

What do NC specialty crop growers need to know about climate change?

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Expected climatic change in NC

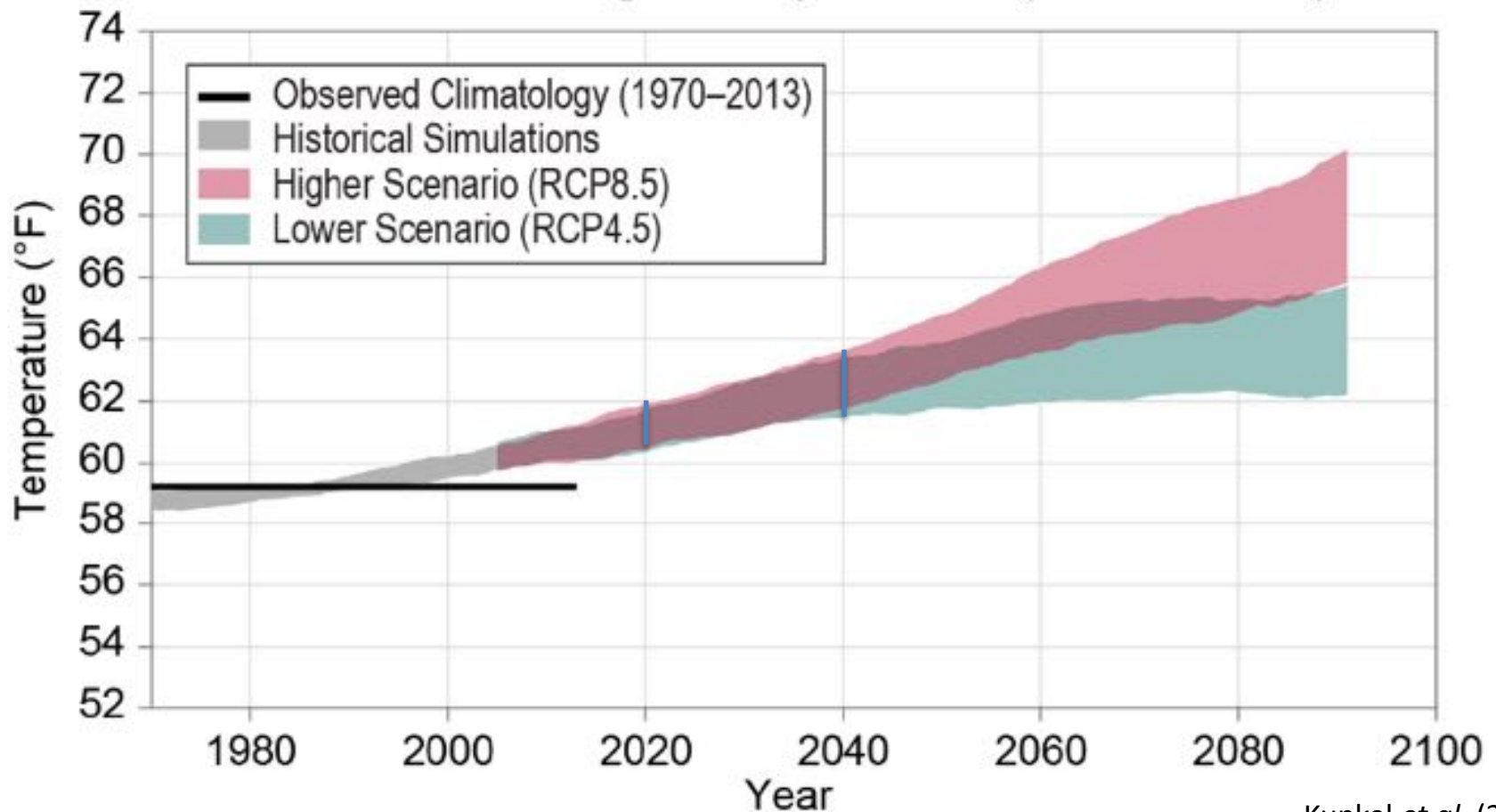
- In the future, both days and nights are likely to get hotter.
- Heavy rains from hurricanes and other weather systems will become more frequent and more intense.
- Increased flooding, due largely to sea level rise, will disrupt coastal and low-lying communities.
- Severe droughts will become more intense, and this will increase the risk of wildfires.

