Wine grapes and climate change

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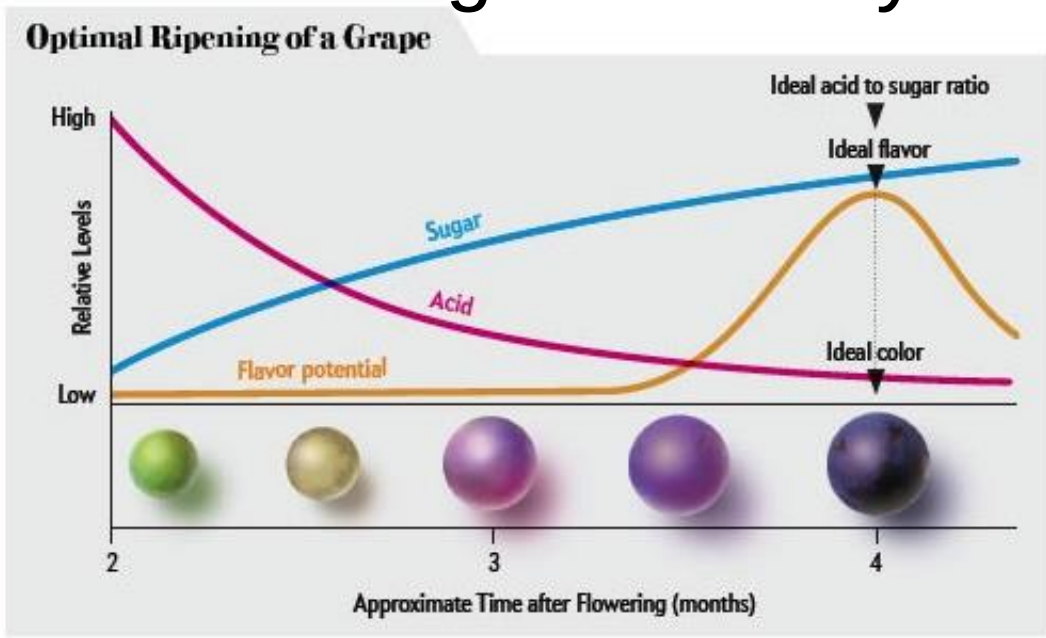
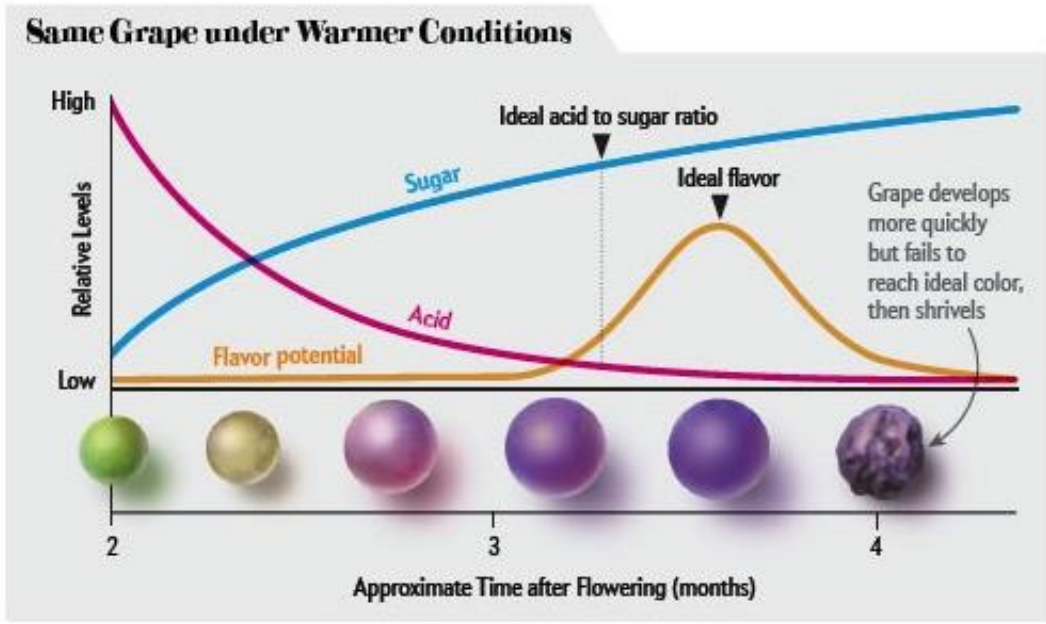
Climate change - Maturity shift



