

AI for Ag Input(s) Optimization

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Washington Agriculture



Washington
State Department of
Agriculture

WASHINGTON AGRICULTURE A GLOBAL IMPACT

MAY
2025
EDITION

Top Export Markets

Source: WISER Trade, CY24

CANADA - \$1.37B

TOP IMPORTS:
Seafood, Apples,
Cherries

JAPAN - \$1.12B French Fries, Hay, Wheat

MEXICO - \$908M Apples, French Fries, Malt

CHINA - \$693M Beef, Seafood, Hay

SOUTH KOREA - \$508M French Fries, Hay, Wheat



19 billion
Value of all ag products
exported through WA ports



300+
Number of crops
grown in Washington



1.99 billion
Dollar value of apples,
the state's top crop



7.64 billion
Value of WA-grown and
processed food and ag products
exported internationally

What are the Key Inputs?

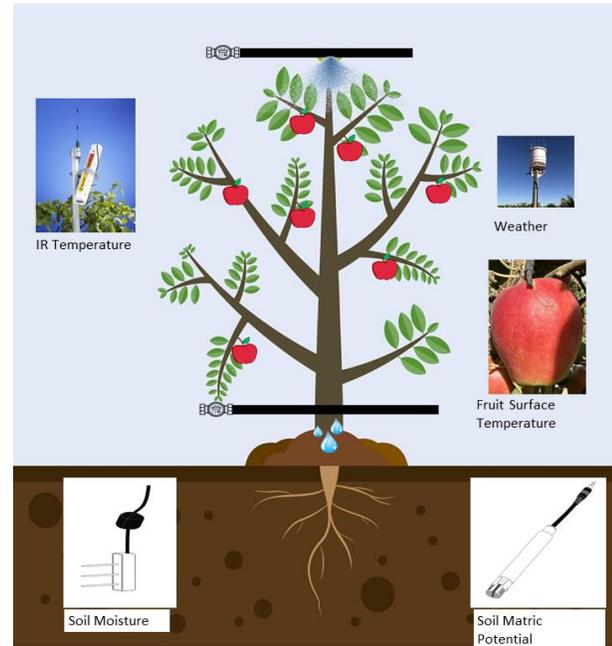
- Irrigation Water
- Fertilizers, Nutrients
- Crop Protection
 - Biotic (Insect/Pests): Chemicals
 - Frost/Heat: Water/Energy
- Labor (\$17/h): Pruning, Thinning, Harvest...



