

Considering vineyard health during prescribed burn windows

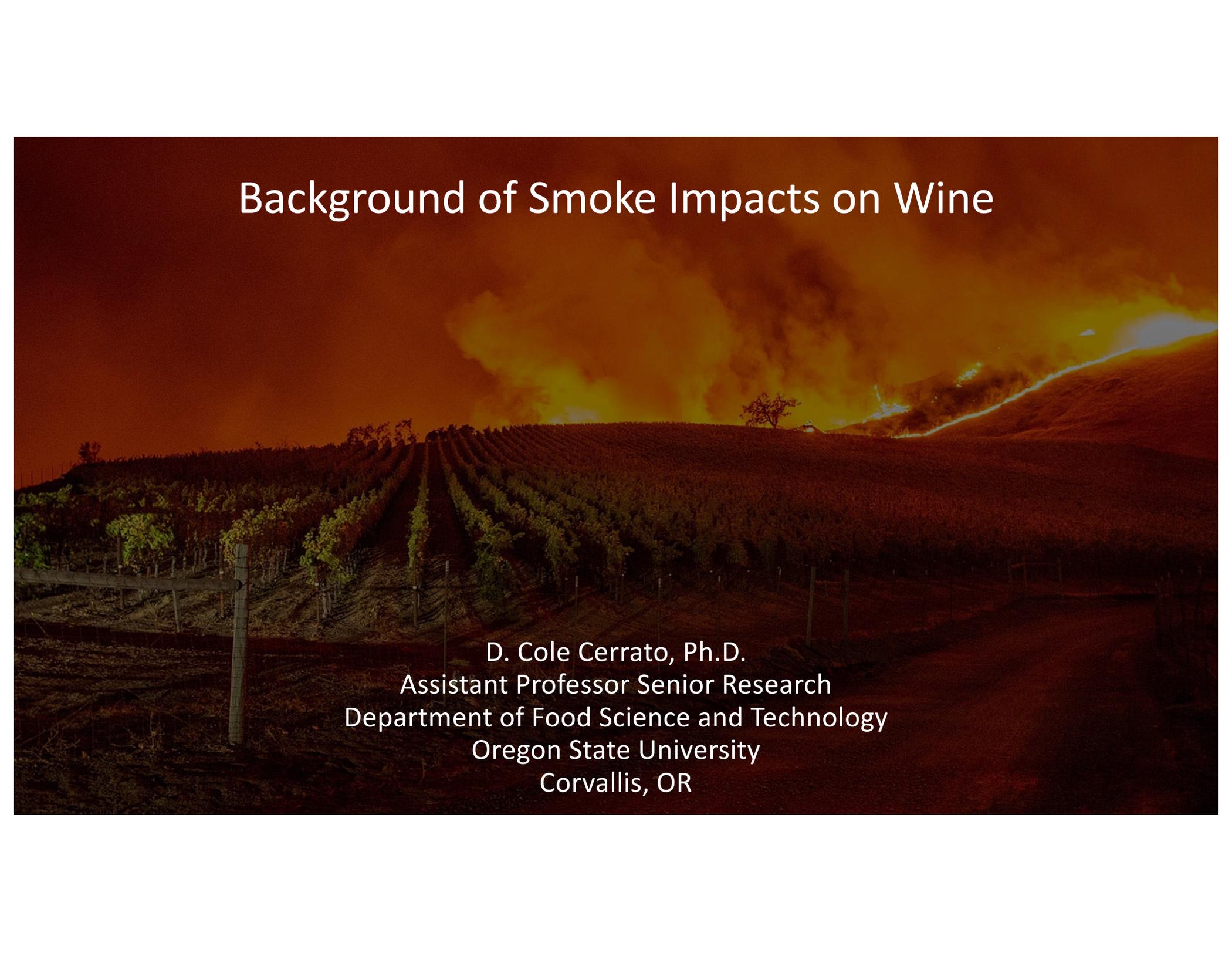
Von P. Walden (WSU)

(but most slides from D. Cole Cerrato from OSU)

Outline

- Background of USDA Smoke Taint project
- What is smoke taint? (Cole's slides!)
- Questions for NW-AIRQUEST regarding prescribed burns

