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Assessment of ‘grey zone’ smoke exposure on grapes and potential wine production approaches to mitigate impact

Dr Sijing Li, Dr John Blackman & Professor Leigh Schmidtke

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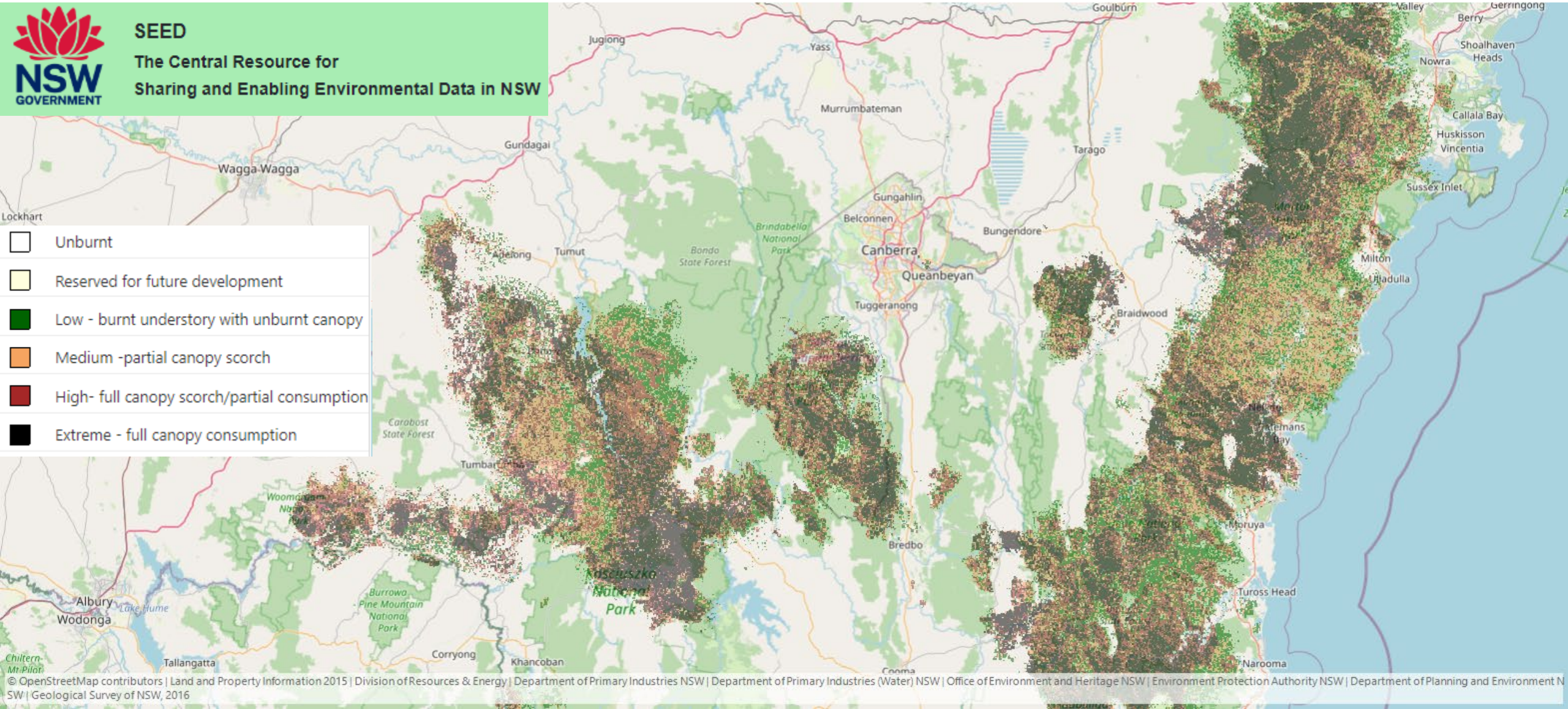
NSW Bushfires 2020



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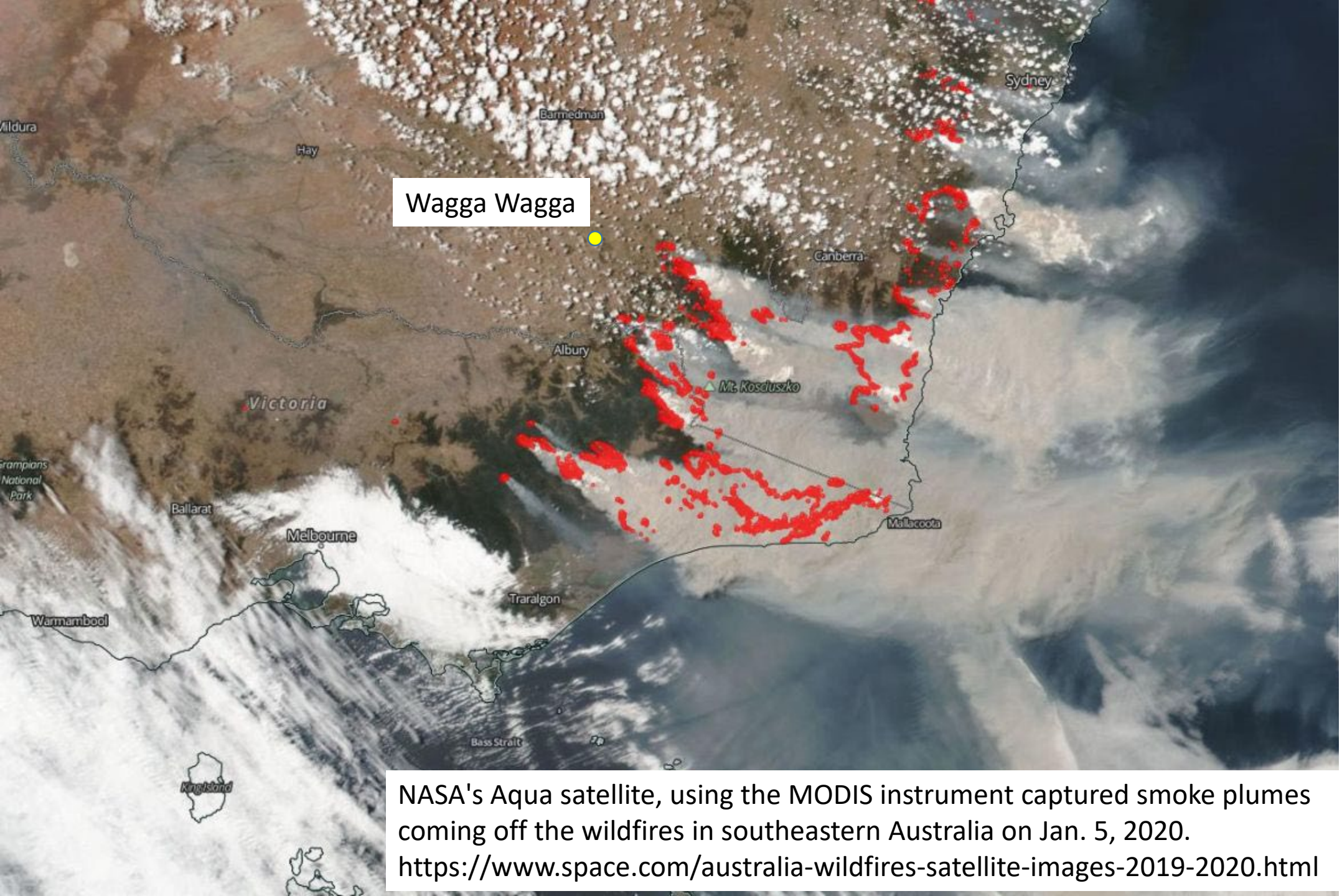

NASA's Aqua satellite, using the MODIS instrument captured smoke plumes coming off the wildfires in southeastern Australia on Jan. 5, 2020. https://www.space.com/australia-wildfires-satellite-images-2019-2020.html

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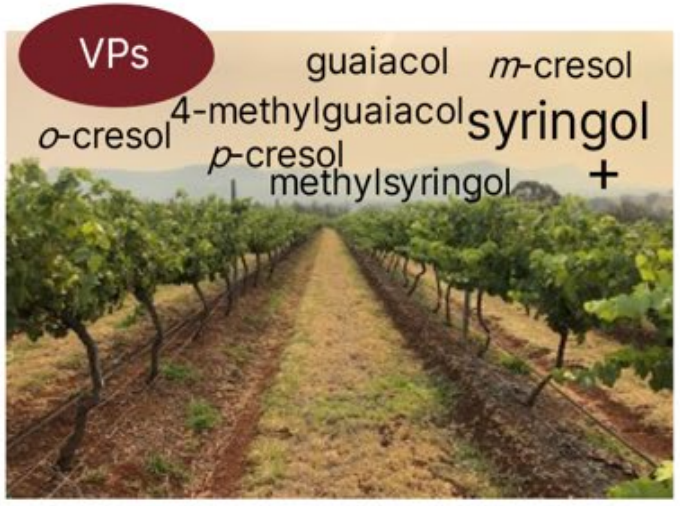
Wagga Wagga

5th January 2020

~40 km from Dunns Road

Smoke compounds in grapes and wine



uptake

conversion in grapes

sugar

sugar

VPs

Glycosides

Biomarker: GG

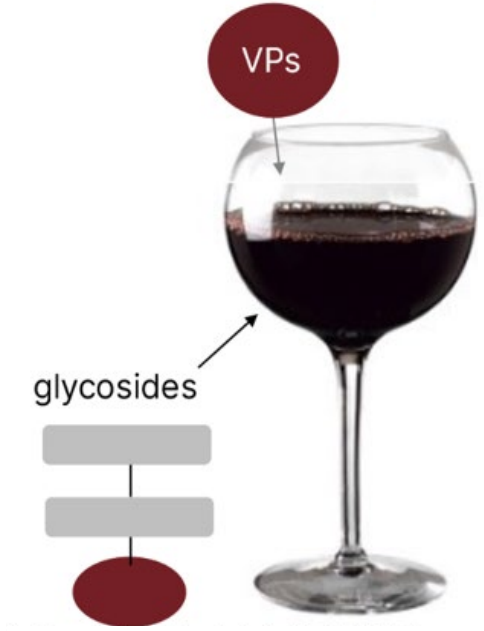
syringol gentiobioside

Smoky aroma

guaiacol + cresols

Smoky aftertaste

release of VPs from glycosides in-mouth



release of VPs from glycosides during winemaking

Grape and Wine Biomarkers

Glycoside biomarker

- Syringol gentiobioside
- 4-Methylsyringol gentiobioside
- Phenol rutinoside
- *p*-Cresol rutinoside
- 4-Methylguaiacol rutinoside

Sum total glycosides

Volatile phenol

- Syringol
- 4-Methylsyringol
- Phenol
- *p*-Cresol
- *m*-Cresol
- *O*-Cresol
- 4-Methylguaiacol

Sum total volatile phenols

Project Aims

- Examine sensory properties of wines made from 'grey zone' grapes.
  - Can these grapes produce acceptable wines for commercial styles?
- Examine the effects of limiting skin extraction on wine sensory and chemical profiles
  - Making Rosé wine out of red varieties
  - Reducing pressing yields in white varieties