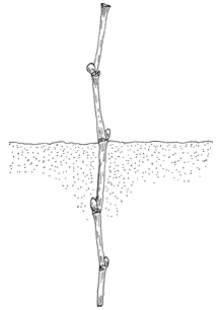


K. A. Nicholas (2015). Will we still enjoy Pinot Noir? Scientific American 312:60-67

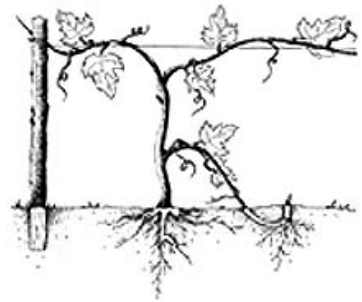
Which Romanée-Conti in 2119?

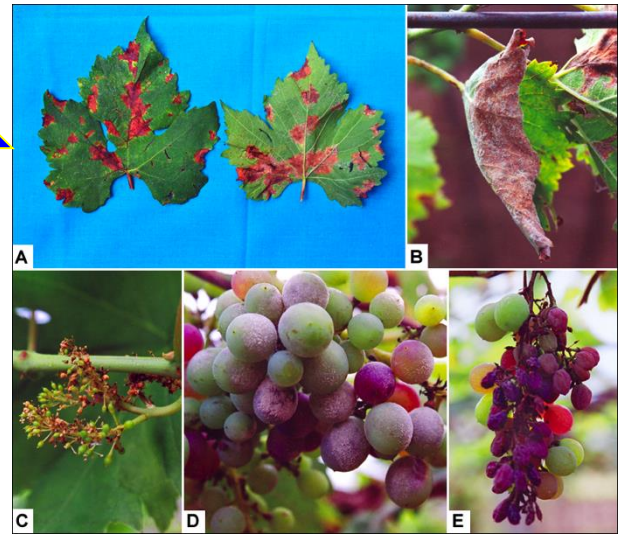
Pinot propagation

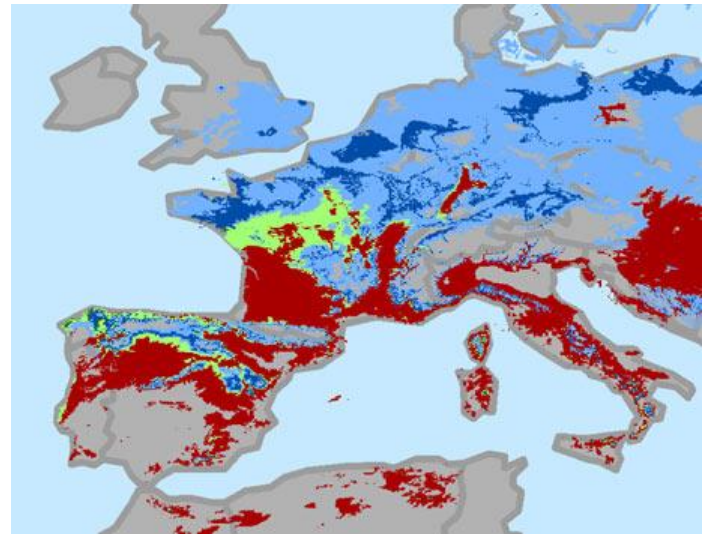
cuttings



layering





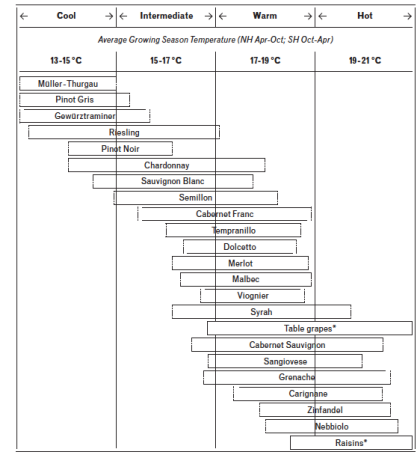


Which Romanée-Conti in 2119?

Which grape variety?

Pinot Noir

Other?



