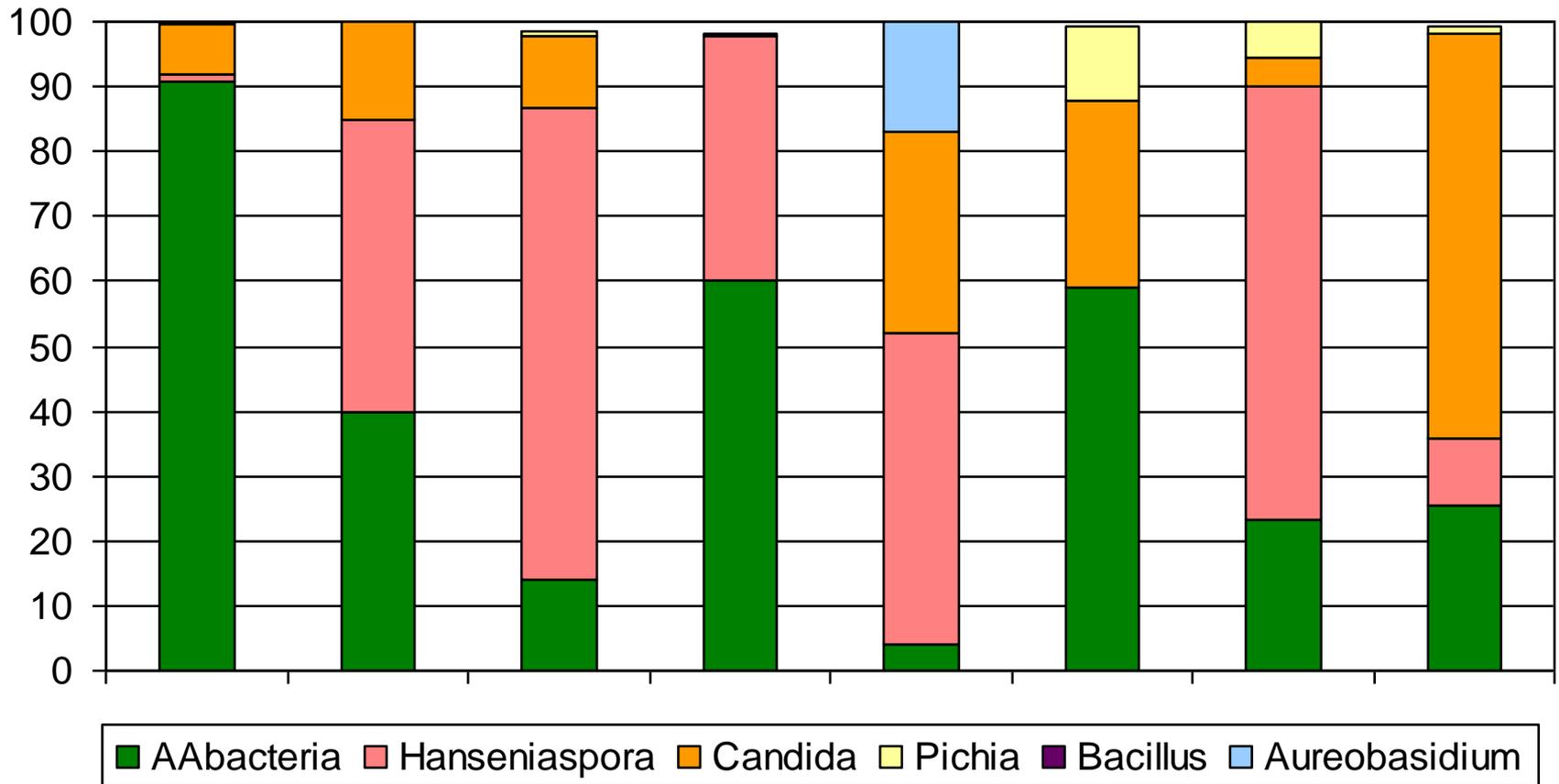
Isolations from rotted P. noir berries, 2011



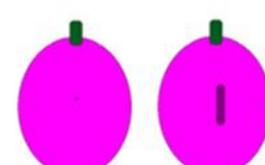
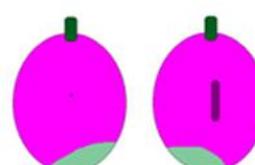
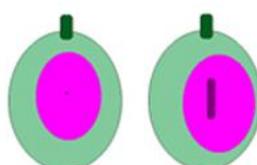
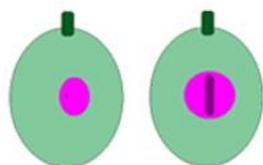
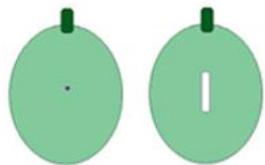
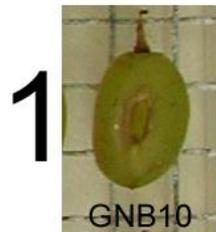
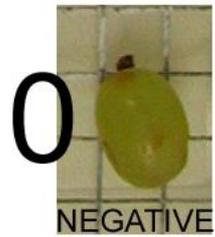
Isolations from rotted Chardonnay berries, 2011



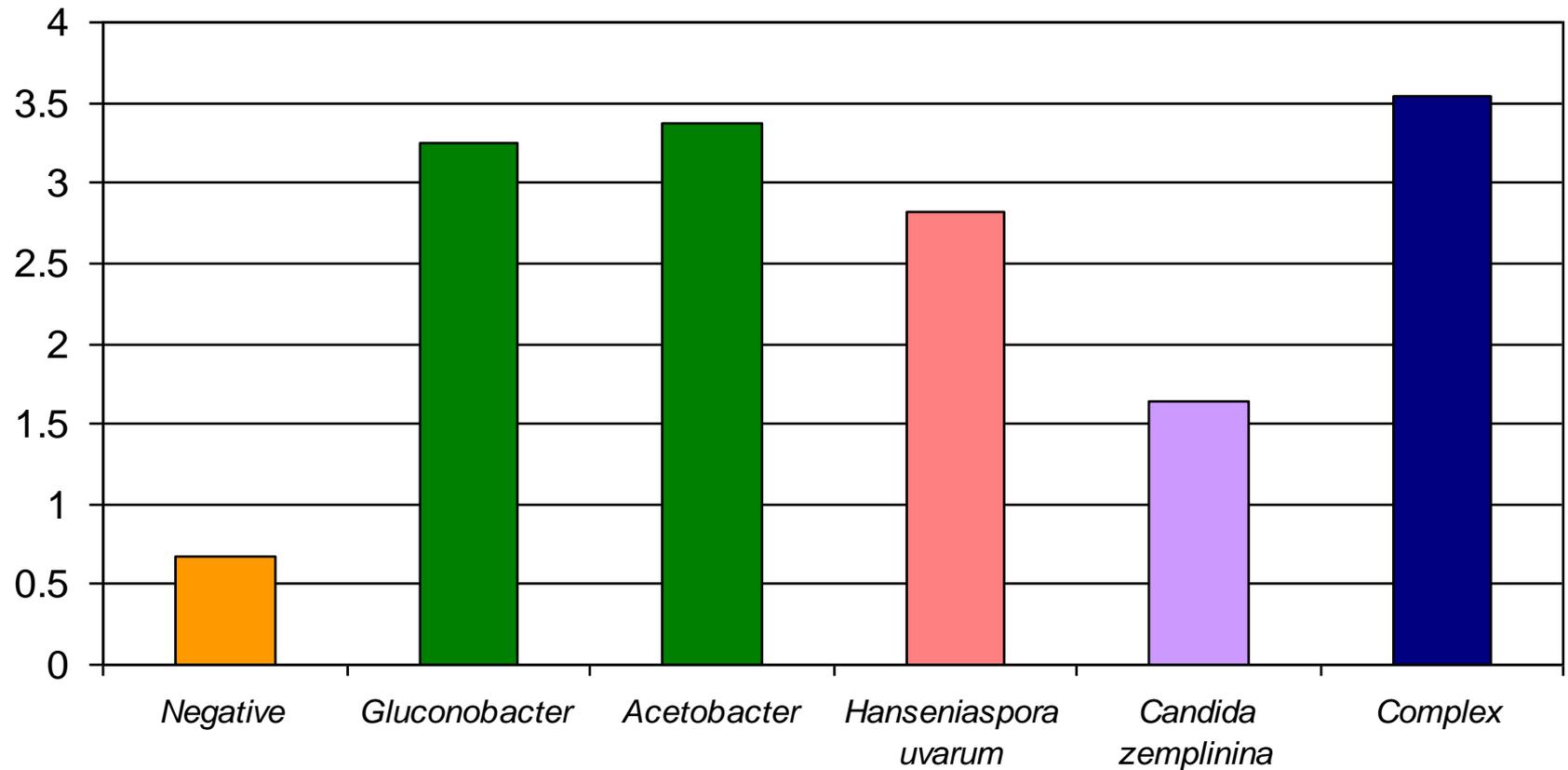
Isolations from rotted Riesling berries, 2011



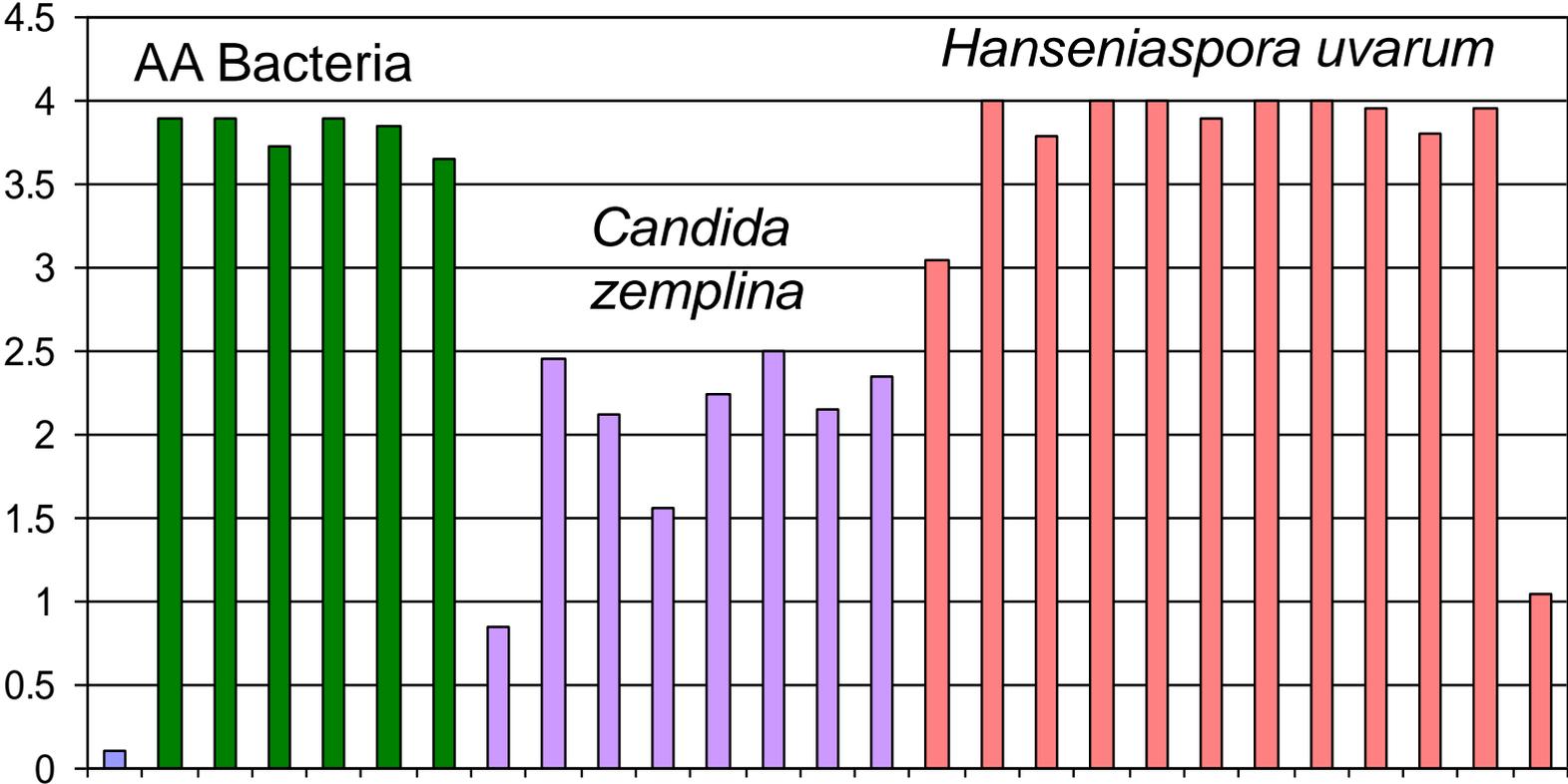
Rating scale for sour rot



Pathogenicity of Organisms



Pathogenicity of Organisms



Why does it happen?



