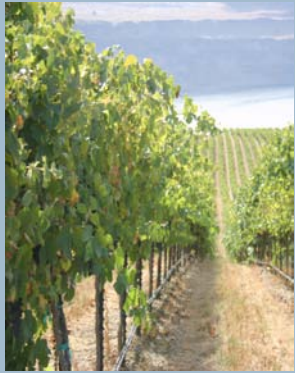
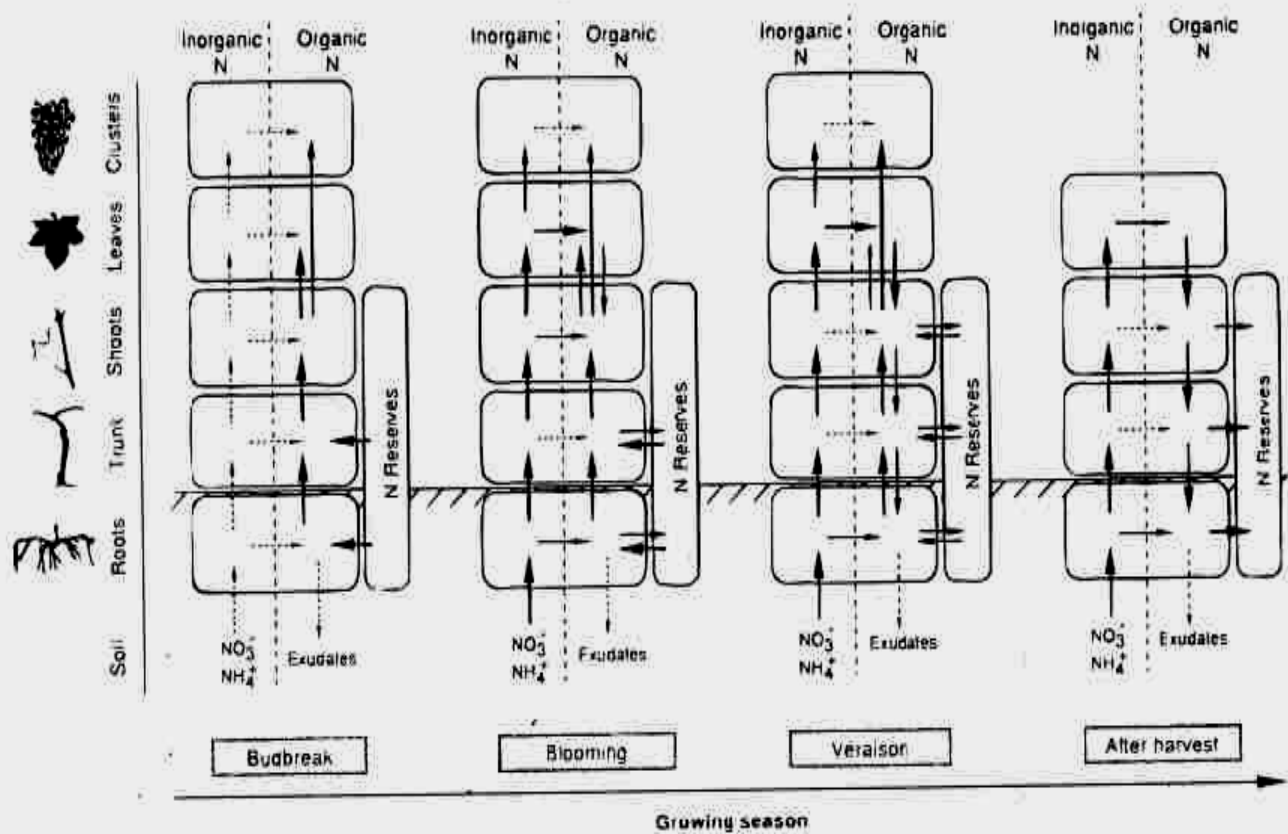
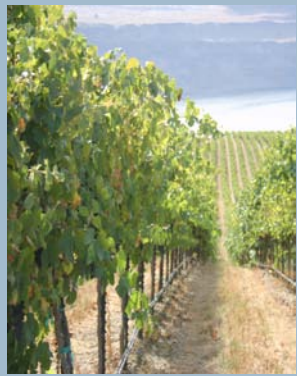