- **Agrochemical weaponry**
- **Pinot clones screening**
- **Rootstock improvement**
- **GM Pinot**

- **Late varieties**
- **Crossings**
- **Hybrids**

GMOs - Genetically Modified Organisms in *Vitis*

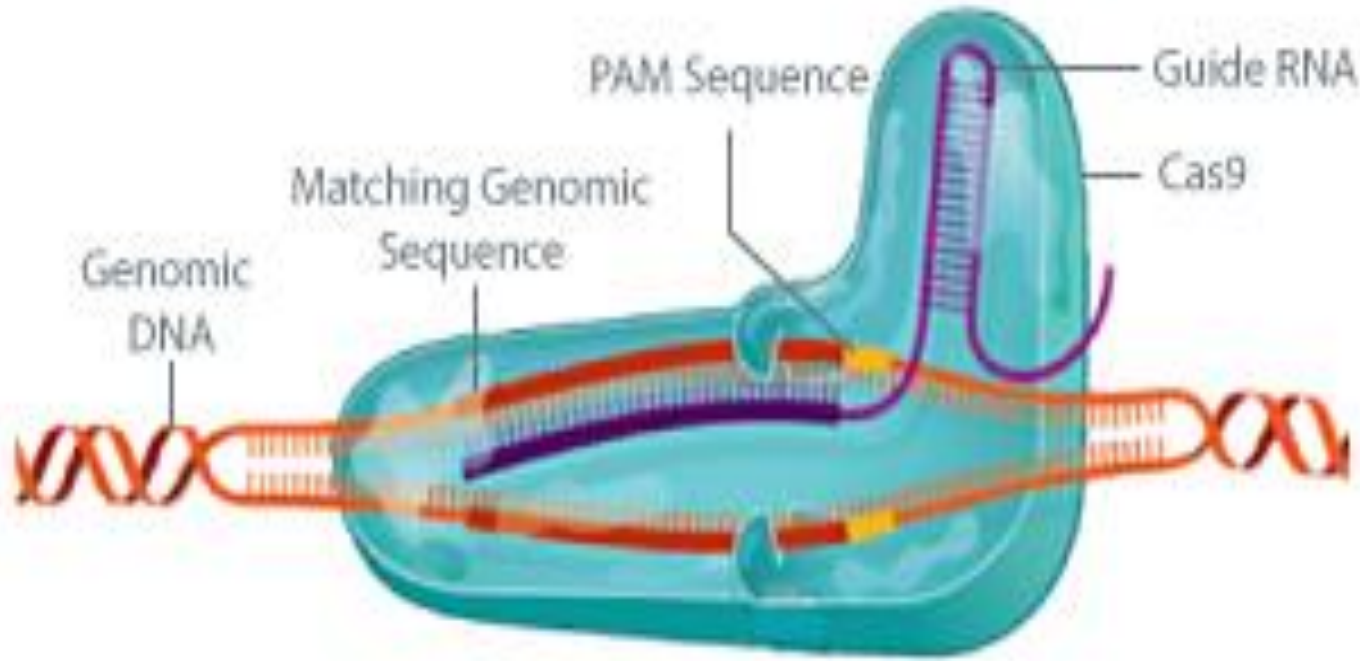
Could solve mildews, leafroll virus, Pierce's disease, draught, cold, etc.

Country	Varieties	Aim	Dates
Italy	Sultanina, Silcora	Parthenocarpic	1999-2006
Canada	Cabernet Franc	Cold tolerant	?
France	Roostok 41 B	GFLV resistant	2005-2009
Romania	Russalka, Roostok 41B	Viruses resistant	2003-2006
Germany	Dornfelder, Riesling, Seyval Blanc	Fungal resistant	1999-2009 (Interrupted)
USA	Chardonnay, Merlot, Niagara, Concord, Sultanina	Bacterial and fungal resistant	2000-2010
	Rootstock	Viruses resistant	2007-2008
China	Sultanina	Fungal resistant	?
South Africa	Chardonnay, Sultanina	Visual markers	Pending

Gene editing

CRISPR-Cas 9 (Clustered regularly interspaced short palindromic repeats)

- Derived from a natural process found in bacteria to protect themselves from pathogens
- Targets genes for editing and regulating
- Comparable to Photoshop



Gene editing

CRISPR-Cas 9 (Clustered regularly interspaced short palindromic repeats)

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ARTICLE

Knockdown of *MLO* genes reduces susceptibility to powdery mildew in grapevine

Stefano Pessina[1,2], Luisa Lenzi[1,3], Michele Perazzolli[1], Manuela Campa[1], Lorenza Dalla Costa[1], Simona Urso[4,5], Giampiero Valè[4,5], Francesco Salamini[1], Riccardo Velasco[1] and Mickael Malnoy[1]

Danger of genetic erosion