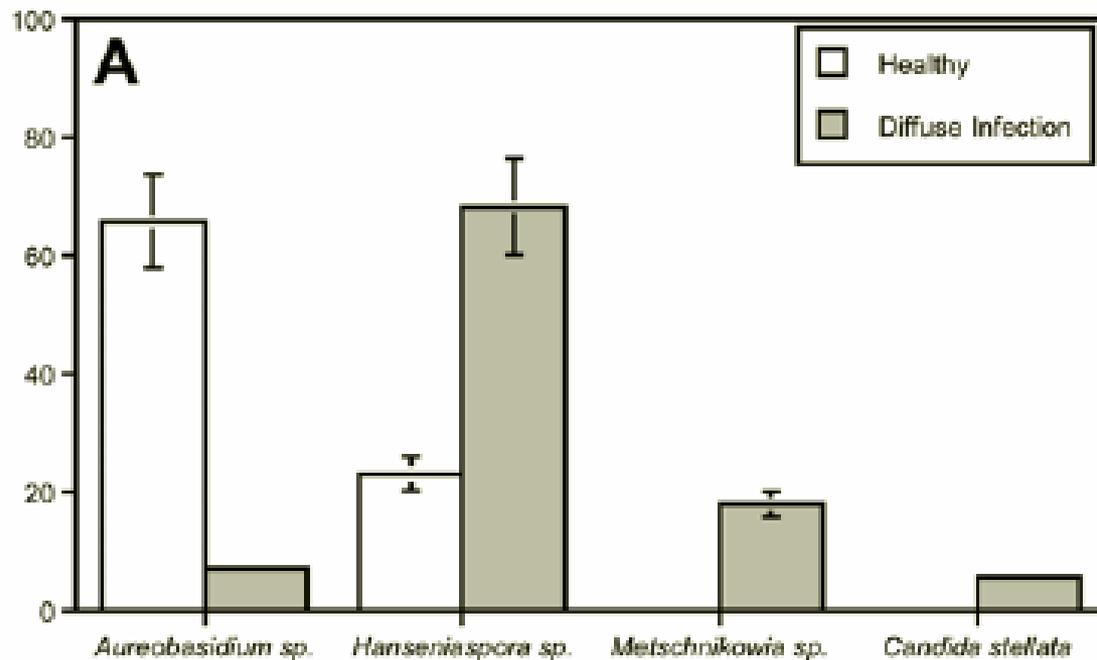
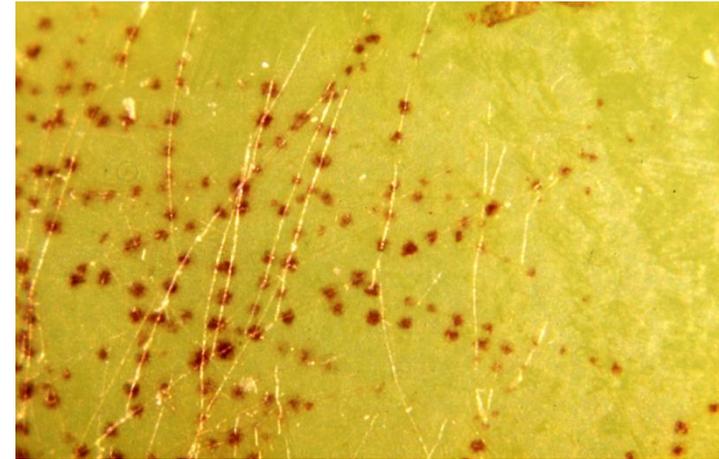
Factors that promote sour rot

- Tight clusters/Thin skins
 - Varieties Affected
 - Pinot noir, Pinot gris, Gamay, Chardonnay, Riesling, Gewurztraminer, Baco noir



Factors that Promote Sour Rot

- Favoured by
 - Physical damage
 - Powdery mildew



Gadoury et al., 2007

Factors that Promote Sour Rot

- Clusters infected with bunch rot are more prone to infection by sour rot





Factors that Promote Sour Rot

- But
 - Frequently found sour rot without bunch rot sporulation
 - Frequently found sour rot in areas of clusters (shoulders) where no berry squeeze occurred
 - Very weak correlation ($r= 0.028 - 0.147$) between severity of bunch rot and sour rot 2008, 2010, 2011



Factors that Promote Sour Rot

- Grape Berry Moth
 - Bunch rot frequently associated with GBM injury
 - But a problem in vineyards with low GBM pressure









Factors that Promote Sour Rot

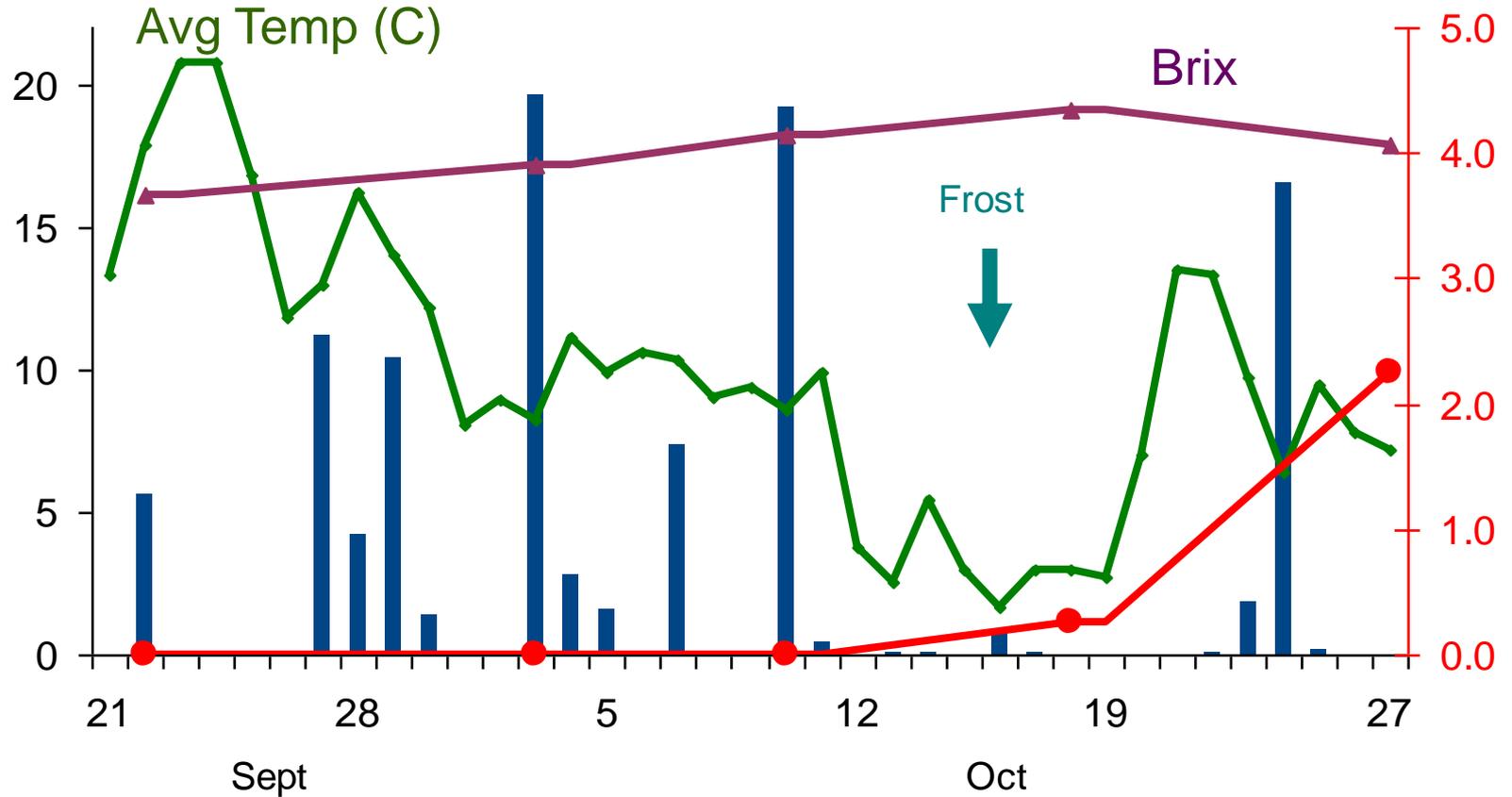


- Vinegar flies attracted by volatile compounds released during berry degradation
- Vector sour-rot organisms
 - passive transport by adults
 - eggs laid near base of berry where it pulls away from stem
 - transmitted throughout cluster during larval stages
 - larvae carry sour rot organisms in their gut.