What time horizon for decision making?

- Specialty crop have a 1–20 year planning horizon
- Major climate effects forecast to occur 30+ years out
- What can we expect in the next decade or so?

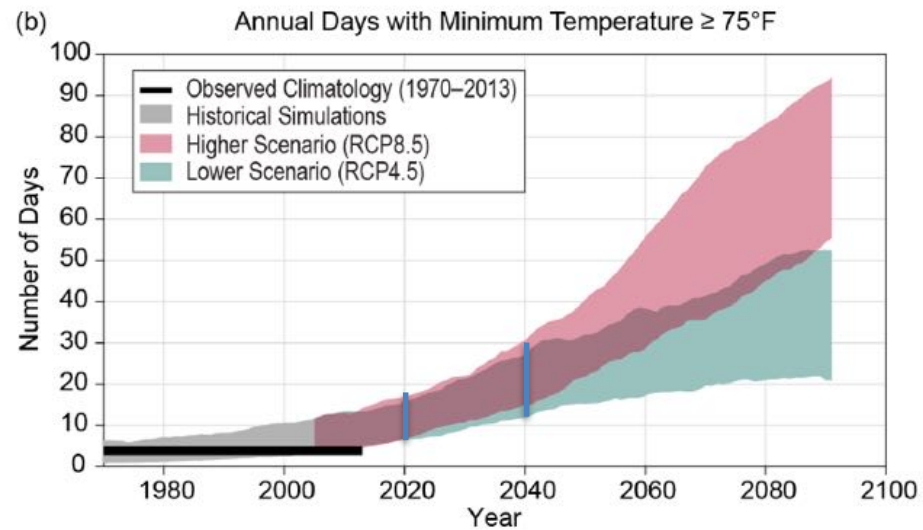
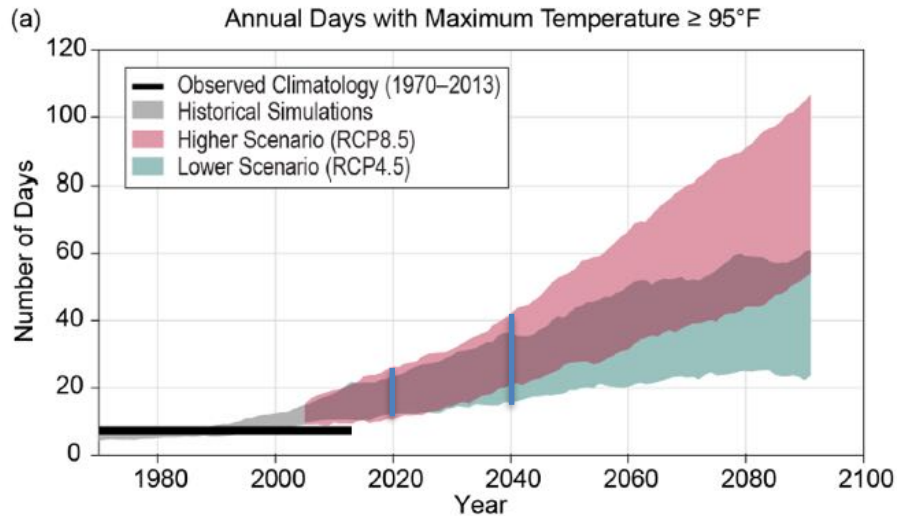
Expect a 1-2 F increase by 2040

Observed and Projected
Annual Average Temperature (1970–2100)