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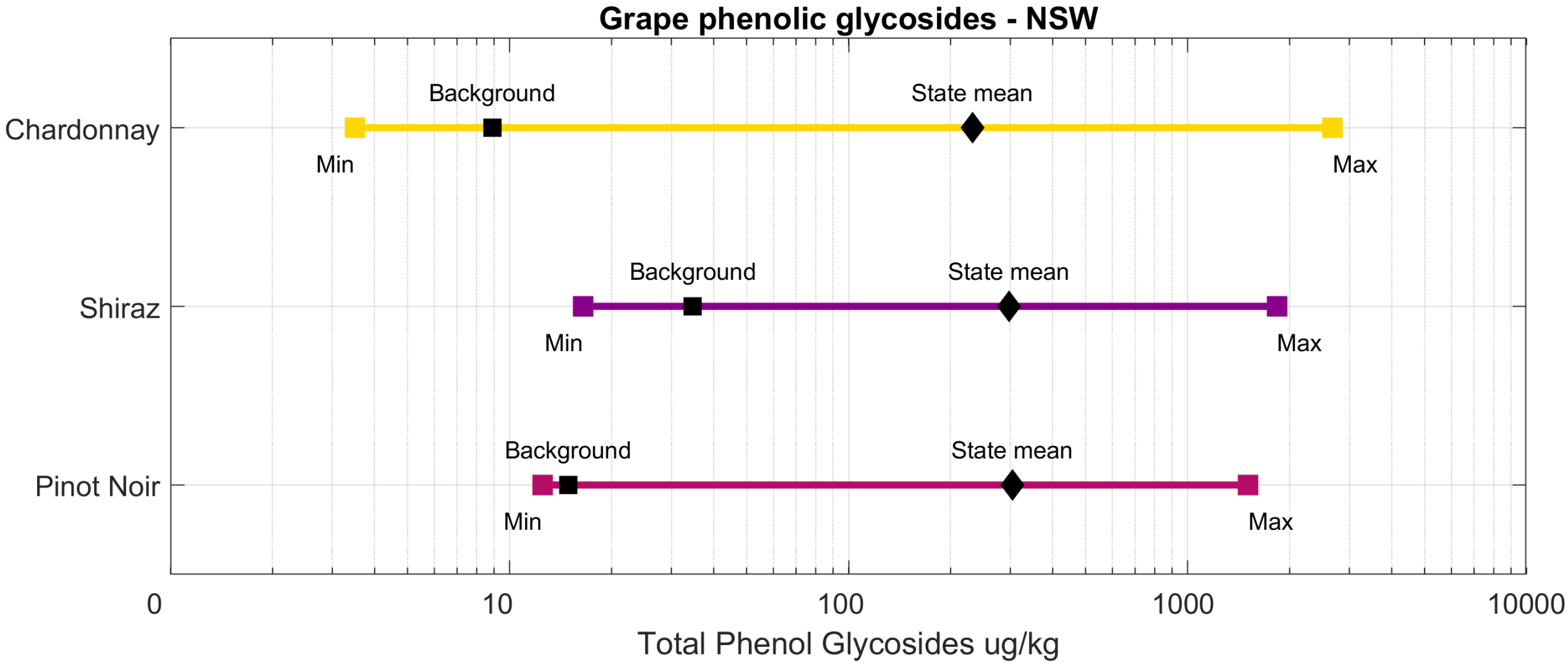
Grape Glycoside Biomarker Concentrations (post event)



Simos, C. 2021. NSW New knowledge seminar presentations.

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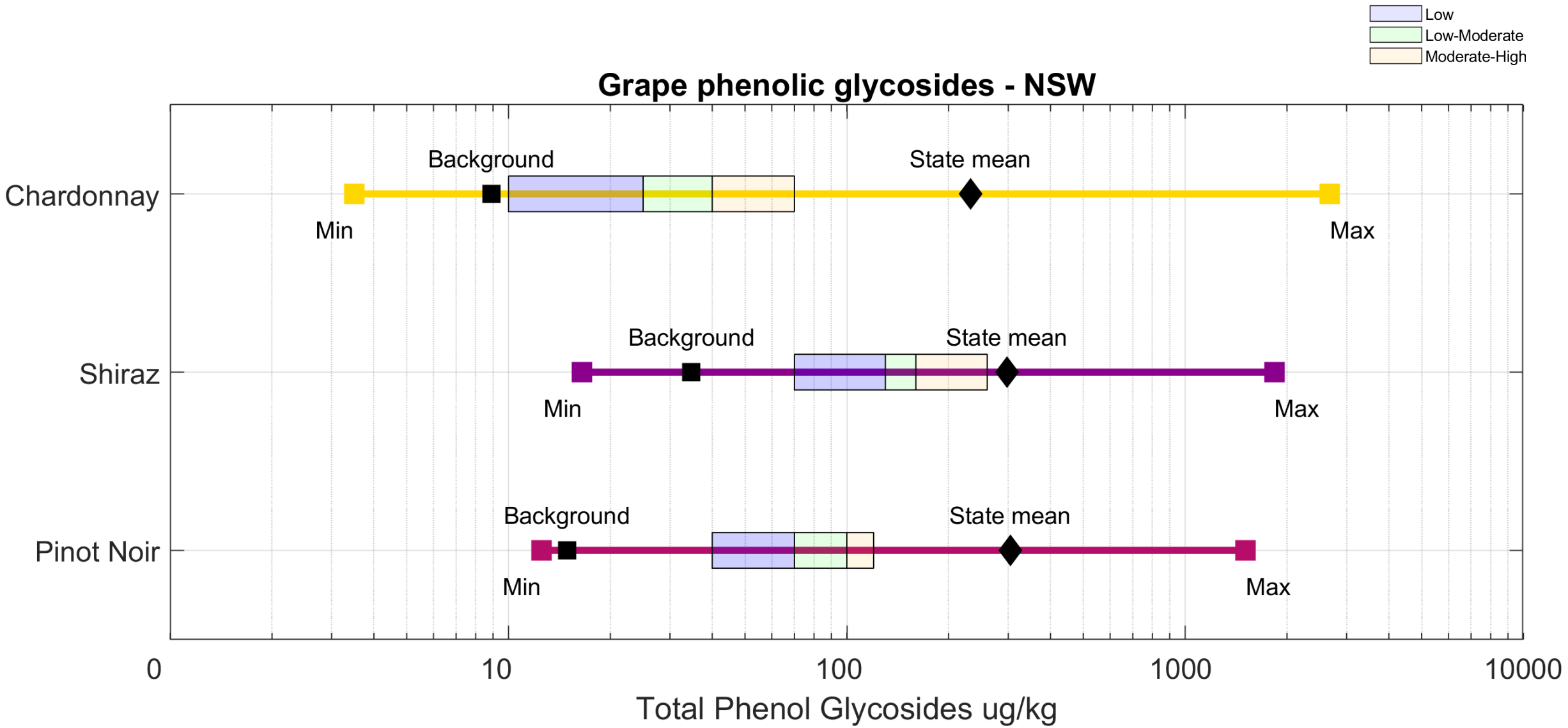
What is the Grey Zone?



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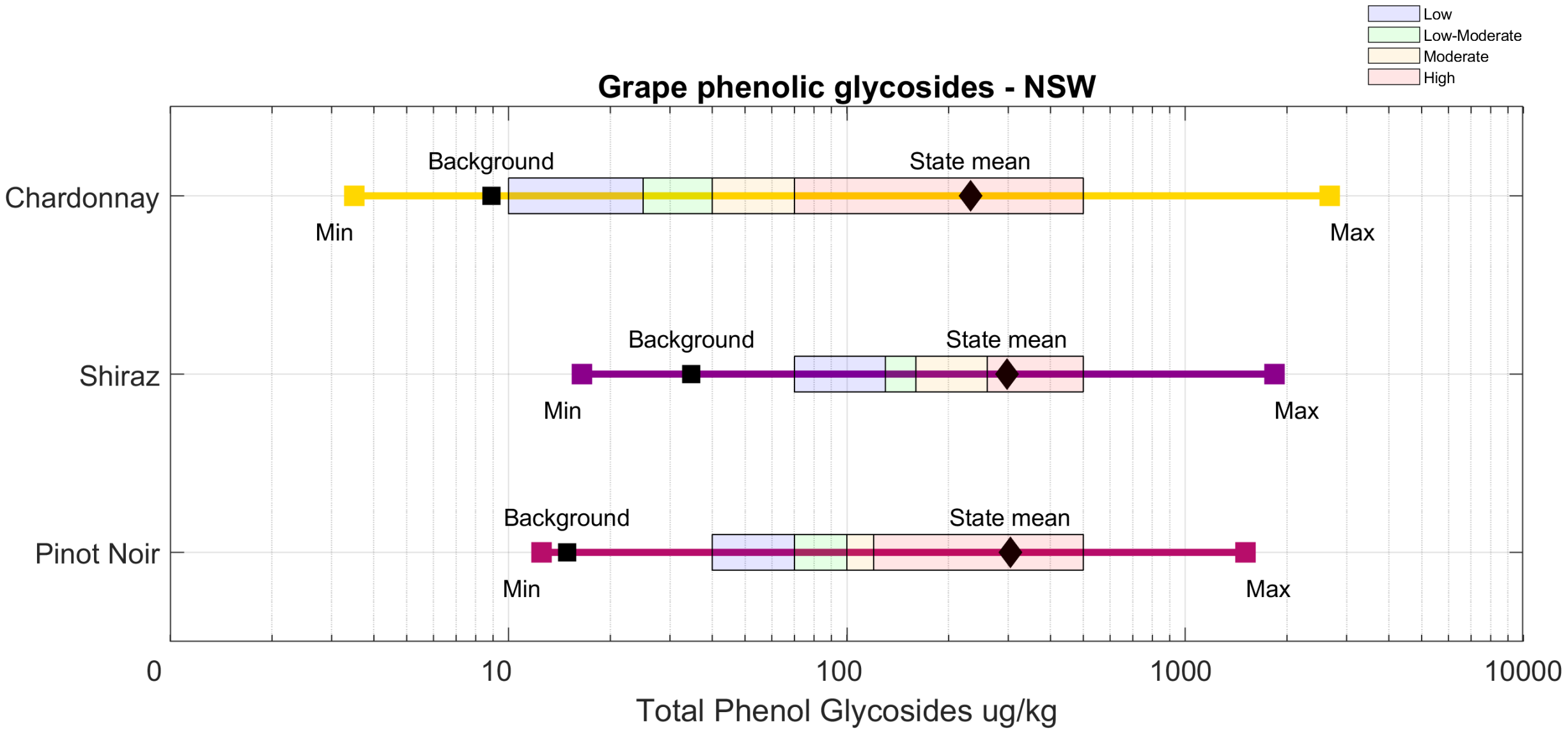
Shades of Grey



