Soil Variability Within Vineyards

Consequences and Management

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Texas Tech University at Fredericksburg

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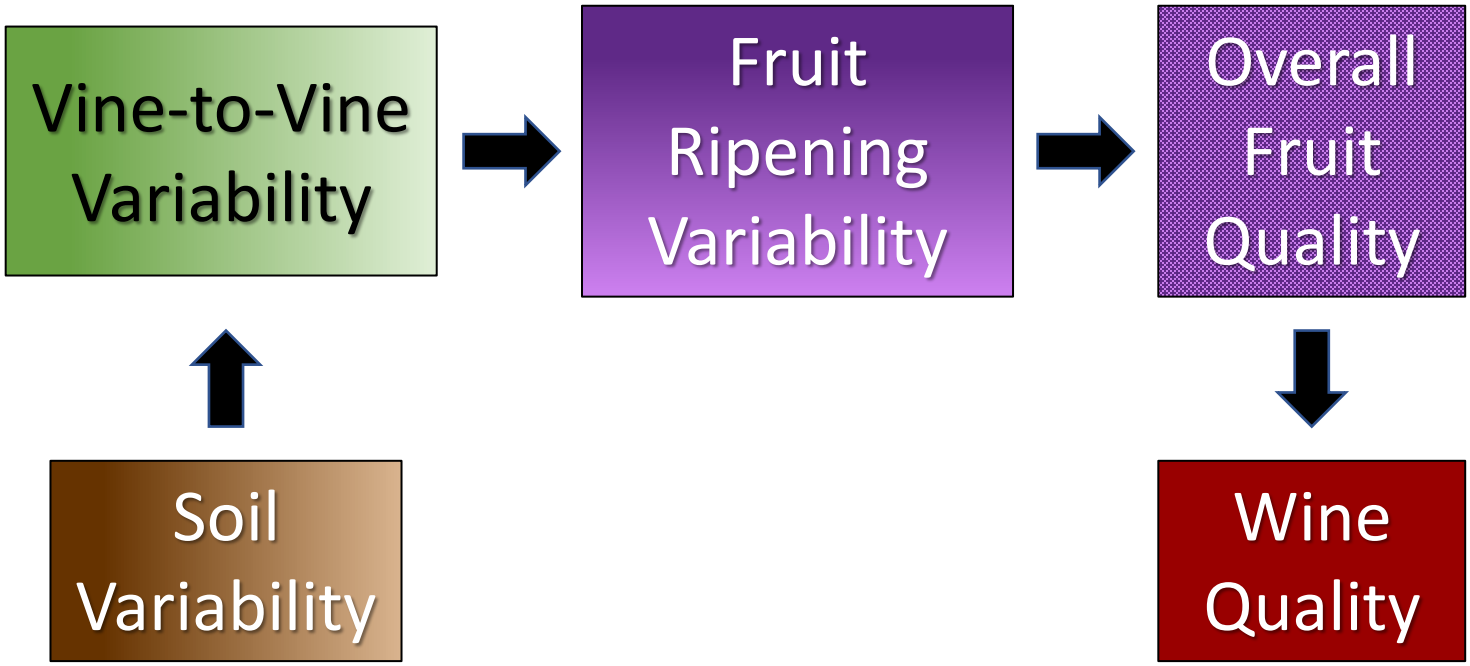
So What? Consequences



Vast Areas of Suitable Vineyard Soils

Soil Variability on Texas High Plains AVA

Warning: Soil Map may not be valid at this scale.

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Soil Variability

Among other things, soils can vary in:

- Depth
- Texture (% Sand, Silt, Clay)
- Water permeability (infiltration & drainage)
- Available water capacity
- Organic Matter
- Cation Exchange Capacity
- pH
- Salinity

All Influence Vine Growth

Vineyard Site Within a Property

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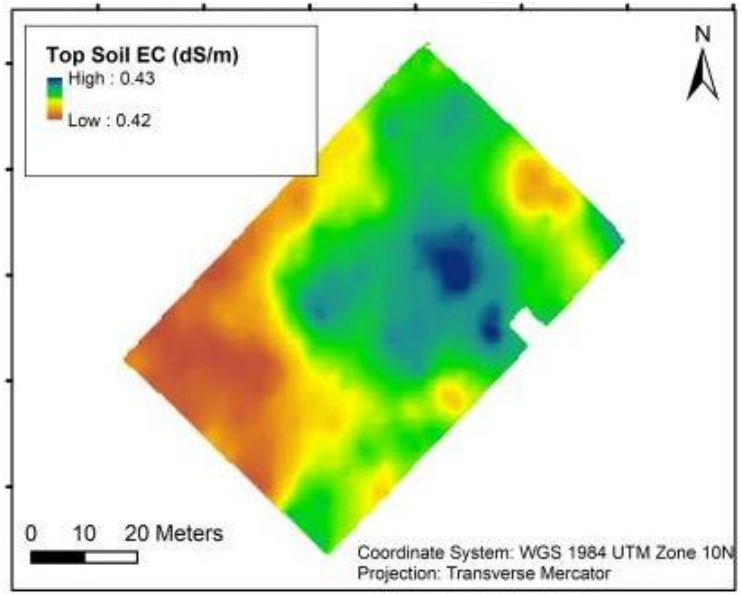
Soil Electrical Conductivity to Map Variability



Source: K. Kurtural, UC-Davis

Soil EC Related to:

