Canopy management for sparkling grape production

TASMANIAN INSTITUTE OF AGRICULTURE

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UTAS

TIA is a joint venture of the University of Tasmania and the Tasmanian Government

Tasmania
Explore the possibilities

The starting point

Online survey

- Viticultural management practices
- Winemaking methods
- Helped develop trial methodology both in the vineyard and in the winery

Tasmanian online survey results

Clones

- Pinot Noir
  - -D5V12 (77.3 %)
- Chardonnay
  - -Penfolds (58.8 %)
  - -I10V1 (41.2 %)

Rootstocks or own roots?

- 96% of vines are grown on own roots

Designation of parcels of fruit for sparkling production

- 45.5% designated sparkling blocks based on previous years
- 31.8% decision is made by the winemaker annually (ad hoc)
- 22.7% decide at pruning
- 18.2% decide close to harvest
- 4.5% decide when the crop load is known to be too high for table wine production.

Tasmanian online survey results

Pruning

- Cane pruning preferred
- 95 % of Chardonnay cane pruned
- 91 % of Pinot Noir cane pruned

Bunch removal

- 40 % Chardonnay
- 52 % Pinot Noir

Shoot thinning

- 47 % Chardonnay
- 46 % Pinot Noir

Leaf removal

- 38 % Chardonnay
- 47 % Pinot Noir

Project methodology

Further investigation of common viticultural management practices in dedicated sparkling vineyards:

- •Timing of leaf removal
  - -Anecdotal evidence of impact on phenolics
- •Crop load/target yield (pruning level)
  - -Where is the yield ‘sweet spot’
- •Pruning method (cane or spur pruning)
  - -Some moves to mechanisation (larger plantings)

Measure fruit and base wine parameters, including phenolic profiles

Sparkling wine small scale (12 kg), standard vinification

Base wines also tiraged on a small scale

Leaf removal

2 locations

- Southern Tasmania, Coal River Valley, Tolpuddle Vineyard
- Northern Tasmania, Tamar Valley, Tamar Ridge Estates, Kayena Vineyard

2 varieties

- Pinot Noir (D5V12) and Chardonnay (I10V1)

3 treatments + control (4 replicates)

- Leaves removed pre-flowering
- Leaves removed at pea size
- Leaves removed at 50 % veraison

Leaf removal at pea-size

Juice preparation:
Flat bed water-bag press

Pinot Noir basic fruit analysis

Southern and Northern 2010 grape analyses

- No significant differences
  - TSS
  - TA
  - pH
  - Yield
  - Bunch number
  - Berry weight
  - Bunch weight
  - Grape total phenolics

Southern 2011 grape analyses

- Leaf removal increased TA (lower K+ with exposure?)
- No other significant differences