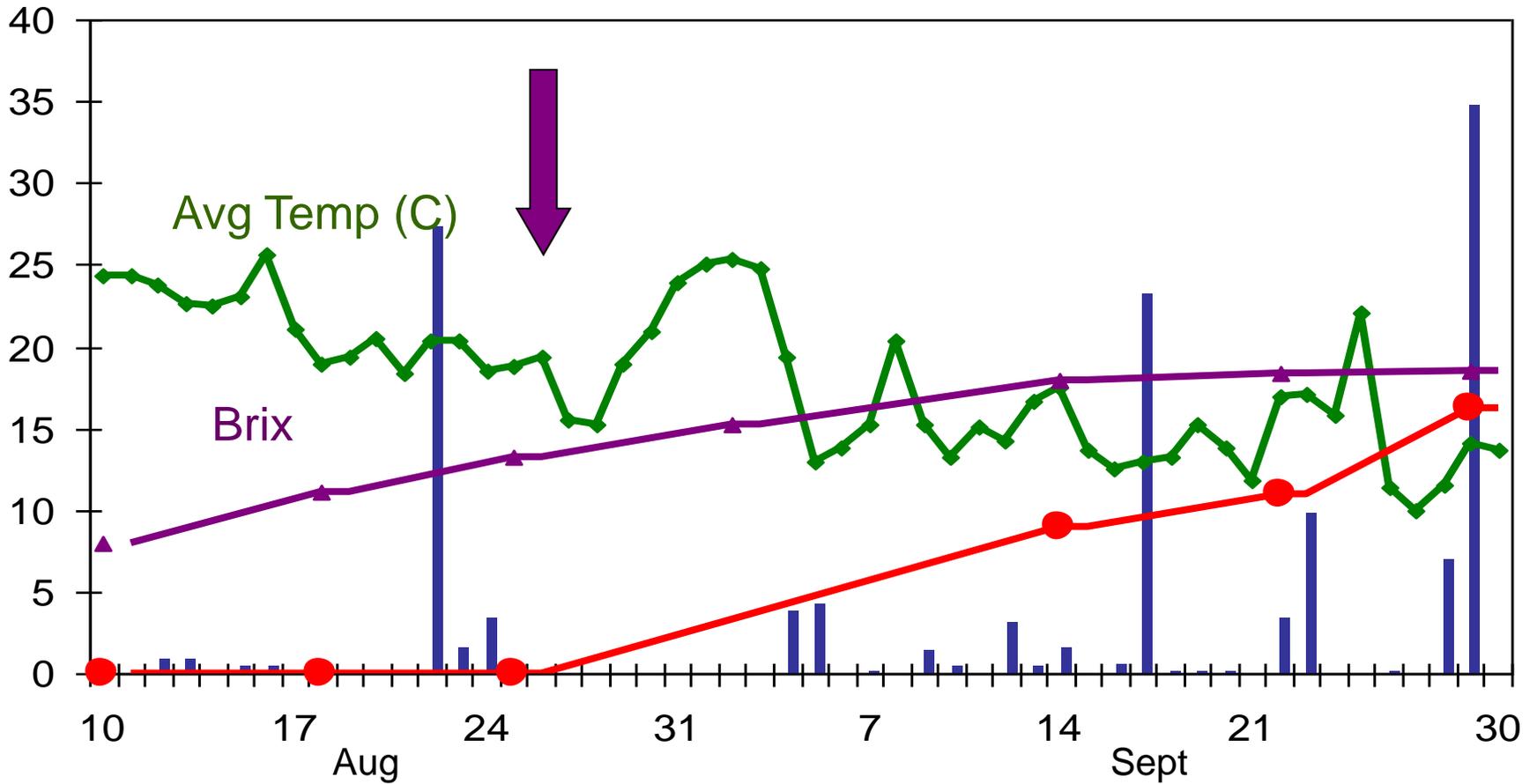


Factors that Promote Sour Rot



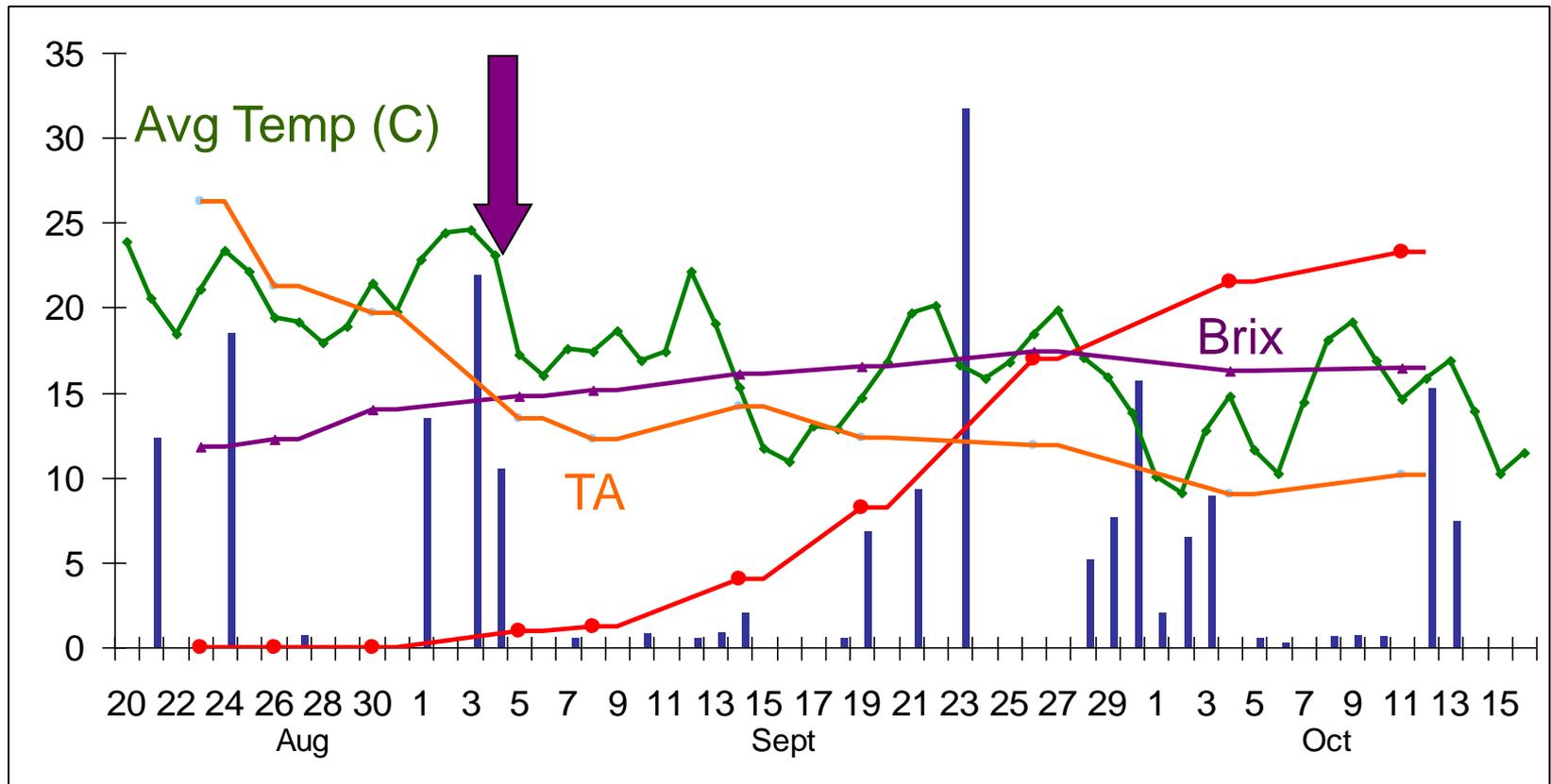
2009 Riesling

Factors that Promote Sour Rot



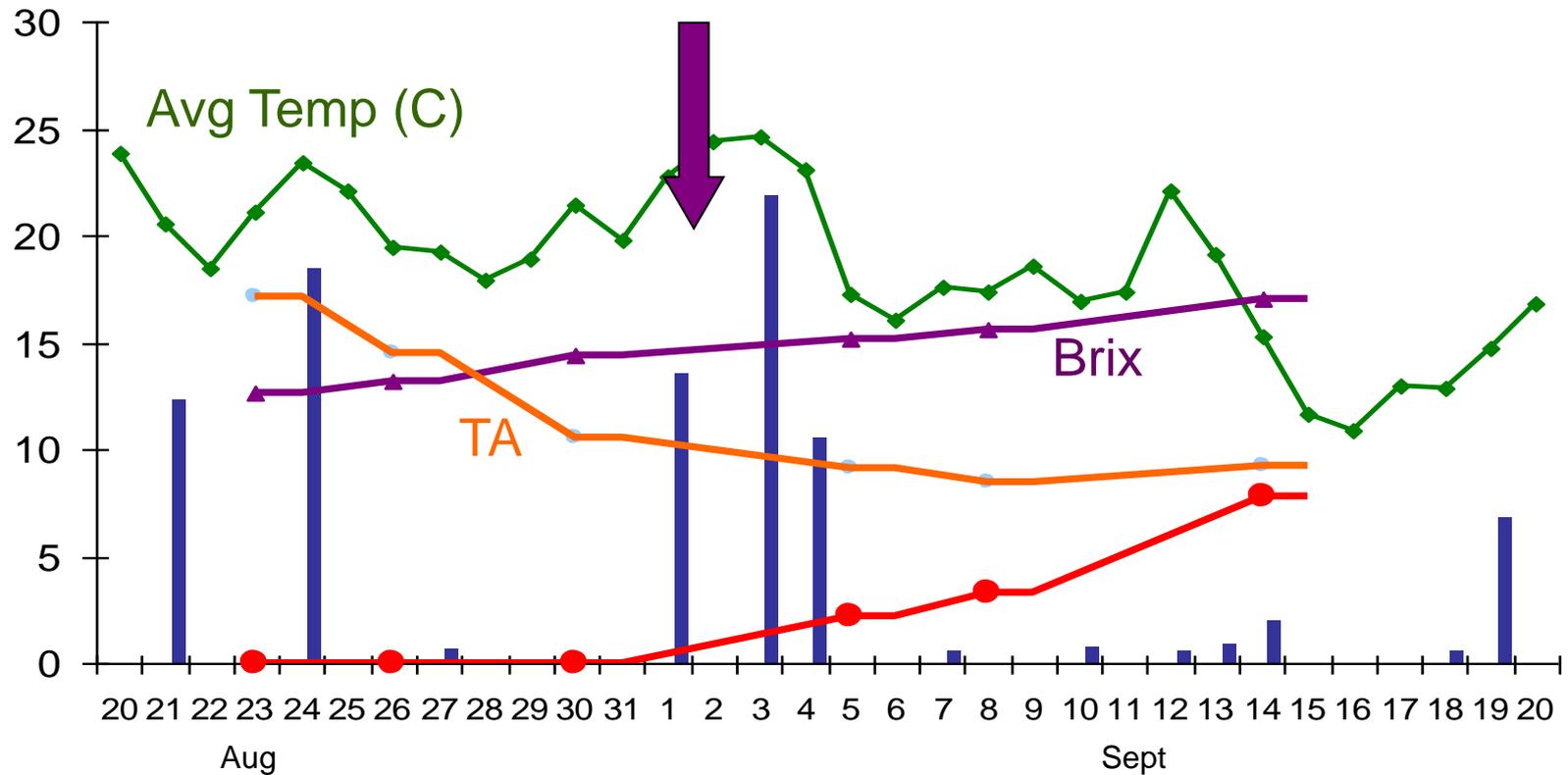
2010 Riesling

Factors that Promote Sour Rot



2011 Riesling

Factors that Promote Sour Rot



2011 P. noir

R_H

Pinot Noir 13.4°

R₁₀₀

R_C

Pinot Noir 15.5°

R₁₀₀

Pinot Noir 9.7°

R₁₀₀

R_G

T₀₀

Riesling 16.7°

R₀₀

R_A

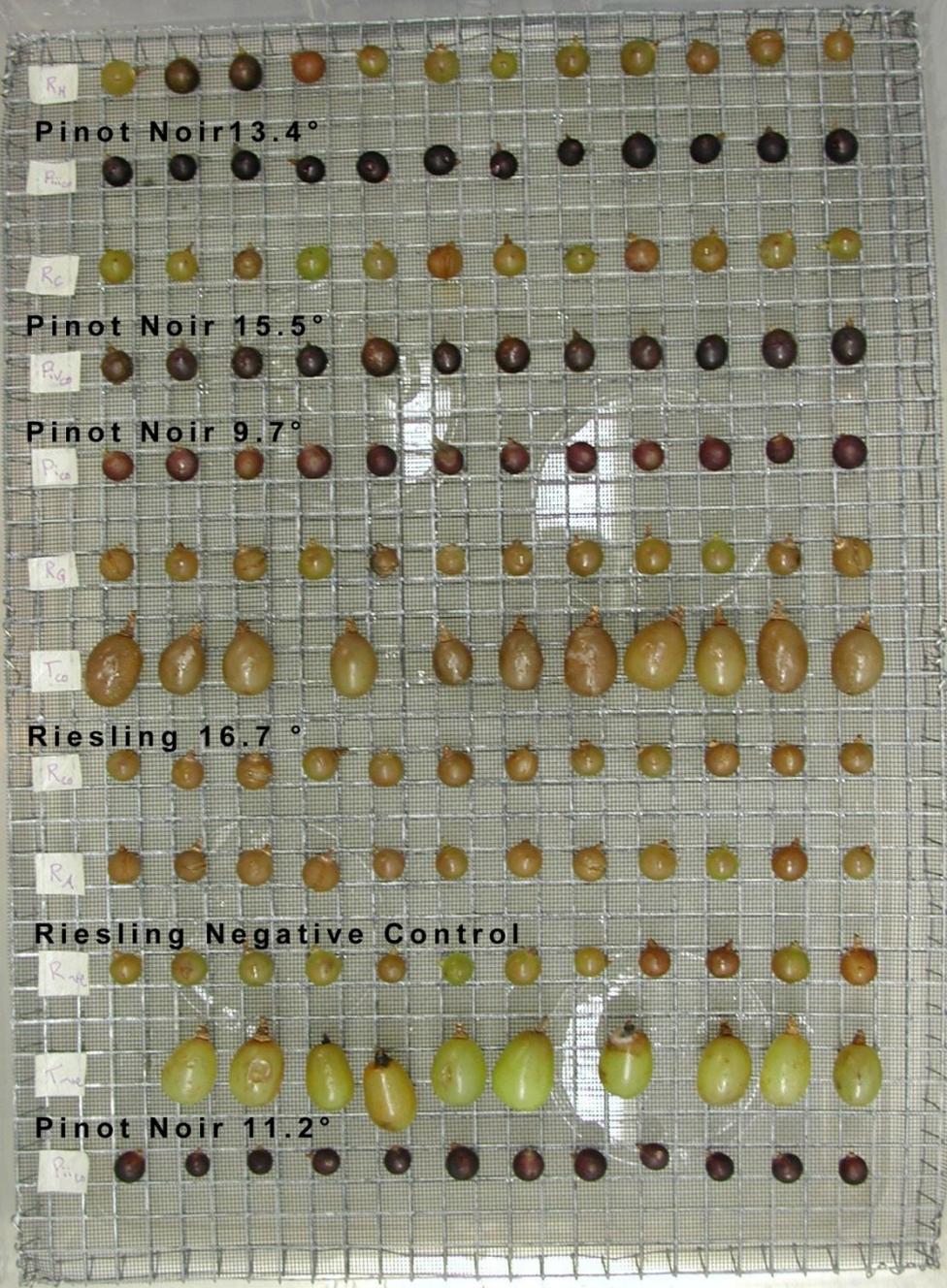
Riesling Negative Control

R₁₀₀

T₁₀₀

Pinot Noir 11.2°

R₁₀₀



Pinot Noir 13.4°

Pinot



Re



Pinot Noir 15.5°

Pinot



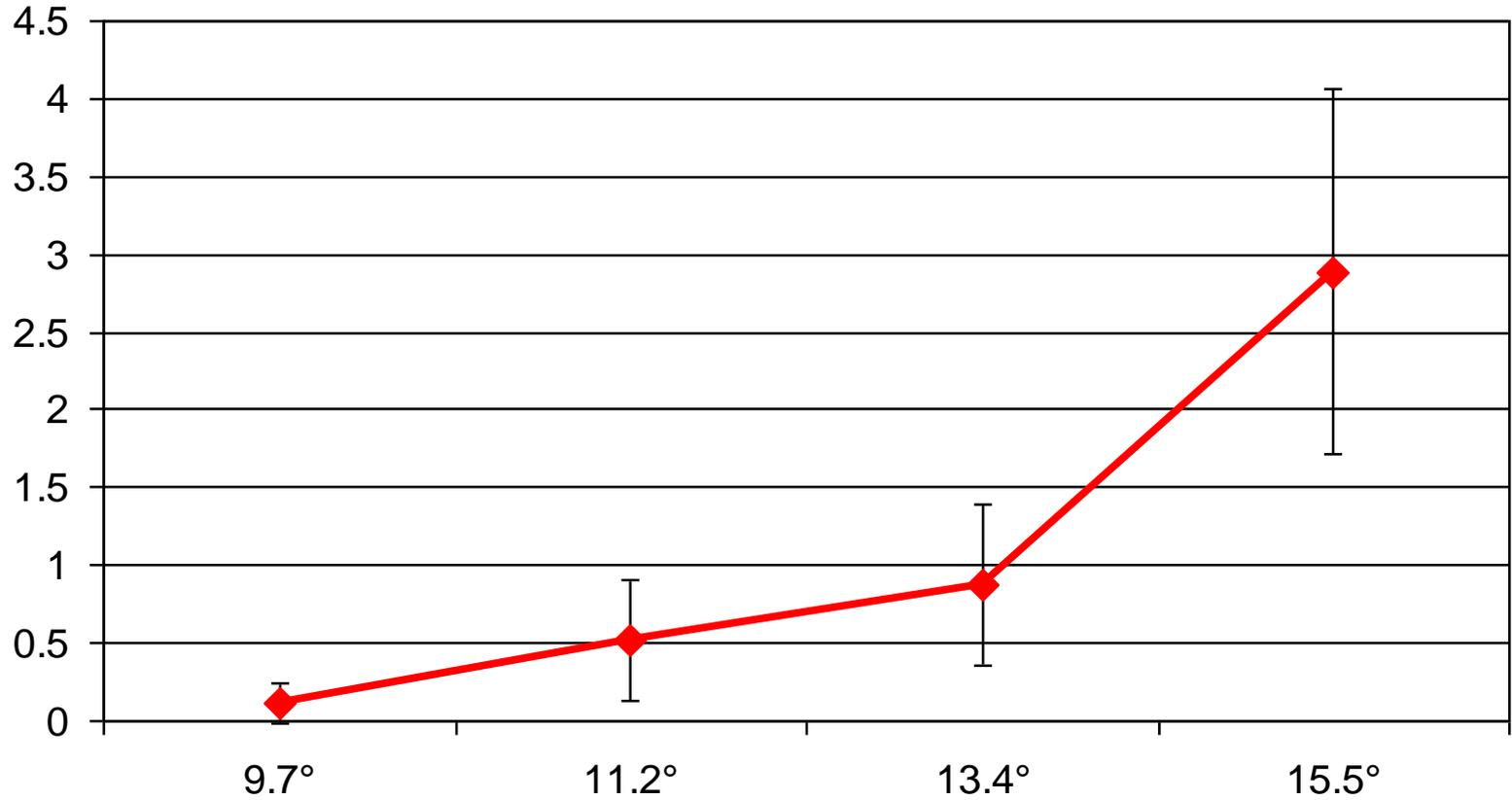
Pinot Noir 9.7°

Pinot



Brix vs Sour rot Development

P. noir, 2011



What can we do about it?



Sour Rot Management

- Reduce berry injury
- Eliminate causal organisms

Reduce Berry Injury

- Loosen grape clusters
 - Reduce berry squeeze
 - Thicker cuticle

Treatments to loosen clusters

- Fruiting zone sprays @ 100 gal/A
- Gibberellic Acid
 - 5, 10, 20 ppm
 - (6.7, 13.4, 26.8 oz/100 US gal)
 - Prebloom, 50-80% bloom, bloom + 7 days
- Prohexidione-Ca
 - High, medium and low rate
 - (9.7, 4.8 and 2.4 oz/100 US gal)
- Stimplex
 - 38, 48, 68 oz/A at 80% bloom.

Cluster Compactness Scale



Zabadal and Dittmer

Reduce Injury

- Loosen grape clusters
 - Bloom basal leaf removal
 - 6 basal leaves removed at trace bloom
 - starves clusters for photosynthate and fewer flowers set fruit.
 - looser cluster with fewer berries