- Water Content
- Porosity
- Texture
- Salinity
- Cation Exchange Capacity

EC Maps Guide Soil Sampling Locations

To Develop More Accurate Site Map

Select Best Vineyard Site Within a Property

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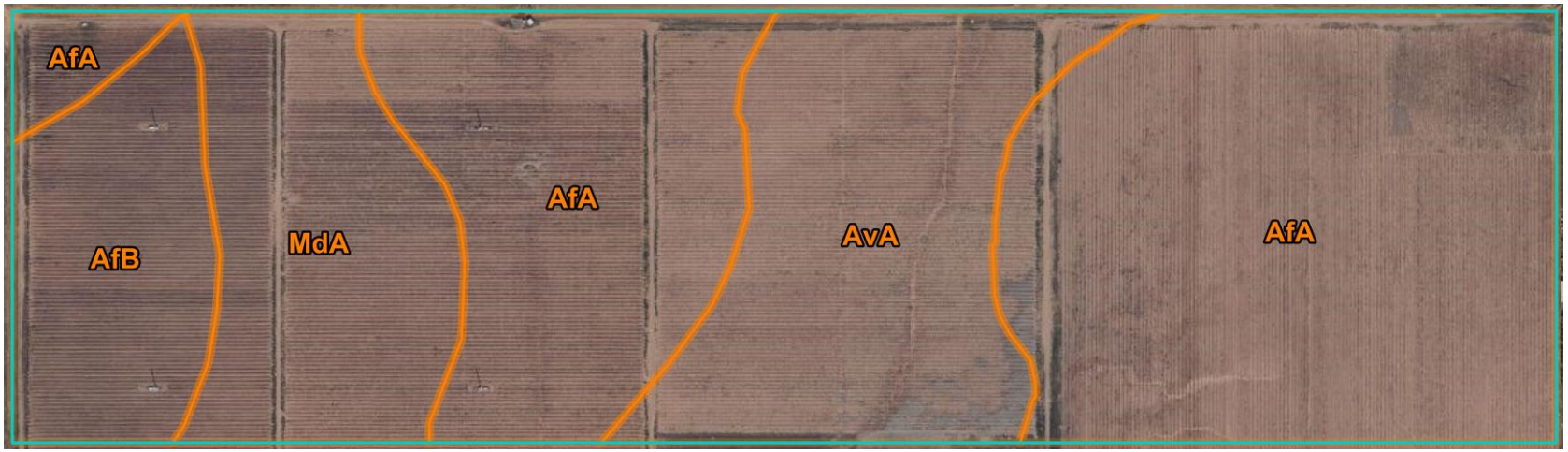
Vineyard Planted Across Fine Sandy Loams With Similar Characteristics



Map Unit Symbol	Map Unit Name
AfA	Amarillo fine sandy loam, 0 to 1 percent slopes
AfB	Amarillo fine sandy loam, 1 to 3 percent slopes
AvA	Arvana fine sandy loam, 0 to 1 percent slopes
MdA	Midessa fine sandy loam, 0 to 1 percent slopes

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Typical profile

A - 0 to 6 inches: very stony clay
Bt - 6 to 13 inches: extremely stony clay
R - 13 to 40 inches: bedrock

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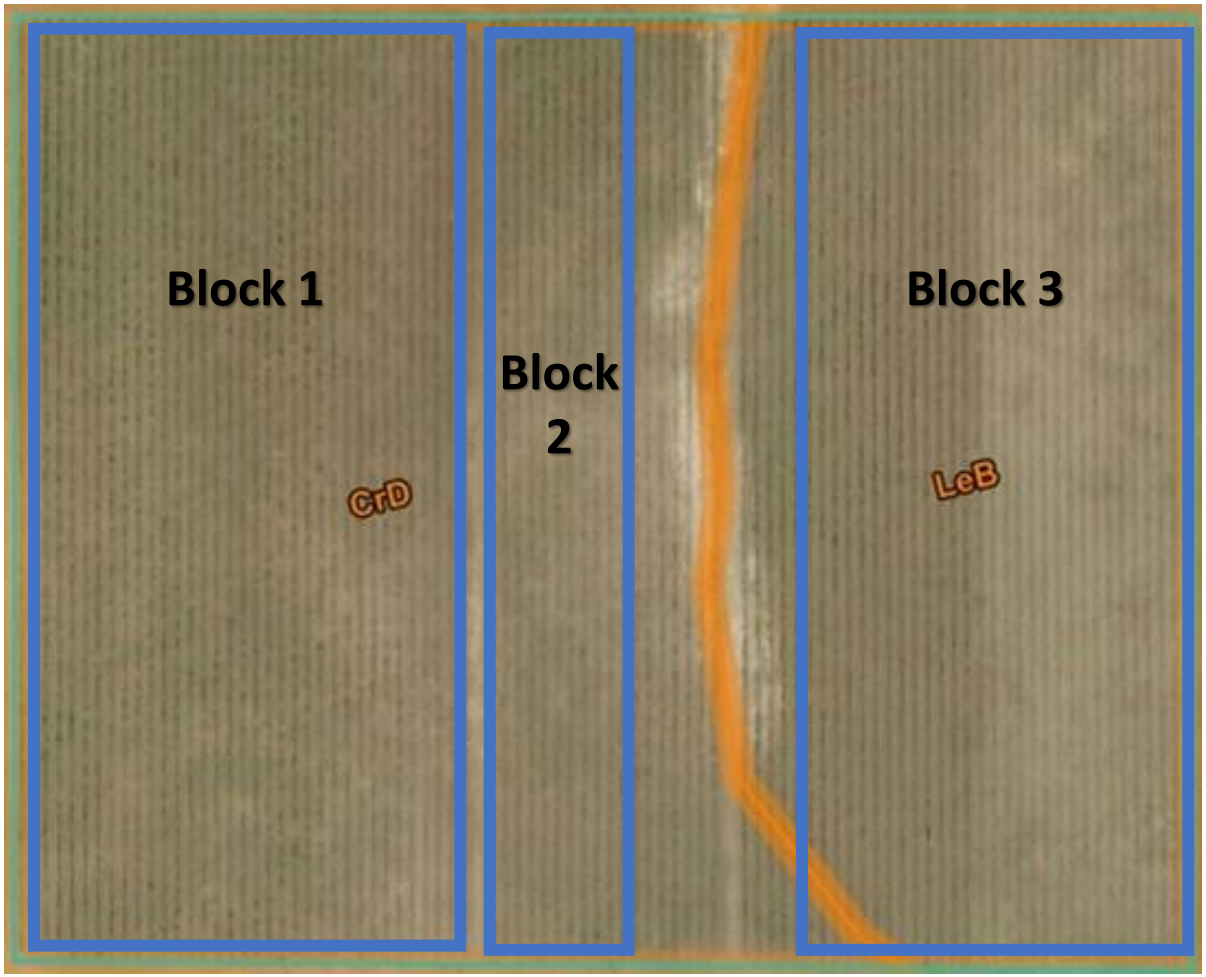

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But Not Great Vineyards!