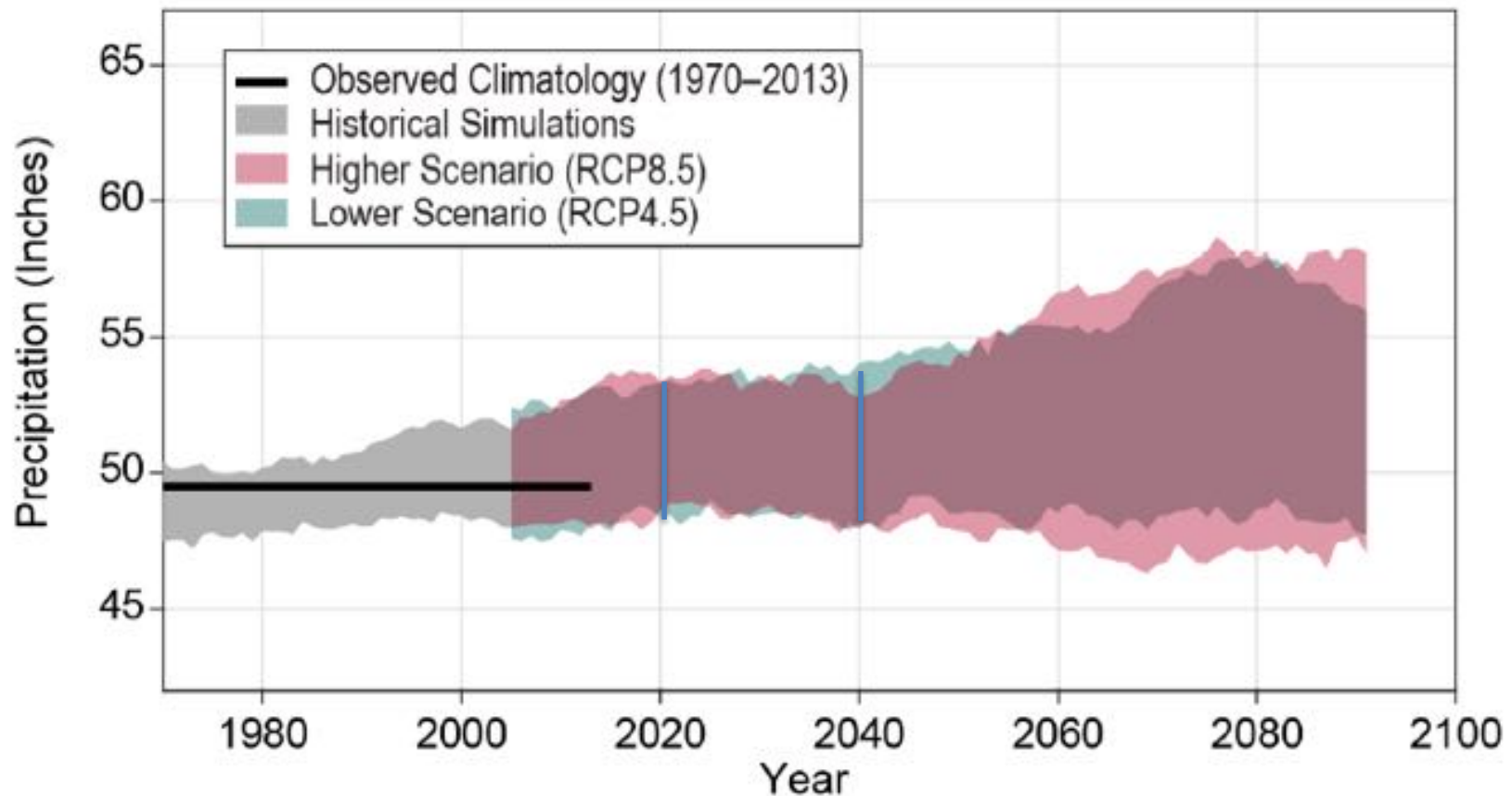
More hot days and warm nights

Observed and Projected
Very Hot Days and Very Warm Nights:
Coastal Plain (1970–2100)



