Climate Change and Agriculture in the Mid-Columbia Region

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Integrated production systems for perennial tree fruit crops in Oregon with an emphasis on sustainable sweet cherry and pear production systems in the Mid-Columbia region.
Agricultural Regions of the Columbia River Gorge National Scenic Area

- Small regions in Clark/Skamania Counties (WA)
- Small region in Hood River County (OR)
- Largest regions in Klickitat County (WA) and Wasco County (OR)
Major Crops of the NSA and Surrounding Land

- **Sweet Cherries**
- **Pears**
- **Apples**
- **Wine Grapes**
- **Berries**
- **Rangeland**
- **Wheat**
- **Hay**
Trends in Crop Type in the Last Decade

Pears and Sweet Cherry holding steady in Hood River and Wasco Counties.

Wine Grapes increasing in Klickitat County.

https://www.nass.usda.gov/
Climate Change Modeling: Dependent on CO$_2$ Changes in the Next Century

Representative Concentration Pathways (RCPs) used for the most recent climate model simulations.

- **RCP 8.5** = Emissions continue to rise throughout the 21$^{st}$ century. “Worst case scenario”
- **RCP 6.0** – Emissions peak in 2060 then decline.
- **RCP 4.5** = Emissions peak in 2040 then decline. “Intermediate scenario”
- **RCP 2.6** = Emissions start to decline in 2020 and go to 0 by 2100. “Very stringent scenario”

IPCC (Intergovernmental Panel on Climate Change)

https://cig.uw.edu/learn/climate-change/
Predicted Changes in Temperature for the PNW

- Regardless of greenhouse gas scenario, temperatures are predicted to rise throughout the 21st century in the PNW.

- Average projected increase of +5.8°F (RCP 8.5) in the 2050s.
Predicted Changes in Precipitation for the PNW

- Predicted similar annual average precipitation, with changes in distribution.
- Drier summer: average of -6% (RCP 4.5) to -8% (RCP 8.5) for the 2050s.
- Wetter fall, winter, spring: average +2% to +7% for the 2050s.

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Predicted Effects of Temperature and Precipitation Changes in the PNW

Increased Temperature

- Less snowpack (less water released into rivers/streams)
- Greater amounts of water needed for crop production
- Changes in crop phenology
- Changes in pest/disease phenology

Decreased Summer Precipitation

- Lower stream/river flow
- Increased wildfires
Greater amounts of water needed for crop production

Irrigation sources are dependent on precipitation, both in the form of rain and snow.

Higher temperatures increase evaporation from rivers and cropland.

Tree fruit and small fruits need adequate water in order to maintain fruit yield, size and quality.

Extra irrigation is used to help protect fruit from heat stress during heat events.

Potential area of research: Precision Irrigation to maximize water conservation while maintaining fruit production.
Changes in crop and pest/disease phenology

Temperate fruit species are dependent on chill hours to flower/fruit.

Spring temperatures control the timing of bloom, which can put flowers at risk of frost damage, poor pollination, etc.

Warmer temperatures give insect pests like codling moth the chance to produce extra generations.

Potential area of research: Modeling phenology based on weather (Growing Degree Days).
Increased Climate Variability: Out-of-Season and Extreme Weather Events

Heat Waves: Damage to developing fruit.

Cold snaps: Damage to vegetative organs and floral buds.
Conclusions

Temperate, perennial crops like sweet cherries, wine grapes and pears are important agricultural commodities either grown in, or near, the NSA.

Climate change is predicted to increase the mean temperatures and decrease the summer precipitation in this area.

Long-term challenges for crops may include limitations to water availability, changes to plant phenology, and increased pressure from pests.

Sporadic challenges for crops may result from increased climate variability and may include damage from heat, drought, cold, hail, etc.

Agricultural producers (and researchers!) should be thinking long-term about how to best adapt our local crop production to the predicted changes we face.