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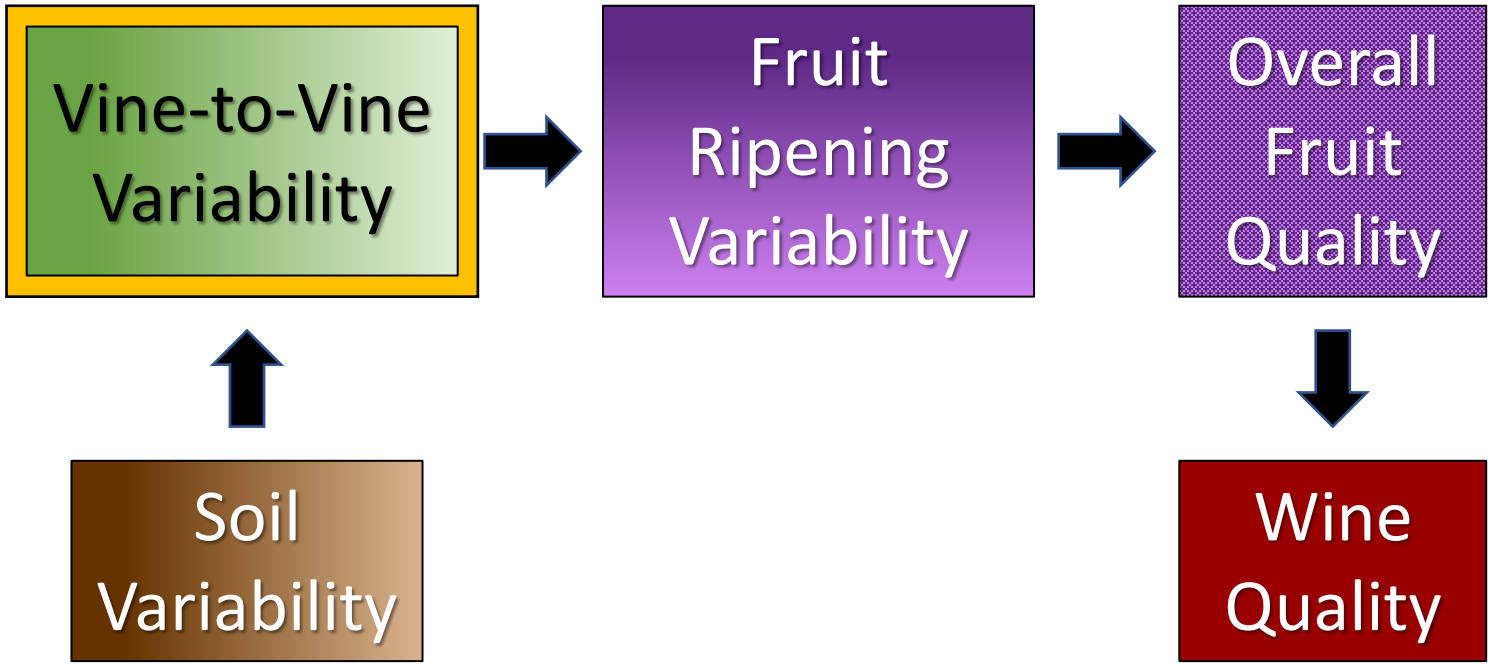
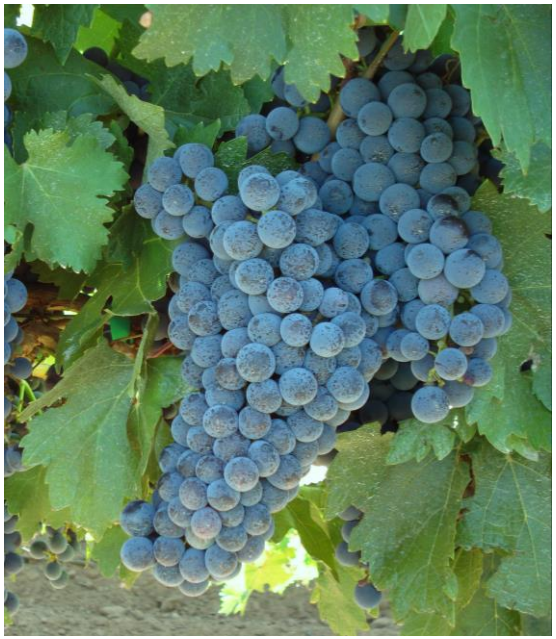
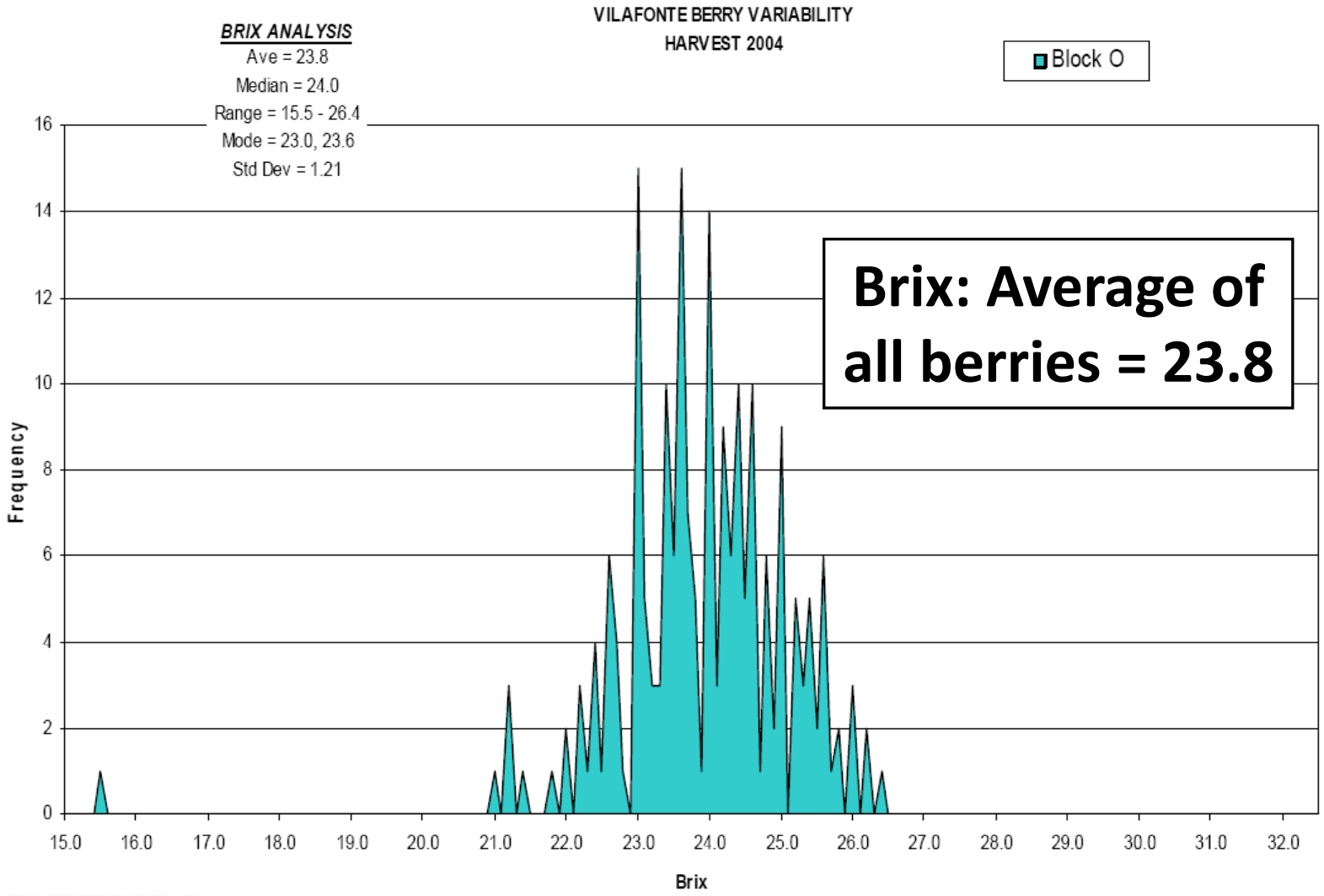


