

# Managing smoke taint in wine



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# What is smoke taint?

- Guaiacol (smoky, sweet, smoky bacon)
- 4-Methyl-guaiacol (4MG) (smoky, spicy)
- Syringol (smoky, charry)
- 4-Methyl syringol (smoky charry)
- *o*-Cresol (phenol, plastic)
- *m*-Cresol (smoky, phenolic, smoky bandaid, faecal, plastic)
- *p*-Cresol (faecal, horse-stable like, medicinal)

Volatile  
phenols



# Where do they come from?

- Guaiacol can occur naturally
- Guaiacol and 4MG occur in wine that has been oak matured
  - Concentration of 20  $\mu\text{g/L}$  guaiacol - highly positive (together with oak lactones, vanilla, etc...)



# Where do they come from?

Smoke derived volatile phenols ( $> 20 \mu\text{g/L}$ )

*Irreversible decomposition of lignin due to high temperatures and absence of oxygen*

**BUSH FIRES**





# Mode of entry into grapevines

- Via the stomata and waxy cuticle on leaves – subsequent translocation to grapes
- Directly via the waxy cuticle on grapes



# Sensitivity to smoke uptake



- Seven days post *veraison* to harvest
- No difference between cultivars
- Does not carry over to the next year
- Yield is lower the next year





# Localisation of smoke taint compounds



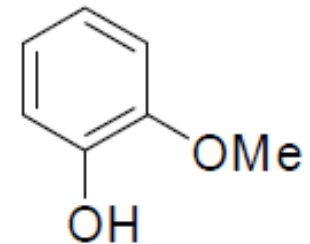
Concentration highest in skins

- Hand versus mechanical harvesting
- Skin contact
- Temperature
- Press fractions

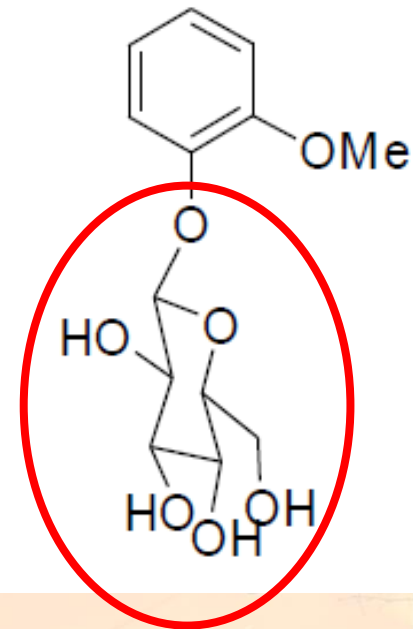


# Two forms of volatile phenols

- Free form (odorous)
  - smaller concentration



- Glyco-conjugated form (the vine adds **sugars** – non-odorous)
  - higher concentration





# Implications of the two forms

- Juice can have negligible free volatile phenol concentrations but high glycosylated concentrations.

- Winemaking practices can release odorous volatile phenols

- Time (acid hydrolysis) can release volatile phenols



# Measuring volatile phenols

- GC-MS

← Expensive Machine, SU can analyse

- LC-MS/MS

← Extremely Expensive Machine, SU cannot yet analyse

## ***EEM bypass***

Acid hydrolysis + enzyme hydrolysis of precursors



# Management of smoke tainted grapes

- Grape washing
- Hand harvest
- Remove leaves and MOG
- Crush as cool as possible
- Limit skin contact
- Settle with purified enzymes (white)
- Red – no enzyme
- Activated carbon fining
- Yeast – inoculate, high vitality, high viability, high aroma
- *Yeast cell walls?*
- MLF – inoculate
- Wood or finishing tannins
- Reverse osmosis and solid phase absorption
- No blending
- Early release on the market



Helpful  
Tips



# Australia



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## Devastated: Smoke taint hits Adelaide Hills wineries

CLOSE ARTICLE

BENSION SIEBERT | 31 MARCH 2015



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Grape grower Frank Baldasso will have to abandon his entire vintage. Photo: Nat Rogers/InDaily

ADELAIDE | Some Adelaide Hills grape growers have been forced to abandon their entire vintage after their grapes tested positive to smoke taint from the Sampson Flat bushfire.

One of the growers and winemakers, Frank Baldasso, was trapped on his property during the January blaze, and counted himself lucky to have survived as the fire roared through one of his vineyards.

He had lost about a quarter of his vines, but he was safe, and optimistic that the smoke - thick enough to block out the sun, but quickly swept away by the wind - could not have ruined the rest of his precious vintage.

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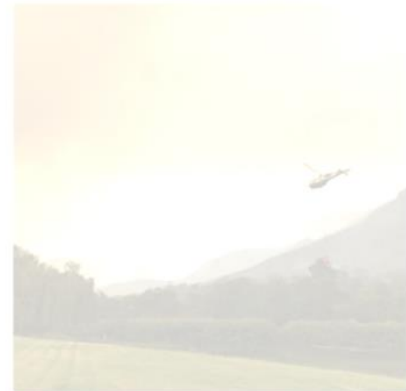
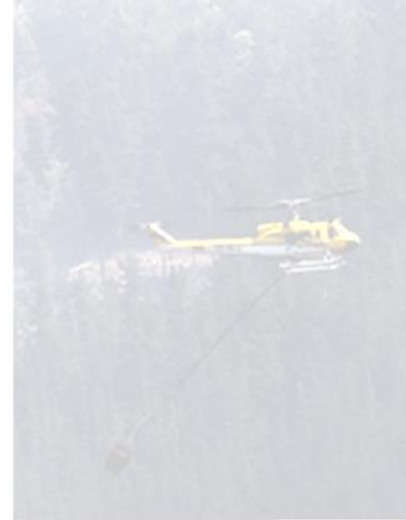
# Past research in RSA

- Chris de Vries (M.Sc.)
  - Volatile phenol composition from Fynbos and Pine, in Pinotage
  - GC-MS method developed



# Future research in RSA

- Develop LC- MS/MS method and compare with acid hydrolyses and enzyme hydrolyses
- Microbial interaction with volatile phenols
- Treatment of wine with glycosidases followed by reverse osmosis



# THANK YOU!