Before Bloom Leaf Removal



After Bloom Leaf Removal





Veraison

Untreated
No leaf removal



Veraison

Leaf removal
at bloom



Veraison

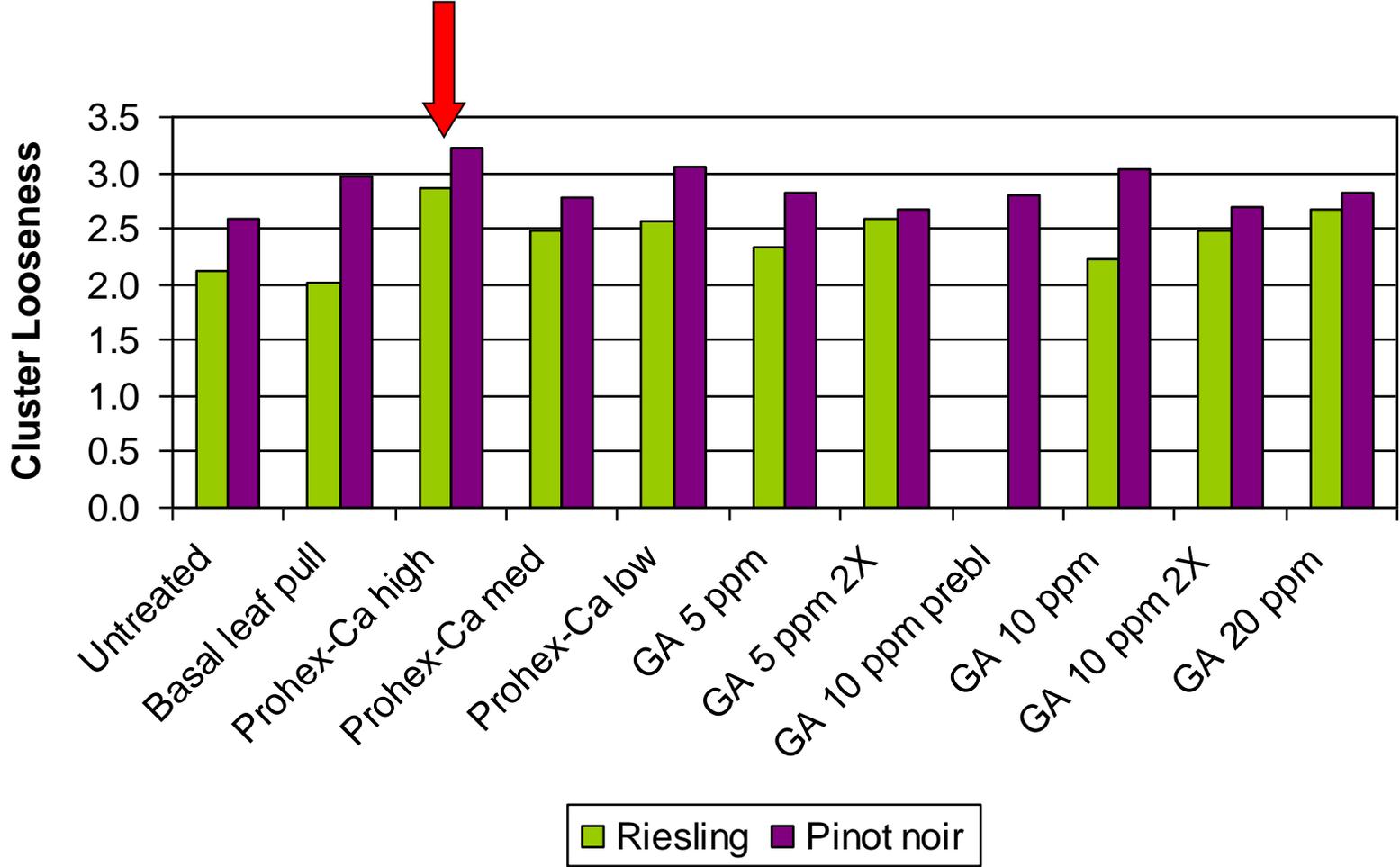
Pea-sized berry
Leaf removal



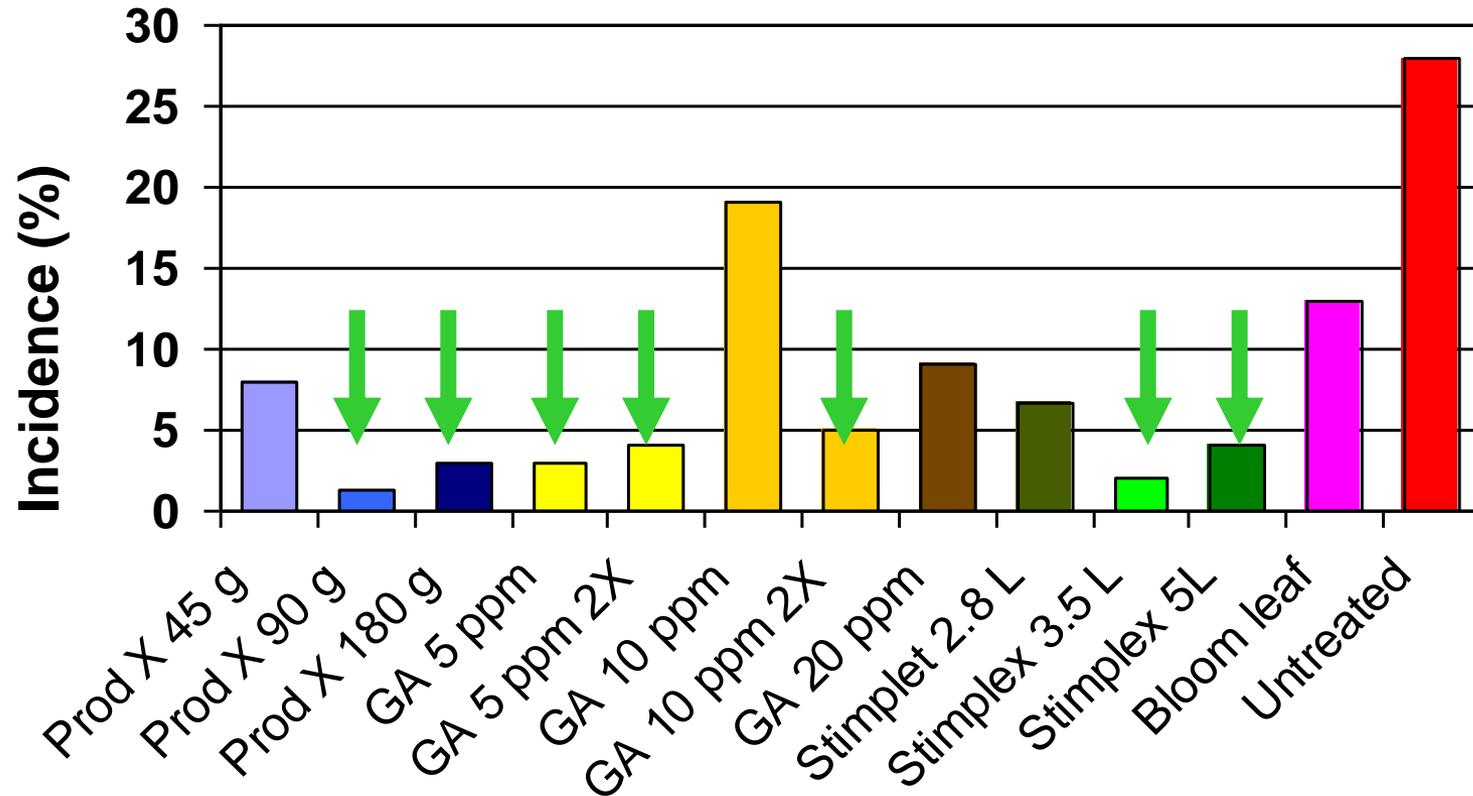
Veraison

Veraison
Leaf removal

Effect of Bloom Treatments on Cluster Looseness, 2009



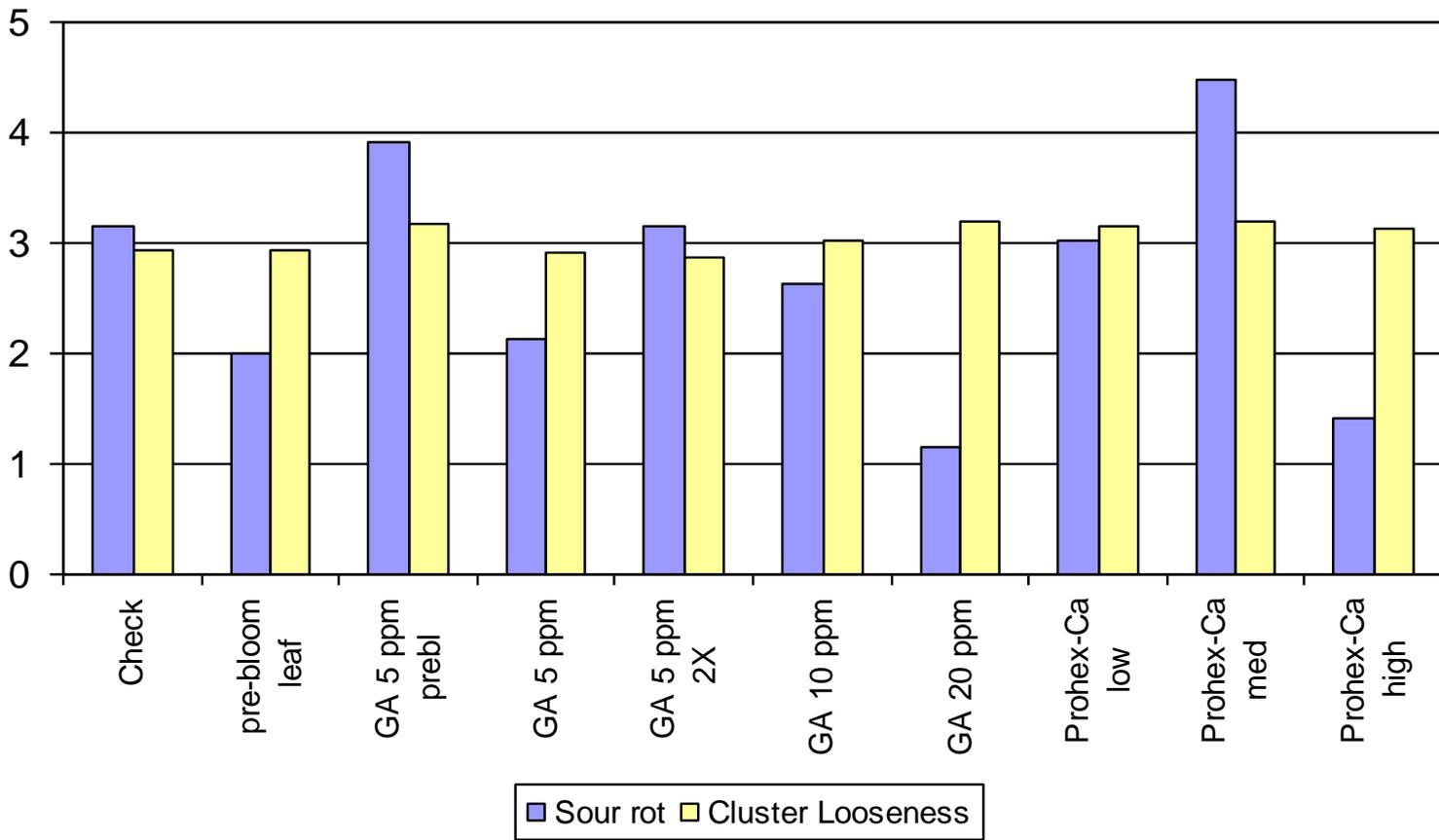
Effect of Bloom Treatments on Incidence of Sour Rot, Riesling, 2009



Very low sour rot severity in both Riesling & P. noir

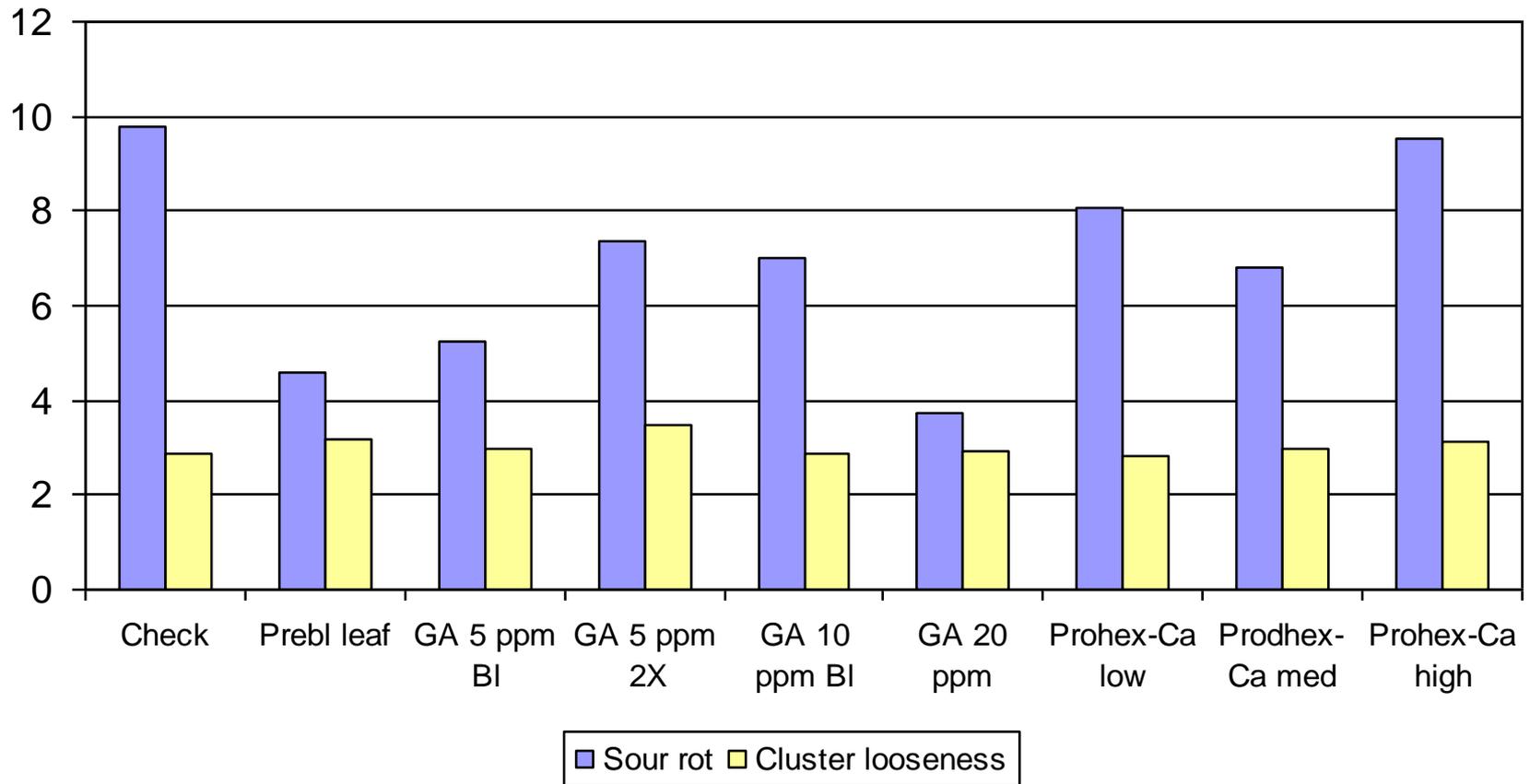
Cluster Looseness and Disease Severity

P. noir, 2010



No Sig Dif among treatments -- Bloom timing for GA and Prohex Ca missed!!!