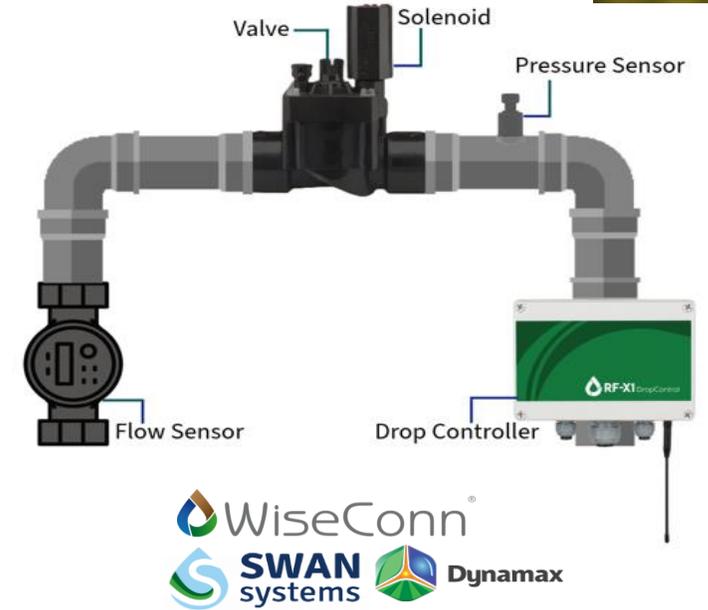
Irrigation: Automation + Precision



Drip: 20-52% Water Saving



Sensing → Climatic Model



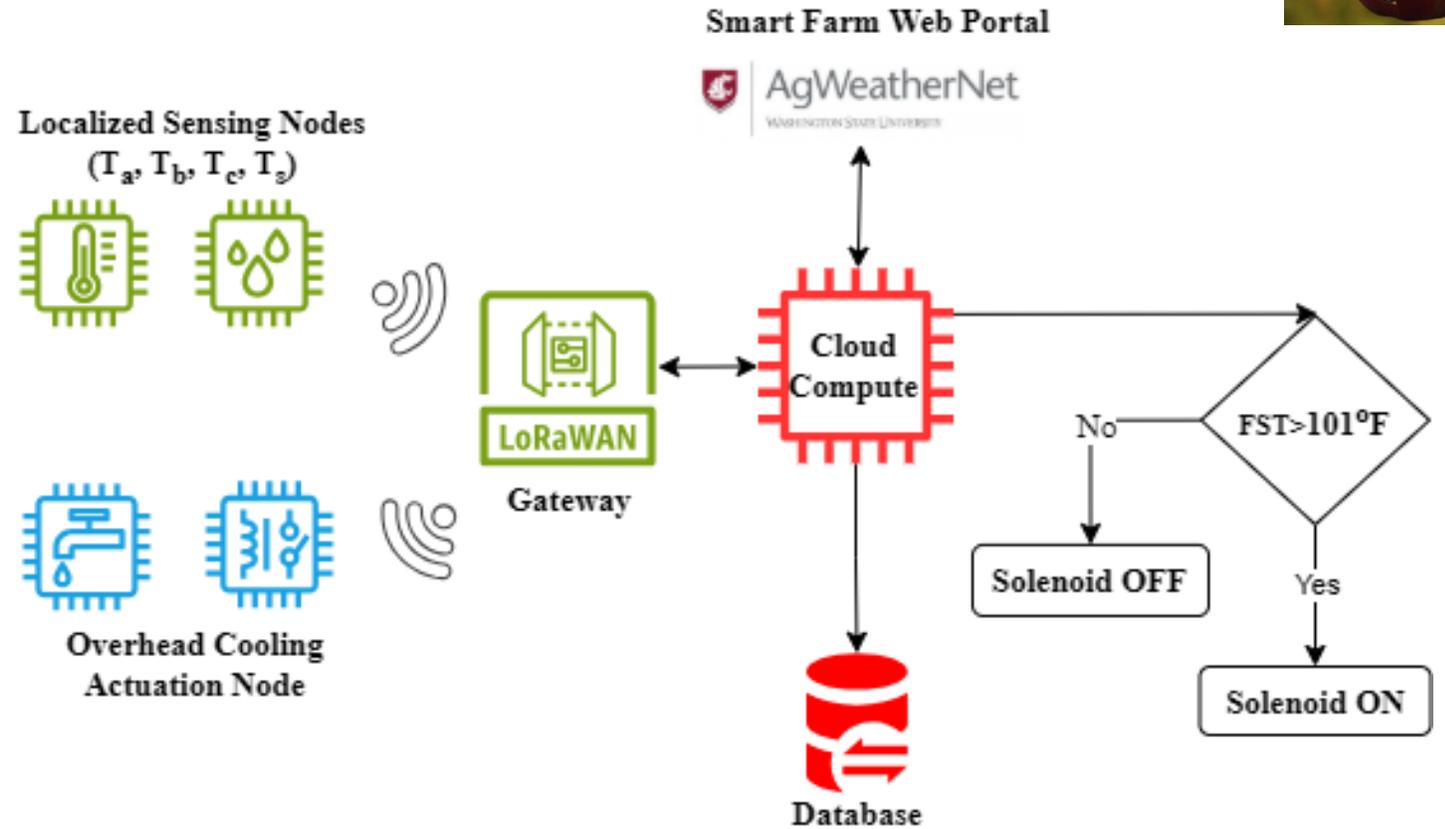
Automation



Heat Stress Automation + Precision



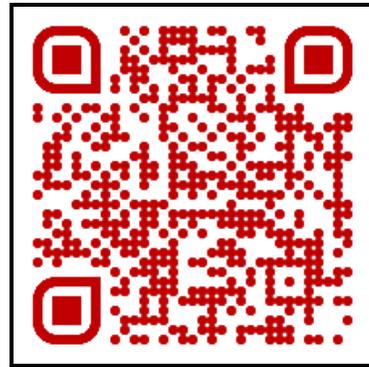
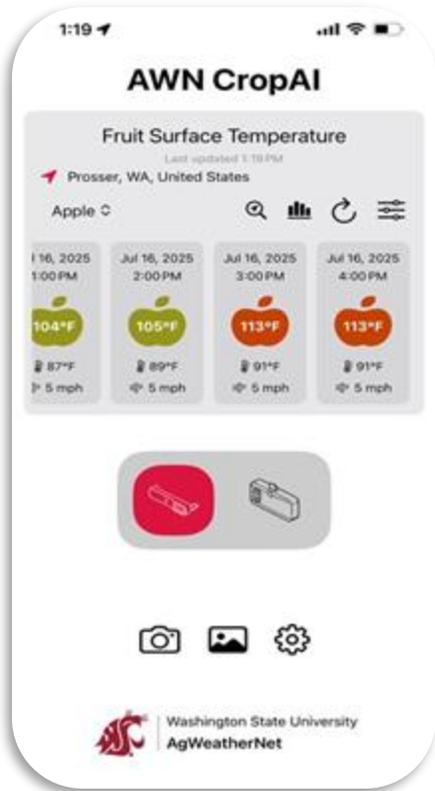
Cooling: 46-50% Water Saving





Heat Stress Mitigation (Apple/Grape/Blueberry)

AI-powered canopy/ fruit stress prediction & color progression monitoring tool



iOS

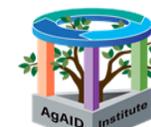


Thermal-RGB imager (\$400) w/smartphone



Deployed 370 AgWeatherNet stations + connected to global weather network

Team: Thennakoon, Amogi, Verukutti, Khot, Sallato, Keller, Hoheisel