Background of Smoke Impacts on Wine



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Wine and Smoke



Smoke Sensory Characteristics*

- Ashy
- Medicinal
- Campfire
- Burnt
- Rubbery

* 1 in ~6 lucky people can't taste smoke or don't perceive it as gross

Living Your Research – September 2020



Corvallis, OR – My apartment

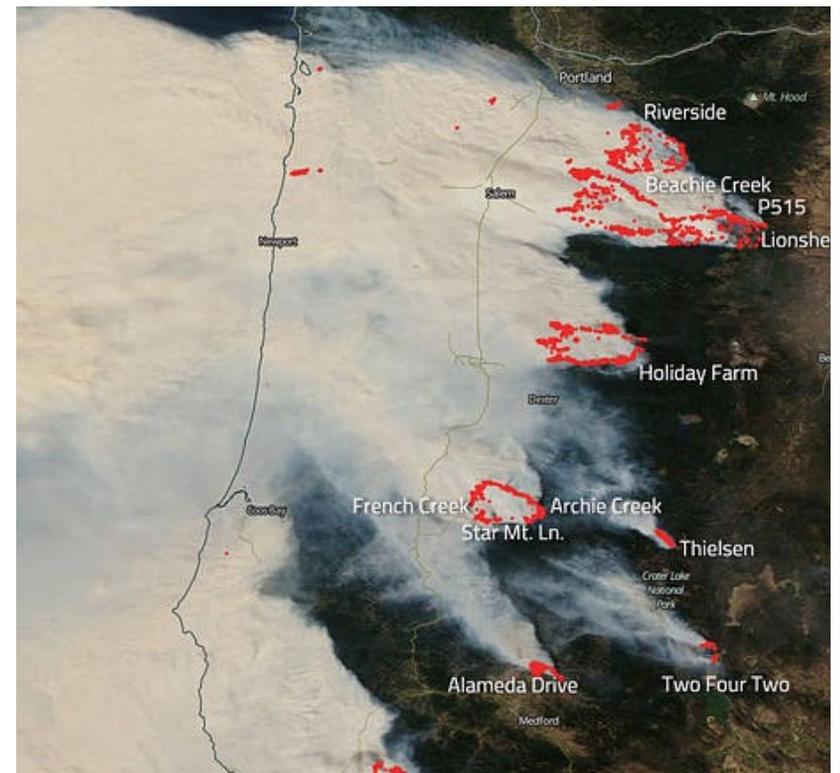
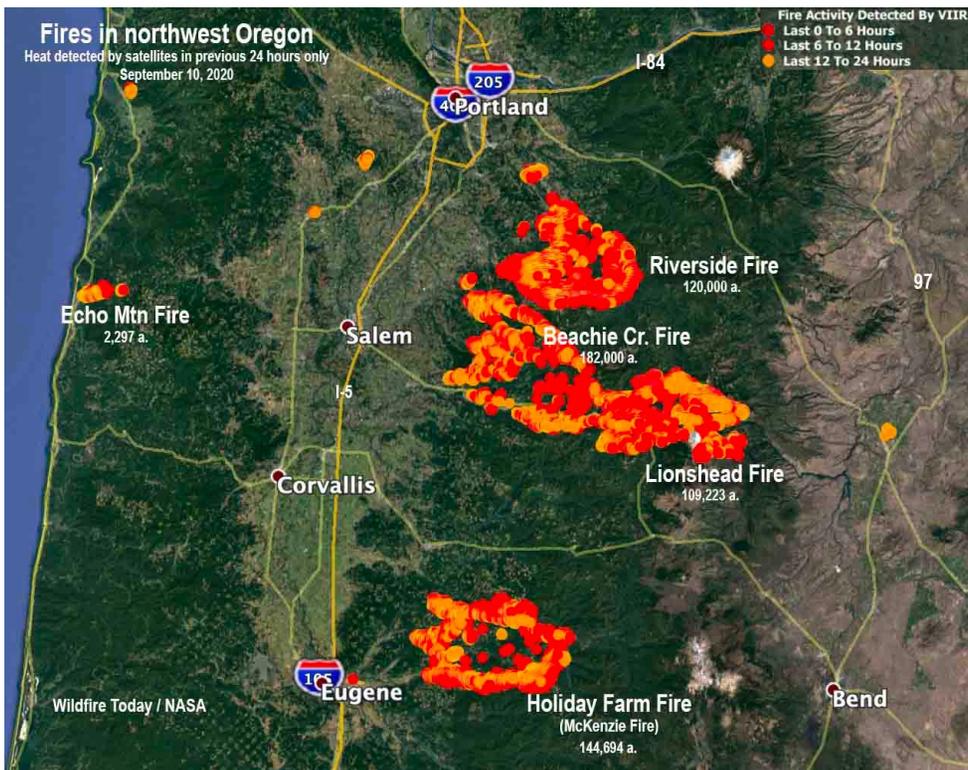