Possible increase in total precipitation

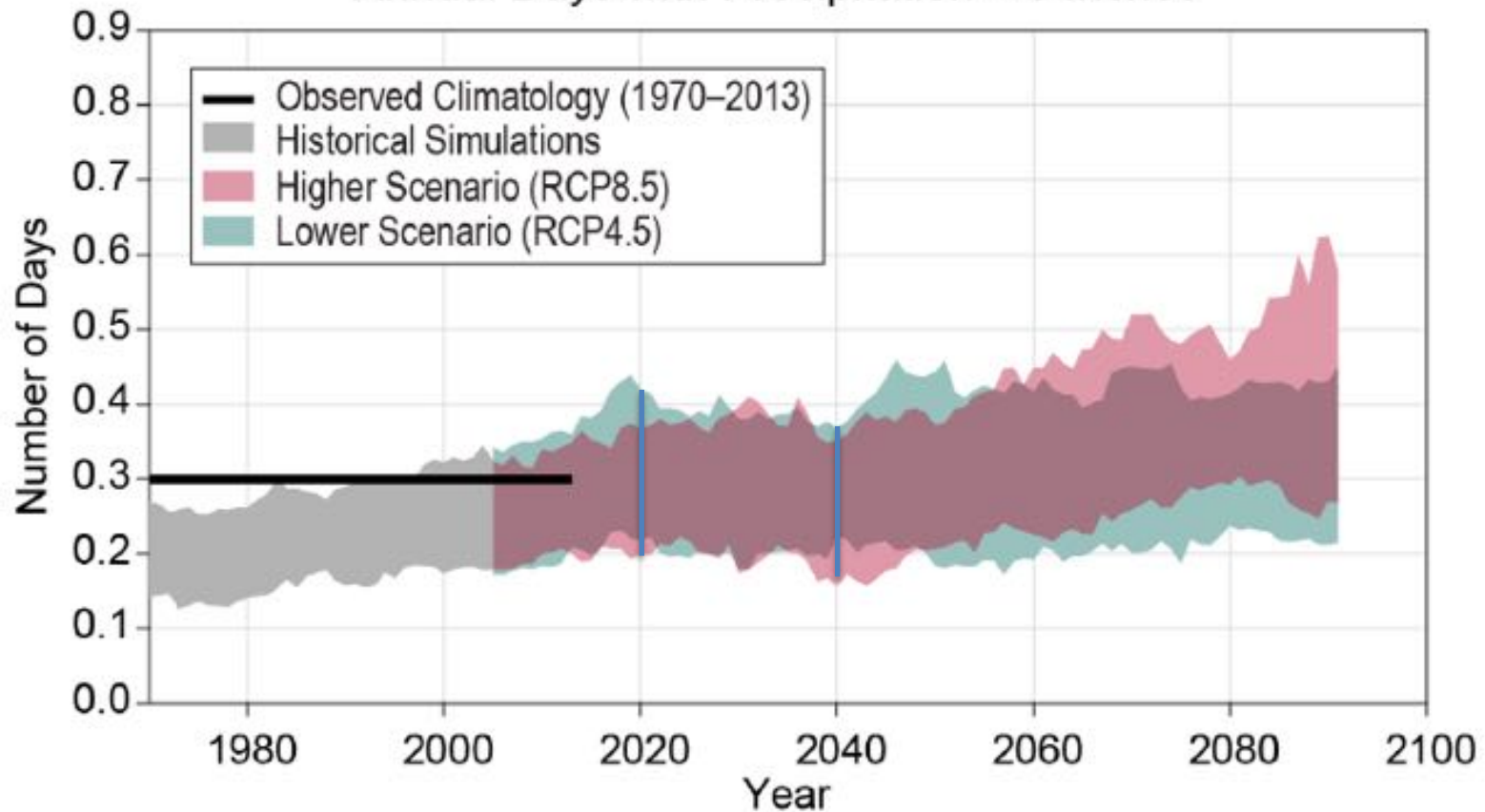
Observed and Projected Annual Total Precipitation:
Coastal Plain (1970–2100)