Vine-to-Vine Variability in Vigor & Growth

Asynchronous Ripening Among Variable Vines



Vilafonte Vineyard Berry Variability - 2004



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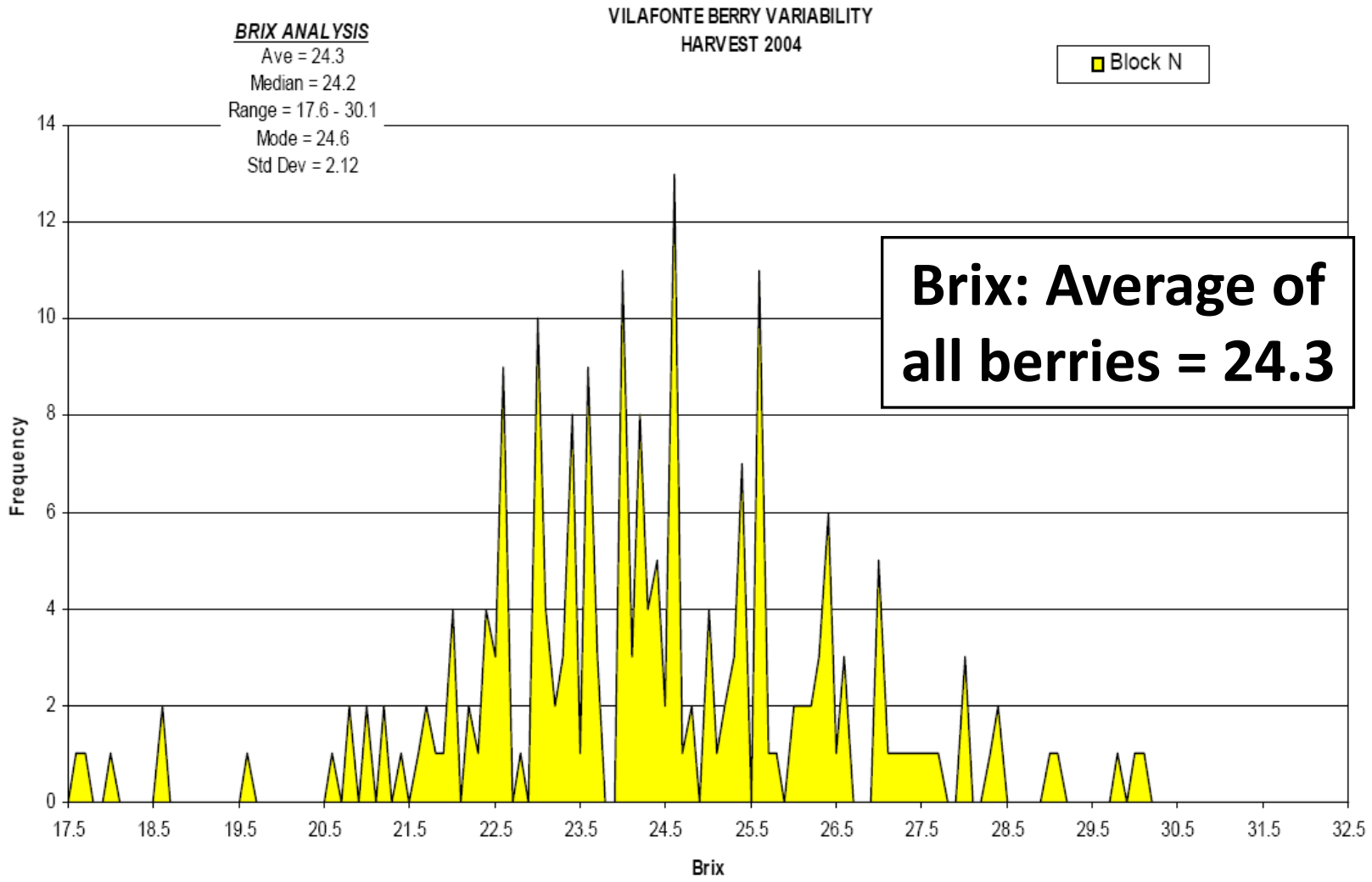
Vilafonte Vineyard Berry Variability - 2004