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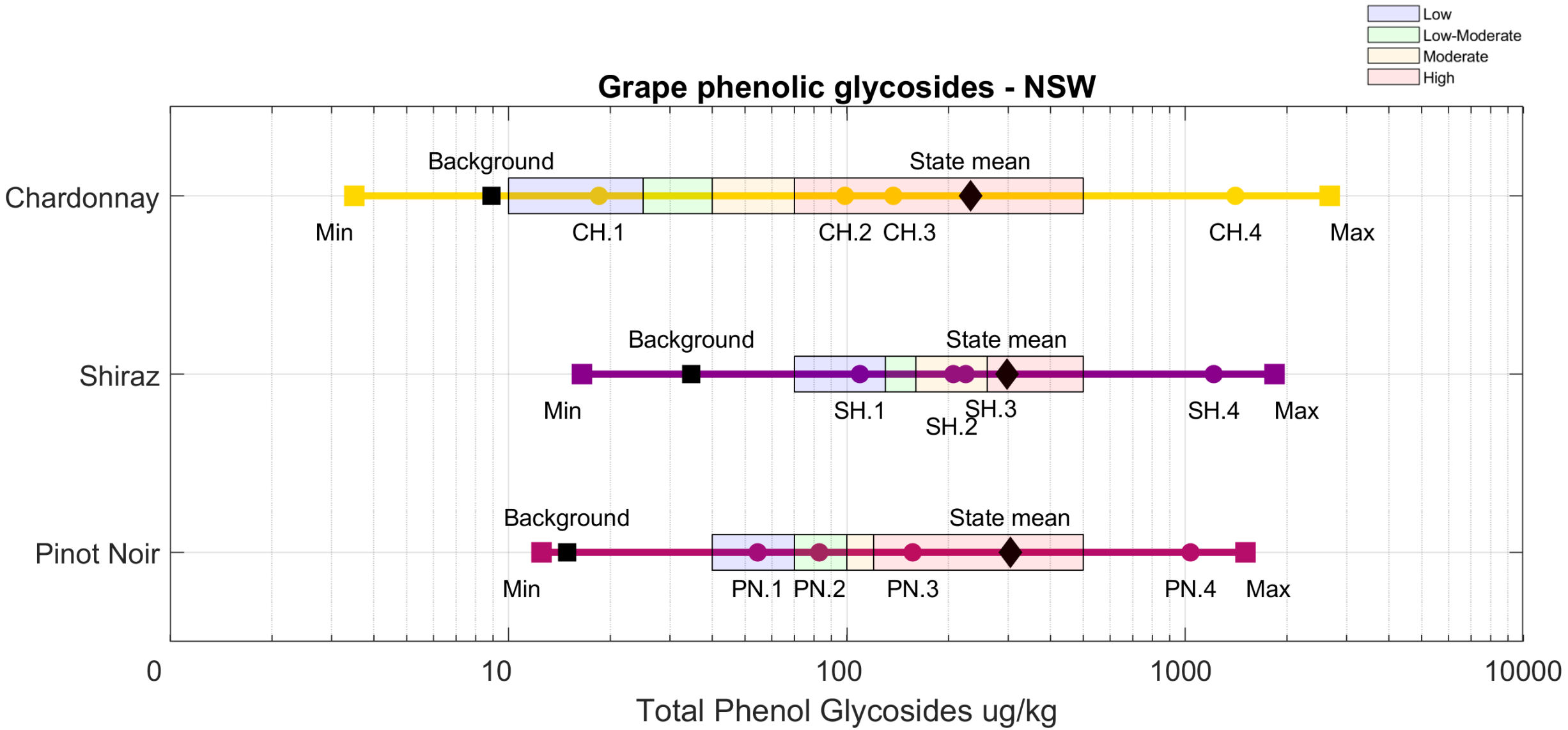
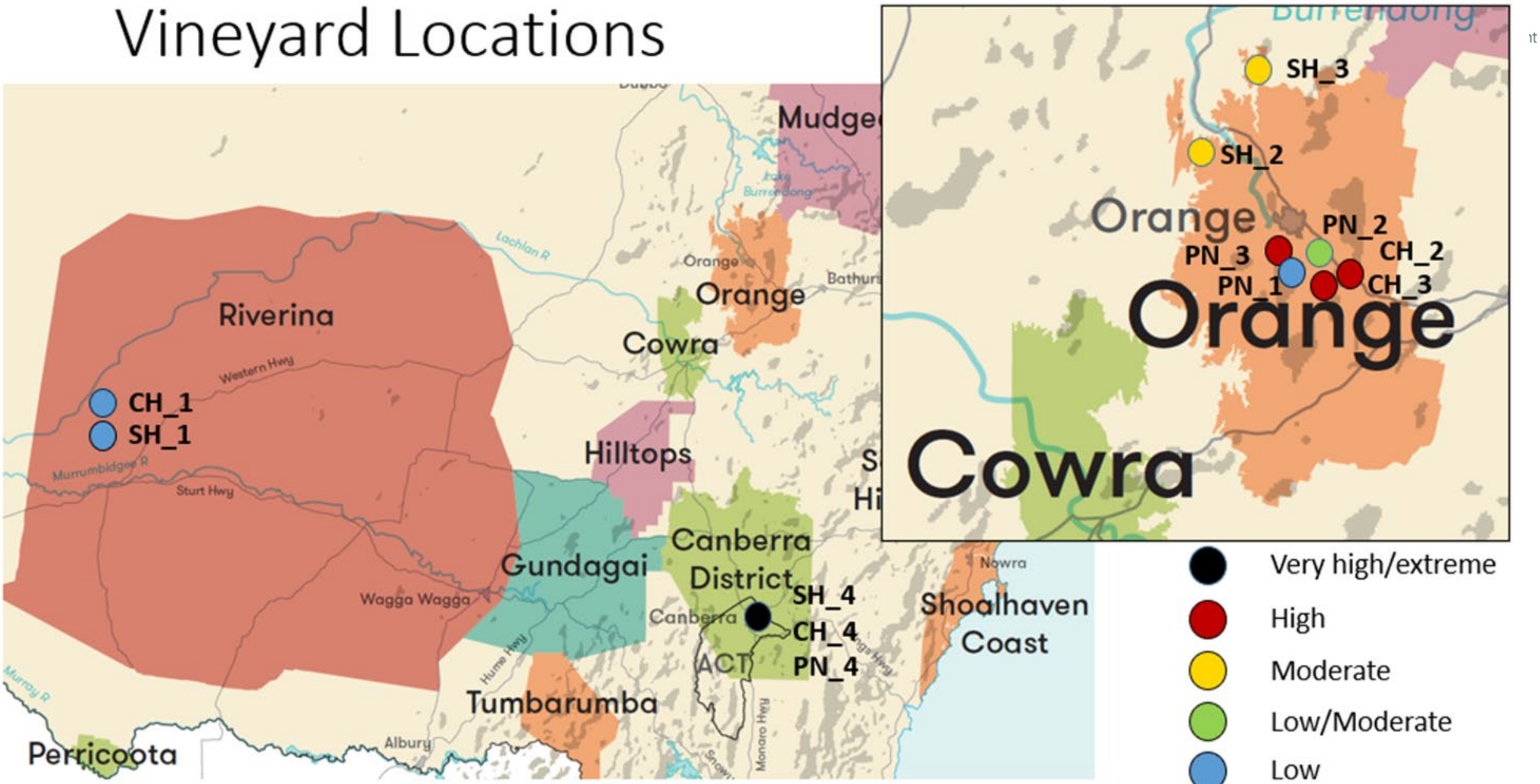
Targeted Grape Harvests from the Grey Zone



Simos, C. 2021. NSW New knowledge seminar presentations.

Vineyard Locations



Winemaking Parameters

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Pinot Noir & Shiraz

- Rosé – ~4 hours skin contact
- Dry table wine - 4-5 days on skins

Chardonnay

- 400L/tonne and 500L/tonne extraction

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Taste Wine 1 & 2

Total VP concentration in finished wines

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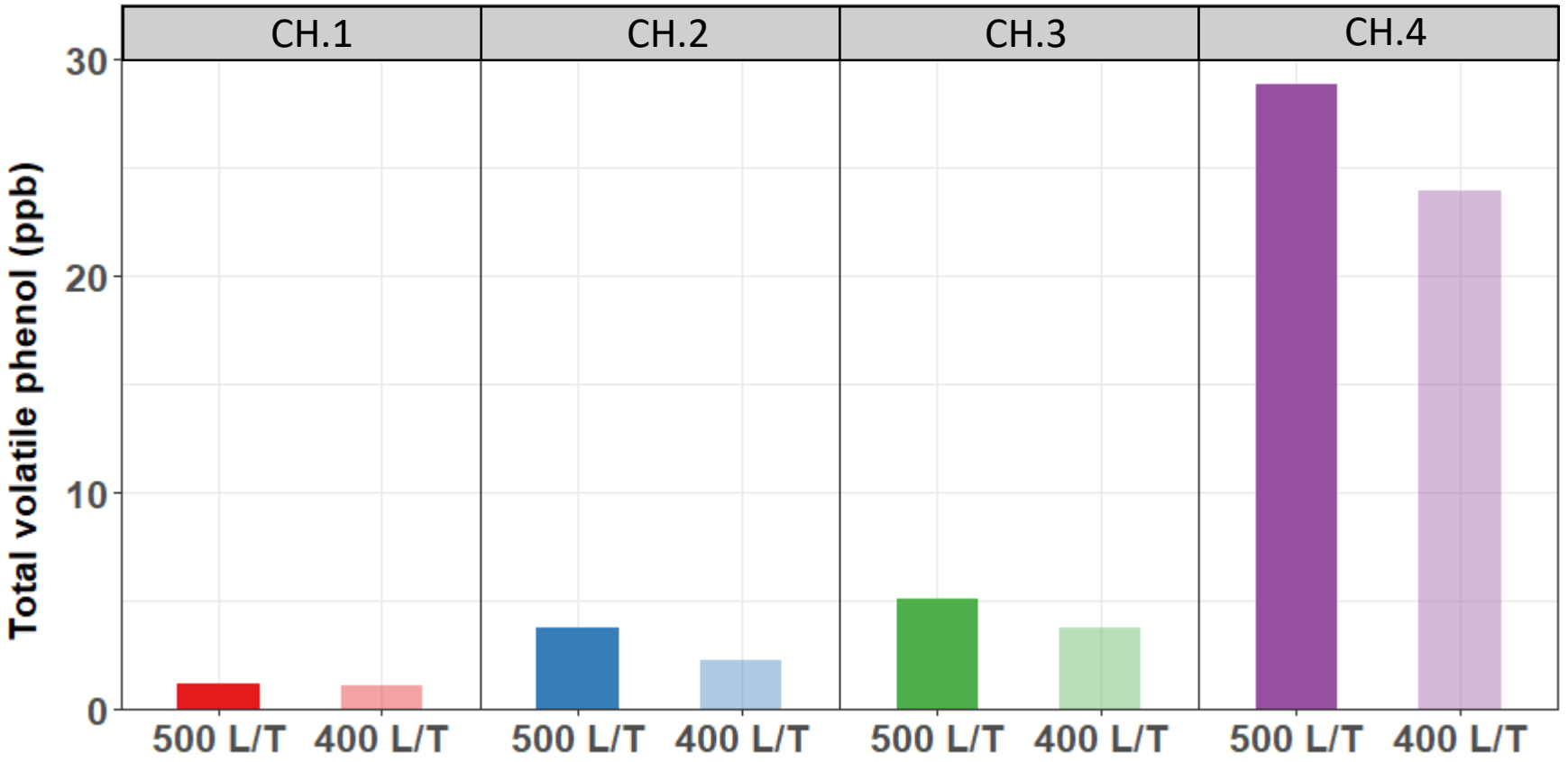