Corvallis, OR – OSU

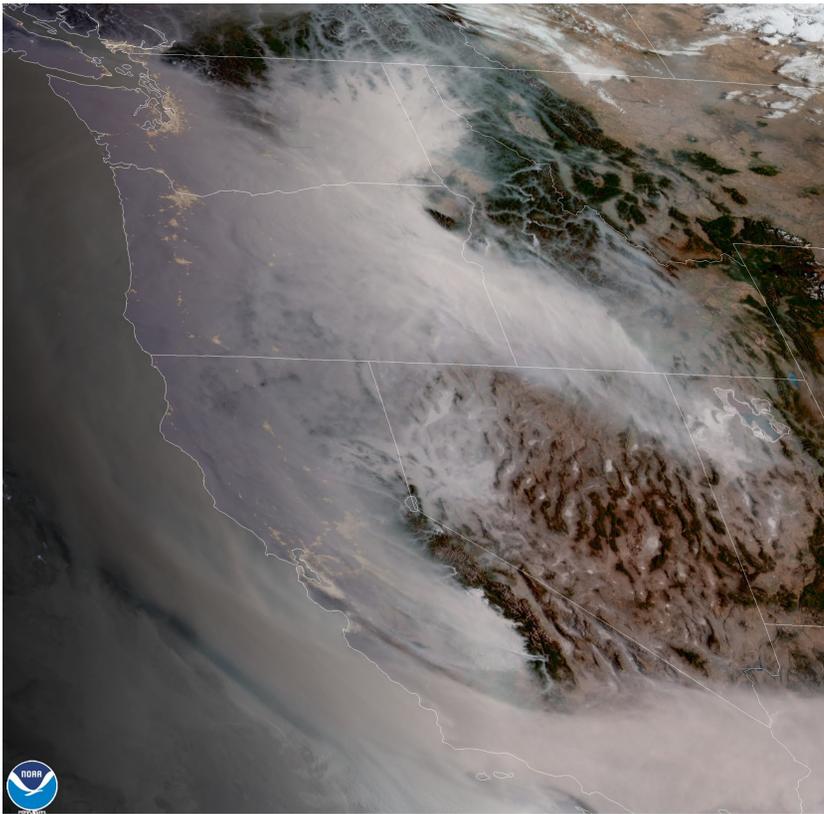


Salem, OR

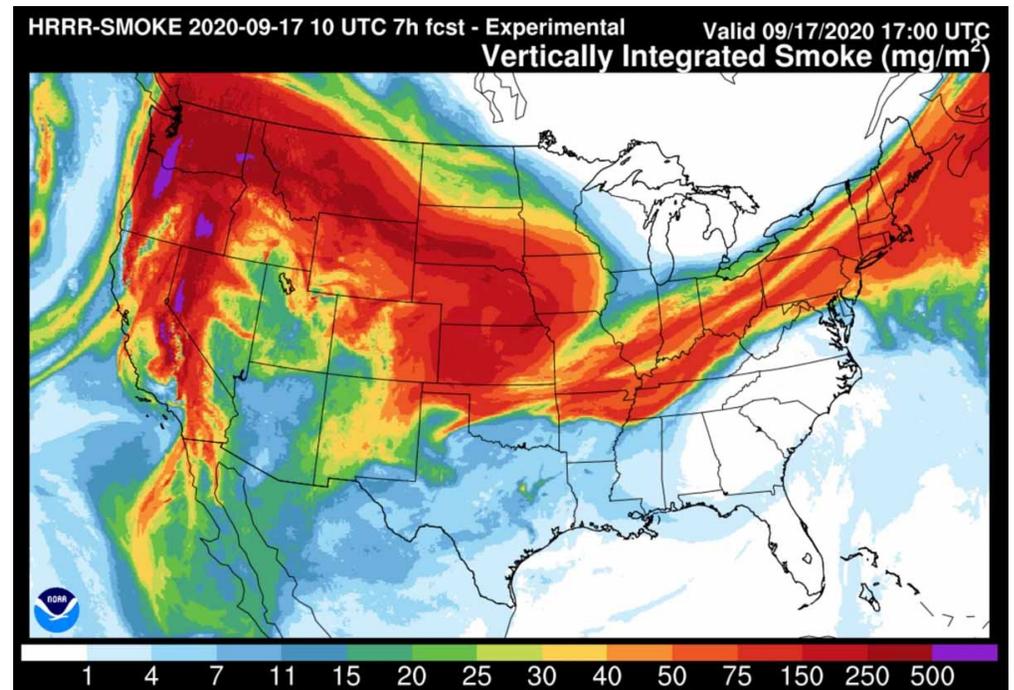
Willamette Valley Oregon – September 2020