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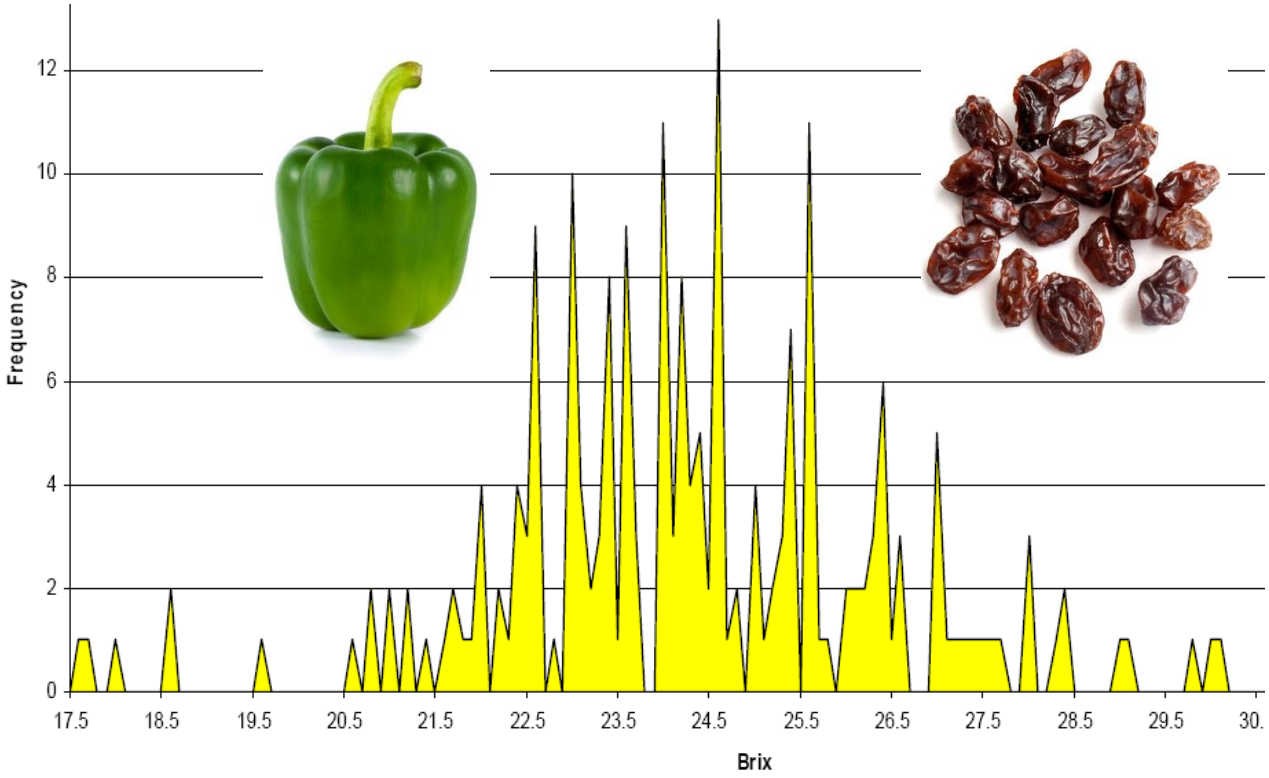
Evolution of Flavors in Cabernet Sauvignon

Herbaceousness	Unripe Fruit	Red Fruit	Black Fruit	Jam
Straw, herb, vegetal, tobacco	Green apple, citrus rind	Cherry, Strawberry, Raspberry, Cranberry	Plum, Blackberry, Black cherry	Prune, Date, Raisin



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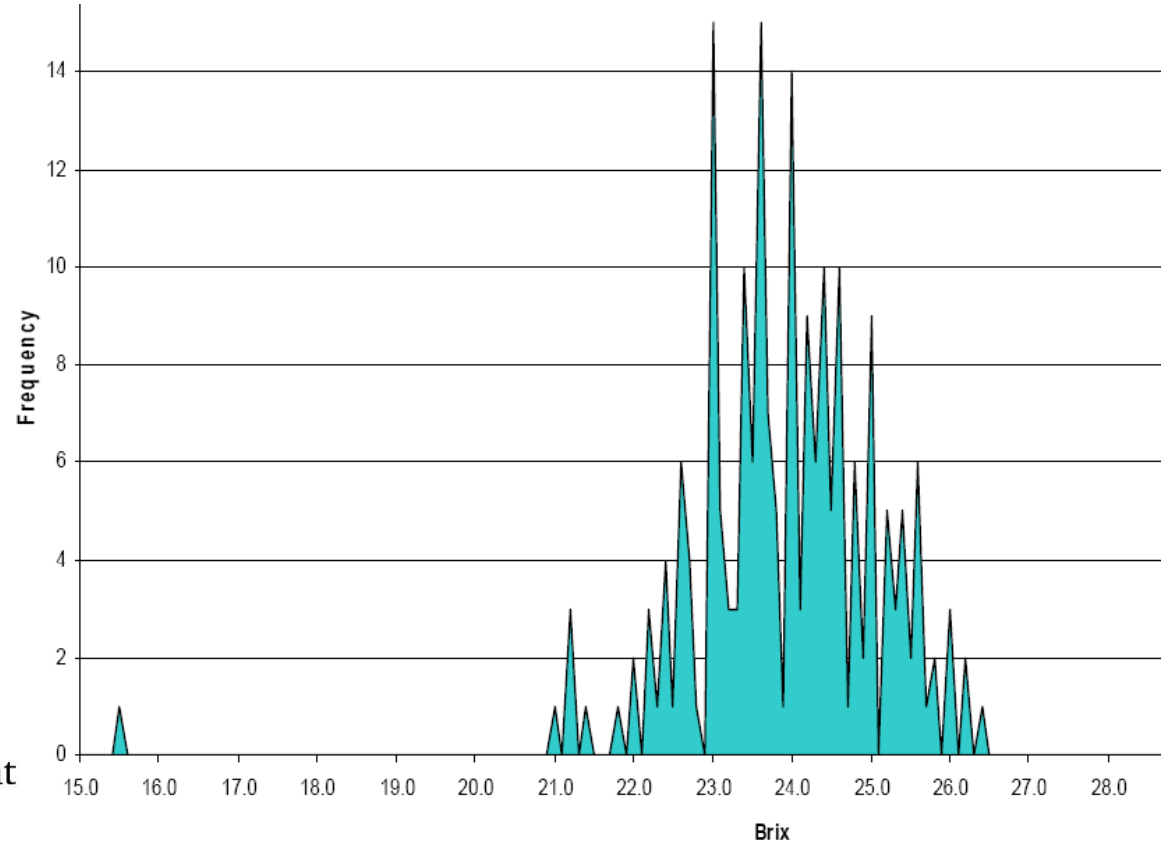