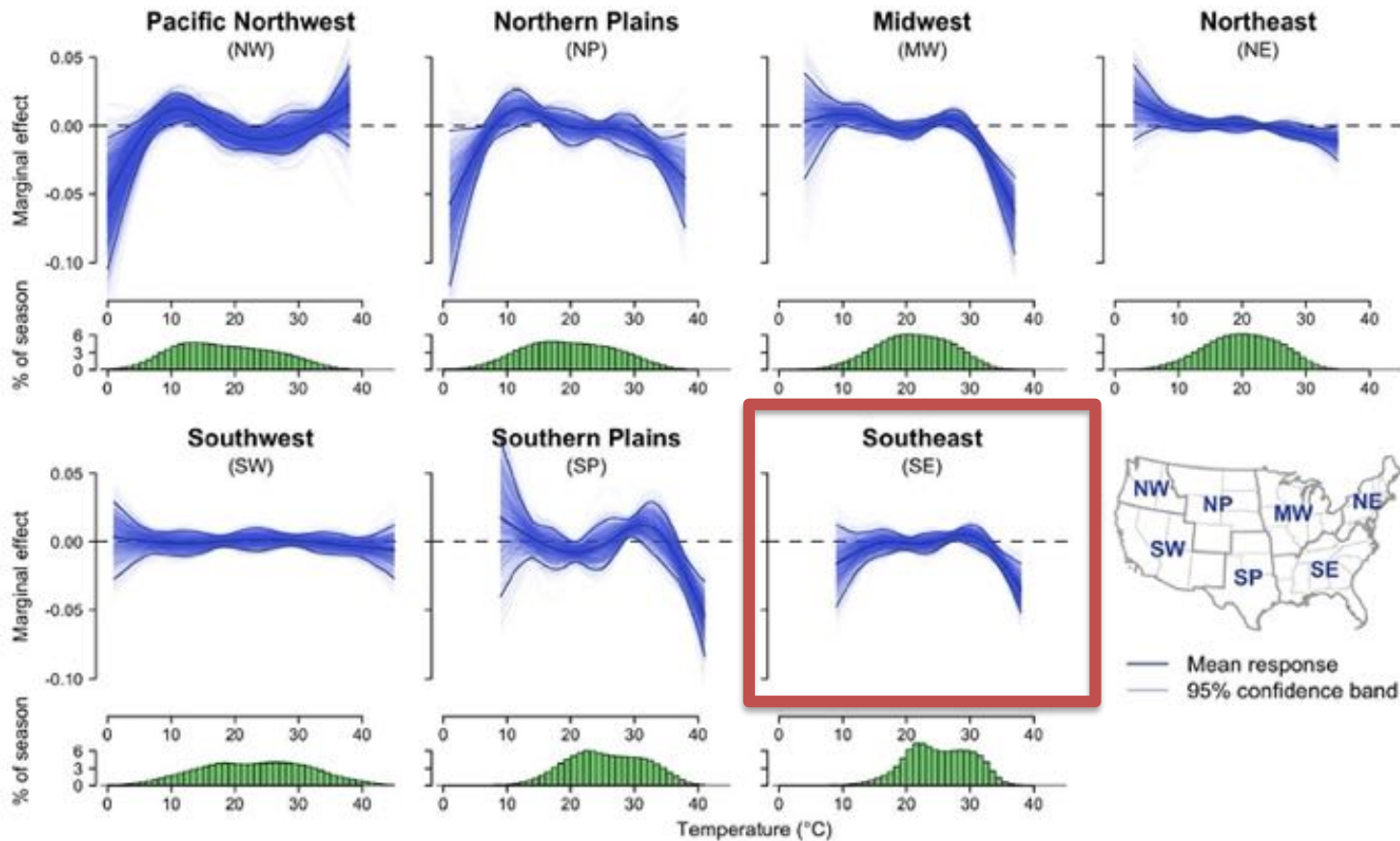
No expected change in heavy rain

Observed and Projected Extreme Precipitation Events:
Coastal Plain (1970–2100)