Why Nitrogen



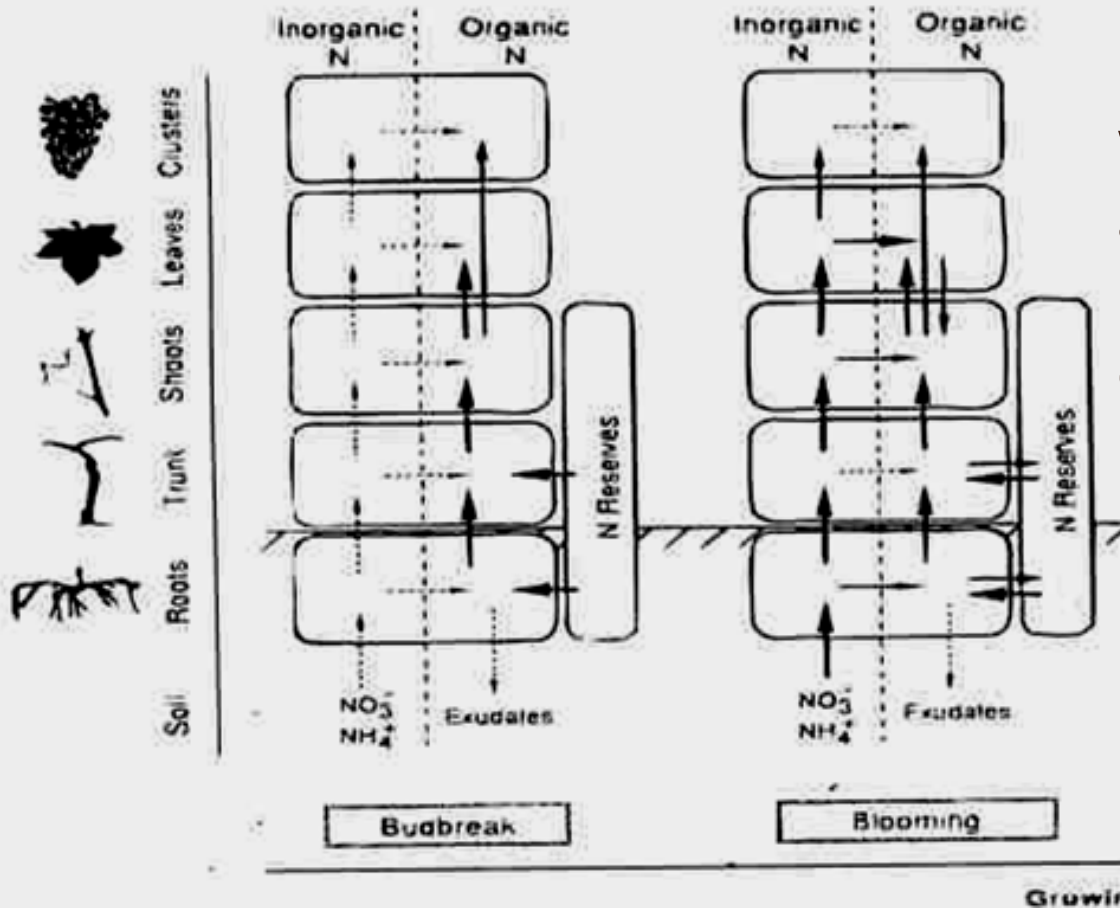
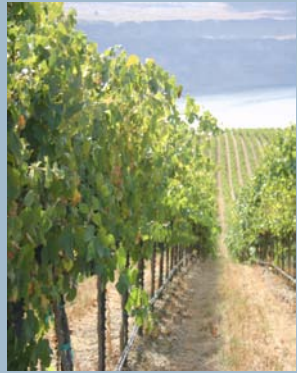
- Canopy growth and development
- Significant component of fruit
- Association with fruit flavor compounds
- The post-harvest N question

Canopy Growth and Development



From Conradie, Chenin Blanc in S. Africa

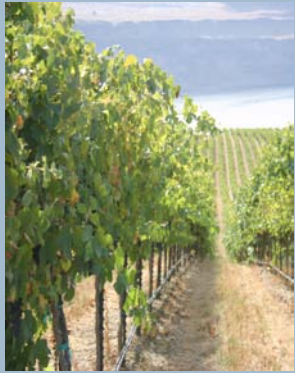
Canopy Growth and Development



Early season N, both from within plant and uptake, builds the canopy.