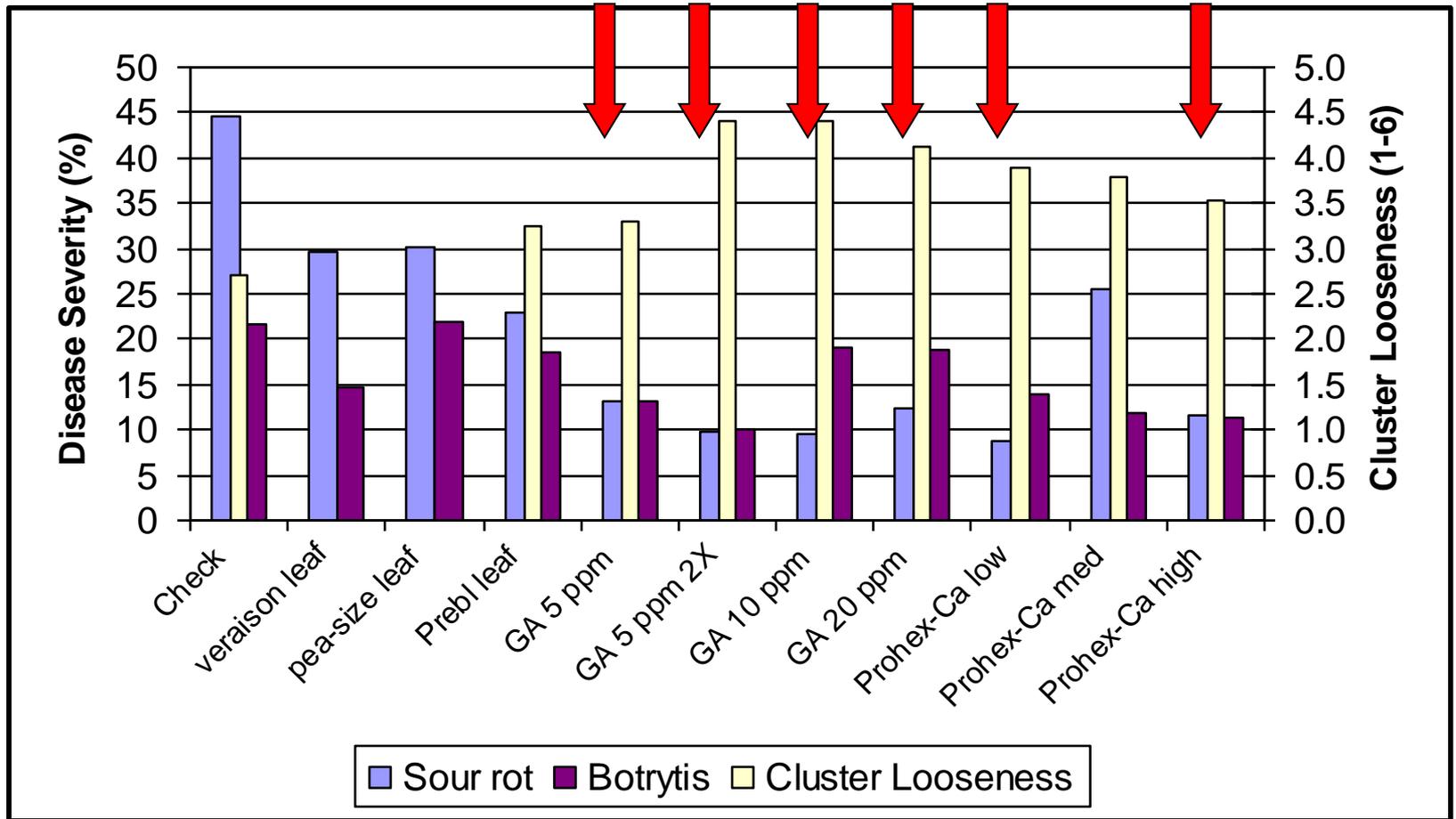
Sour Rot Severity, Riesling, 2010



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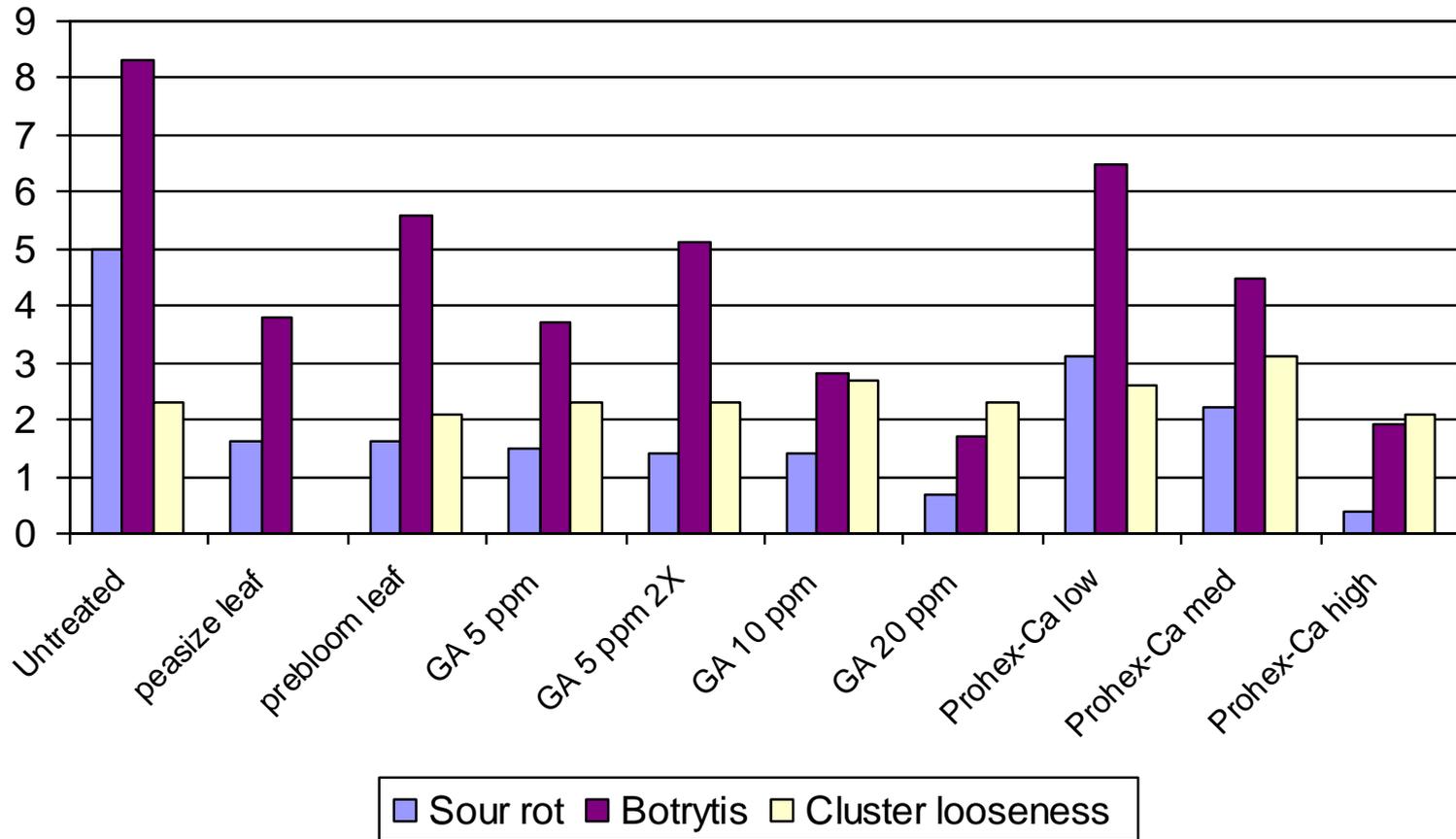
Disease Severity and Cluster Looseness

Riesling, 2011



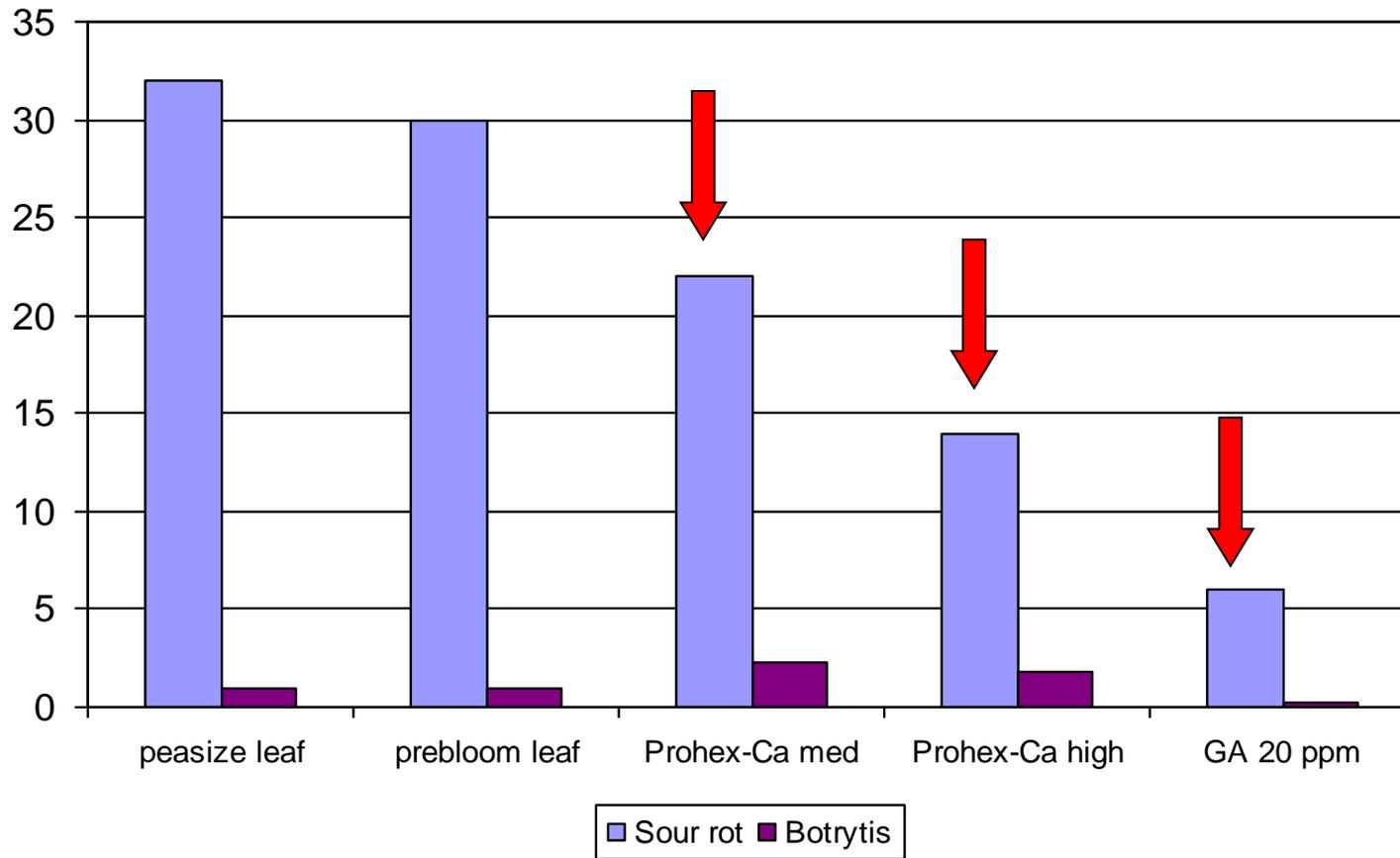
Disease Severity and Cluster Looseness

Pinot noir, September, 2011



No significant difference btw treatments & peasize leaf pulling

Disease severity October 2011



Return Fruitfulness Riesling

	2009/10	2010/11
Untreated	88	96
prebloom leaf	88	93
GA 5 ppm prebl	90	94
GA 5 ppm bl	92	97
GA 5 ppm 2X	86	96
GA 10 ppm bl	92	94
Prohex-Ca low	88	94
Prohex-Ca med	86	95
Prohex-Ca high	89	97





Orchardists use helicopters to protect cherry crop

Peachland News



A helicopter flies low over a cherry orchard on Elliott Avenue in Peachland Tuesday morning. Rain can collect on cherries, causing them to split, so orchard owners hire helicopters to act as giant fans, blowing water off the cherry crop. (Dave Preston photo)

Reduce Mechanical Injury

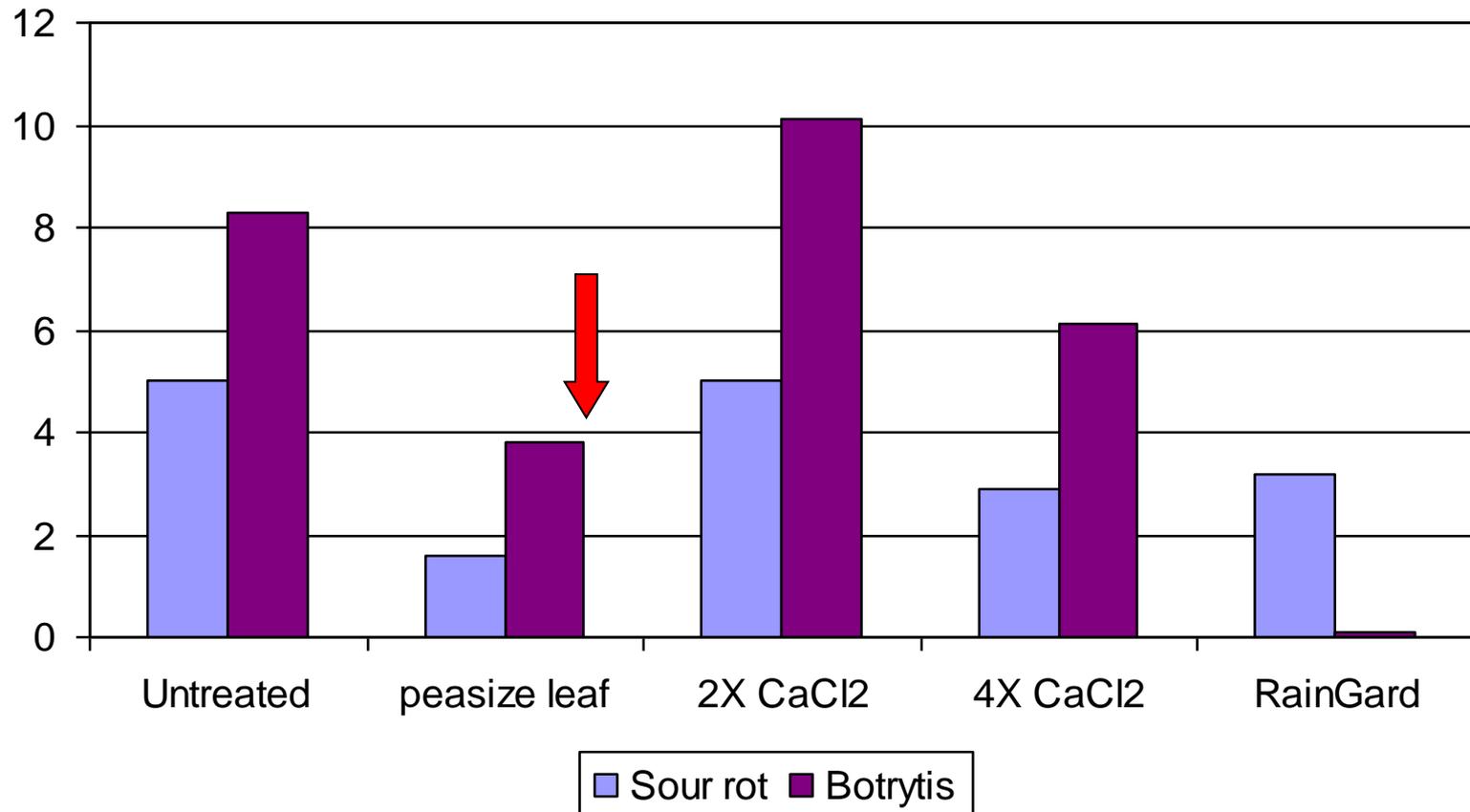
- Suggestions for Cherry Cracking
 - Osmoticum sprays
 - Mineral salts (CaCl₂) applied prior to or during rain
 - Reduce absorption of water across skin
 - Calcium
 - Strengthen cell walls?
 - Timing between fruit set and veraison
 - Surfactants
 - Raingard? (non-ionic surfactant)
 - Desikote (new formulation of VaporGuard)

Reduce Mechanical Injury

- Treatments
- CaCl_2
 - Stopit (12% CaCl_2 w/v)
 - 1.64 gal/100 gal (US) biweekly (peasize berry + veraison)
 - 0.87 gal/100 gal (US) weekly starting at peasize berry
- Leaf removal
 - Peasize berry vs veraison
- Raingard
- Desikote