Northern 2011 grape analyses

- No significant differences

Southern Chardonnay fruit analysis

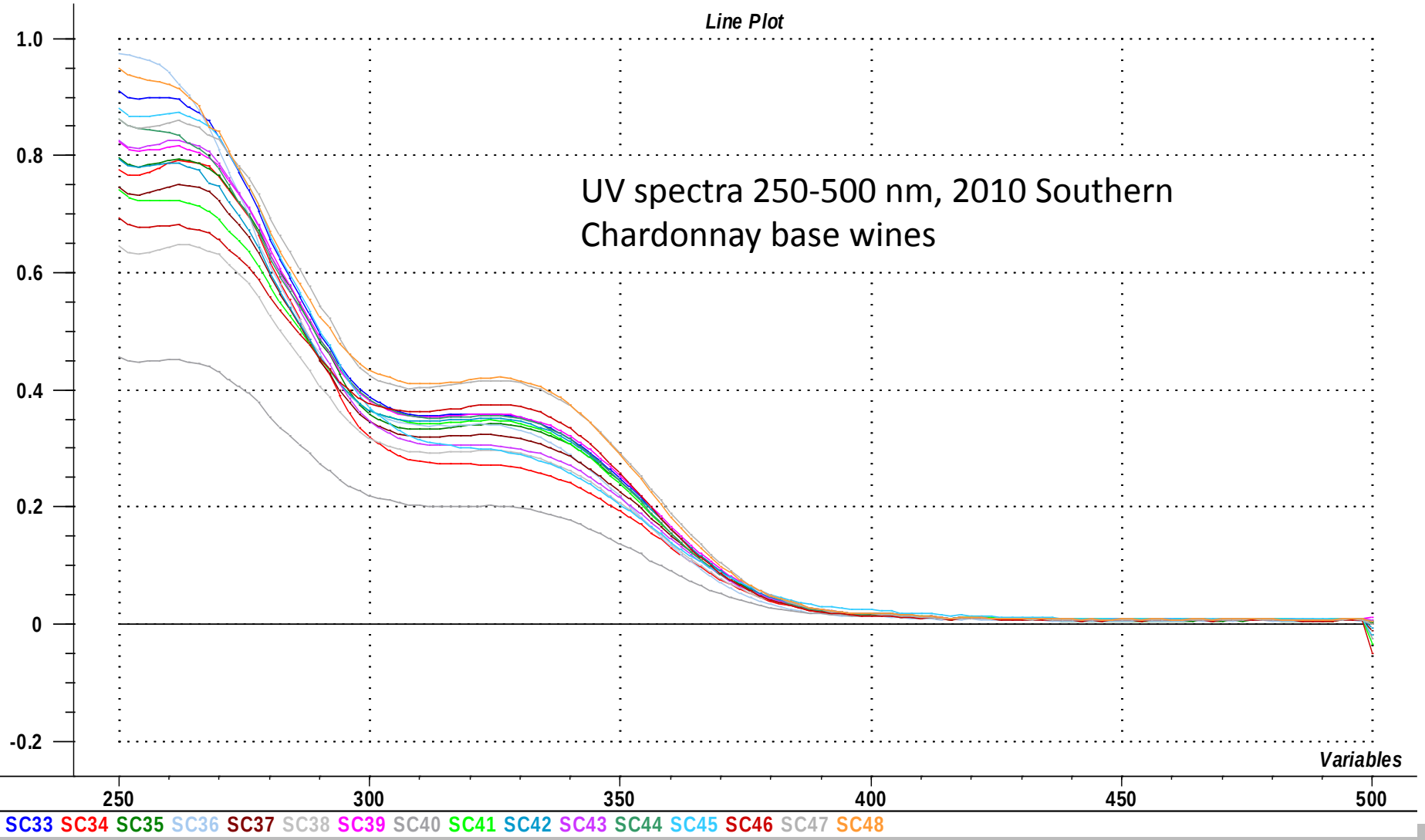
2010 grape analyses

- No significant differences
  - TSS
  - TA
  - pH
  - Yield
  - Bunch number
  - Berry weight
  - Bunch weight
  - Total phenolics (A280)