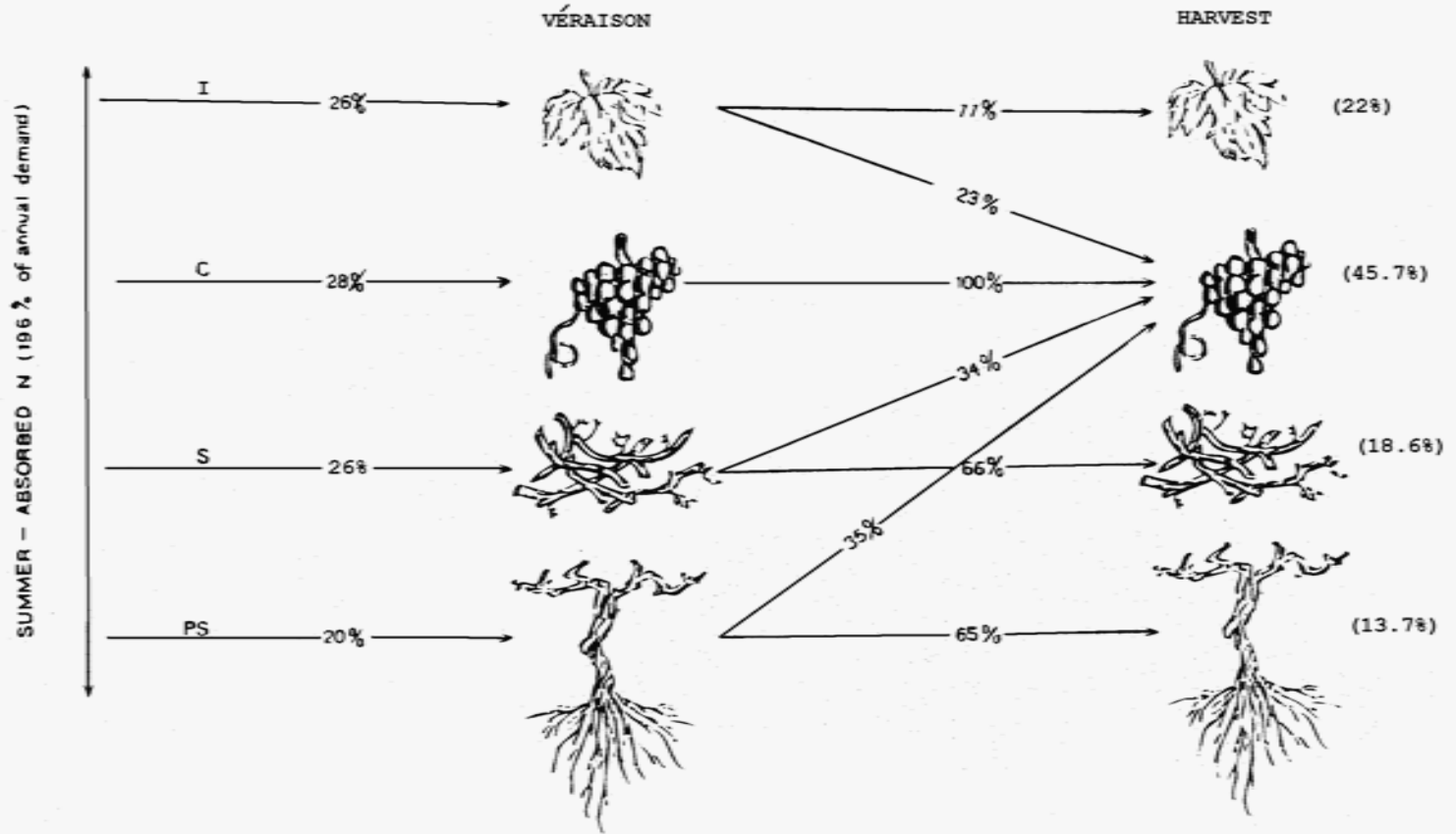
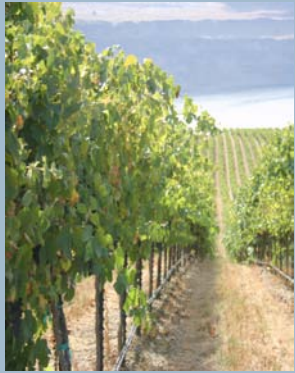
From Conradie, Chenin Blanc in S. Africa