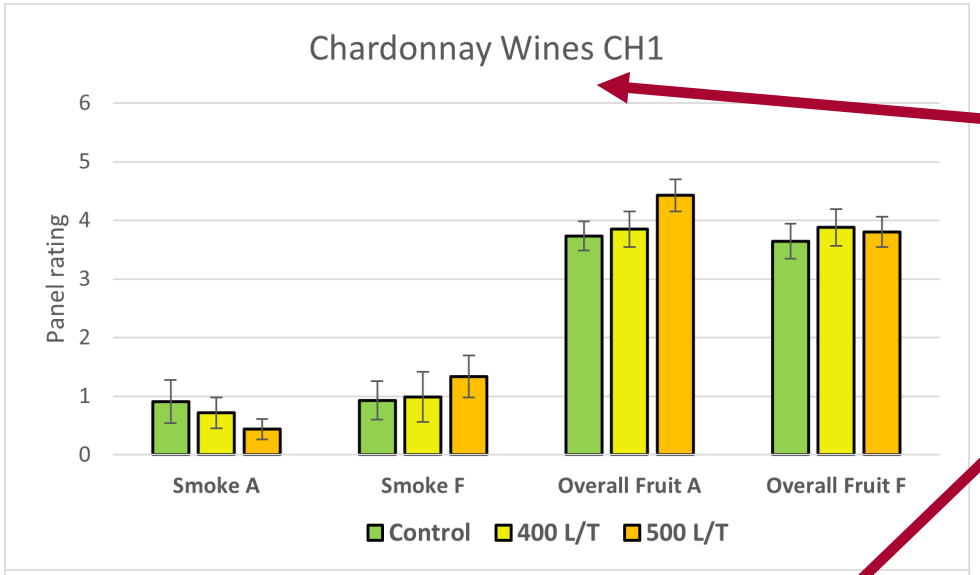
Chardonnay

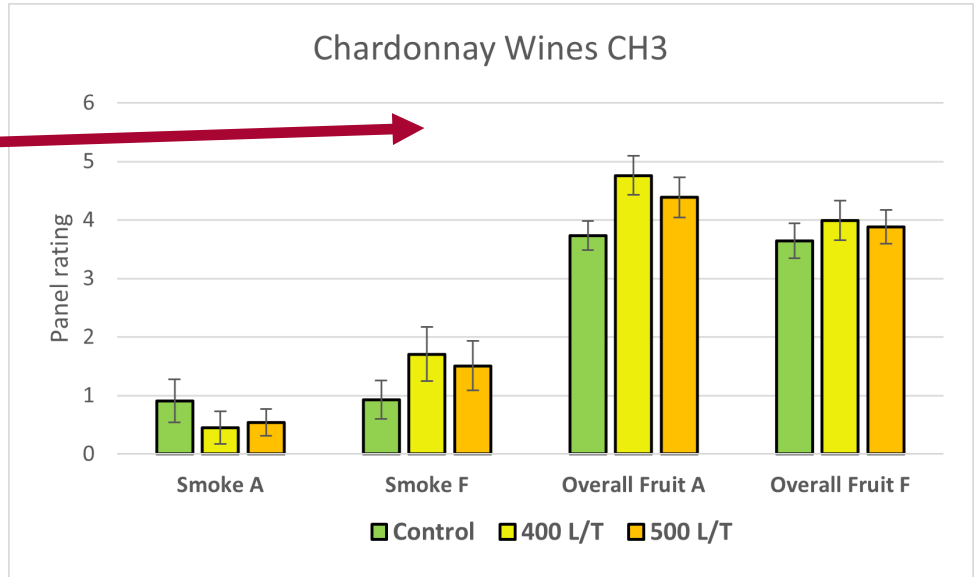
Press Yield

* p< 0.05
** p< 0.01
*** p< 0.001

Sensory Comparison – Press Yield Differences

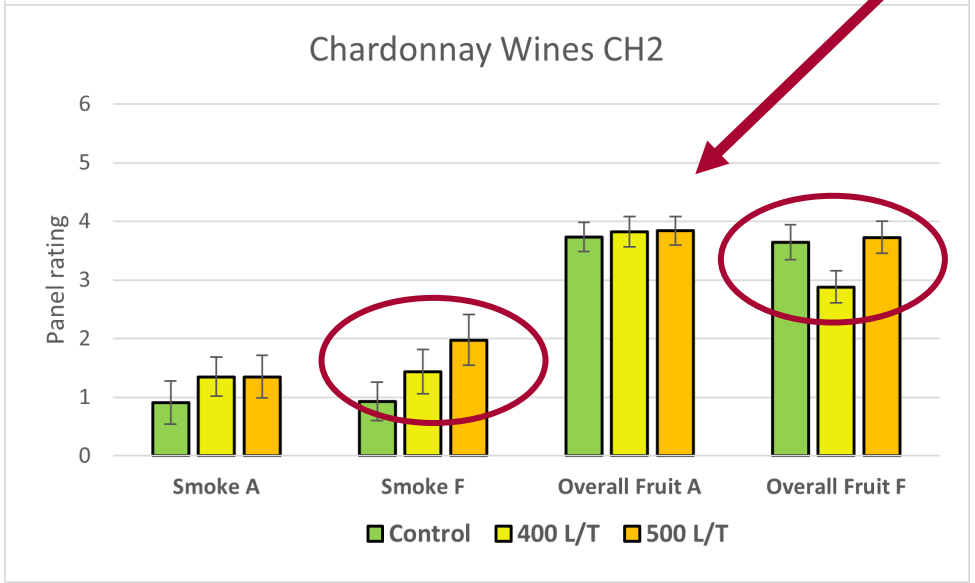
Smoke aroma/flavour panel ratings



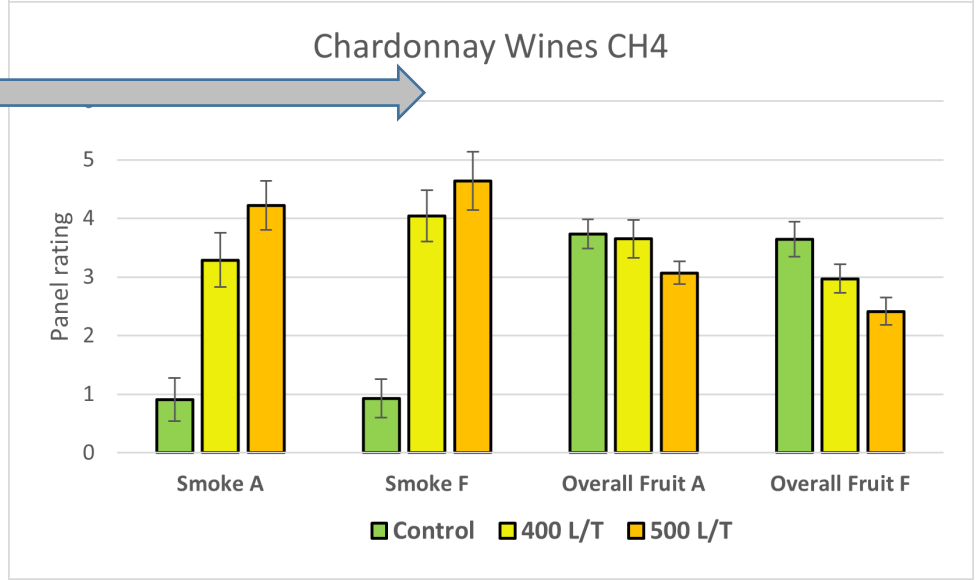


No differences

- Press fraction



Large differences



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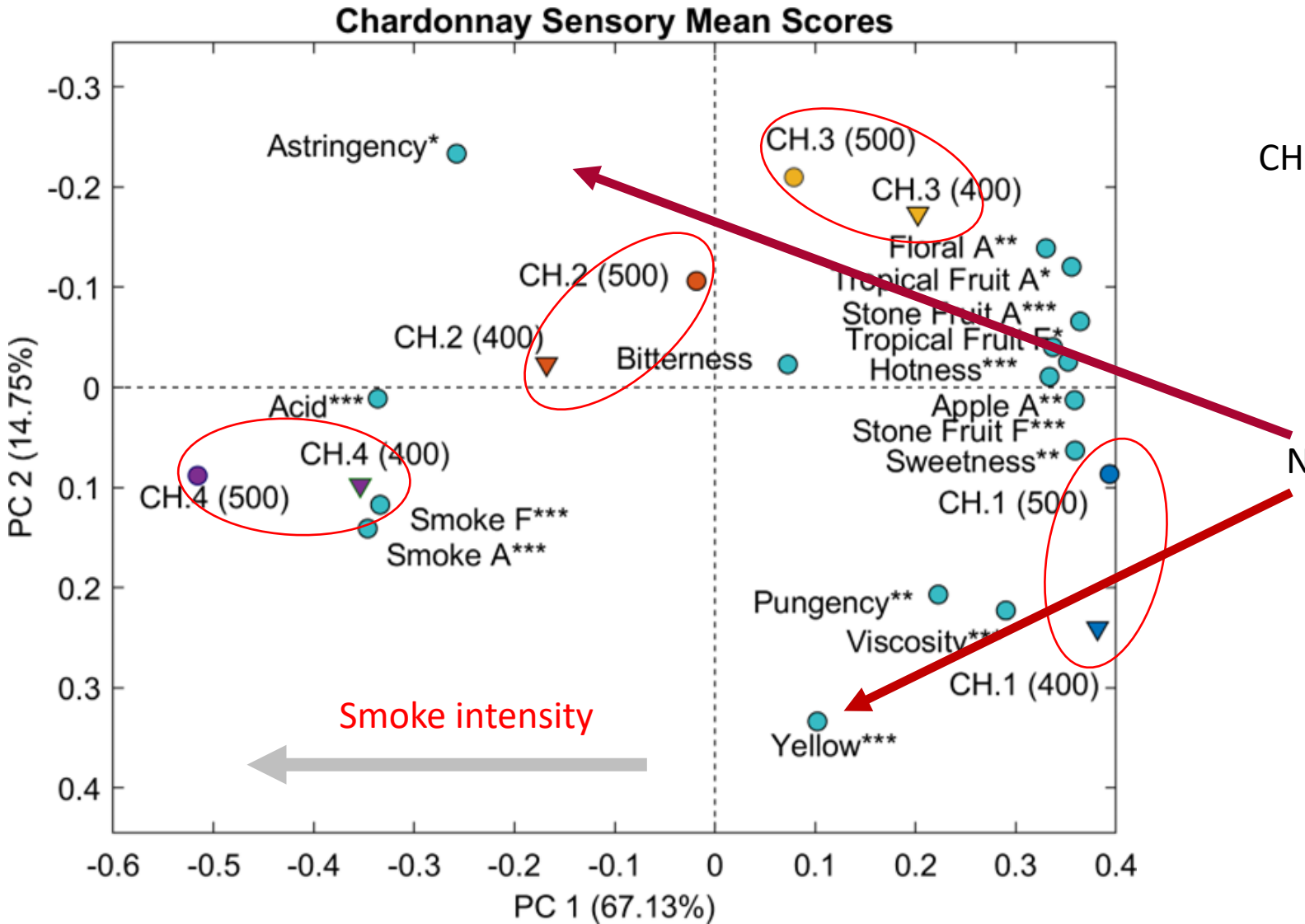
Descriptive Sensory Analysis - Chardonnay



