

THE IMPACT OF CLIMATE CHANGE ON WINE

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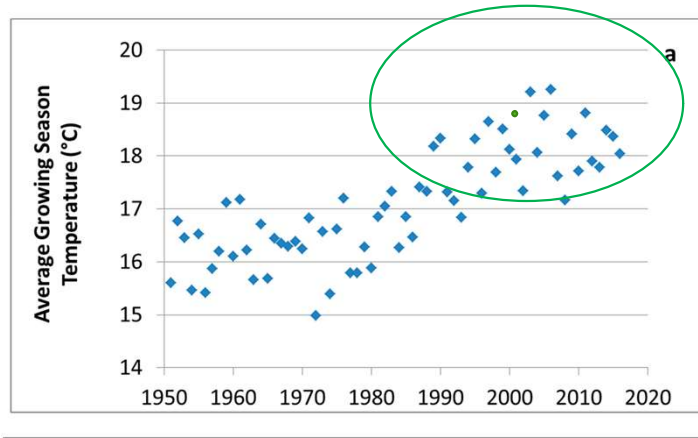
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TERROIR: VARIETAL, HUMAN EXPERTISE, AND ENVIRONMENT



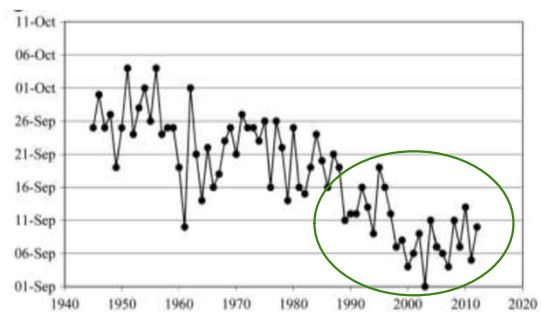
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BORDEAUX: AVERAGE GROWING SEASON TEMPERATURE



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CHÂTEAUNEUF- DU-PAPE – HARVEST DATES 1945 - 2012



Source: ONERC, 2014.

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A WARMING
CLIMATE –
EARLIER
HARVESTS
IMPACT ON THE
VINE

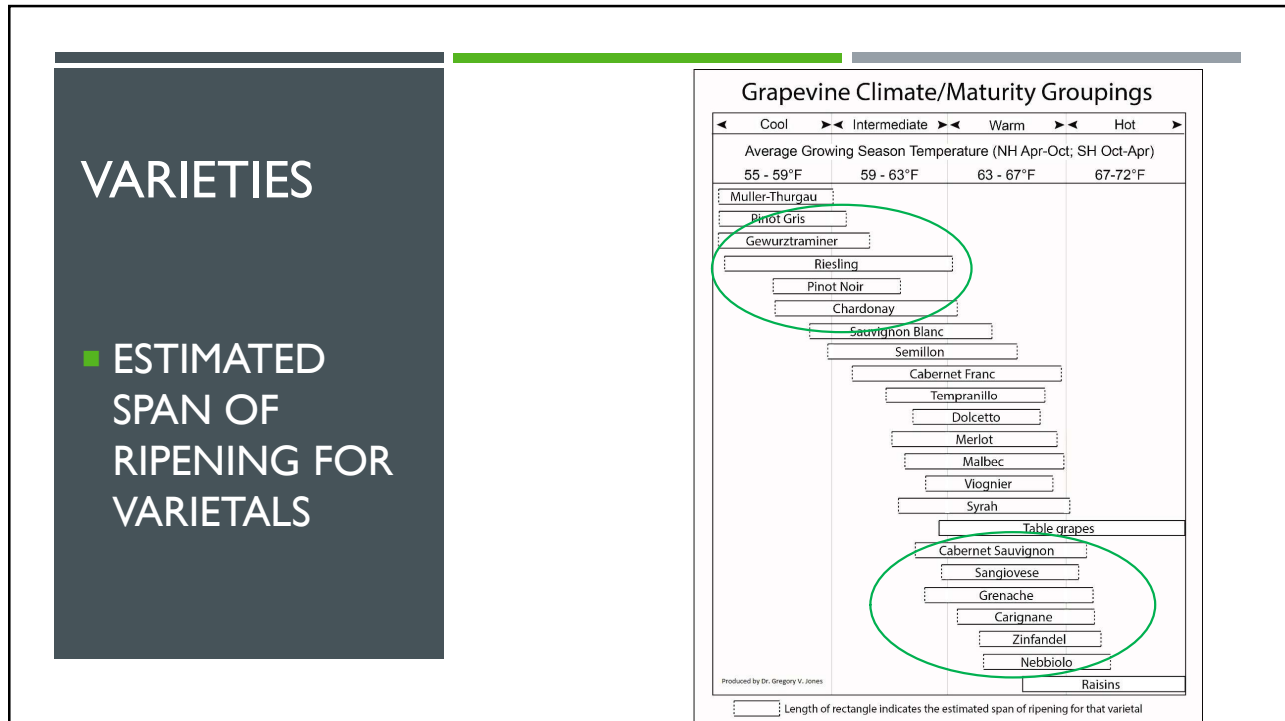
- RISING POTENTIAL ALCOHOL AND FALLING ACIDITY.
- SHIFT OF RIPENING PHASE TO HOTTER PART OF SUMMER = CHANGES COMPOSITION OF FRUIT
- **BOOST SUGARS AND DIMINISH DESIRABLE AROMAS AND FLAVORS, DISRUPTING THE BALANCE OF A WINE ...AND LOWERING THE QUALITY.**