Estimates of N in canopy (leaf/shoot) tissue



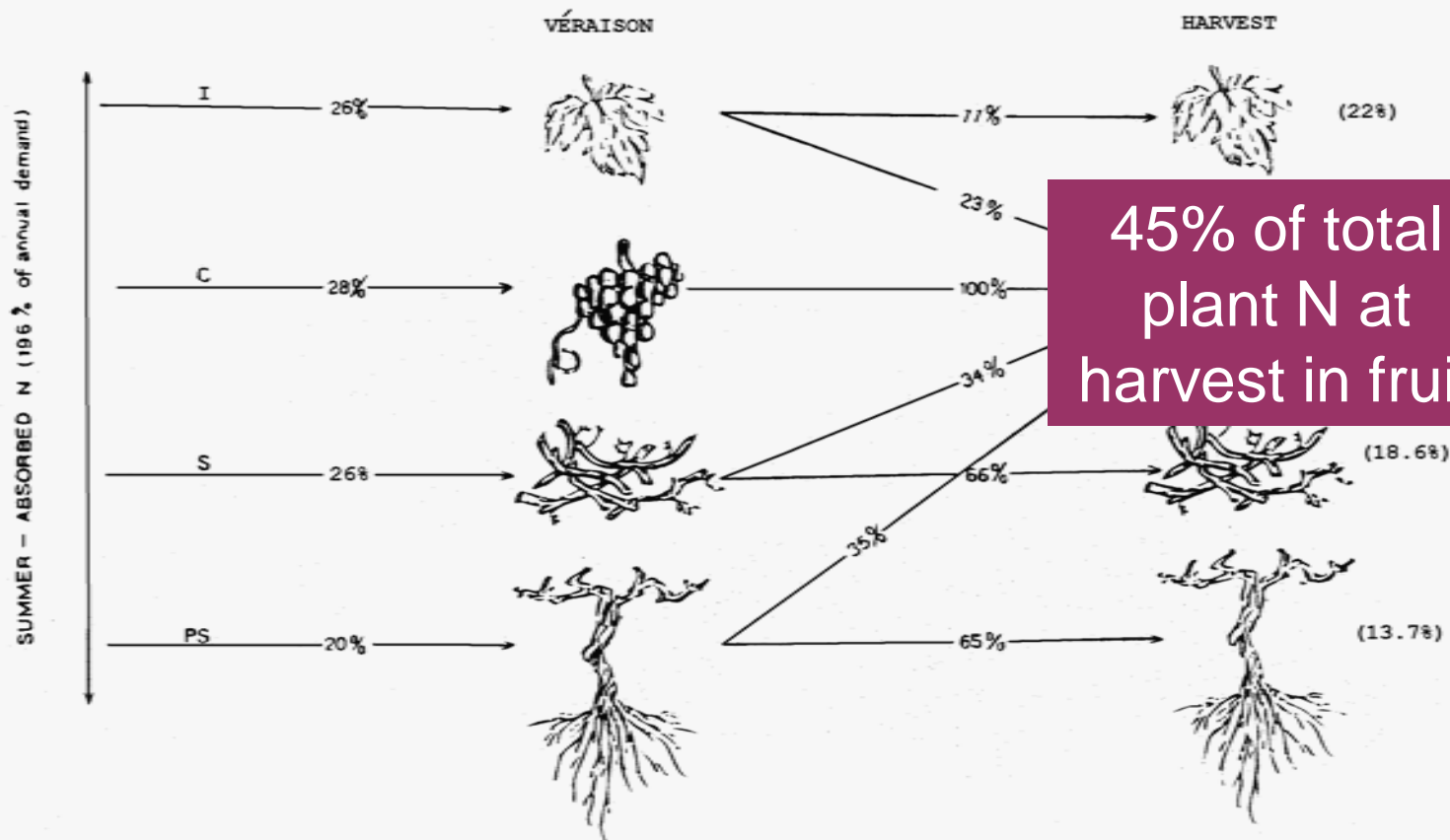
- A PNW study found >90% of N uptake between bud break and bloom goes to canopy tissue (Schreiner et al., 2006; Pinot Noir, OR)
- Studies in S. Africa support this (Conradie, 1986)

N in Fruit



From Conradie, Chenin Blanc in S. Africa

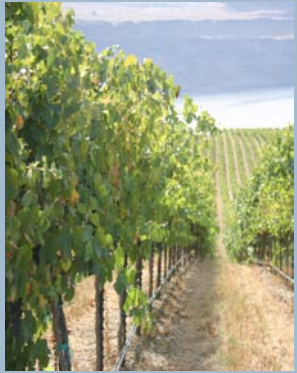
N in Fruit



45% of total plant N at harvest in fruit

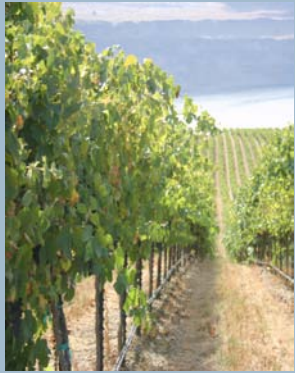
From Conradie, Chenin Blanc in S. Africa

N in Fruit



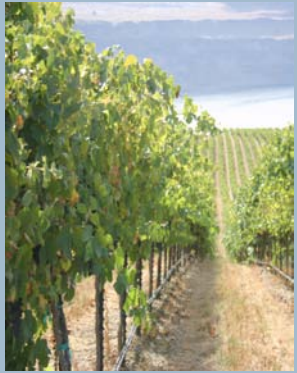
- A PNW study found $>75\%$ of N uptake between bloom and harvest goes to canopy tissue (Schreiner et al., 2006; Pinot Noir, OR)
- Studies in Concord grape in WA show similar pattern (Pradubsuk 2008, Ph.D. thesis)

N in Fruit



- Low N in fruit can lead to sluggish/stopped fermentation (Spayd et al, 1990.)