CH3 marginally higher fruit ratings

No significant effect of press fractions

* p< 0.05
** p< 0.01
*** p< 0.001

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Taste Wines 3 & 6

- Pinot Noir Rose
- Pinot Noir Dry Red Wine

Pinot Noir Total Volatile Phenols Rosé vs Red

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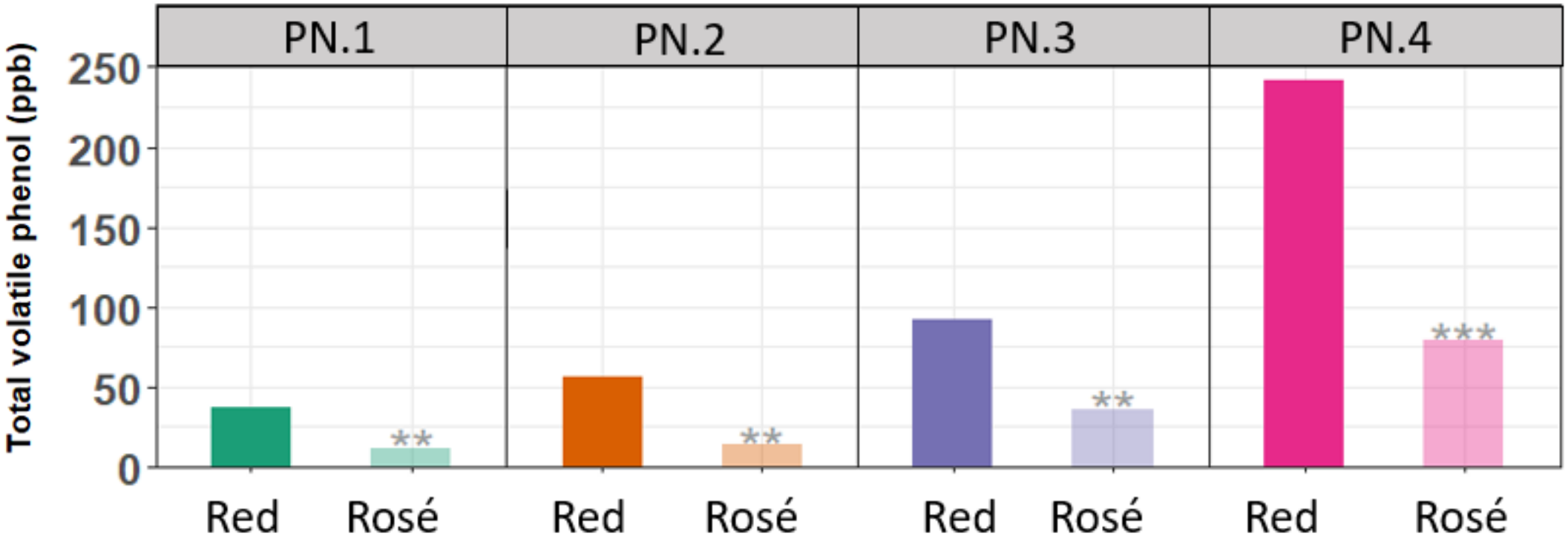
Limiting skin contact decreases VP in wines



* p< 0.05
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*** p< 0.001

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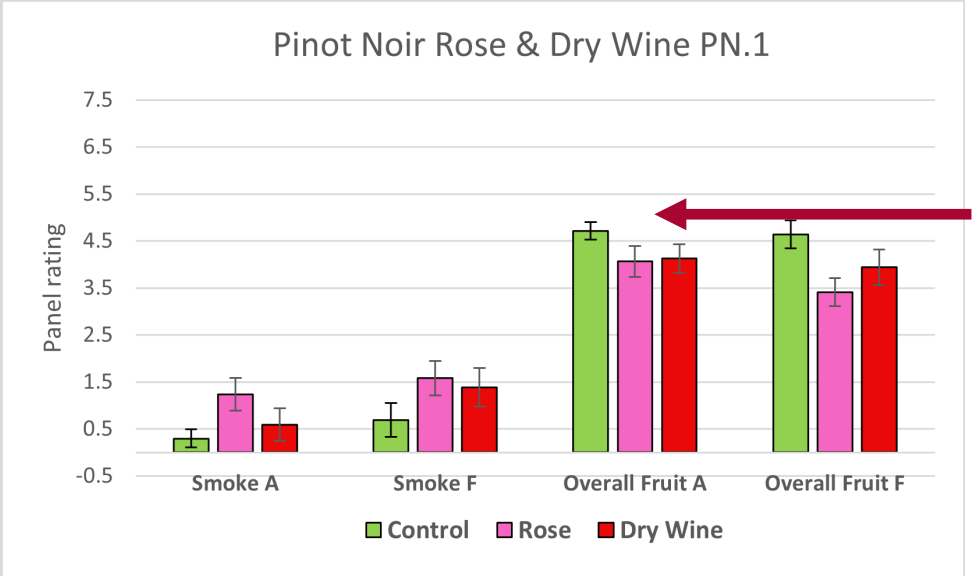
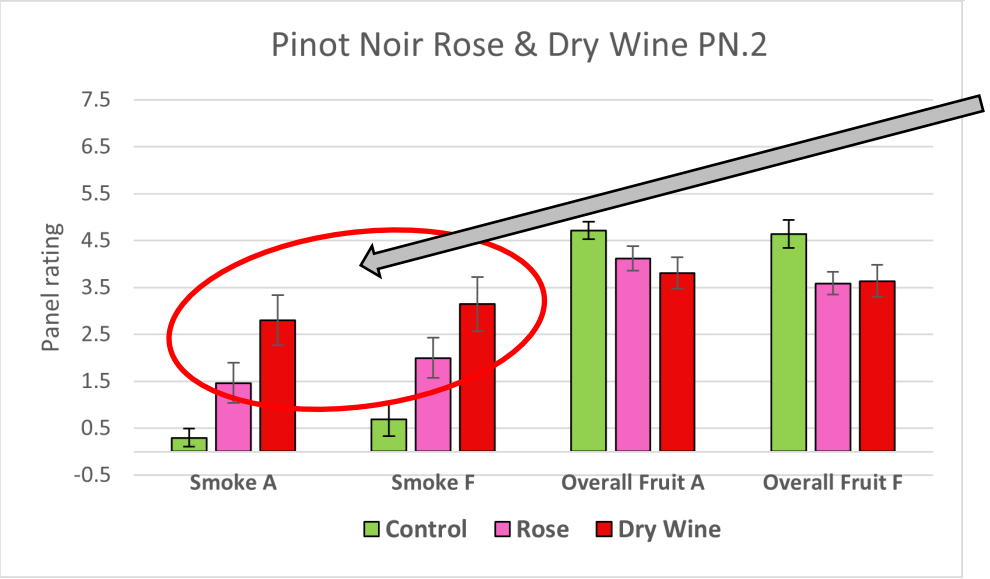
Rosé and Dry Wines – Pinot Noir