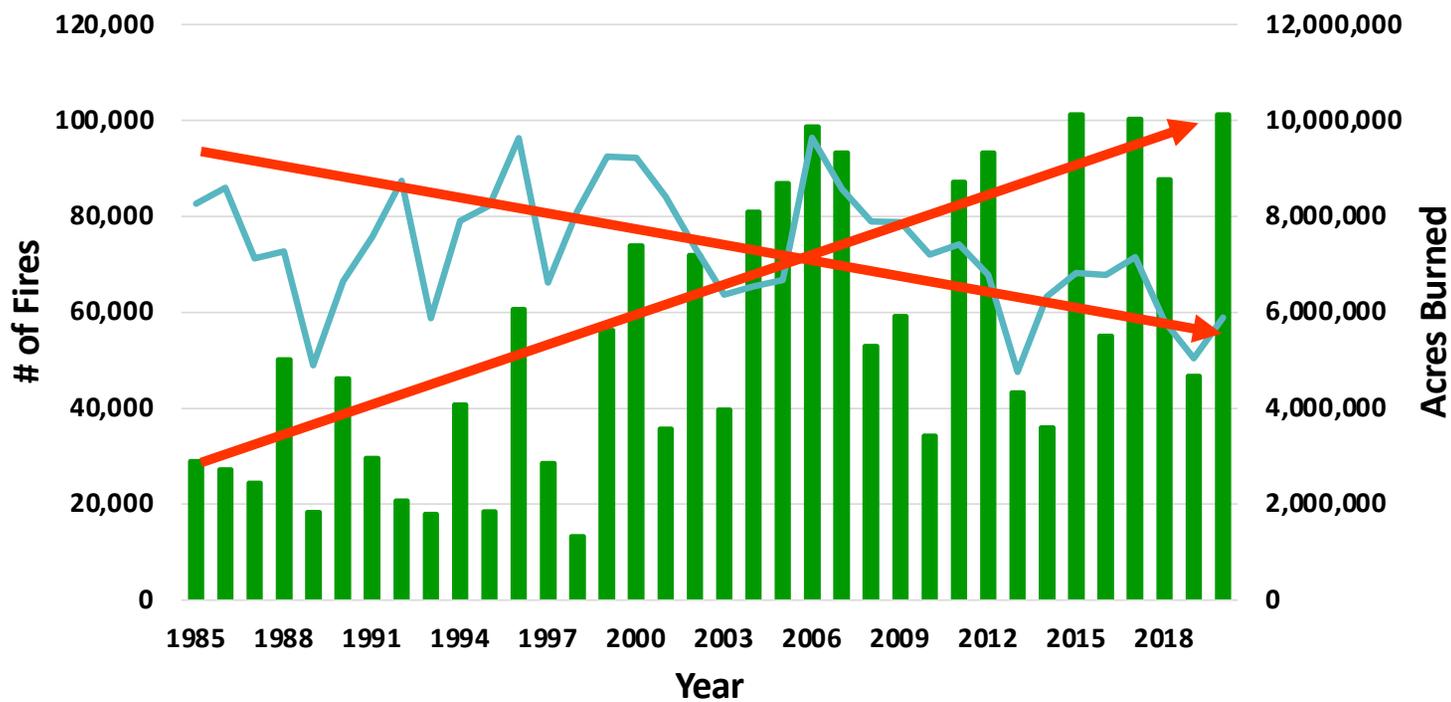
West Coast Wildfires – September 2020



12 Sep 2020 14:56Z NOAA/NESDIS/STAR GOES-West ABI GEOCOLOR



Wildfire Prevalence in the U.S.



Trends

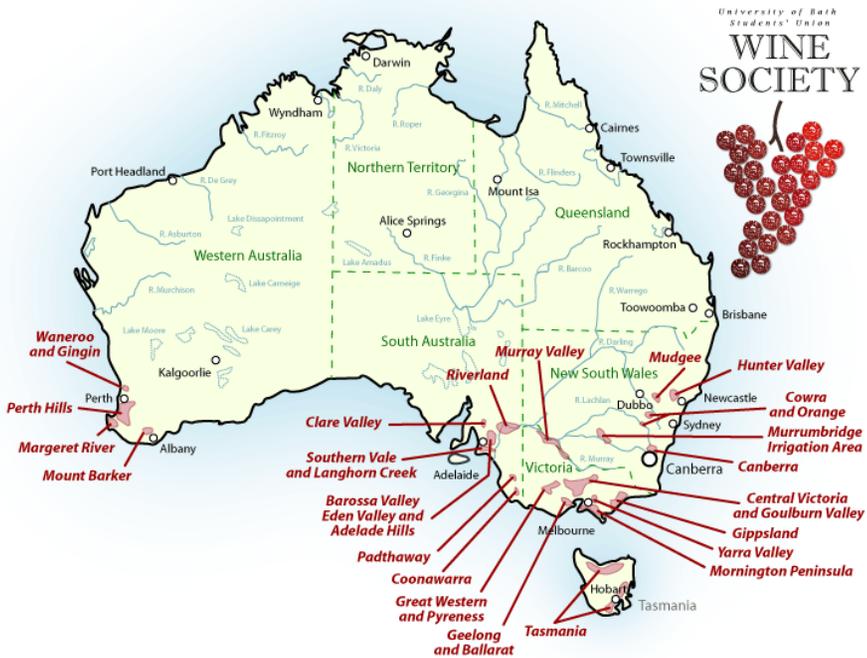
- # of fires decreasing
- Area burned increasing