N in Fruit



- Low N in fruit can lead to sluggish/stopped fermentation (Spayd et al, 1990.)
- Late season foliar N can increase N in fruit (Wilcox, 2008)
- Risks
 - Increased pest pressure
 - Long term effects on canopy vigor

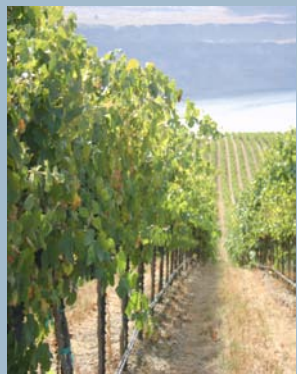
Association with Fruit Flavor Compounds



- Study of Sauvignon Blanc
- University of Bordeaux
- Flavor compound examined

Compound	Abbrev	Descriptors	Want?
3-mercaptohexan-1-ol	3-Merc	Tropical fruit	Yes
4-mercapto-4-methyl-pentan-2-one	4-Merc	Cat urine	No
4-mercapto-4-methyl-pentan-2-ol	4-MOL	Citrus peel	Maybe
3-mercaptohexan-1-ol acetate	3-MOL	Cat urine and passionfruit	Maybe

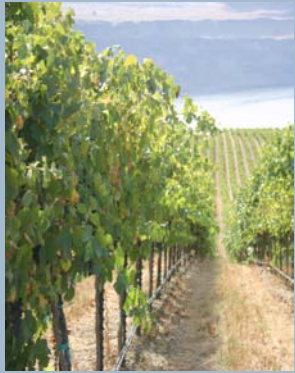
Association with Fruit Flavor Compounds



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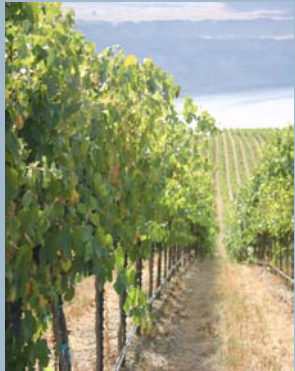
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Association with Fruit Flavor Compounds



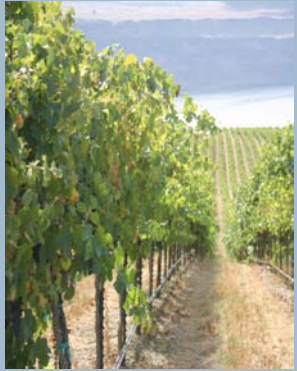
- N deficient
 - Low 3-Merc
- N fertilized
 - 4 X increase in 3-Merc
- Need enough N to ensure tropical fruit flavors (including grapefruit) in Sauvignon Blanc

Association with Fruit Flavor Compounds



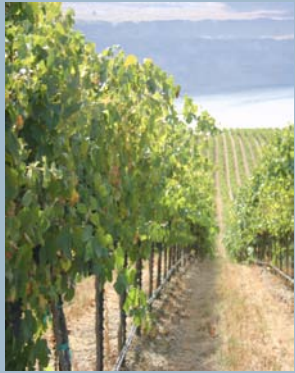
- N deficient
 - Low 3-Merc
- N fertilized
 - 4 X increase in 3-Merc
- Need enough N to ensure tropical fruit flavors (including grapefruit) in Sauvignon Blanc
- Similar results with Riesling and Chenin Blanc

Association with Fruit Flavor Compounds



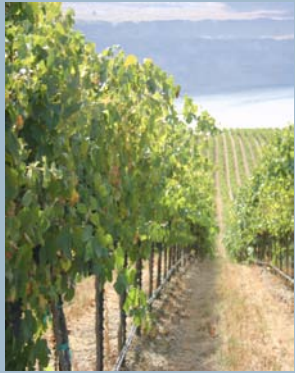
- Study in Riesling
- Water and N management

Association with Fruit Flavor Compounds



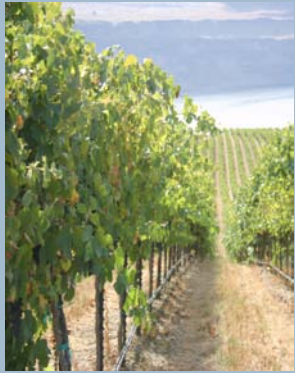
- Study in Riesling
- Water and N management
- Small, under developed canopy
- Moderate, sprawl canopy