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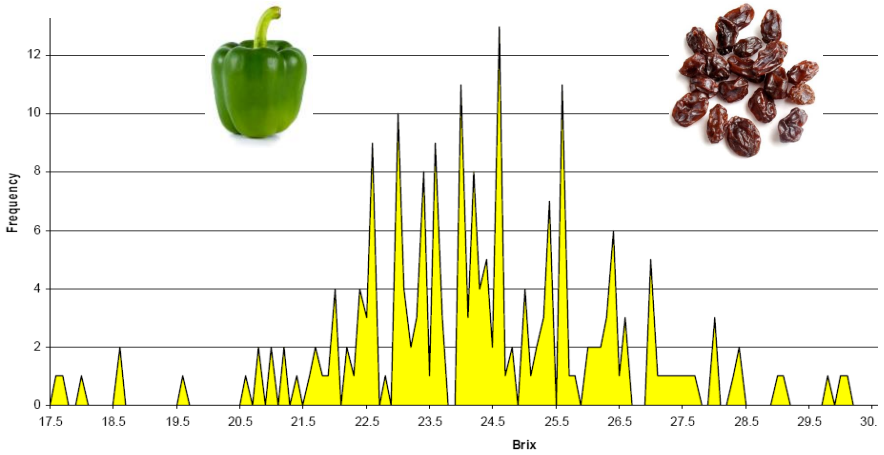
Regardless of the Cause
Vine Variability Reduces Overall Quality



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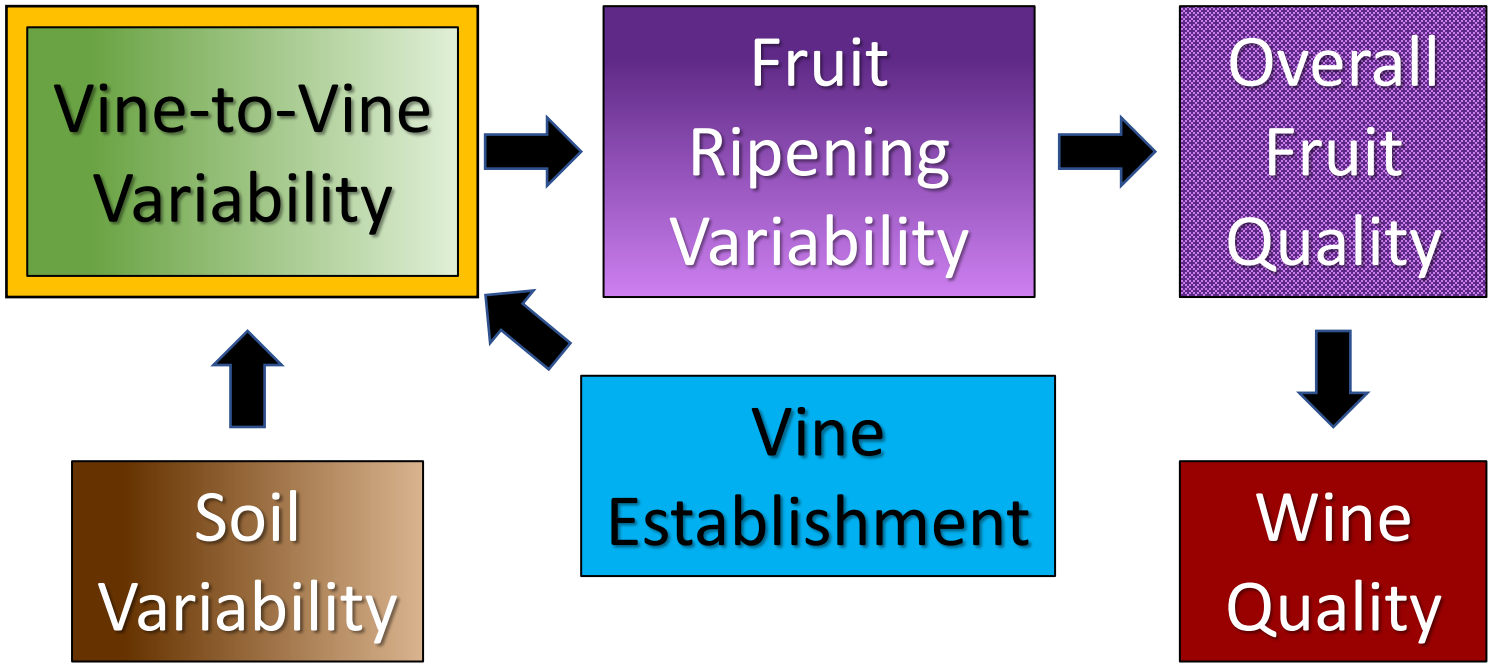