National Interagency Fire Center,

■ Acres Burned — # of Fires

Graphic by D. Cole Cerrato, Ph.D., OSU

Australian Wildfires – January 2020



European Wildfires 2021

Wildfires in southern France

● Active fires as of August 17 at 0800 GMT



Italy, Greece battling wildfires



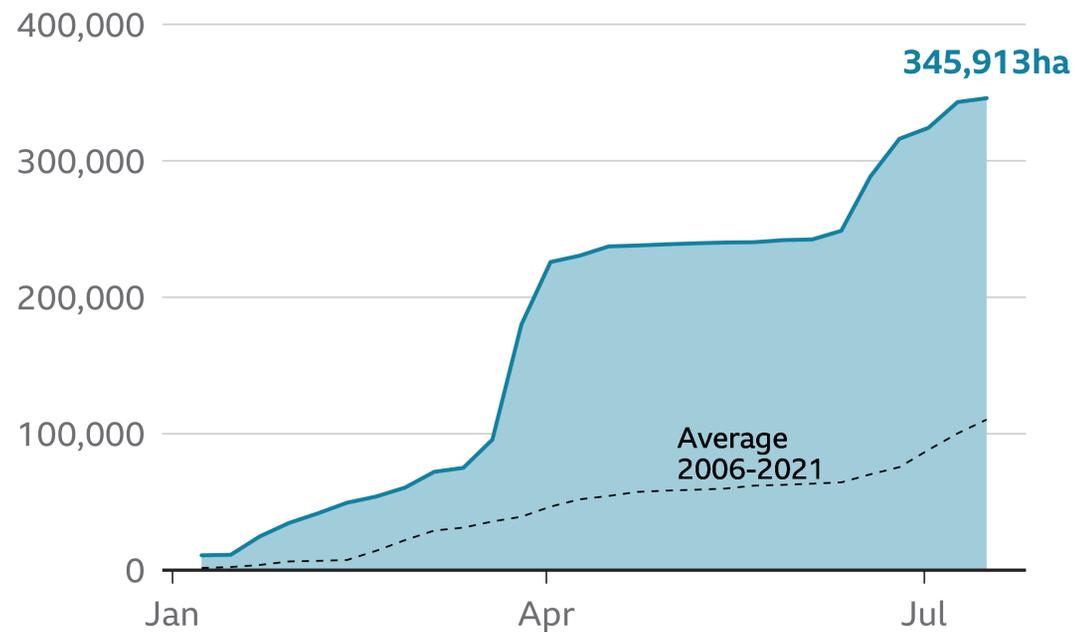
European Wildfires 2022



Image by: Metro.co.uk

Wildfires in the EU are well above average

Weekly cumulative burnt areas in 2022 in hectares

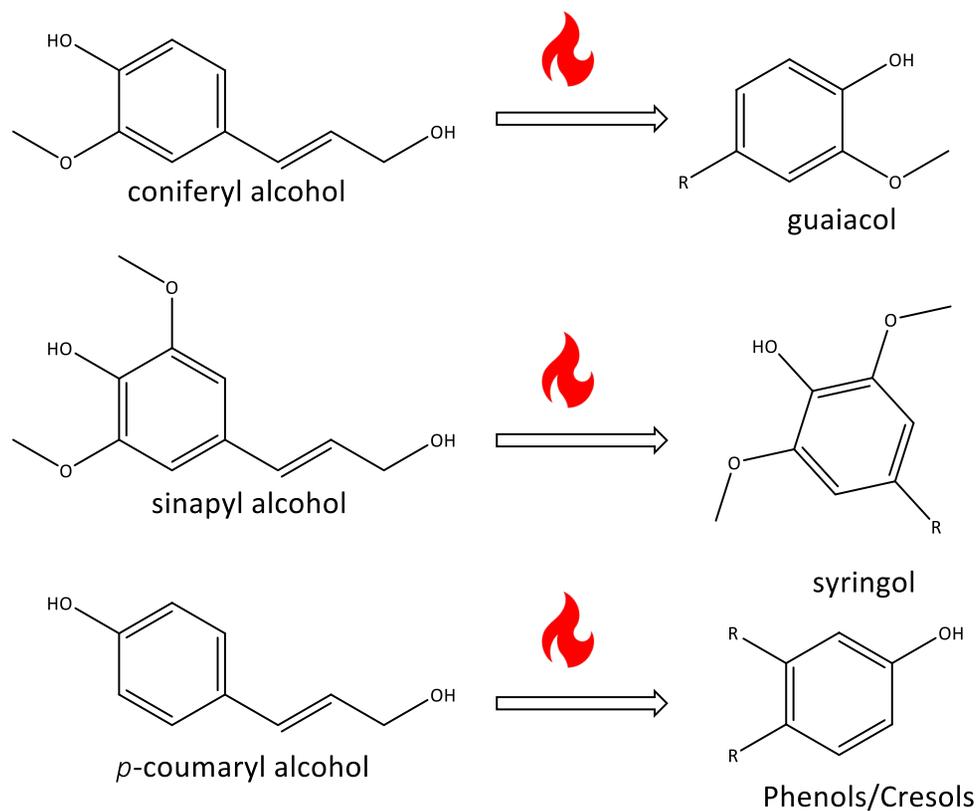


Source: EFFIS Copernicus

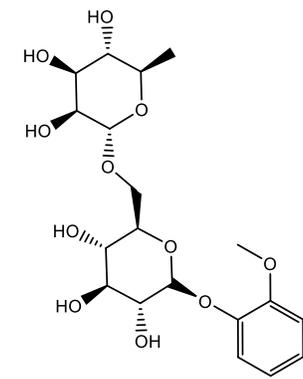
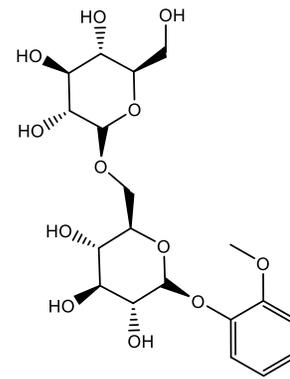
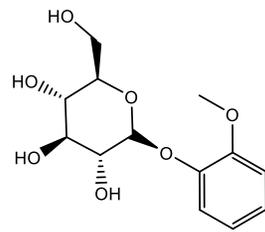
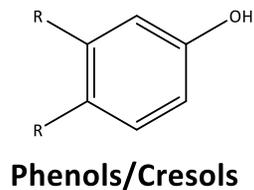
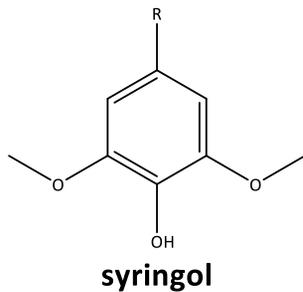
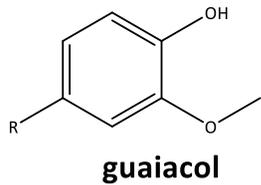
Chemistry of Smoke

- CO₂
- H₂O (g)
- SO₂
- O₃
- NO_x
- CO
- Benzene
- Polyaromatic hydrocarbons

Hundreds of compounds dependent on material and temperature!



Chemistry of Smoke



Despite their higher concentrations after wildfire smoke exposures, the flavors imparted by these compounds aren't necessarily representative of smoked wine flavors when added directly