Association with Fruit Flavor Compounds



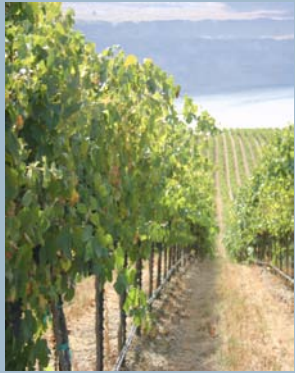
- Study in Riesling
- Water and N management
- Small, under developed canopy
 - Direct sunlight on clusters
- Moderate, sprawl canopy
 - “Dappled” sunlight on clusters

Association with Fruit Flavor Compounds



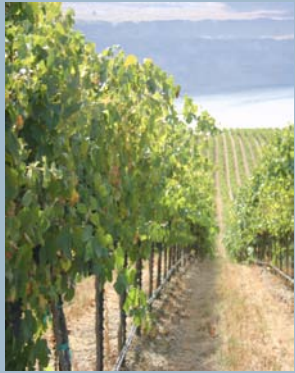
- Small, under developed canopy
 - Direct sunlight on clusters
 - Large amount of diesel flavor
- Moderate, sprawl canopy
 - “Dappled” sunlight on clusters
 - Reduced to negligible diesel flavors

Association with Fruit Flavor Compounds



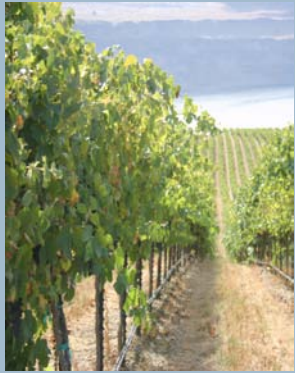
- Small, under developed canopy
 - Direct sunlight on clusters
 - Large amount of diesel flavor
- Moderate, sprawl canopy
 - “Dappled” sunlight on clusters
 - Reduced to negligible diesel flavors
- Manage N and water to ensure a full canopy
- WA research suggests 20-40 lbs/A N

When to Apply N (the post-harvest N question)



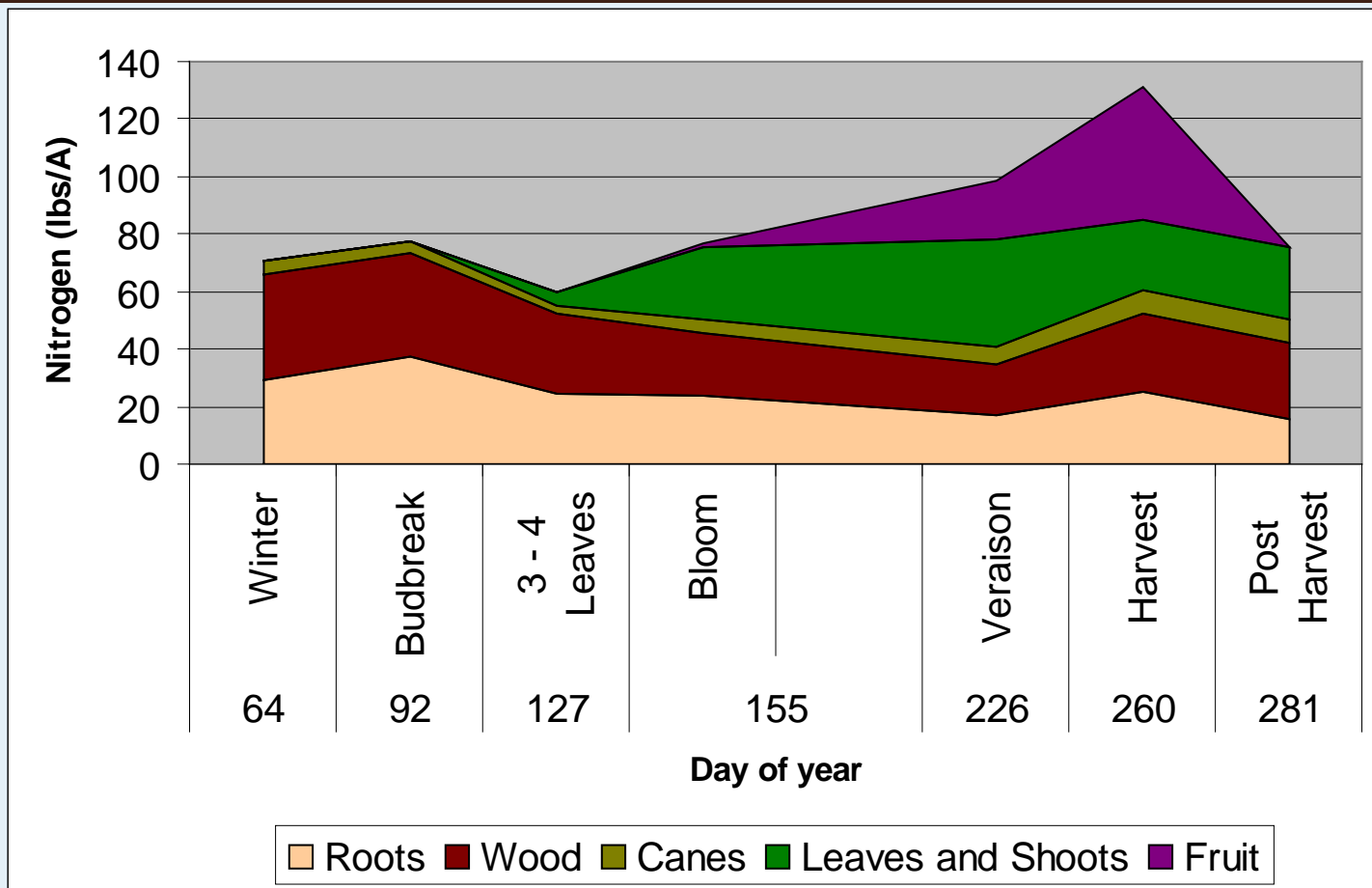
- Why post-harvest N?
- Studies by Conradie
- Chenin Blanc in S. Africa
- Approx 20% N uptake post-harvest