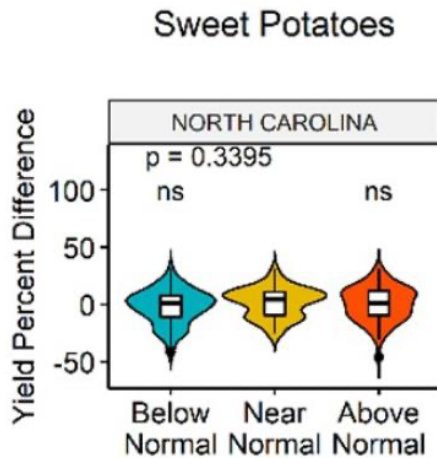
Annual Days with Precipitation ≥ 3 Inches



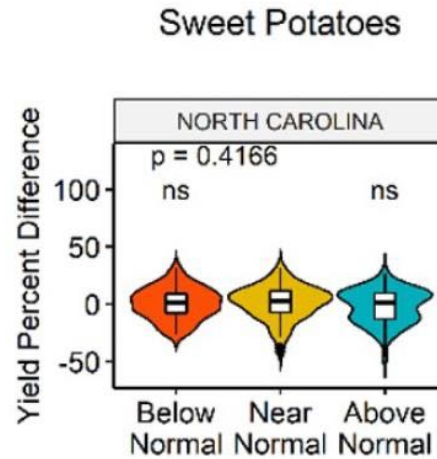
Southeast crop yields are relatively resilient to temperature changes



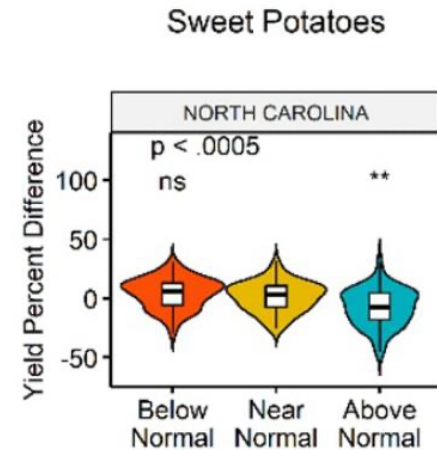
Sweetpotatoes are robust to temperature anomalies, sensitive to high rainfall