1. McKay, M., Bauer, F.F., Panzeri, V., Mokwena, L., and Buica, A. Profiling smoke tainted red wines: volatile phenols and aroma attributes. *South African Journal of Enology and Viticulture*. **2019**. 40(2). Doi: 10.21548/42-2-3270.
2. Wilkinson, K., Ristic, R., McNamara, I., Loveys, B., Jiang, WW., and Krstic, M. Evaluating the potential of smoke from Stubble burning to taint grapes and wine. *Molecules*. **2021**. Vol 26. Doi: 10.3390/molecules26247540

Smoke Taint

- How taint occurs is still not well known...
 - Three possible transport pathways: roots, leaves, fruit/grape
 - It is likely that chemicals primarily enter the grape fruit (through skin)
 - Then combine with sulfur to create “thio-compounds”
 - Like thio-guiacol, thio-phenols, ...
- These thio-compounds may be causing the different smoke taint taste

Concerns of Wine Industry

- U.S. wine industry suffered significant losses in 2020
 - Crushed a lot less grapes = less wine...
- Industry wants to avoid smoke taint by all fires, including prescribed burns
- Idaho, Oregon and Washington all have significant grape and wine production

Questions to NW-AIRQUEST

- What factors are taken into account when agencies consider issuing a permit for a prescribed burn?
 - Are any affected industries considered?