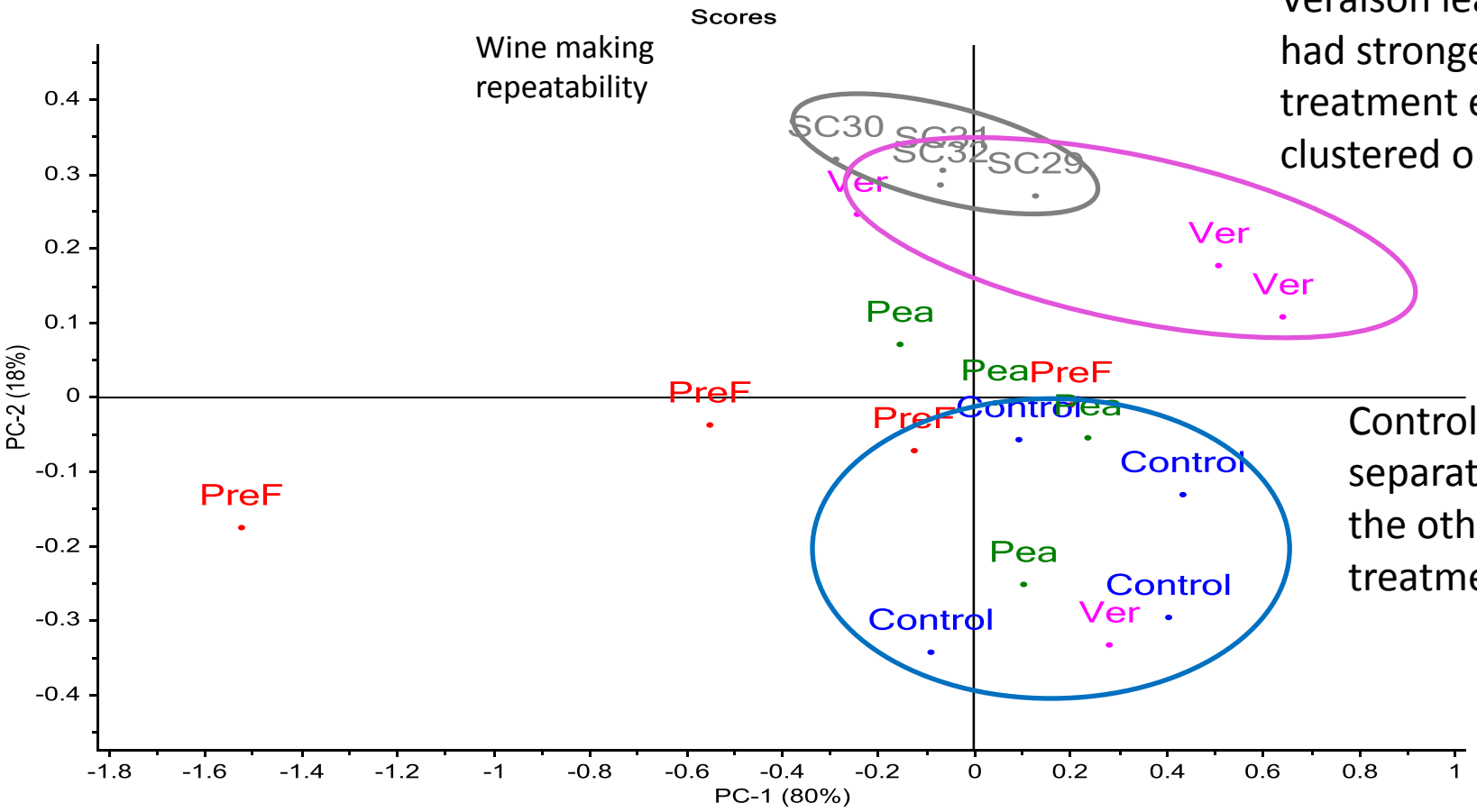
2011 grape analyses

- TSS and TA increased by leaf removal
- No significant differences
  - pH
  - Yield
  - Bunch number
  - Berry weight, Bunch weight
  - Total phenolics (A280)

However .... UV spectral fingerprints of base wines show differences !!!