Maximum temperature anomalies

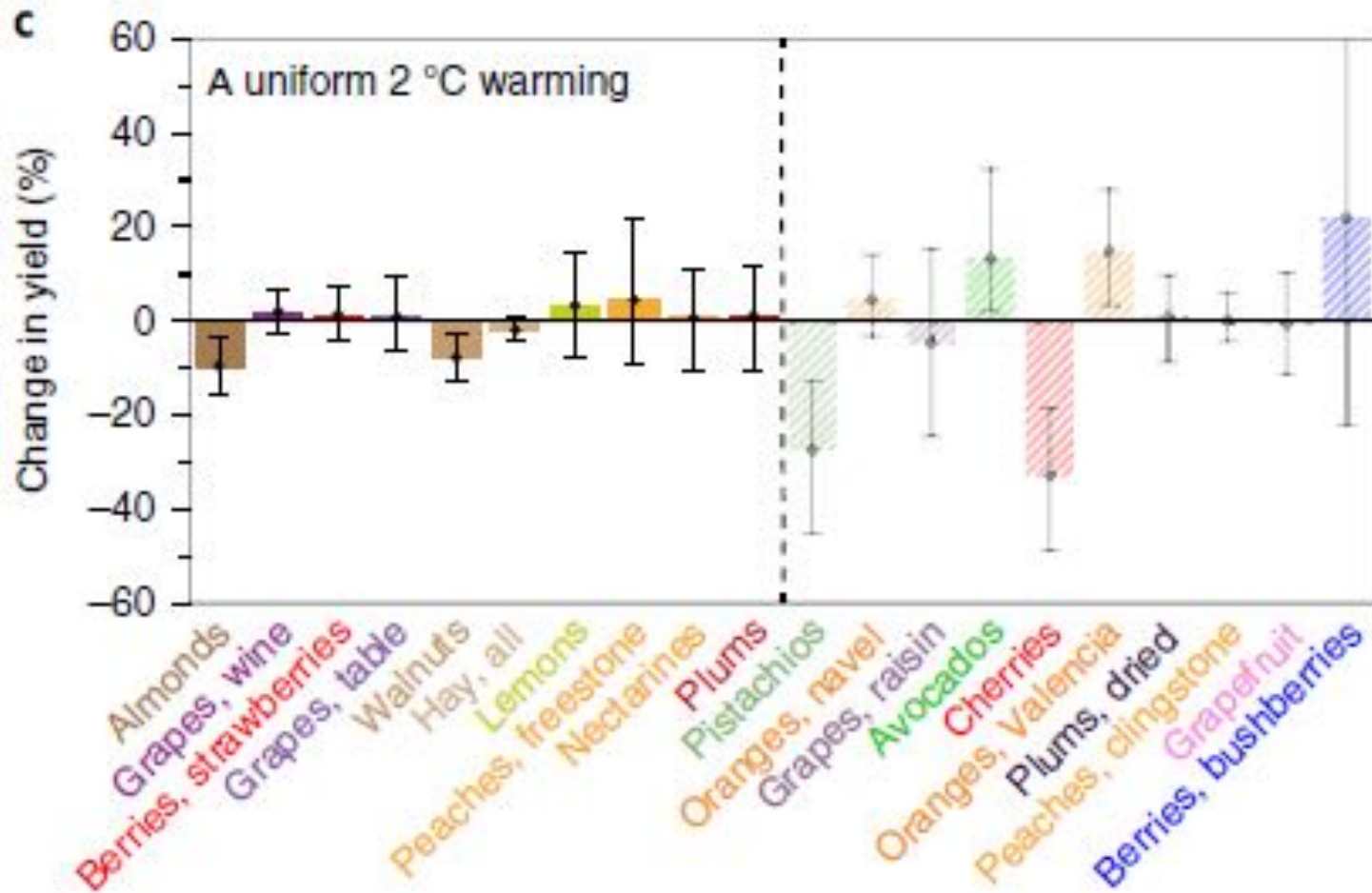


Minimum temperature anomalies



Precipitation temperature anomalies

Which specialty crops are vulnerable to temperature change?



Hong et al. (2020) - Impacts of ozone and climate change on yields of perennial crops in **California**