Questions to NW-AIRQUEST

- When are prescribed burns issued?
 - There appear to be particular time periods during grape development when the grapes are sensitive to smoke taint
 - This would likely require communication between agencies and the wine industry
- Is there overlap between prescribed burns and sensitive times?

Questions to NW-AIRQUEST

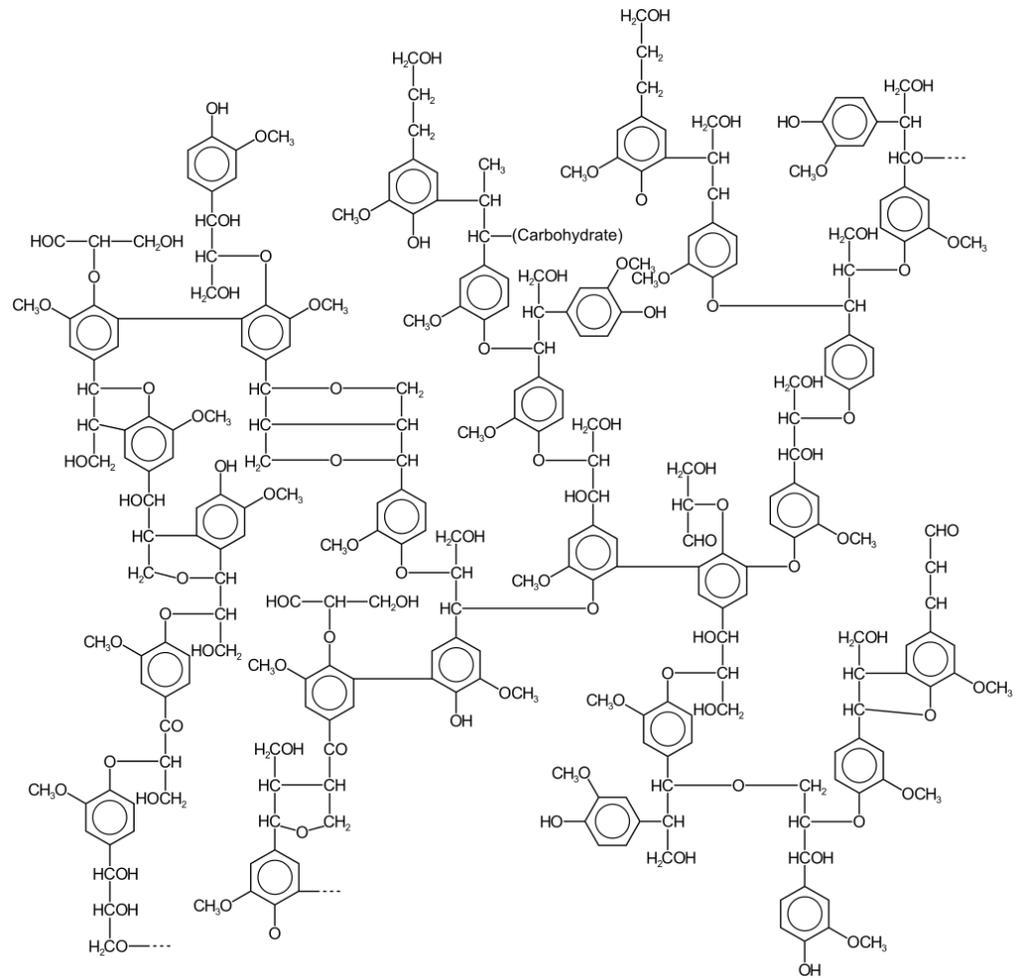
- How does one approach state and local agencies to have them consider a particular entity during prescribed burns?
 - Is there an official process (that depends on the particular state)?
 - Who would need to approve the addition of new considerations?