2010 Southern Chardonnay base wines – PCA clustering with UV spectra



Veraison leaf removal had strongest treatment effect and clustered on PC2

Control separated from the other treatments

2010 Southern Chardonnay base wines – UV wavelengths that show treatment effects

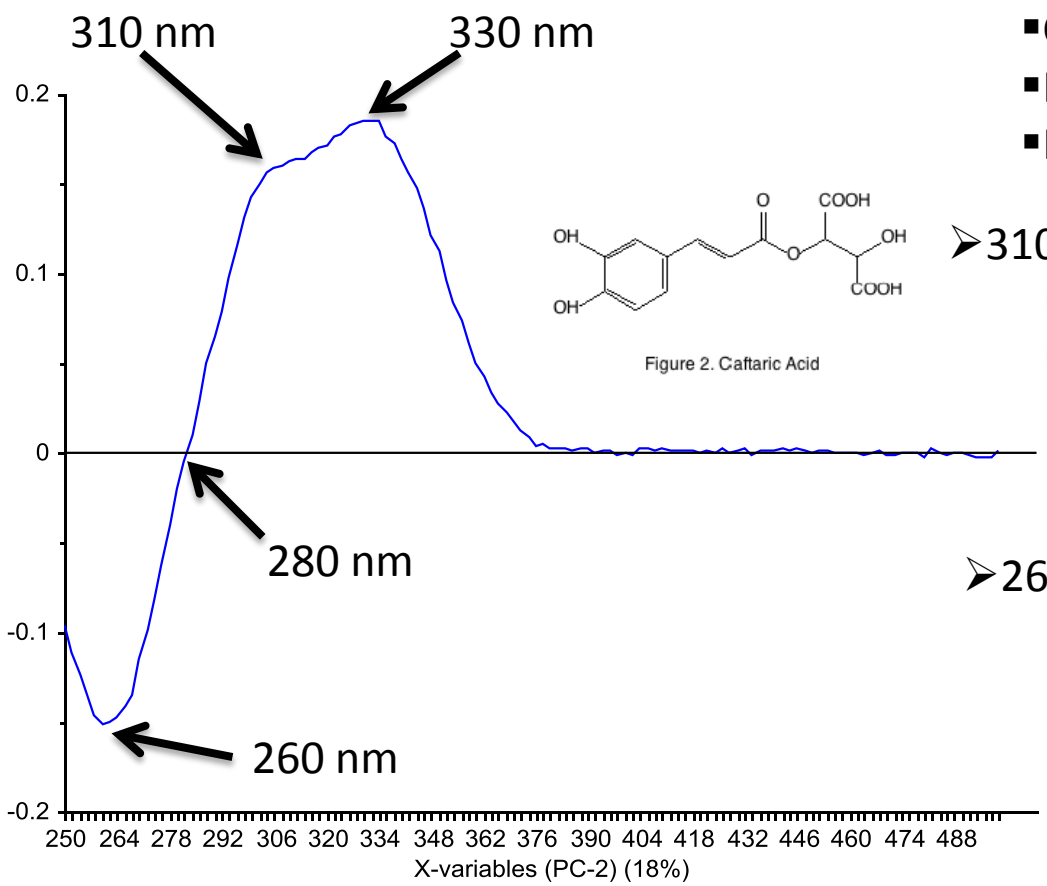
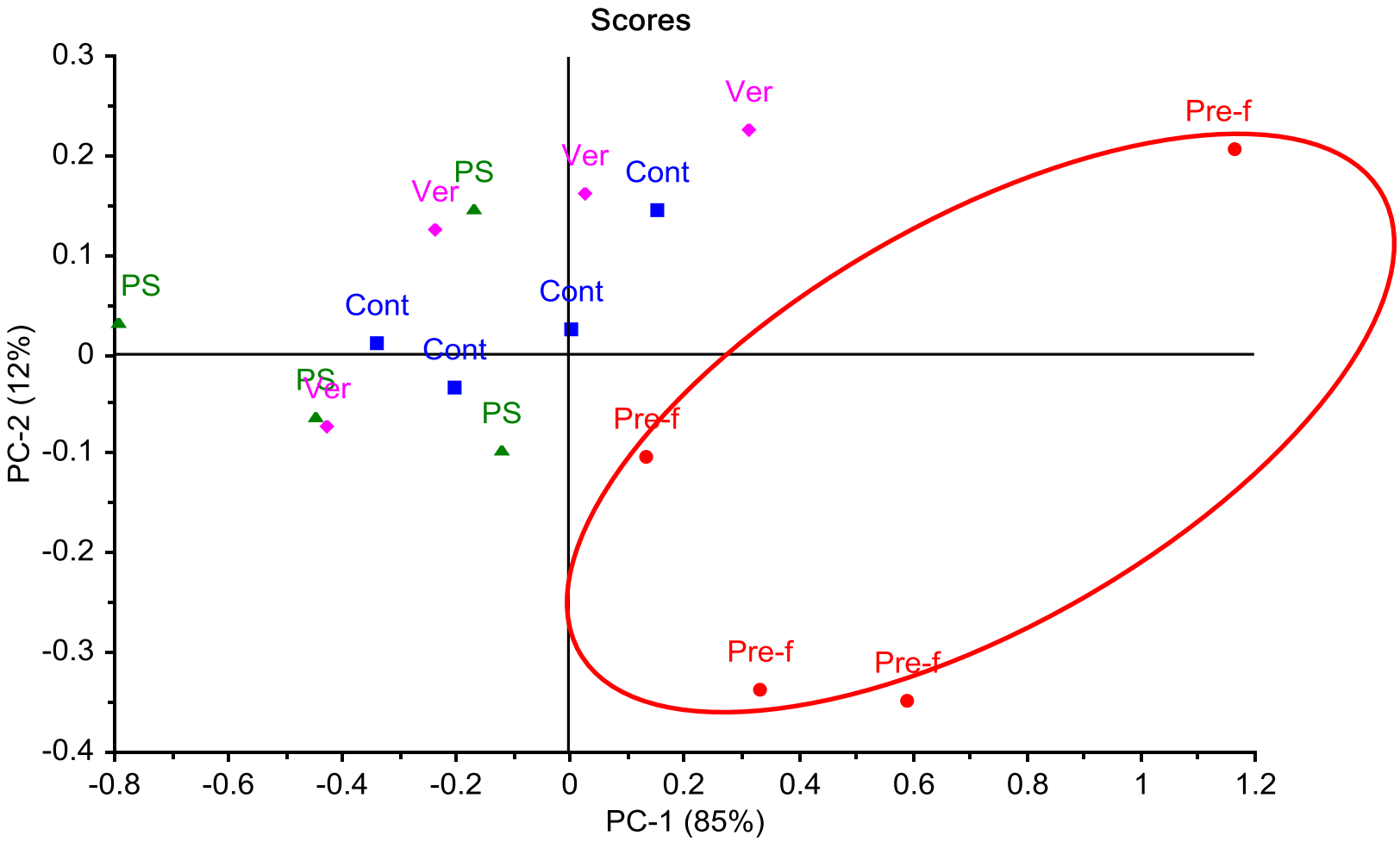