Frost Mitigation in Fruit crops



Sweet Cherry



Grape



Blueberry



Blackberry

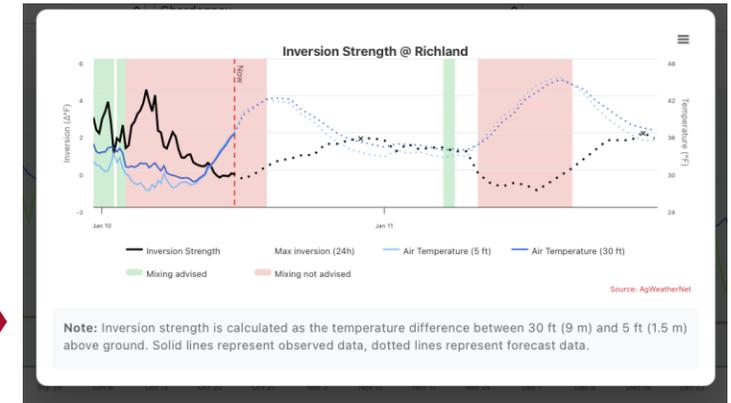
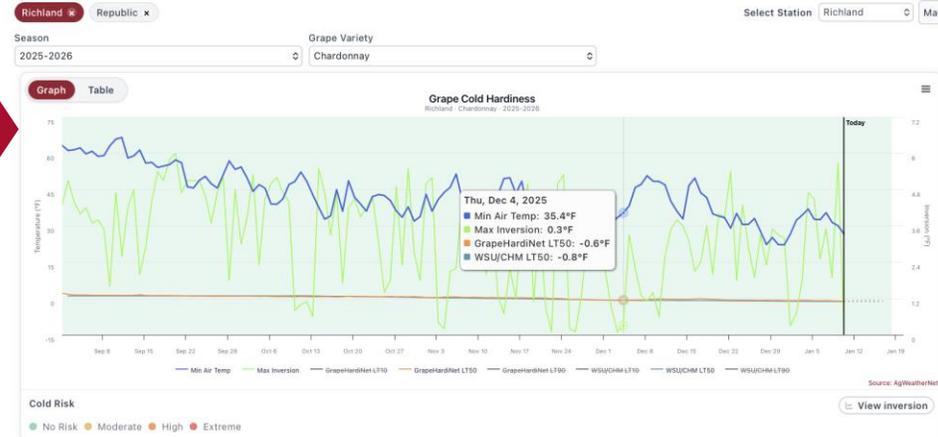


Grape Cold Hardiness

This decision support tool predicts critical low temperatures for grapevine bud cold hardiness using two different weather driven models.

- The **GrapeHardNet** (Saxena et al. 2023) is an artificial intelligence (AI) based model that uses station specific temperature and other environmental variables as input. **This model should not be used after bud break.**
- The **WSUCHM** (Ferguson et al. 2014, 2011) is a scientific model that uses daily average temperature data as input.