Questions to NW-AIRQUEST

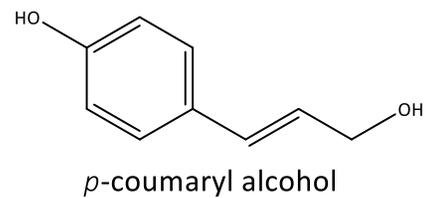
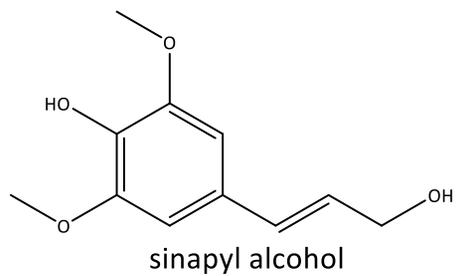
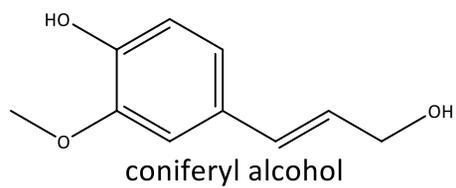
- How might we increase communication on this issue?
 - Is NW-AIRQUEST a good forum to periodically touch base on this issue?



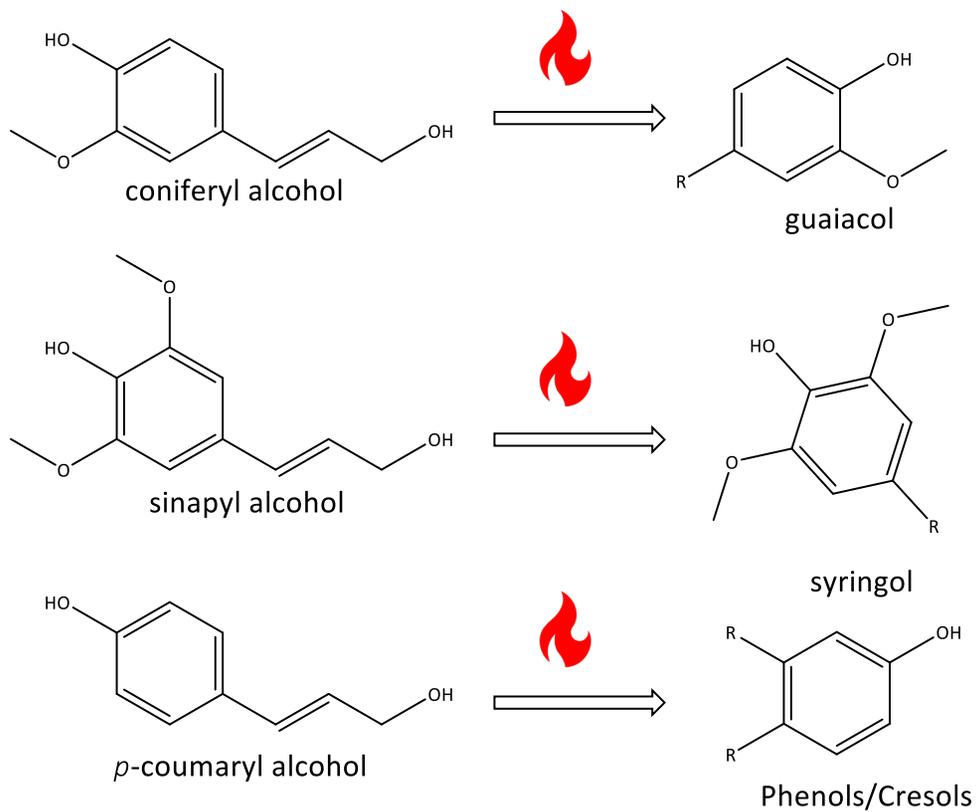
General Lignin Structure



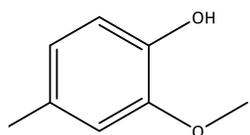
Chemistry of Smoke



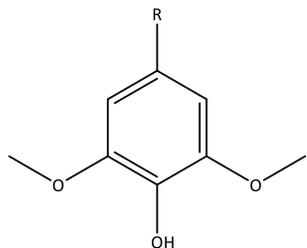
Chemistry of Smoke



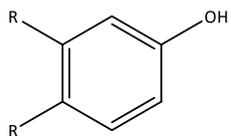
Wine Grape Chemistry



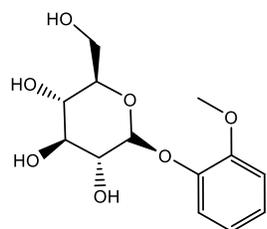
guaiacol



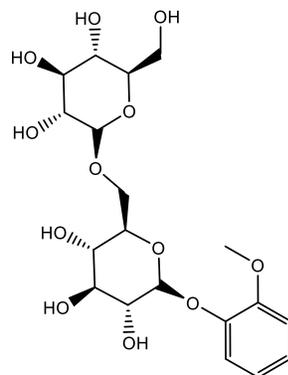
syringol



Phenols/Cresols



guaiacyl- -D-glucopyranoside



guaiacyl- -D-gentiobioside