When to Apply N (the post-harvest N question)

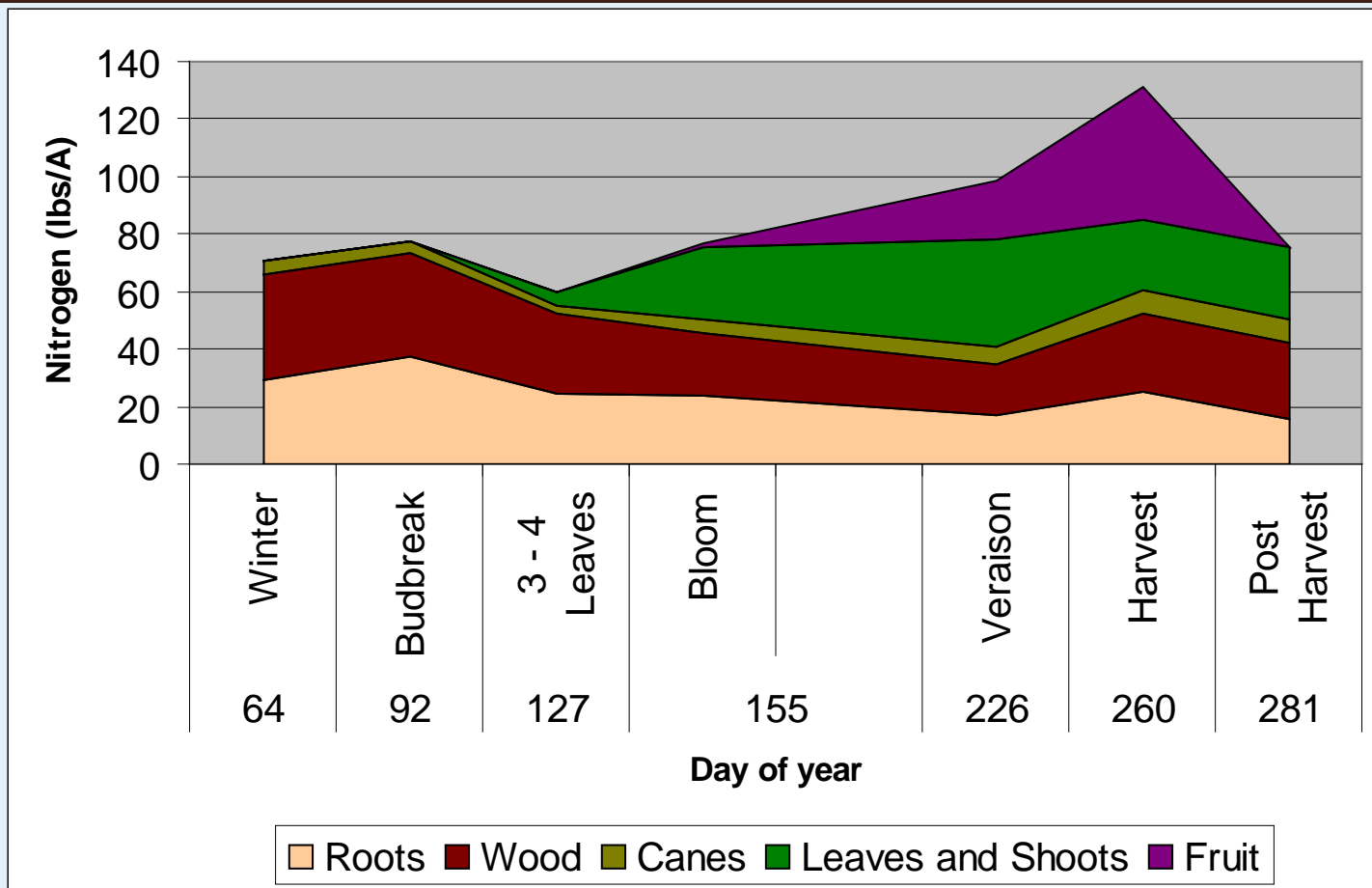
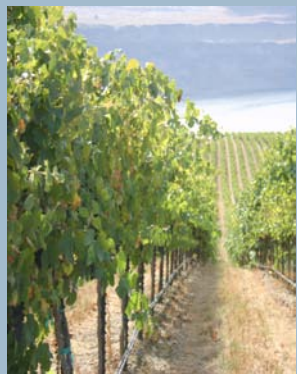