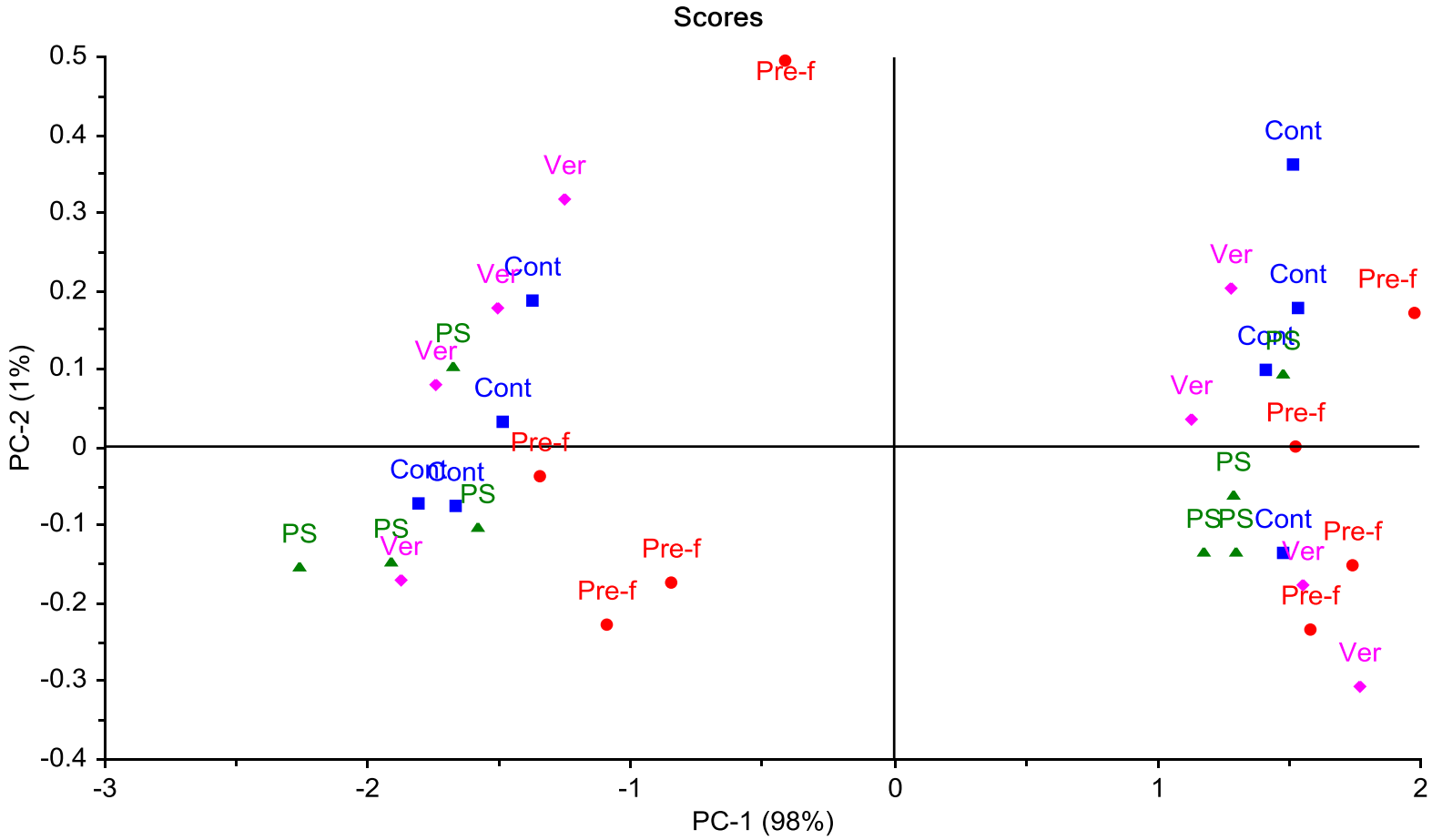
Figure 2. Caftaric Acid

- 280nm
  - Classical measure of total phenolics
  - Neutral
  - No importance
- 310 and 330nm
  - Positive loading peaks
  - Hydroxycinnamates?
- 260nm
  - Negative loading (identity???)

2011 Southern Chardonnay base wines – Pre-flowering leaf removal had the strongest effects



Wine shows stronger treatment effects than juice?