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ADAPTATION TO
HIGHER
TEMPERATURES

- **1. VARIETAL: LATE RIPENING VARIETIES**
- **2. ENVIRONMENT: THE NEW NORMAL**
- **3. HUMAN EXPERTISE: VINEYARD MANAGEMENT AND WINEMAKING**

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REINVENTING THE BORDEAUX BLEND: LOSING 'PERSONALITY'

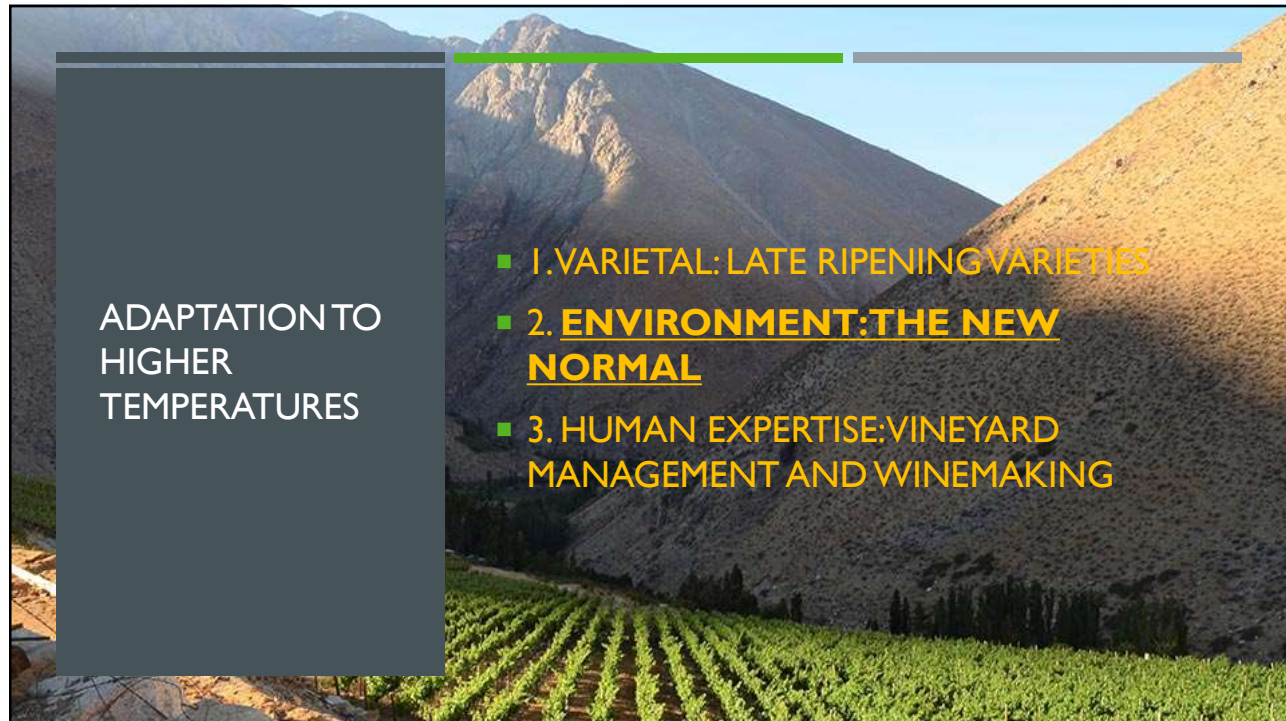
TODAY

- 65% Cabernet Sauvignon
- 25% Merlot
- 5% Cabernet Franc
- 5% Petit Verdot

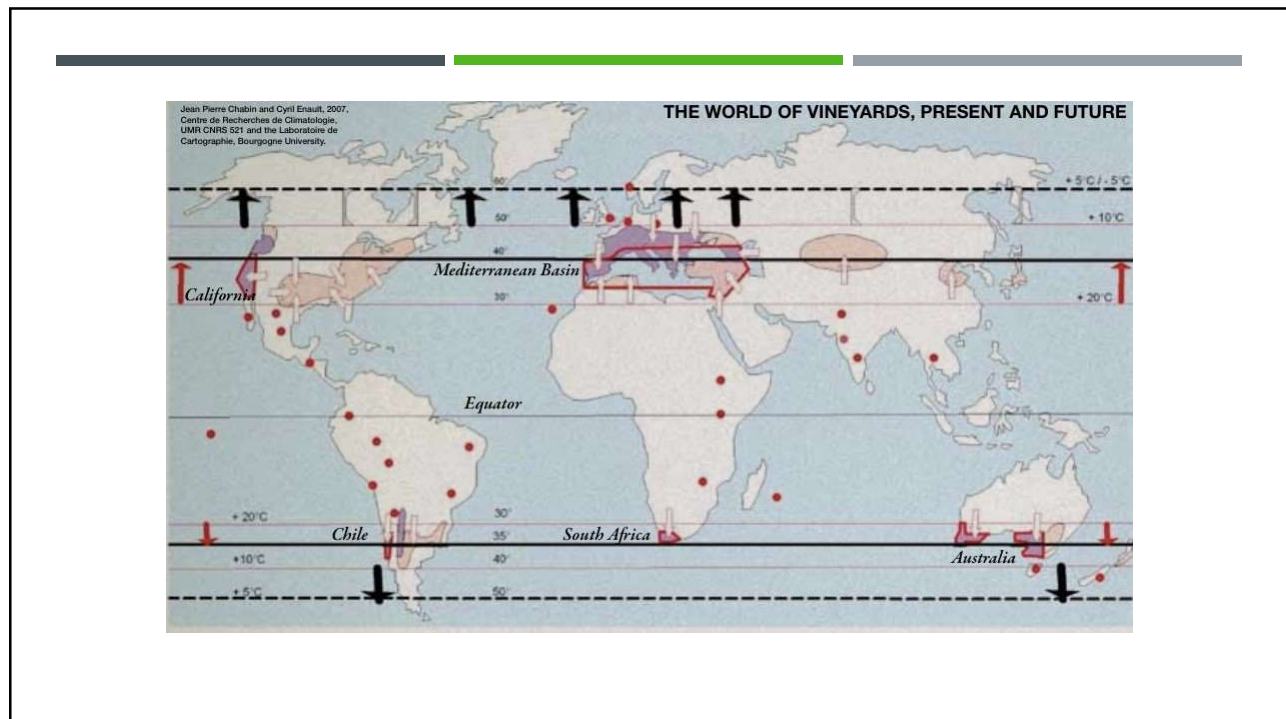
TOMORROW

- 30% Malbec
- 20% Petit Verdot
- 20% Touriga Nacional*
- 15% Marselan*
- 10% Castets*
- 5% Arinarnoa*