- Studies by others – No post harvest uptake
- Schreiner et al, Pinot Noir
- Williams and Biscay, Cabernet Sauvignon
- Pradubsuk and Davenport, Concord

When to Apply N

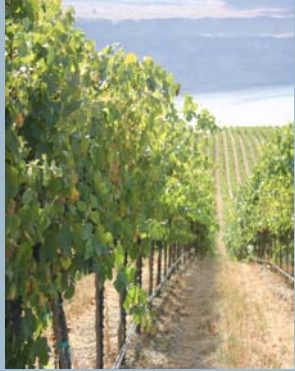


When to Apply N



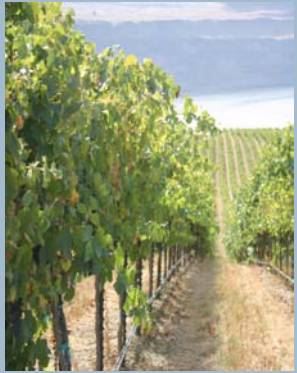
Between veraison and leaf fall, N moving from leaves to wood and roots

Why the Difference for Post Harvest N



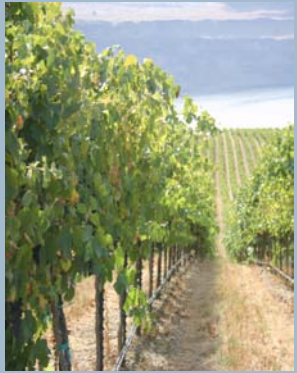
- Climate
- Soil temperature
- Hours of sunlight
- Short interval between harvest and leaf fall

Conclusions

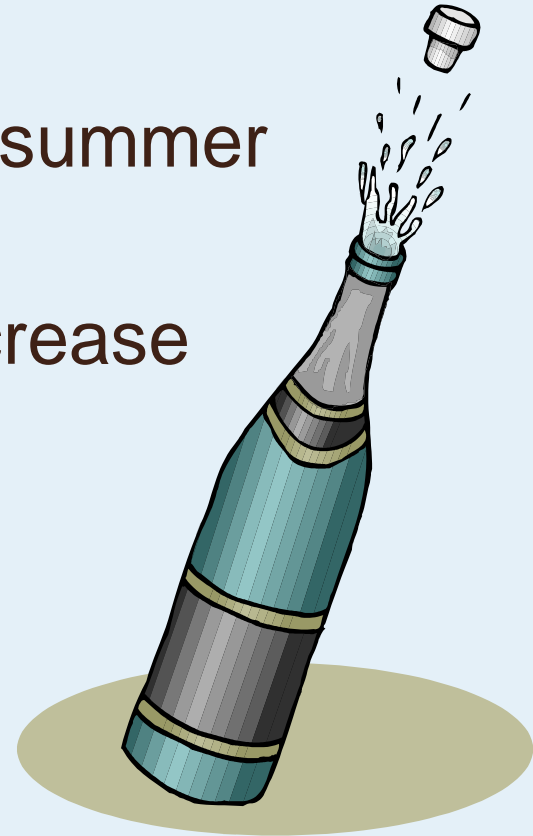


- N application between 3-4 leaves and bloom for canopy
- Concentrate N applications between bloom and veraison
- Avoid post-harvest N
 - Leaching
 - Short uptake interval
- Riesling 20 – 40 lbs/A N
- Soil texture and soil credits

Exciting News on the Horizon



- WSU and Cornell Scientists
- Funded under new national grant initiative
- Preliminary data collection summer 2008
- Build a national team to increase scope of research
- PNW meeting in February



Questions?