Timing of leaf removal treatment summary

•Little fruit composition effect or traditional measure of total phenolics

• Spectral fingerprinting of juice and base wines indicates individual phenolic compounds are affected by the leaf removal treatments

Varietal effect – leaf removal had more impact in Chardonnay than Pinot

Regional effect – leaf removal had more impact in Southern Tasmania than Northern Tasmania

Seasonal effect - In the same vineyard leaf removal timing effects vary with season

Pinot Noir crop load (pruning level)

3 treatments – cane pruned, 114 (8418)

- Low – 10 nodes/vine
- Medium – 40 nodes/vine
- High – 60 nodes/vine

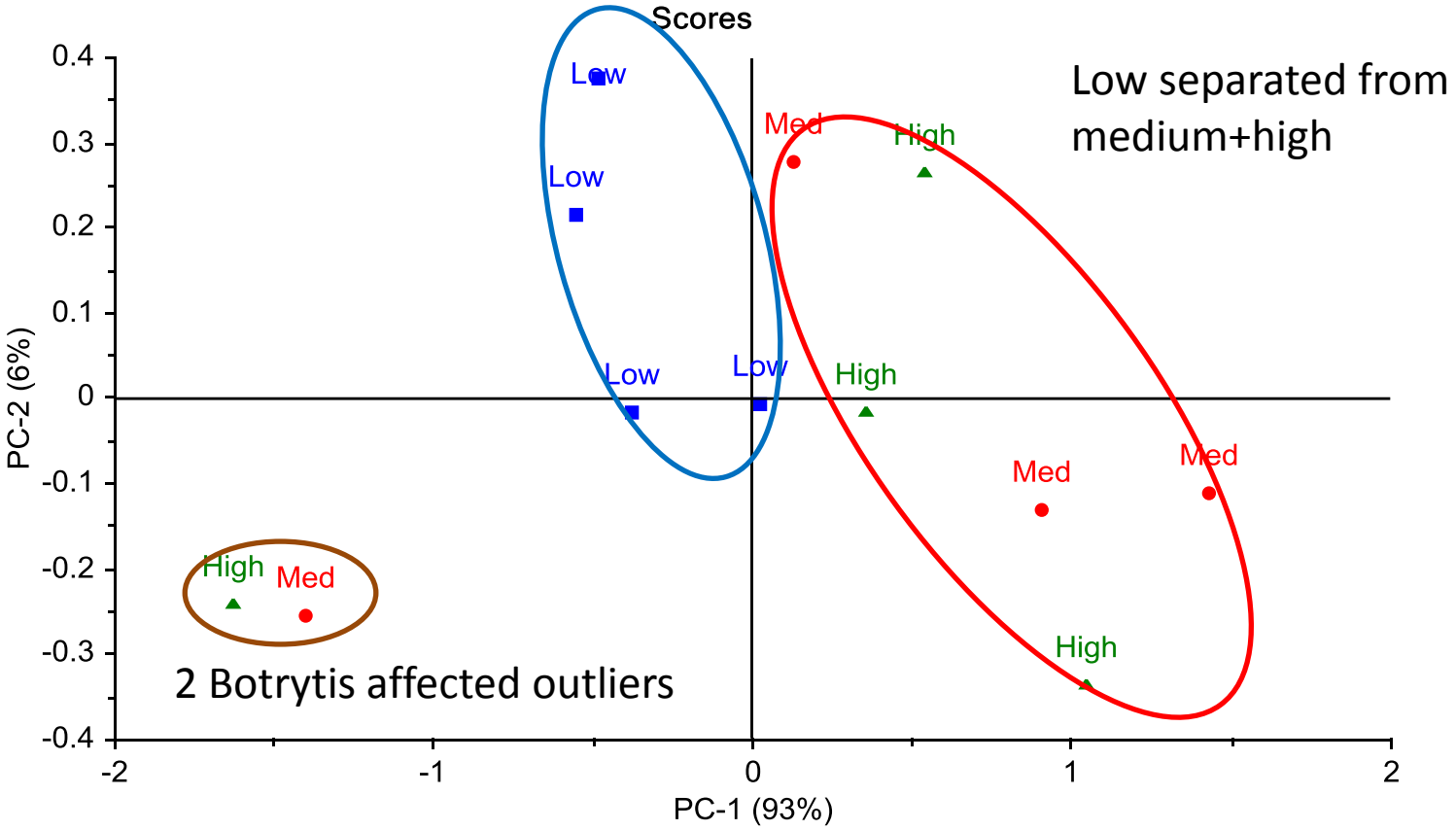
Pinot crop load (pruning level)

	2010					2011				
	Yield (t/ha)	TSS (°Be)	pH	TA (g/L)	Total phenolics (mg/g)	Yield (t/ha)	TSS (°Be)	pH	TA (g/L)	Total phenolics (mg/g)
Low	4.1 a[x]	10.5 b	2.97	13.05	1.83 a	6.0 a	10.9 b	3.27 b	12.02	0.85
Medium	7.7 b	10.6 b	2.98	11.87	1.95 ab	7.4 a	10.9 b	3.18 a	12.38	0.90
High	9.8 b	10.0 a	2.96	12.60	2.09 b	13.6 b	10.2 a	3.17 a	12.89	0.80