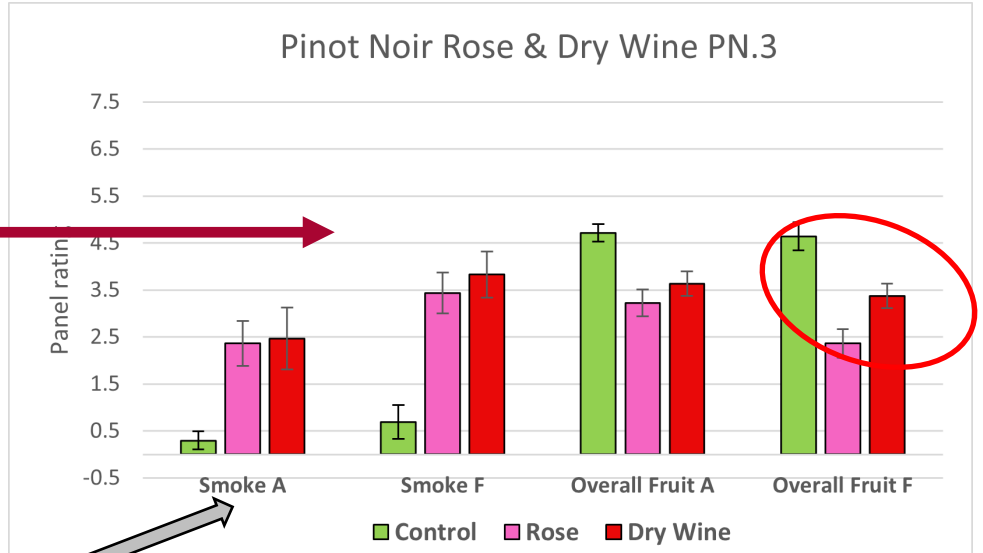


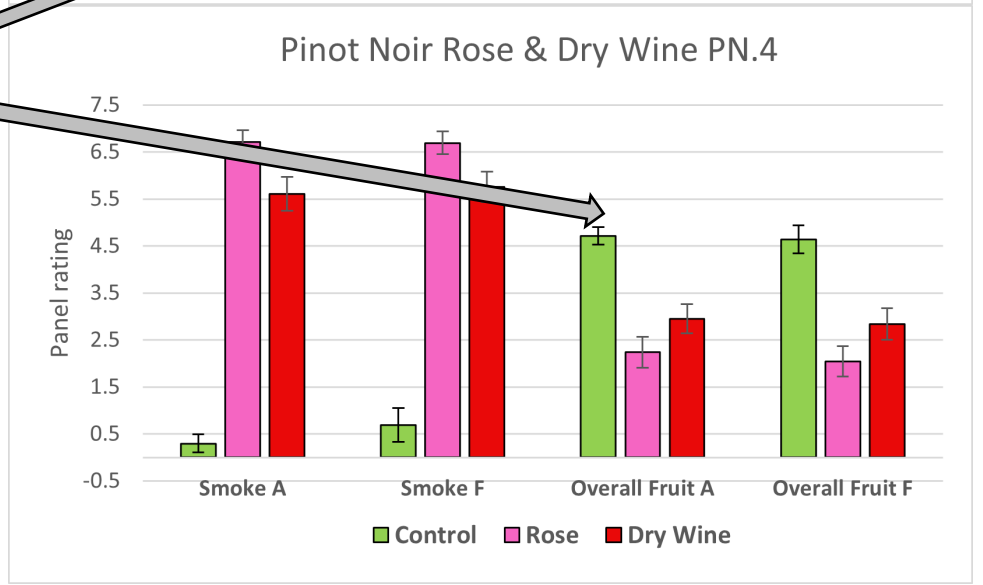


Few differences

- Skin contact
- Less fruit & smoke with reduced skin contact

Notable smoke





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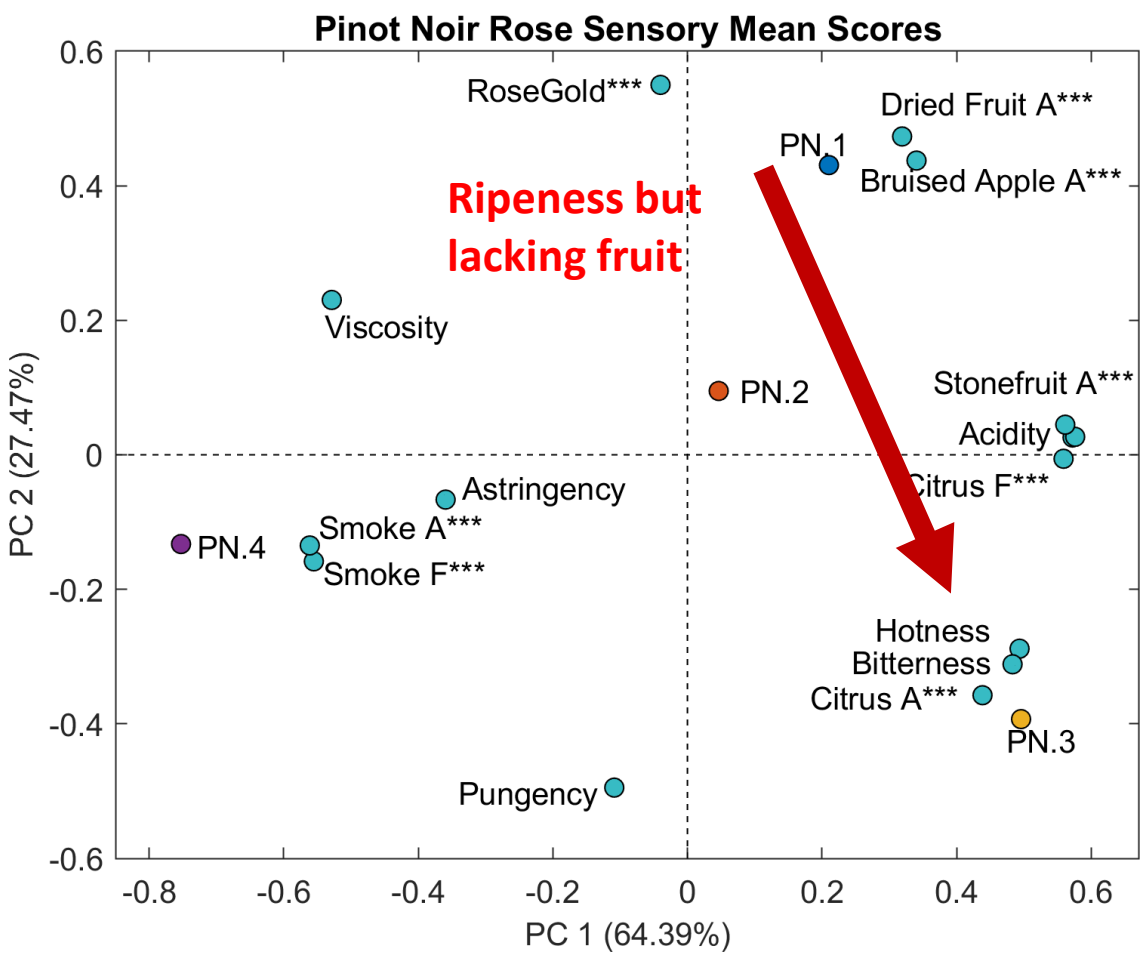
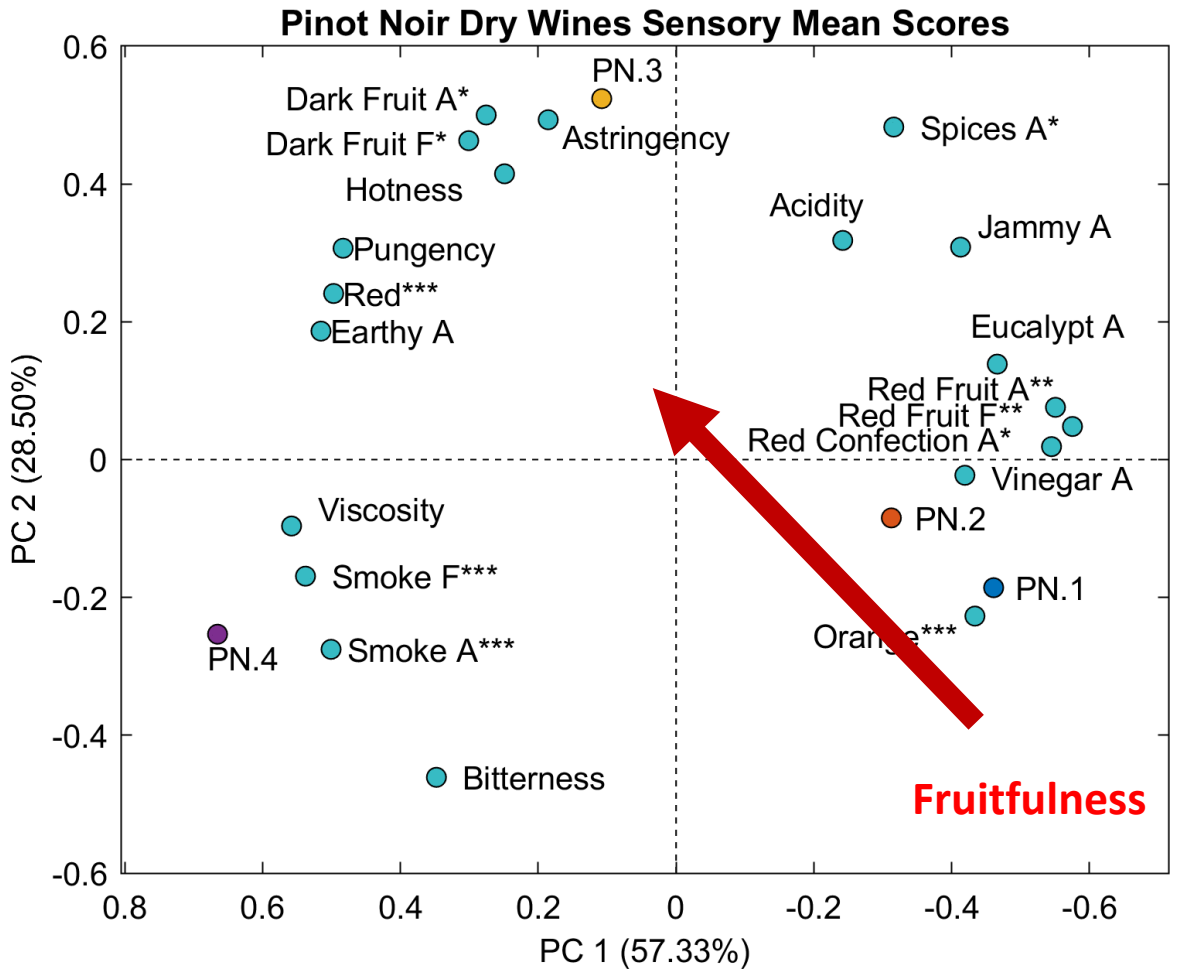
Pinot Noir Descriptive Sensory Analysis



Smoke



Smoke

* p< 0.05
** p< 0.01
*** p< 0.001

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Taste Wines 4, 5 & 7, 8

Shiraz Rose

Shiraz Dry Red Wine

Shiraz Total Volatile Phenols - Rosé vs Red

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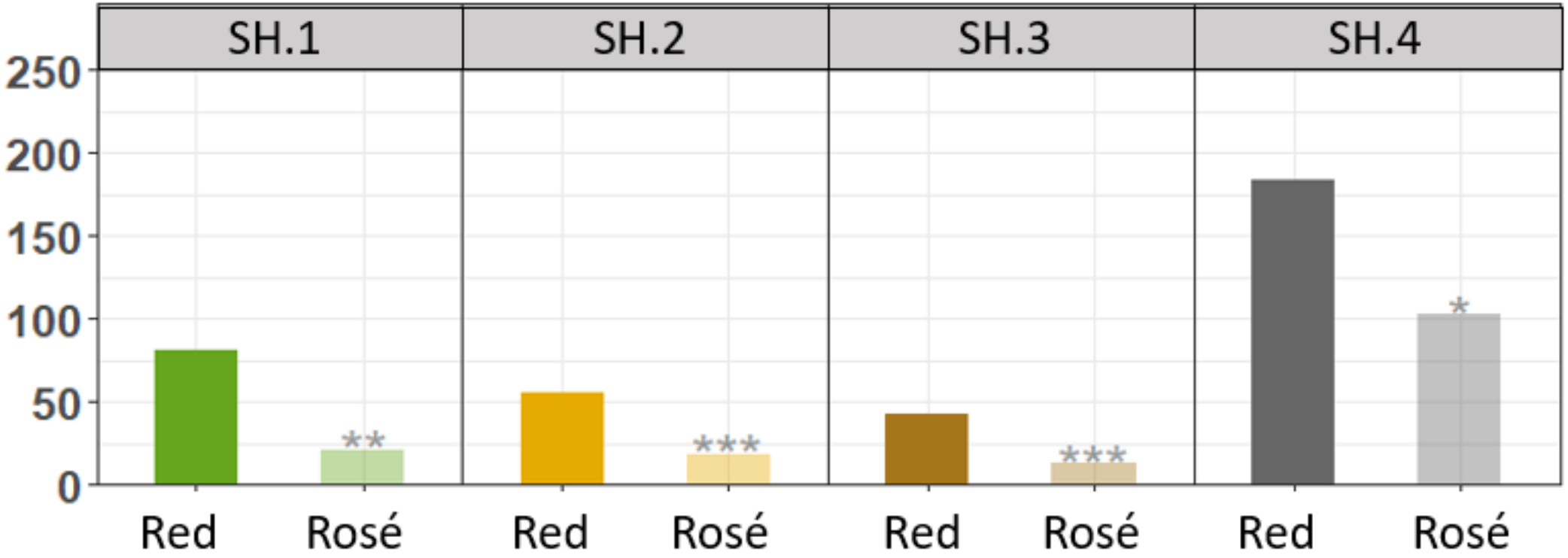
Limiting skin contact decreases VP in wines