Stone fruit are potentially the most sensitive to temperature changes

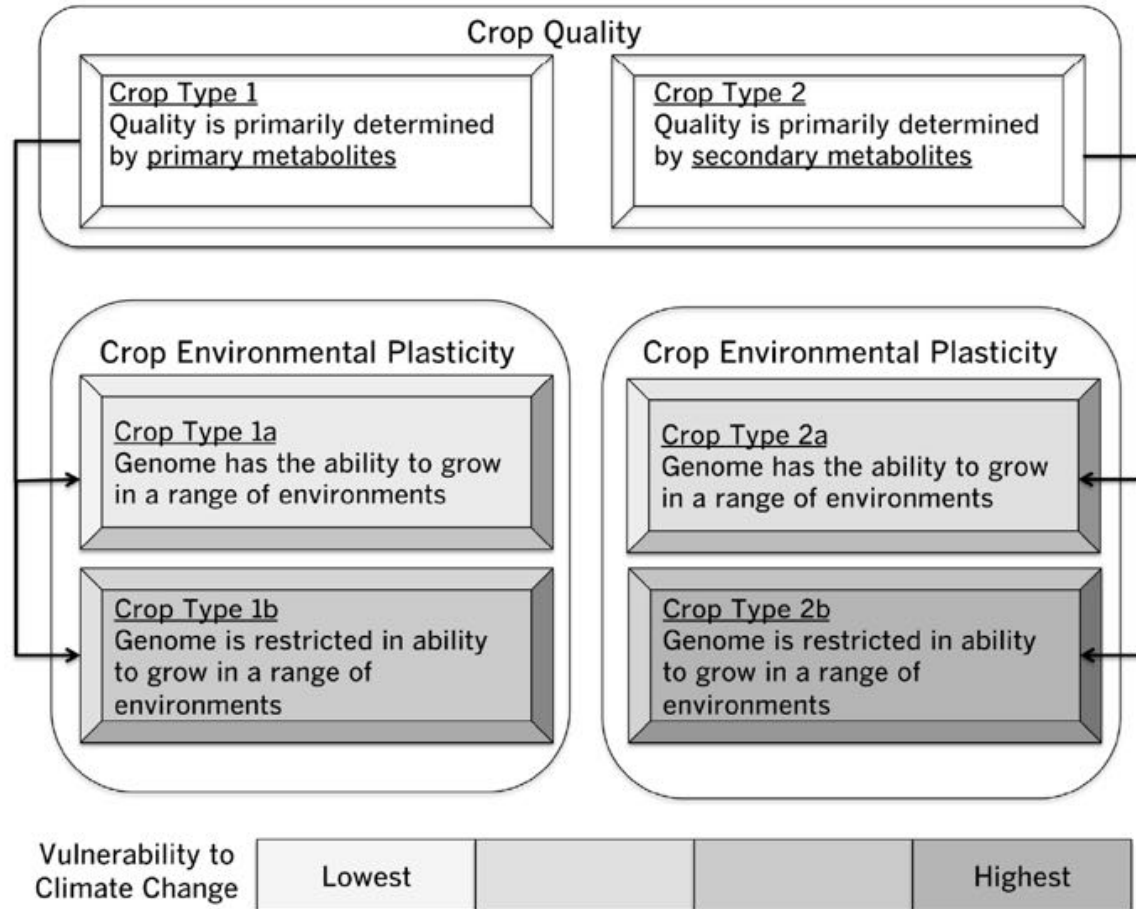
Crop	Sensitivity to winter minimum temperatures (1 = low, 4 = high)	Sensitivity to summer maximum temperatures (1 = low, 4 = high)
Table grapes	2	1
Wine grapes	2	3
Strawberries	2	3
Tomatoes	1	2
Stone fruit	4	3
Cucurbits	1	2

Kerr *et al.* (2018) - Vulnerability of California specialty crops to projected mid-century temperature changes

What about quality?

Crop	Climate Variables	Secondary Metabolites	Findings	Quality Implications
Apple	Temp, humidity, rainfall	Volatiles	Rainfall, temp, and humidity influence volatiles	Flavor
Grapes	Temp, solar radiation, rainfall	Phenolics and antioxidants	Cooler temps positively correlated with phenolics and antioxidants	Sensory quality, health-related benefits
Kale	Temp and solar radiation	Phenolics and antioxidants	Lower temperatures had higher concentrations	Health-related benefits
Strawberry	Temp	Phenolics and antioxidants	Warmer nights and days had higher antioxidants and phenolics	Sensory quality, health-related benefits
Tomato	Temp, solar radiation, rainfall	Lycopene, carotene, lutein, tocopherols	Higher solar radiation, higher temp, and lower precipitation led to higher concentrations	Sensory quality, health-related benefits

Geographically specific, flavor-driven crops are most vulnerable



No immediate action seems necessary, in addition to existing risk management

- Temperature impacts:
 - Wait and see
- Flooding impacts:
 - Avoid planting perennials in low-lying areas where possible

References

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