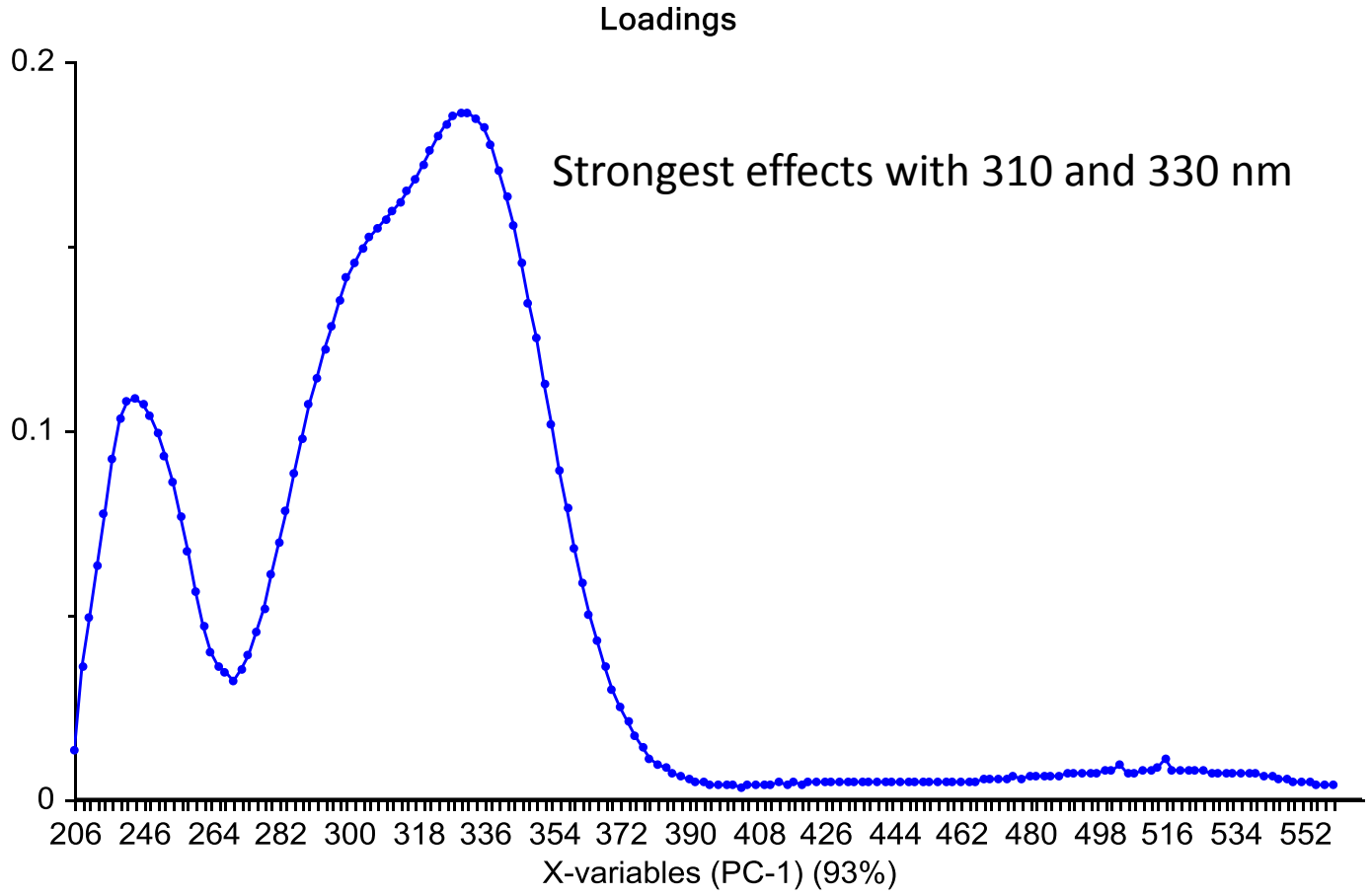
[x] Data shown are means of four replicates. Data with the same letter are not significantly different at 5 % probability when analysed by Fisher's Protected L.S.D. test.