* p< 0.05
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*** p< 0.001

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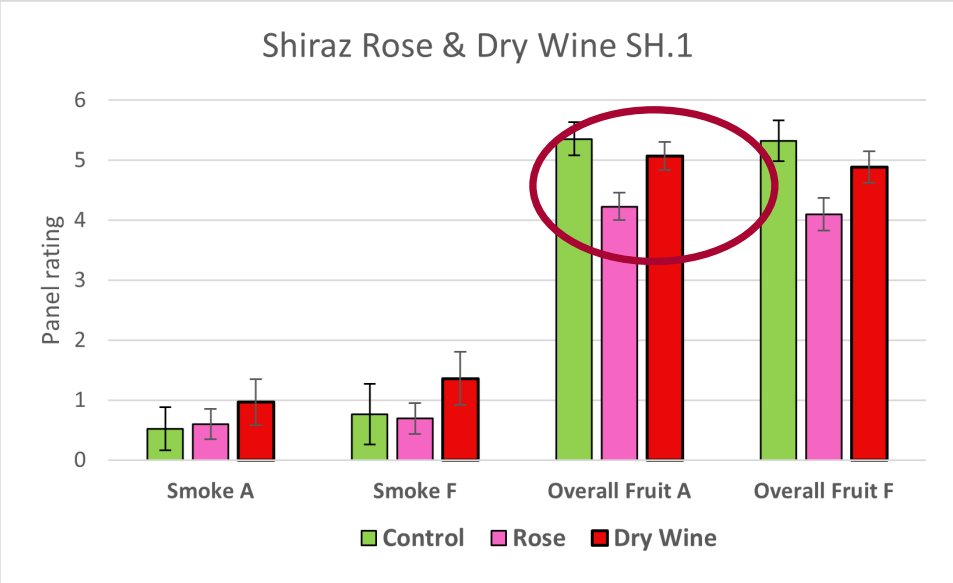
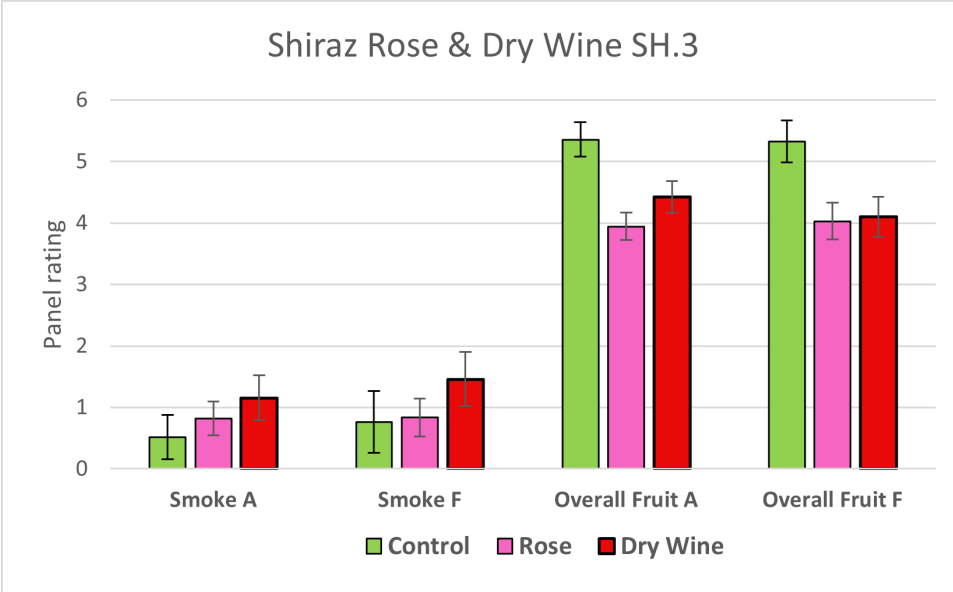
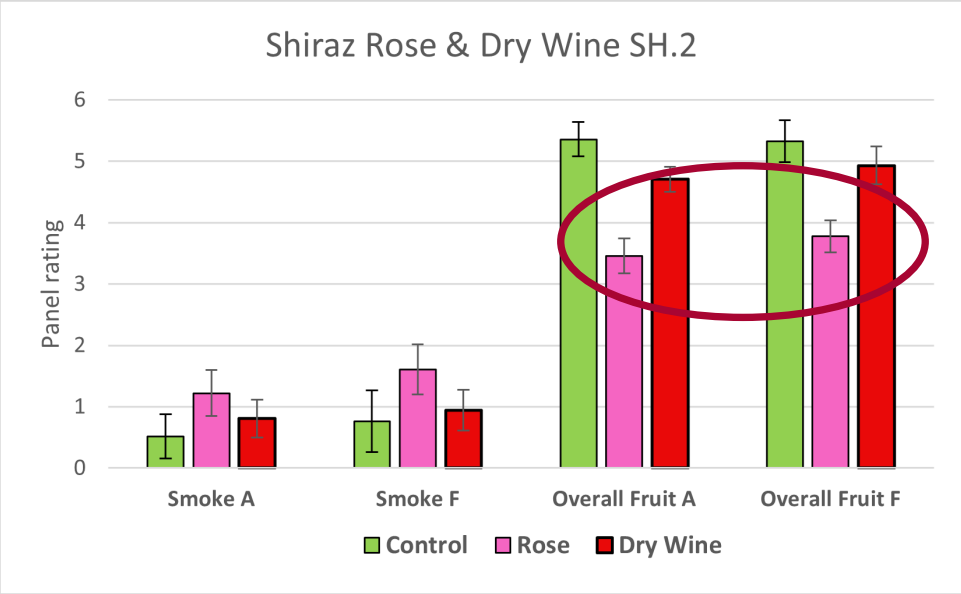
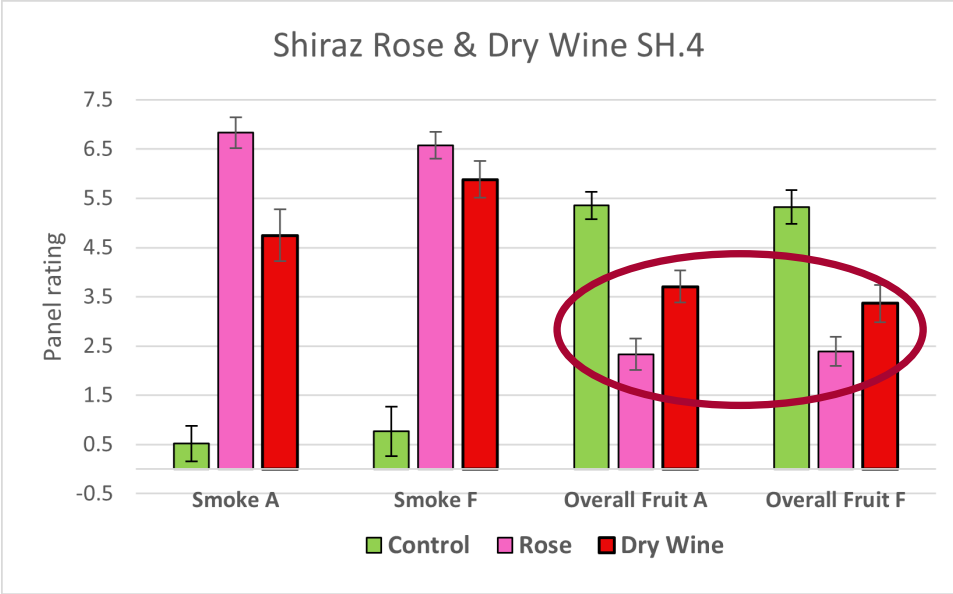
Rosé and Dry Wines – Shiraz



Consistent reduction
Fruit aroma in Rose







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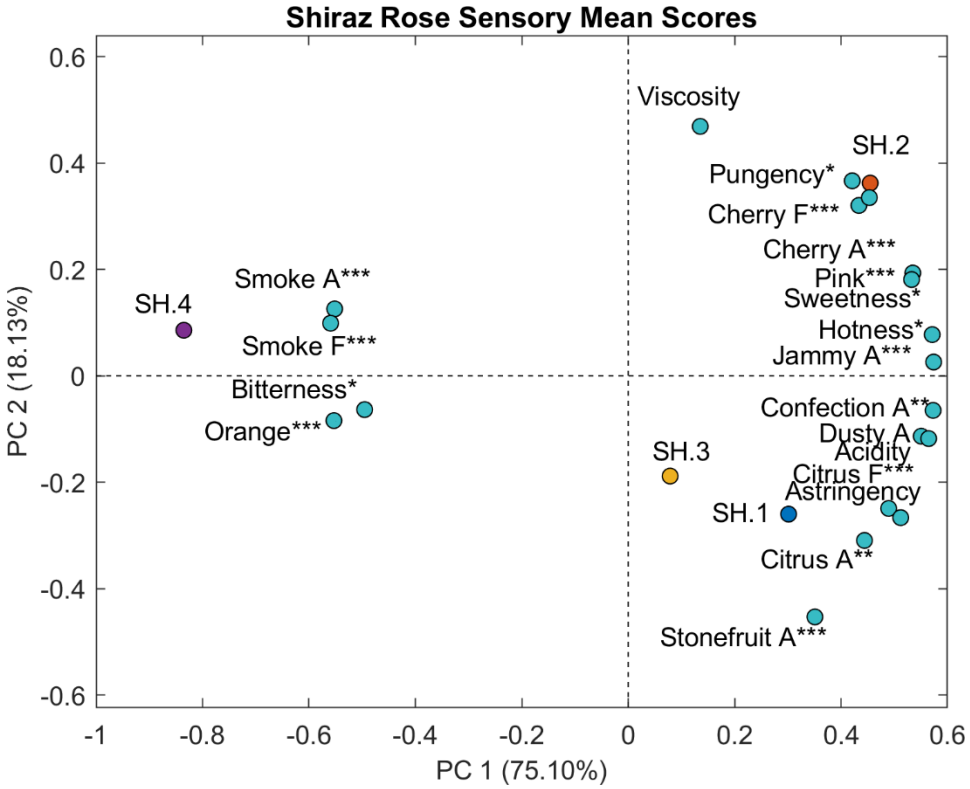
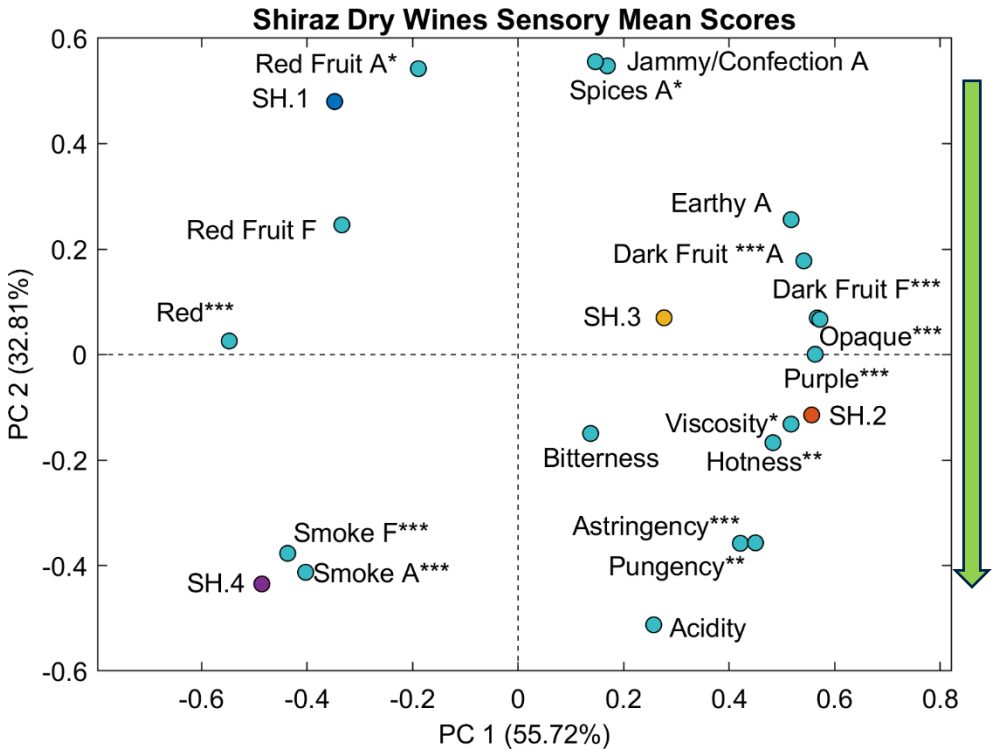
Shiraz