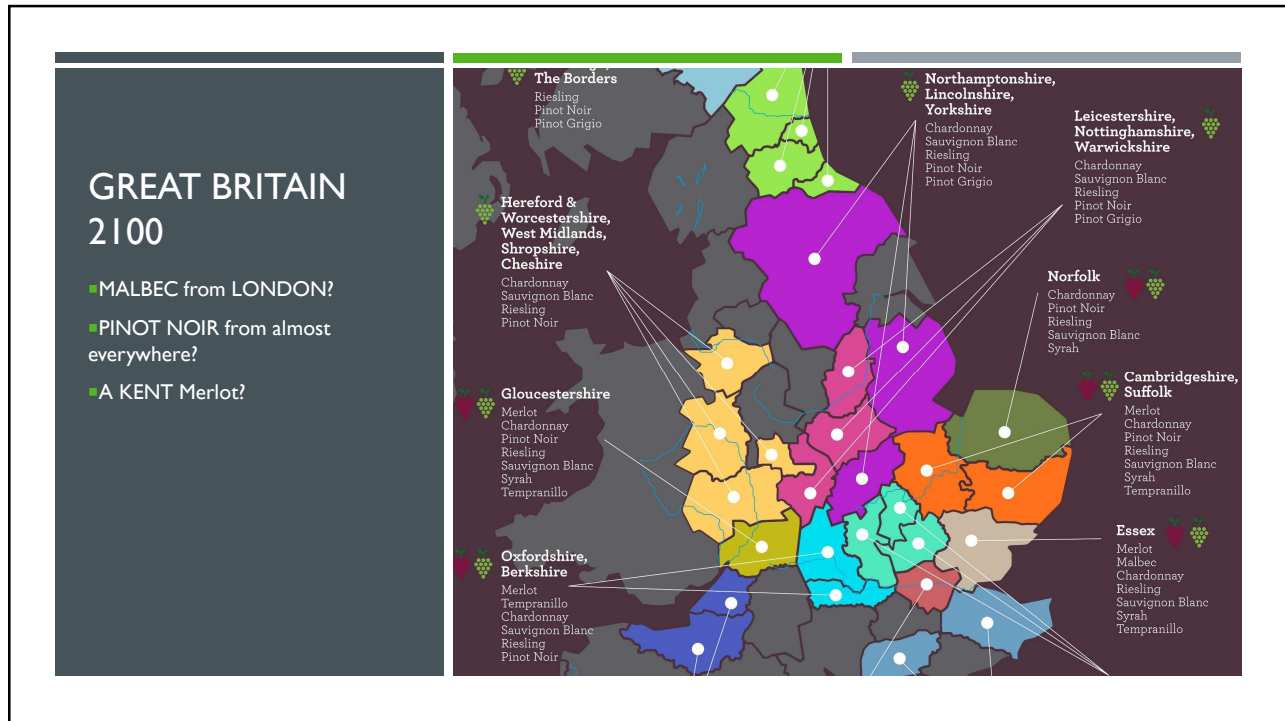
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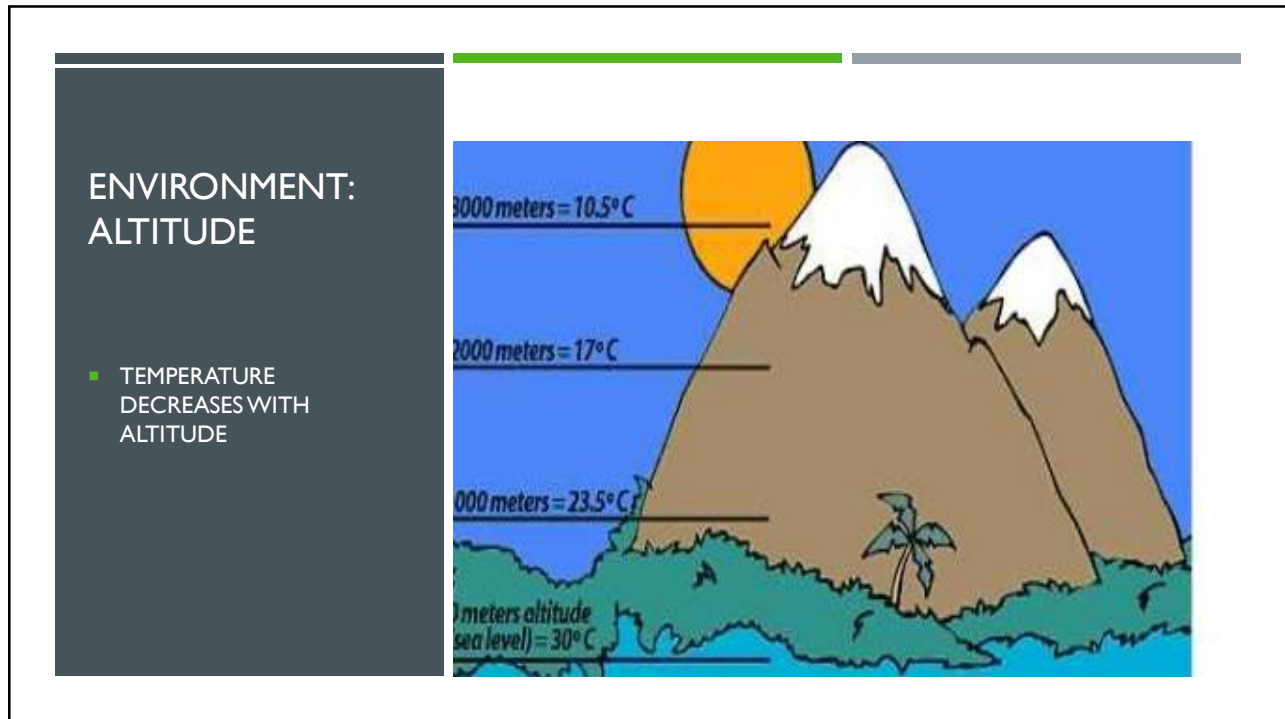
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ENVIRONMENT: ASPECT