Establish Uniformity From the Beginning

Plant Only Strong Vines - *Sort Out Weak Vines*

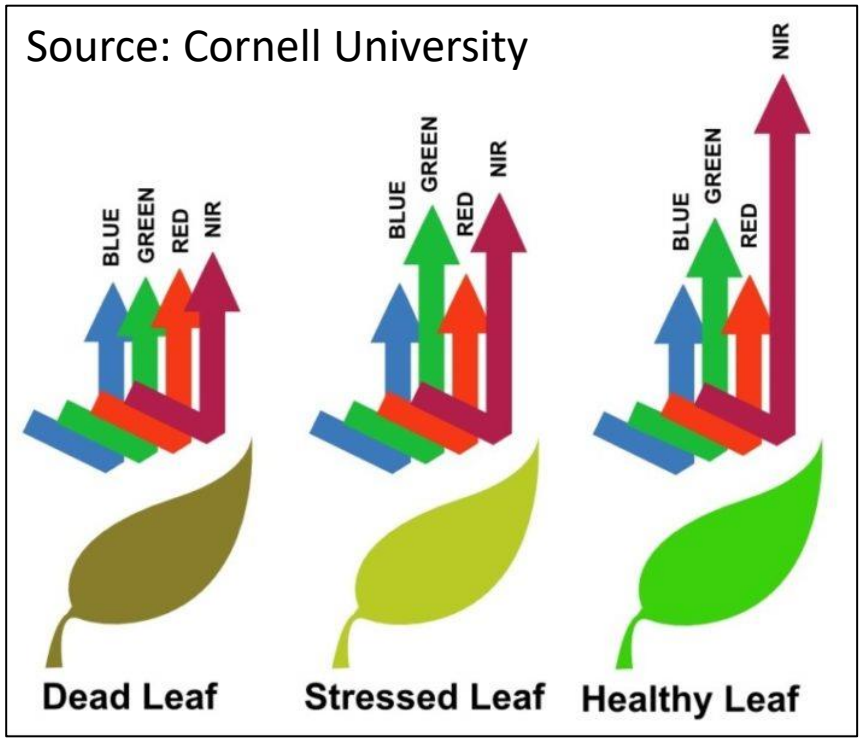
Replace Weak or Missing Vines in Year 2

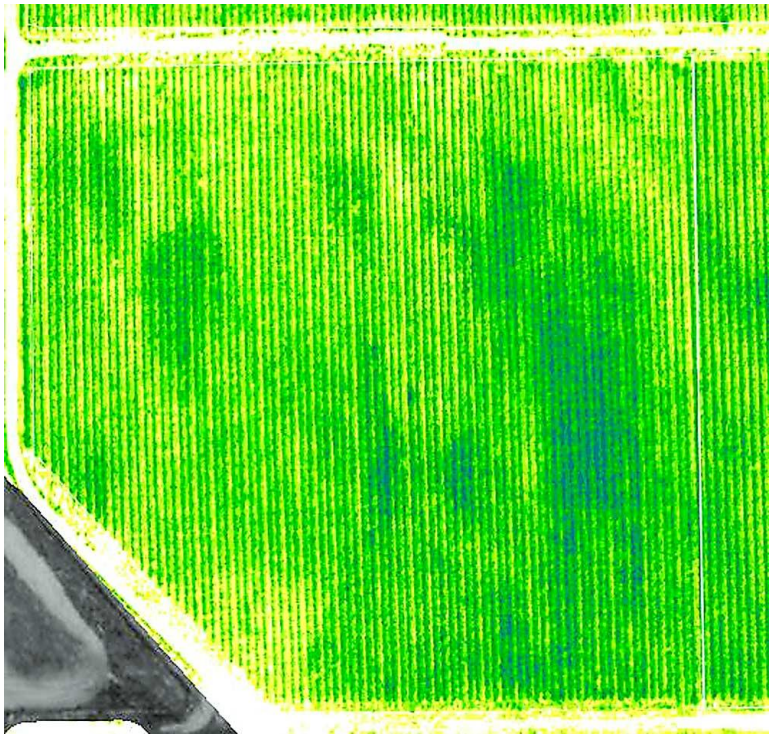
Monitor and Maintain Vine Uniformity as Much as Possible

Measuring Variability in the Vineyard

Normalized Difference Vegetative Index (NDVI)

Canopy Health and Leaf Density





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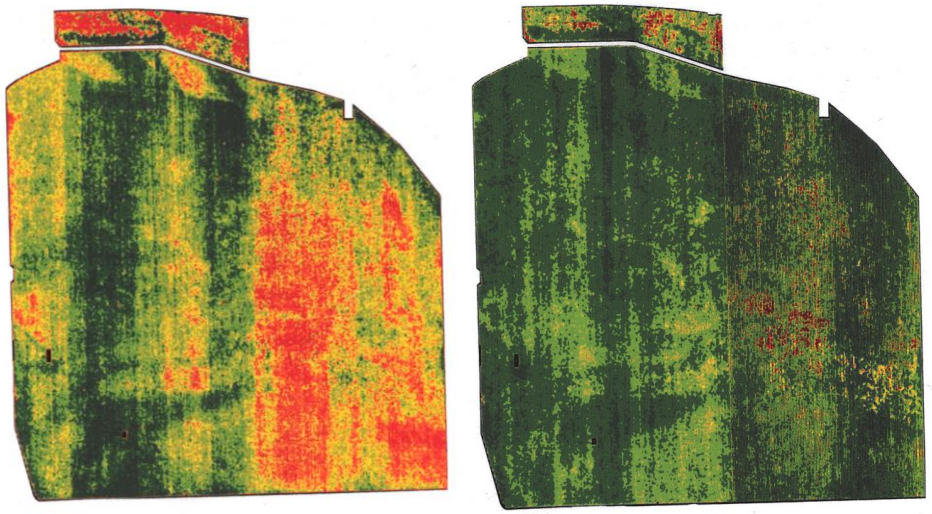
Ste Michelle WINE ESTATES

Variable Rate Vine Management Based on NDVI Imagery



- Dormant pruning
- Fertilization
- Irrigation
- Shoot thinning
- Hedging
- Leaf removal