Fruitfulness discrimination by panel for dry wine
Masking effect of smoke





Maturity

Smoke

Fruitfulness

* p< 0.05
** p< 0.01
*** p< 0.001

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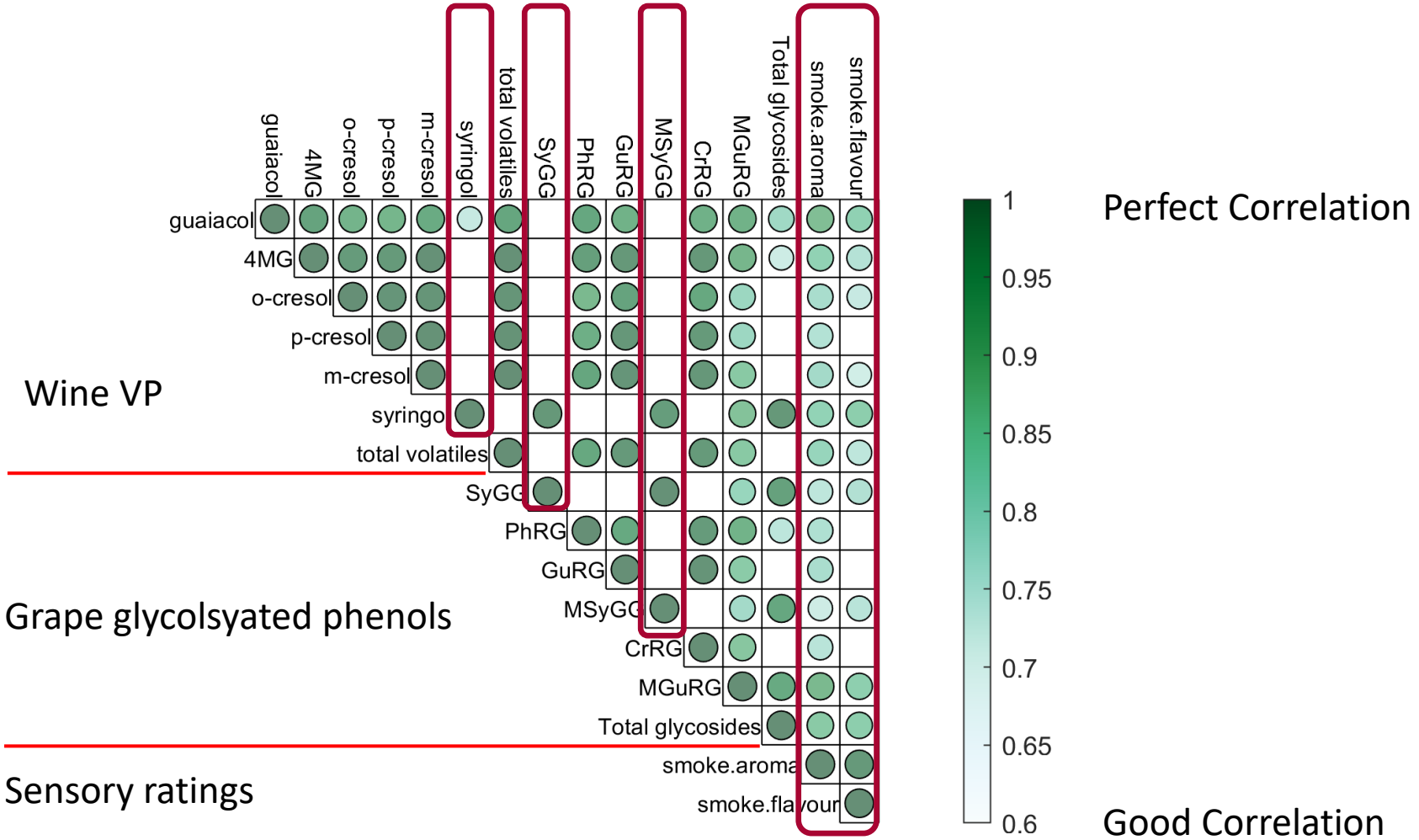
How well do grape and wine markers correlate to smoke aroma and flavour?



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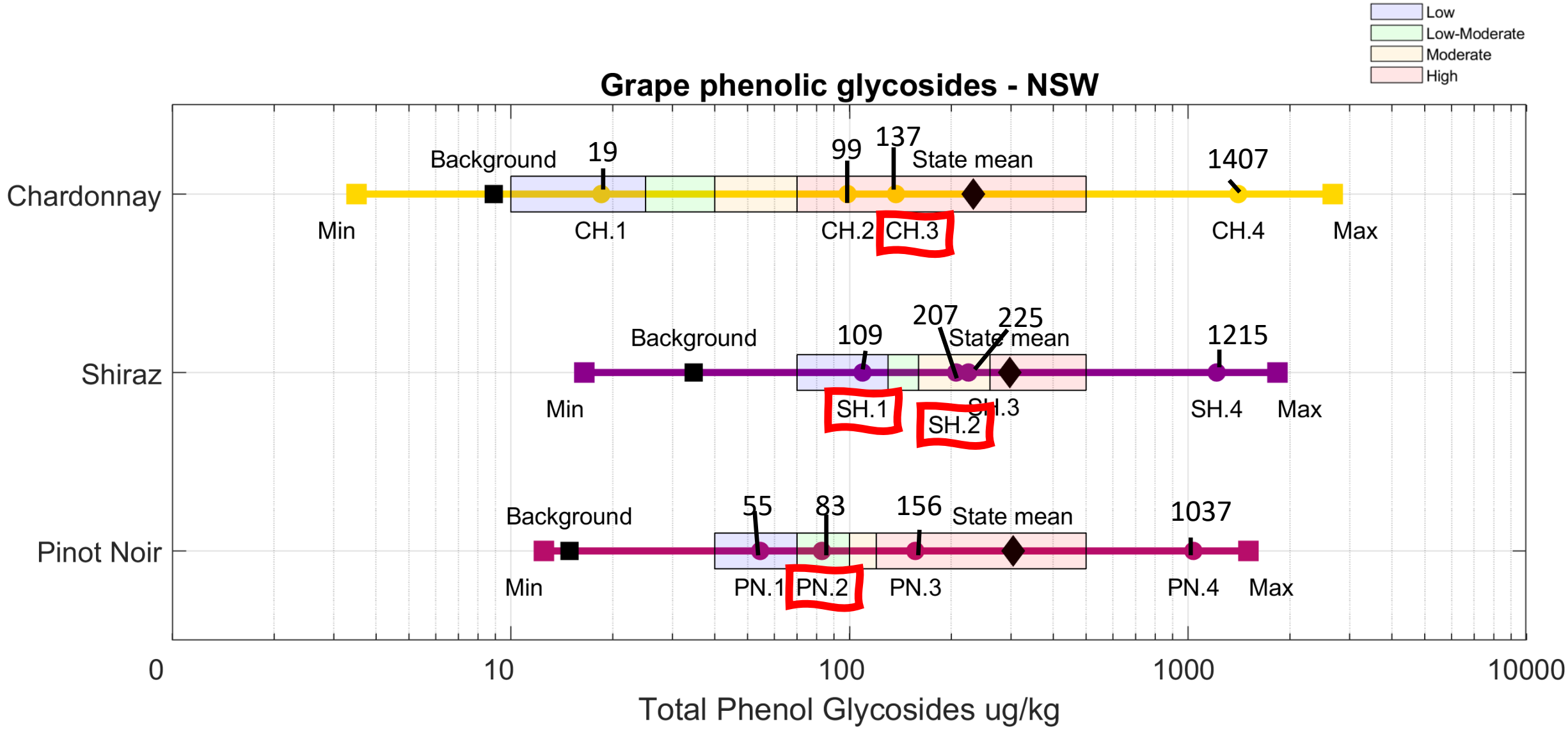
Targeted Grape Harvests from the Grey Zone



Wine Chemistry

	400 L/T			500 L/T		
	pH	TA (g/L)	Alcohol (%v/v)	pH	TA (g/L)	Alcohol (%v/v)
Chardonnay						
CH.1	3.31	6.9	13.4	3.27	6.9	12.8
CH.2	3.48	6.1	13.2	3.41	5.7	11.3
CH.3	3.35	5.1	13.0	3.27	6.8	12.8
CH.4	3.53	5.3	11.3	3.53	4.9	11.3

	ROSE			RED		
	pH	TA (g/L)	Alcohol (%v/v)	pH	TA (g/L)	Alcohol (%v/v)
Pinot Noir						
PN.1	3.5	5.9	12.0	3.47	6.1	12.3
PN.2	3.4	6.3	12.7	3.47	5.4	13.8
PN.3	3.5	5.2	12.1	3.49	5.3	12.9
PN.4	3.4	4.8	11.6	3.42	5.7	12.0

	ROSE			RED		
	pH	TA (g/L)	Alcohol (%v/v)	pH	TA (g/L)	Alcohol (%v/v)
Shiraz						
SH.1	3.3	5.9	14.3	3.62	6.2	12.5
SH.2	3.3	6.3	13.8	3.27	7.6	15.4
SH.3	3.6	5.9	13.3	3.47	5.0	13.8
SH.4	3.6	5.0	12.0	3.21	7.4	12.5

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Take home messages

Chardonnay

- Lower extraction rates = lower volatiles in wine
- Acceptable wines made noting fruitfulness is key driver

Pinot Noir

- Lacked fruit quality & smoke dominant regardless of style

Shiraz

- Rosé production resulted in a higher perception of smoke taint.
- Corresponding red wines were not perceived to be overtly smoky.
- Fruitfulness key driver of outcome behind glycosidic markers of smoke exposure

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Thank you

Wine Australia

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