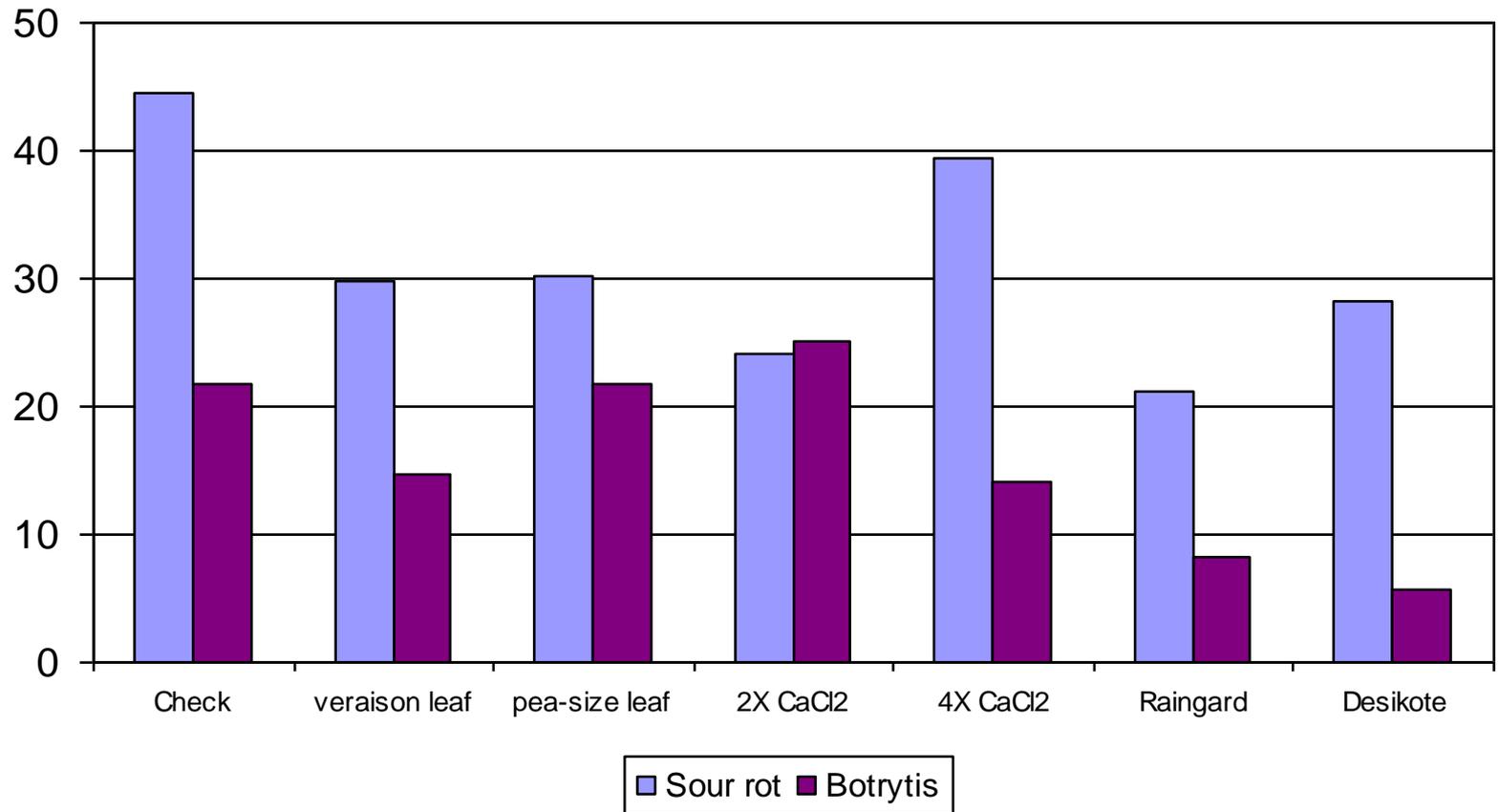
Treatments to Reduce Berry Injury

P. noir, 2011

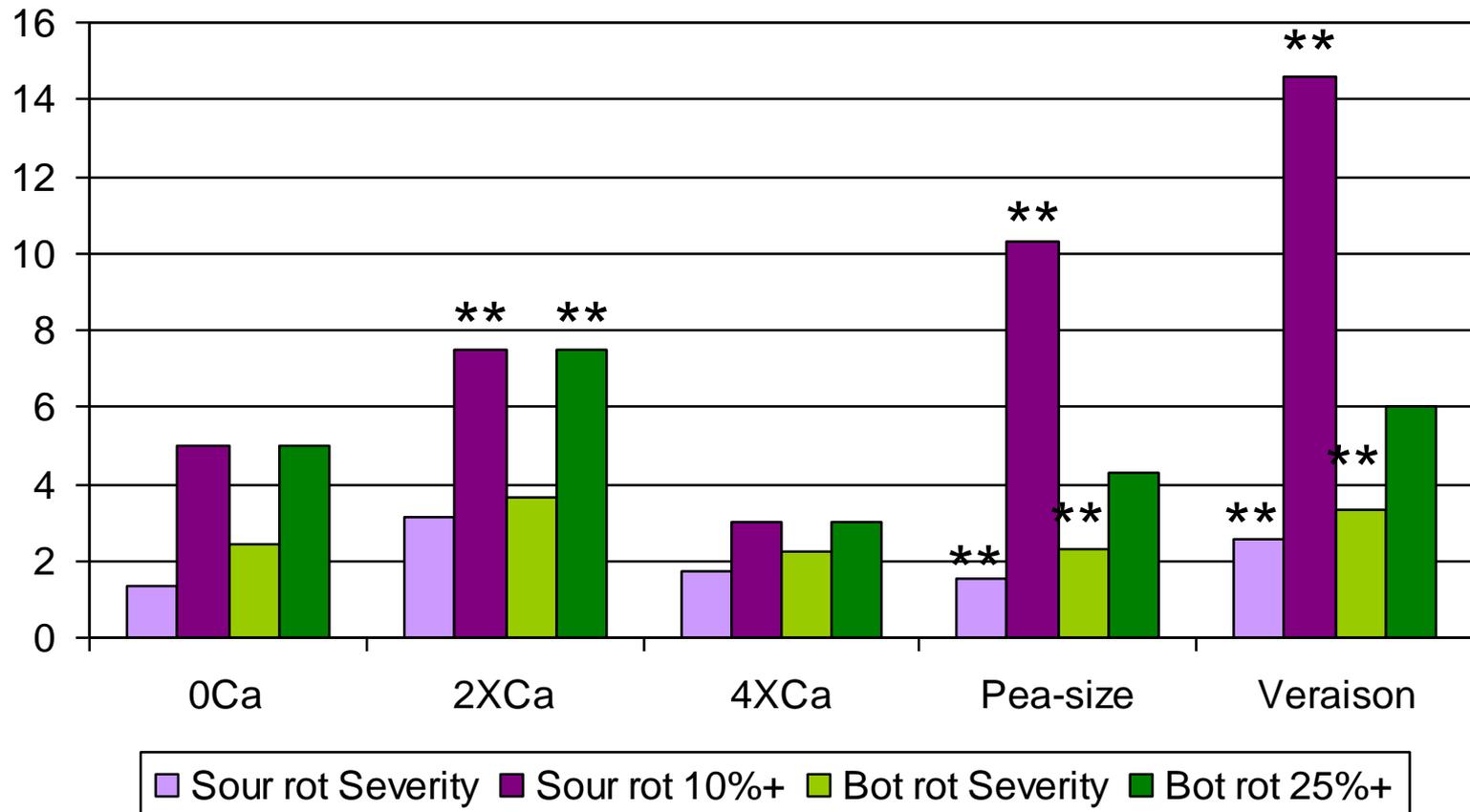


Treatments to Reduce Berry Injury

Riesling, 2011



Large Plot Calcium and Leaf Removal, P. noir, 2011



Sour Rot Management

- Potassium Metabisulphite?
 - Used as anti-oxidant and anti-microbial (vs microbes) in vinification (40-60 g/tonne)
 - Rengasamy & Poole (NZ):
 - 5 kg per 1000 L water
 - Botrytis-infected berries dry out
 - Wicks (Australia):
 - 3-4 g/L KMS killed Botrytis spores & inhibited growth of germ tubes
 - If 4 g/L applied w/i 48 hr of infection, inhibits sporulation from infected berries
 - Little effect on sporulation after that

Sour Rot Management

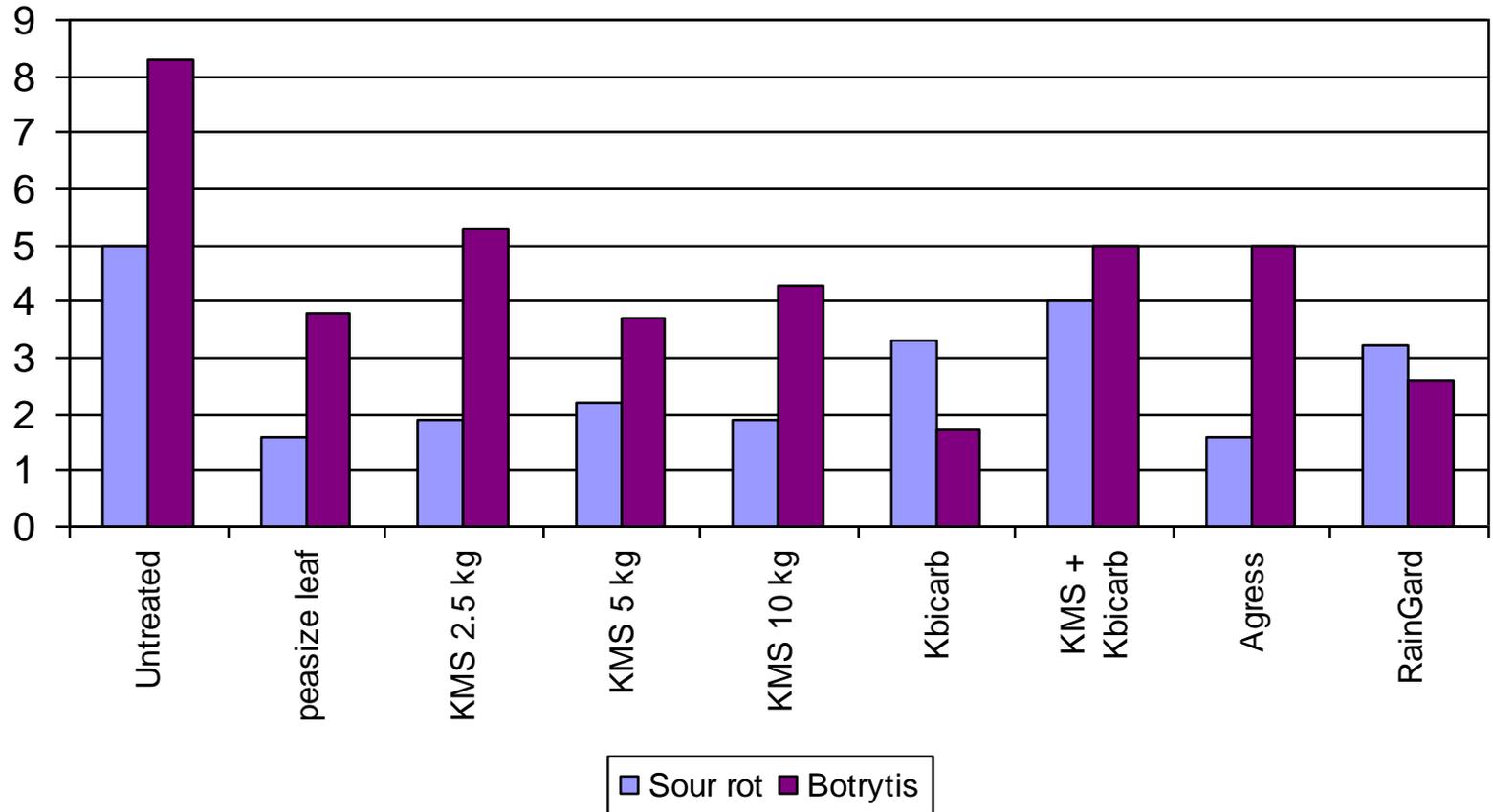
- Potassium Metabisulphite (KMS)
 - Concerns:
 - Does it work?
 - Rate? Timing?
 - How does it work? (anti-oxidant/anti-microbial/both?)
 - Excess sulphites & SO₂ in wine?