- SLOPES FACING THE SUN GET THE MOST HEAT AND LIGHT
- FACE AWAY FROM EQUATOR
 - NORTHERN HEMISPHERE: NORTH FACING VINEYARDS
 - SOUTHERN HEMISPHERE: SOUTH FACING VINEYARDS

South-facing slopes receive far more sunshine than North-facing ones in the Northern Hemisphere

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ADAPTATION TO HIGHER TEMPERATURES

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- 1. VARIETAL: LATE RIPENING VARIETIES
- 2. ENVIRONMENT: THE NEW NORMAL
- 3. **HUMAN EXPERTISE: VINEYARD MANAGEMENT AND WINEMAKING**

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VINEYARD MANAGEMENT AND WINEMAKING

■ VINEYARD MANAGEMENT

- 1. LATER-RIPENING CLONES
- 2. LATER-RIPENING ROOTSTOCKS
- 3. INCREASE TRUNK HEIGHT
- 4. SHADE THE GRAPES
- 5. INCREASE ROW SPACING
- 6.....

■ WINEMAKING

- 1. BLEND DIFFERENT LOTS
- 2. CO-FERMENT WHITE AND RED GRAPES
- 3. ACIDIFICATION
- 4. DILUTION (ADD WATER)
- 5. REMOVE ALCOHOL
- 6.....

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■ THE END

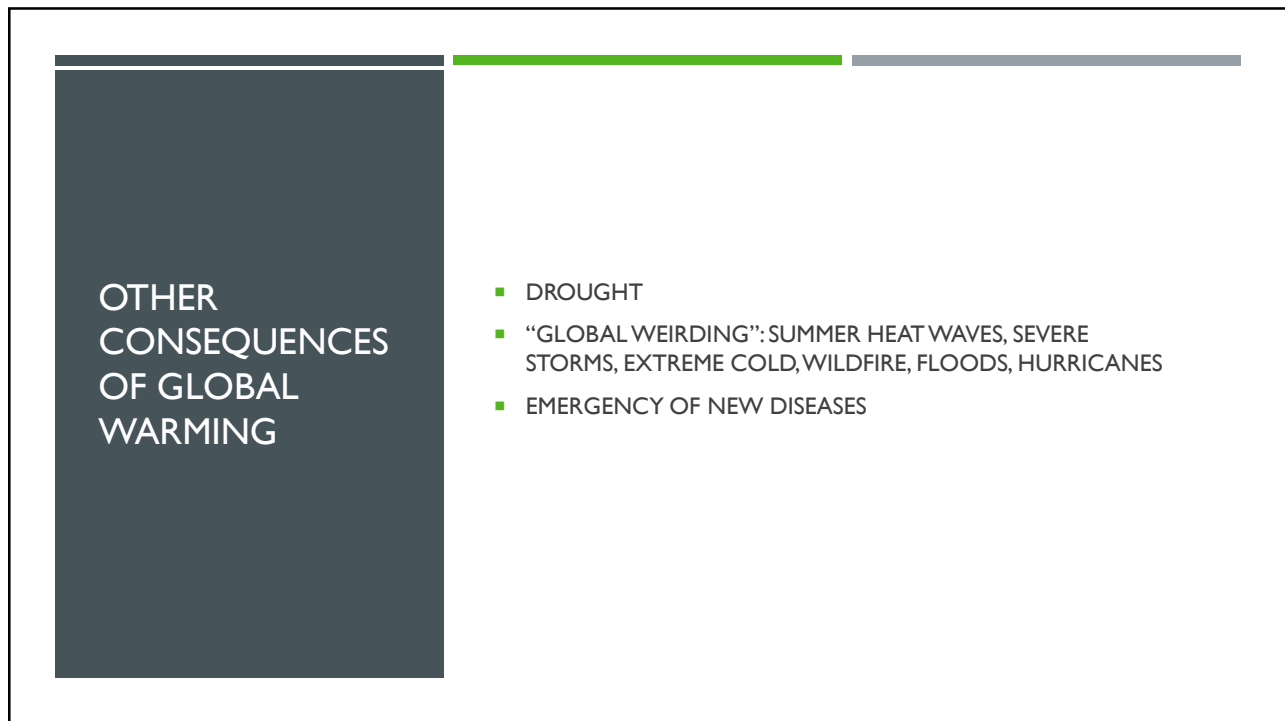
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■ APPENDIX