With high bud number , slightly lower TSS and higher total phenolics in 2010
With high bud number, slightly lower TSS and pH in 2011

2010 Pinot Noir base wines – treatment effects can be seen in the UV spectra



2010 Pinot Noir base wines – Similar wavelength feature again!!



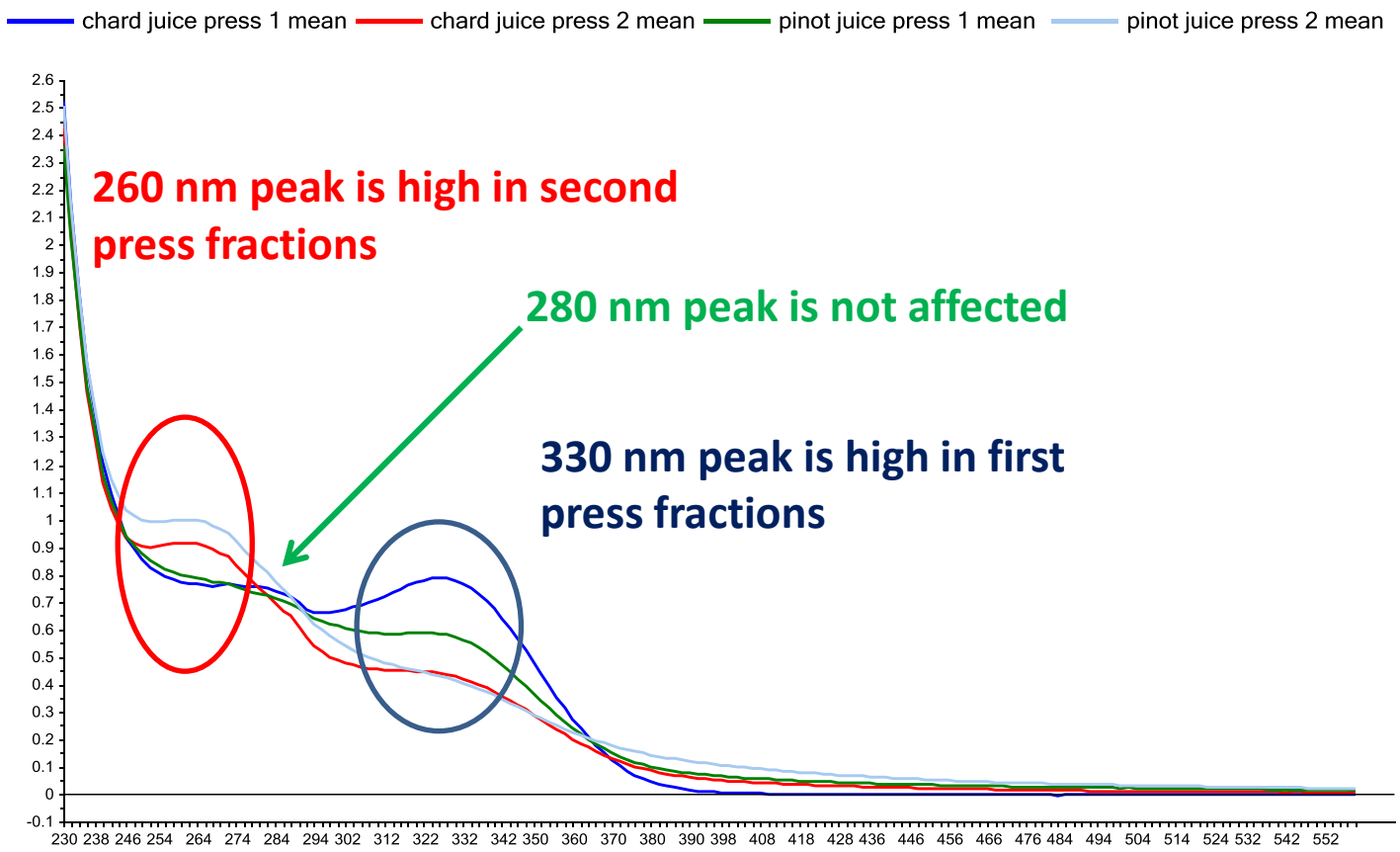
Pinot Noir crop load summary

•Delayed rate of maturation as a result of increased crop load from winter pruning (TSS)

• Juice and base wine phenolic profiles are linked with crop load

•As winter pruning occurs before we know the seasonal weather, most likely that crop thinning may need to be utilised as well to achieve the desired phenolic profile in the base wines

What do the effects mean?



Similar effects for both Chardonnay and Pinot Noir

Take home messages

• Juice and wine phenolic profiles are influenced by exposure and crop load

• Timing of exposure effects is both site and season dependant

• Traditional methods for measuring total phenolics are of little use with the low extaction rates used to prepare sparkling juice

•We may be able to develop a new simple assay for readilly extractable phenolics