Post-Veraison Treatments

- Treatments
 - KMS 2.5, 5, 10 kg/1000 L
 - Milstop (K bicarb)
 - KMS 5 kg + Milstop (K bicarb)
 - Oxidate
 - Blight Ban 506 (*Pseudomonas fluorescens*)
 - Actinovate (*Streptomyces lydicus*)
 - Agress (oxysilver nitrate)
 - Vermicompost (not shown)
- 600 L/ha in fruiting zone @
 - 50-75% veraison
 - + 2 wk
 - + 1 wk (Ries)
 - + 1 wk (Ries)
 - + 1 wk (1 wk pre-harvest)
 - 3 d pre-harvest
 - 1 d pre-harvest

Disease Severity with Post-Veraison Treatments

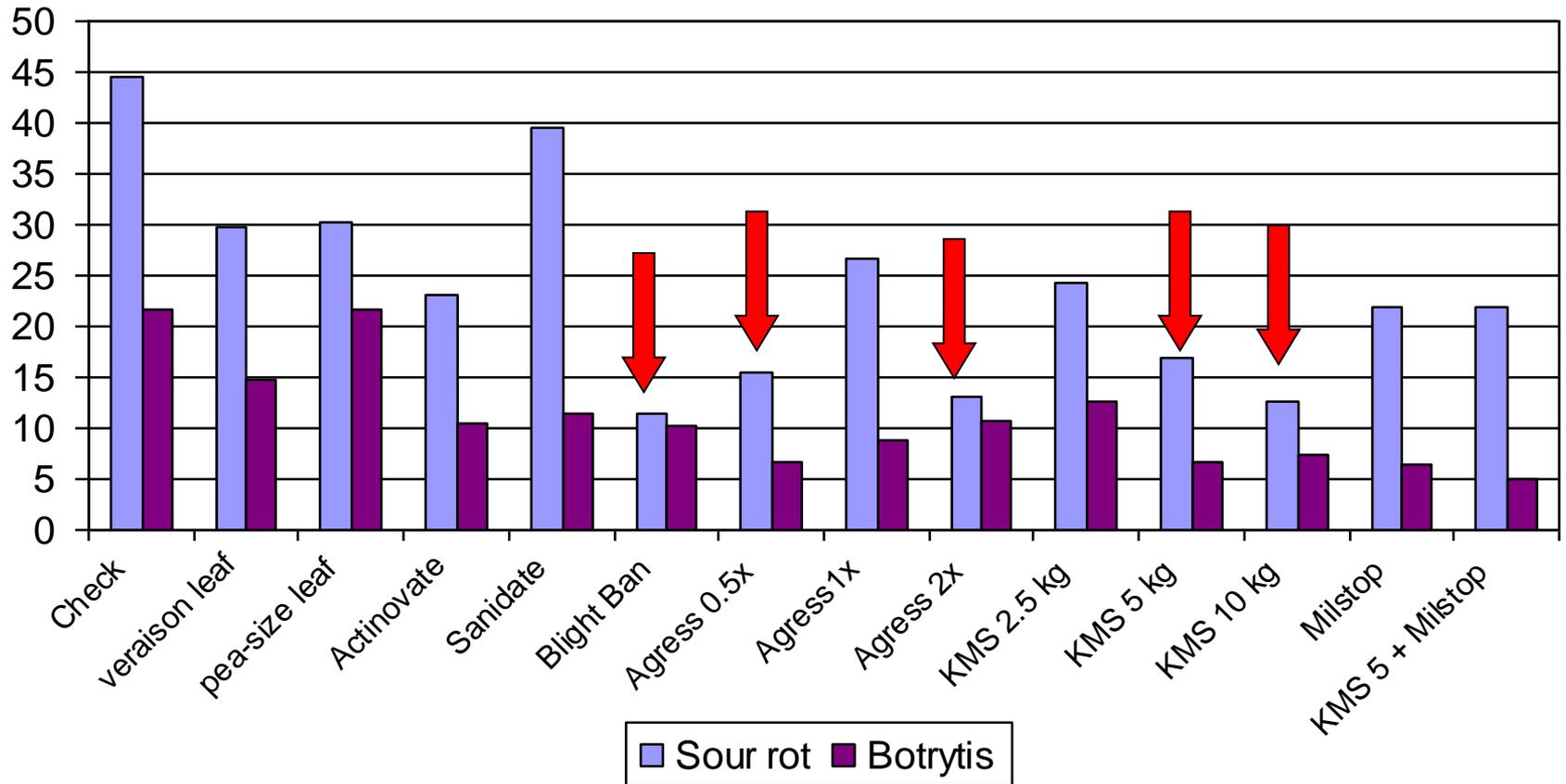
P. noir, 2011



No significant difference btw treatments & peaseize leaf pulling check

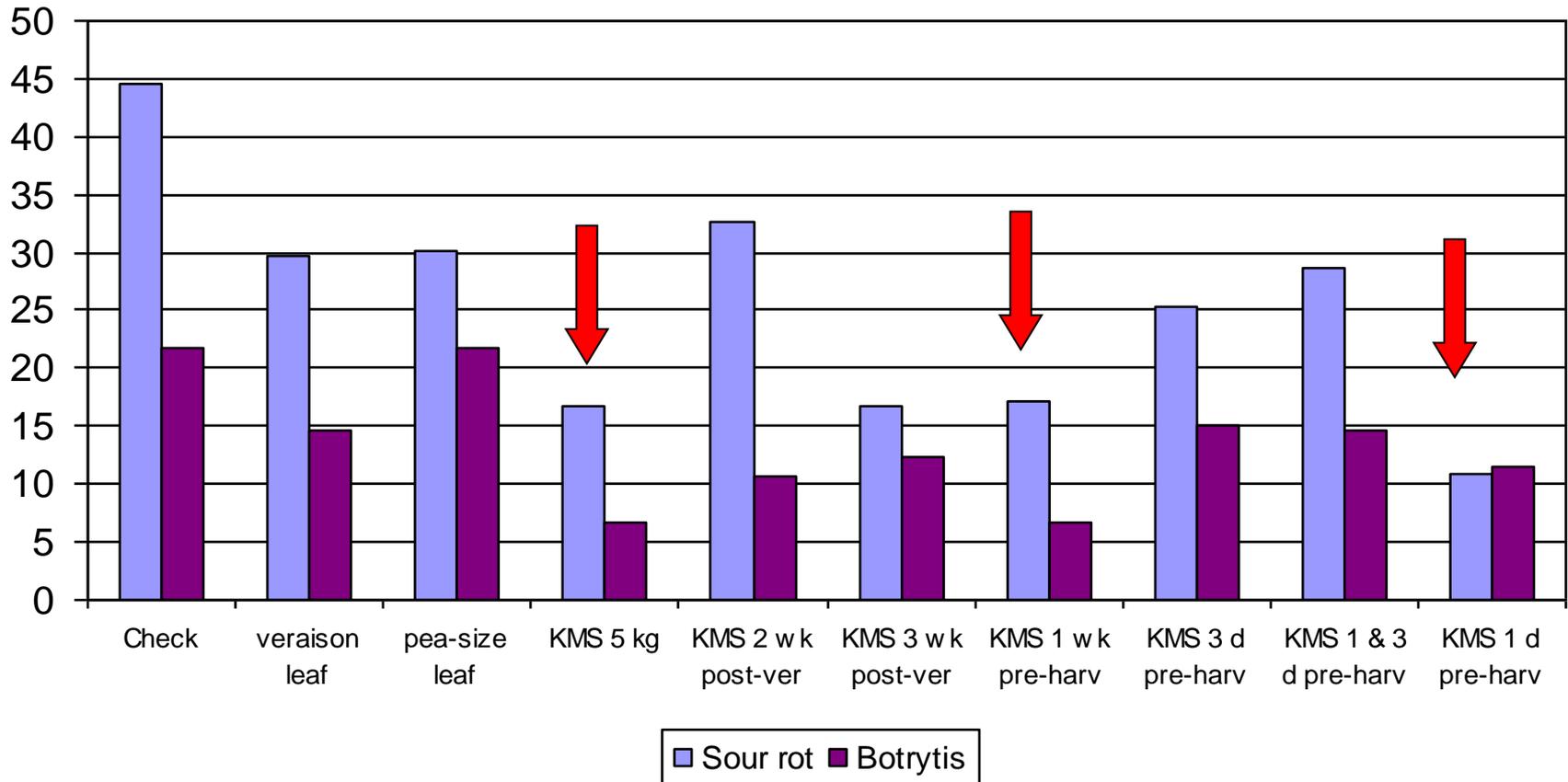
Disease Severity with Post-Veraison Treatments

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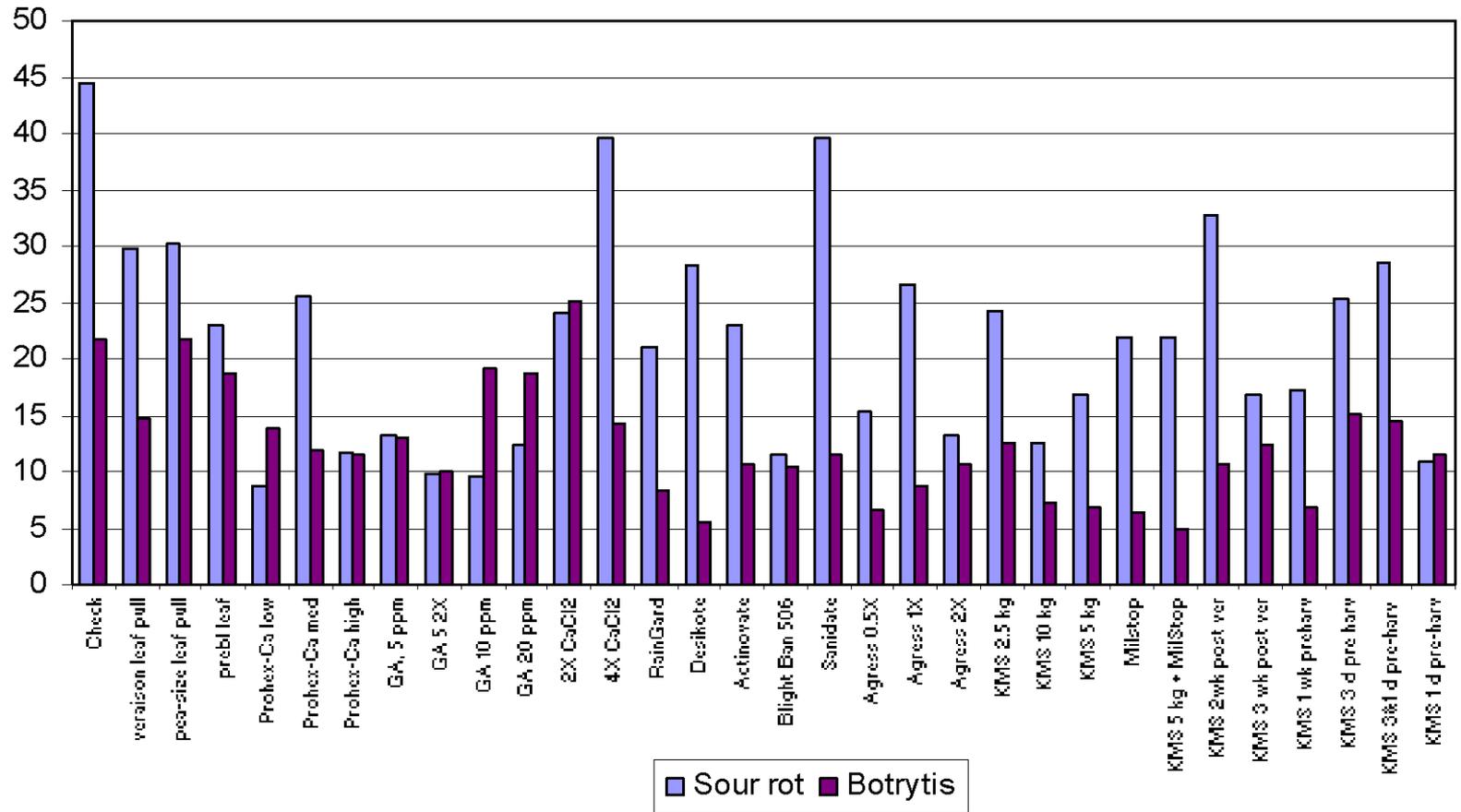


Disease Severity with Post-Veraison Treatments

Riesling, 2011



All Treatments Riesling, 2011



Future Research

- Effects of temperature & wetness duration on infection
- Effect of soil moisture/soil type/vine vigour on disease development
- Changes in berry between 13 and 15 Brix that relate to susceptibility
- Screen other potential control agents
- Repeat prebloom leaf removal, GA and Prohex-Ca on same plots
- Effect of temperature on KMS activity
- Interactions between causal organisms
- Progression of berry microflora pea-size to harvest