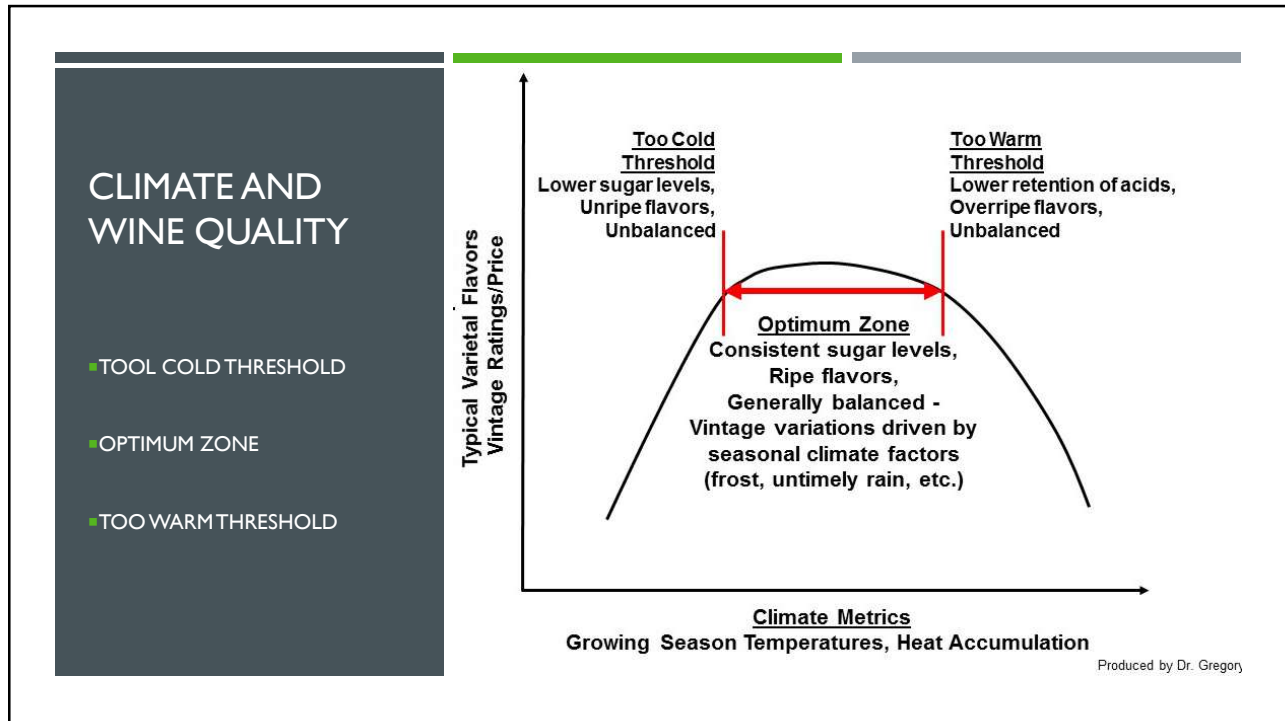
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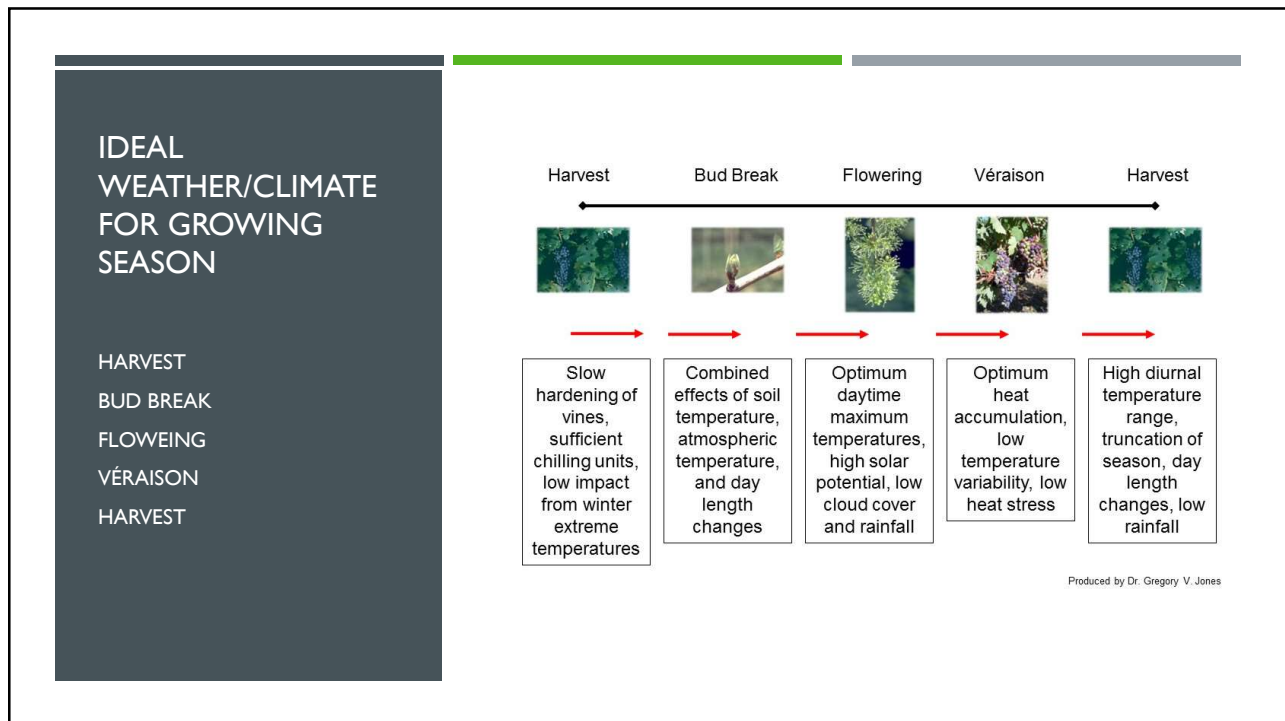
OTHER CONSEQUENCES OF GLOBAL WARMING

- DROUGHT
- "GLOBAL WEIRDING": SUMMER HEAT WAVES, SEVERE STORMS, EXTREME COLD, WILDFIRE, FLOODS, HURRICANES
- EMERGENCY OF NEW DISEASES

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MAIN REFERENCES

Borhmrch, R. "Wine and a changing climate: will the terroir model of today survive?, Society of Wine Educators Virtual Conference, August 14, 2020 (<http://winewitandwisdomswe.com/wp-content/uploads/2020/04/Wine-and-a-Changing-Climate-R-Bohmrch-MW-Session-Handout.pdf>)

Leeuwen, C. et al., "An Update on the Impact of Climate Change in Viticulture and Potential Adaptations", *Agronomy*, Vol 9, issue 9, September 2019 (<https://www.mdpi.com/2073-4395/9/9/514>)

Greenpeace, "Impacts of Climate Change on Wine in France", September 2009 (<https://issuu.com/greenpeacechina/docs/climate-change-french-wine/12>)

Jones, G.V. "Climate and Terroir: Impacts of Climate Variability and Change on Wine", Geological Society of America, 2003. (<https://www.linfield.edu/assets/files/Wine-Studies/GregJones/GJones%20Climate%20Change%20Geoscience%20Canada.pdf>)