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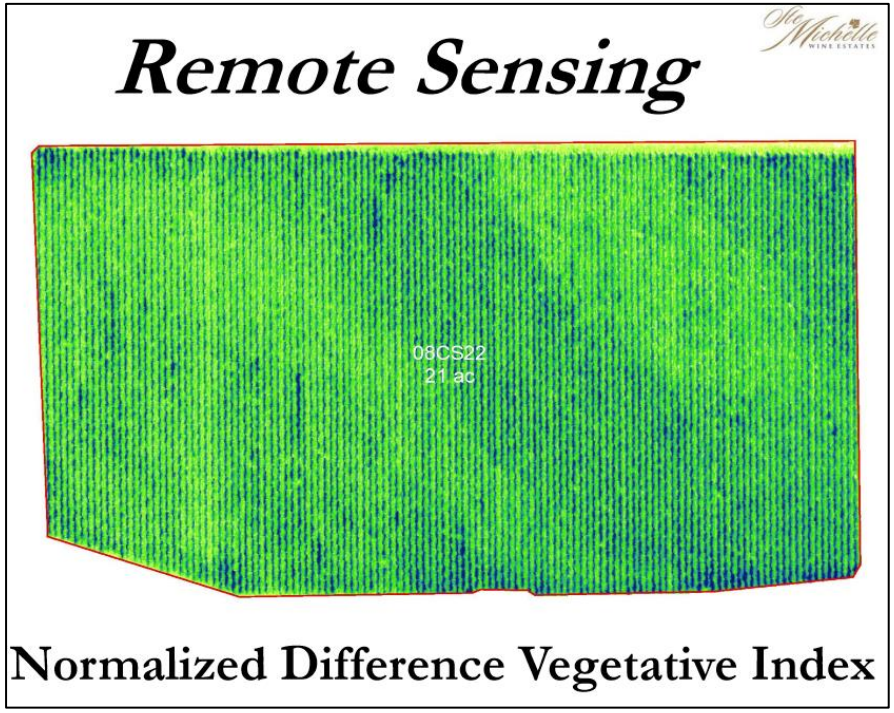
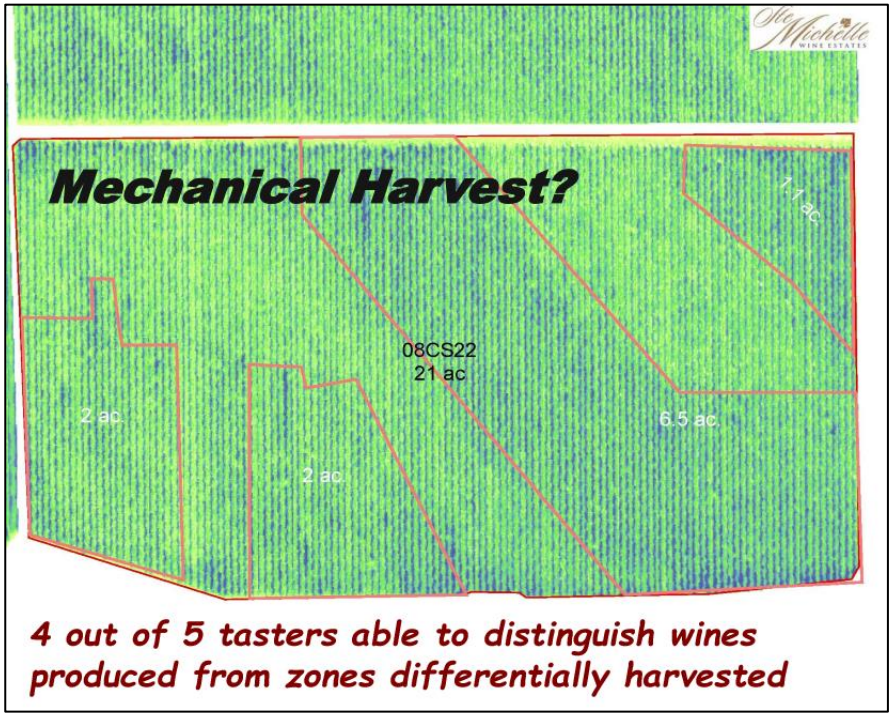
Fruit Quality Differentiation Within a Block





NDVI

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Differential Harvest Within a Block

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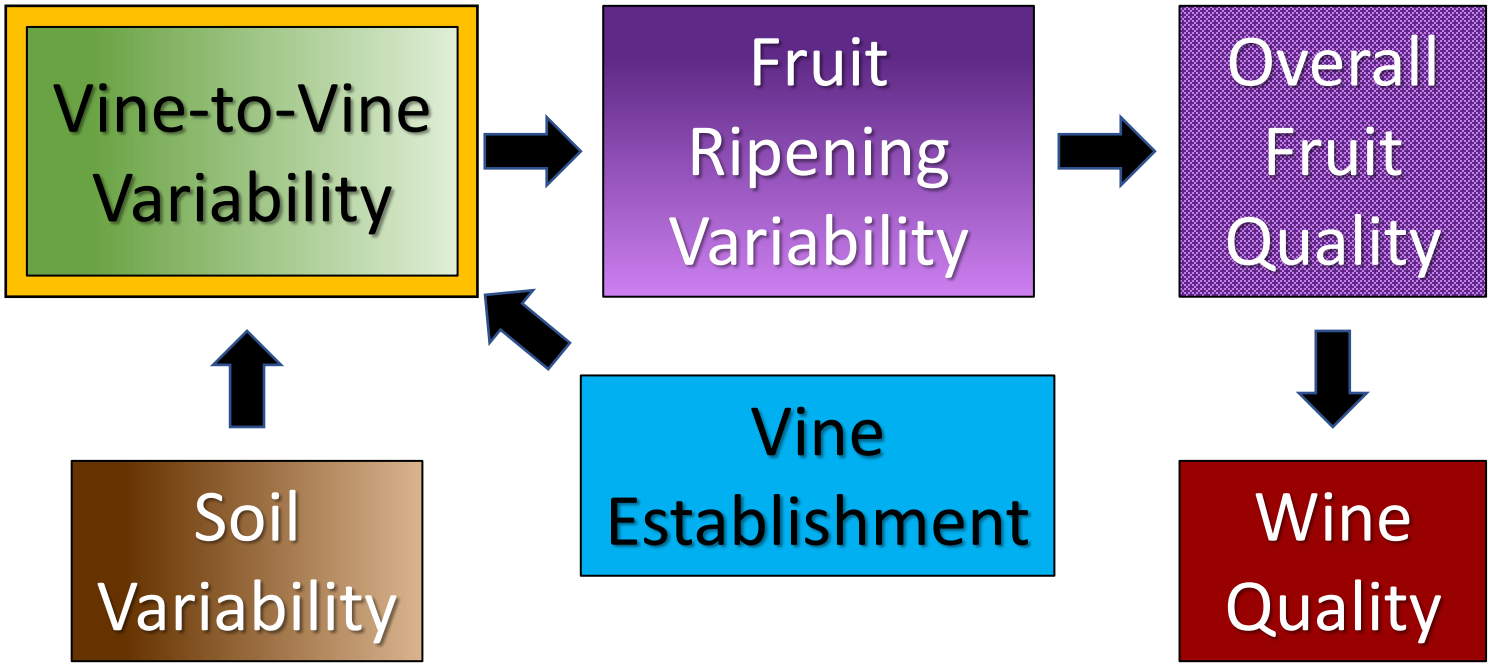
Vine Variability Affects Wine Quality



Improve Wine Quality by Increasing Vine Uniformity

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