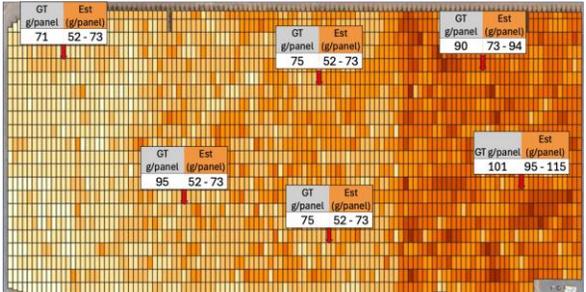
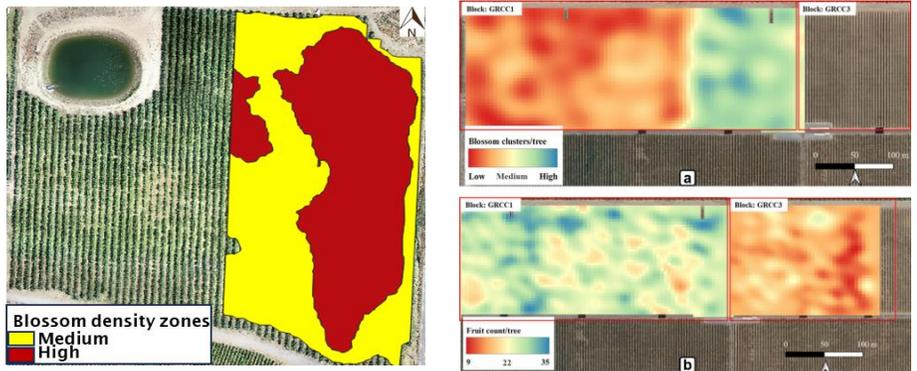
Select a station, season, and cultivar to see the model output.



Team: Khot, Keller, Pesantez, Hoheisel, Kalyanaraman, Amogi (WSU), Fern (OSU), and AgWeatherNet

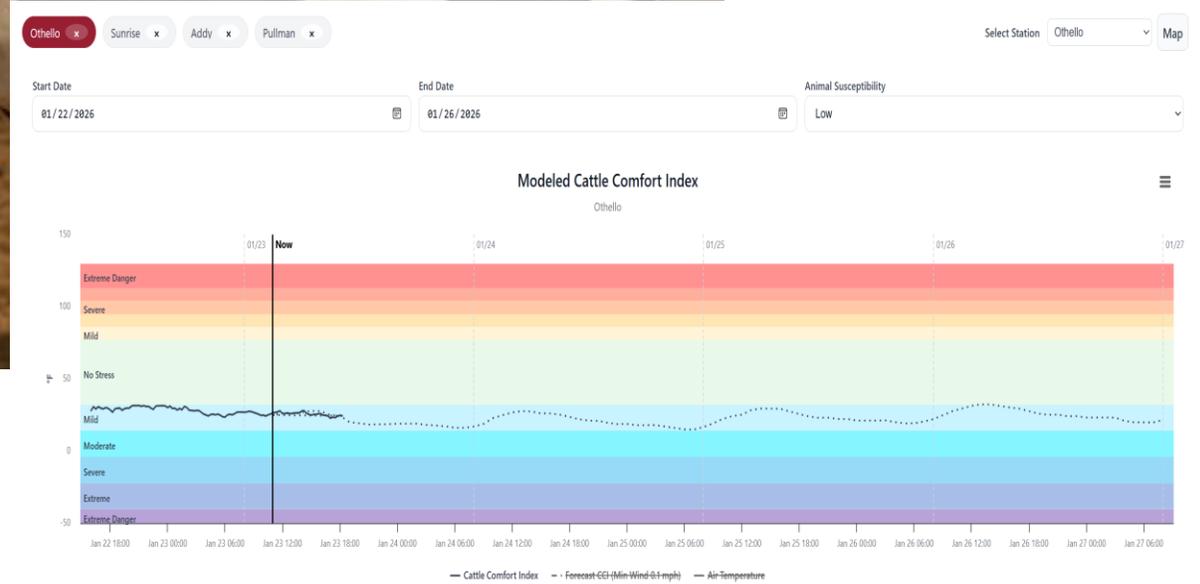
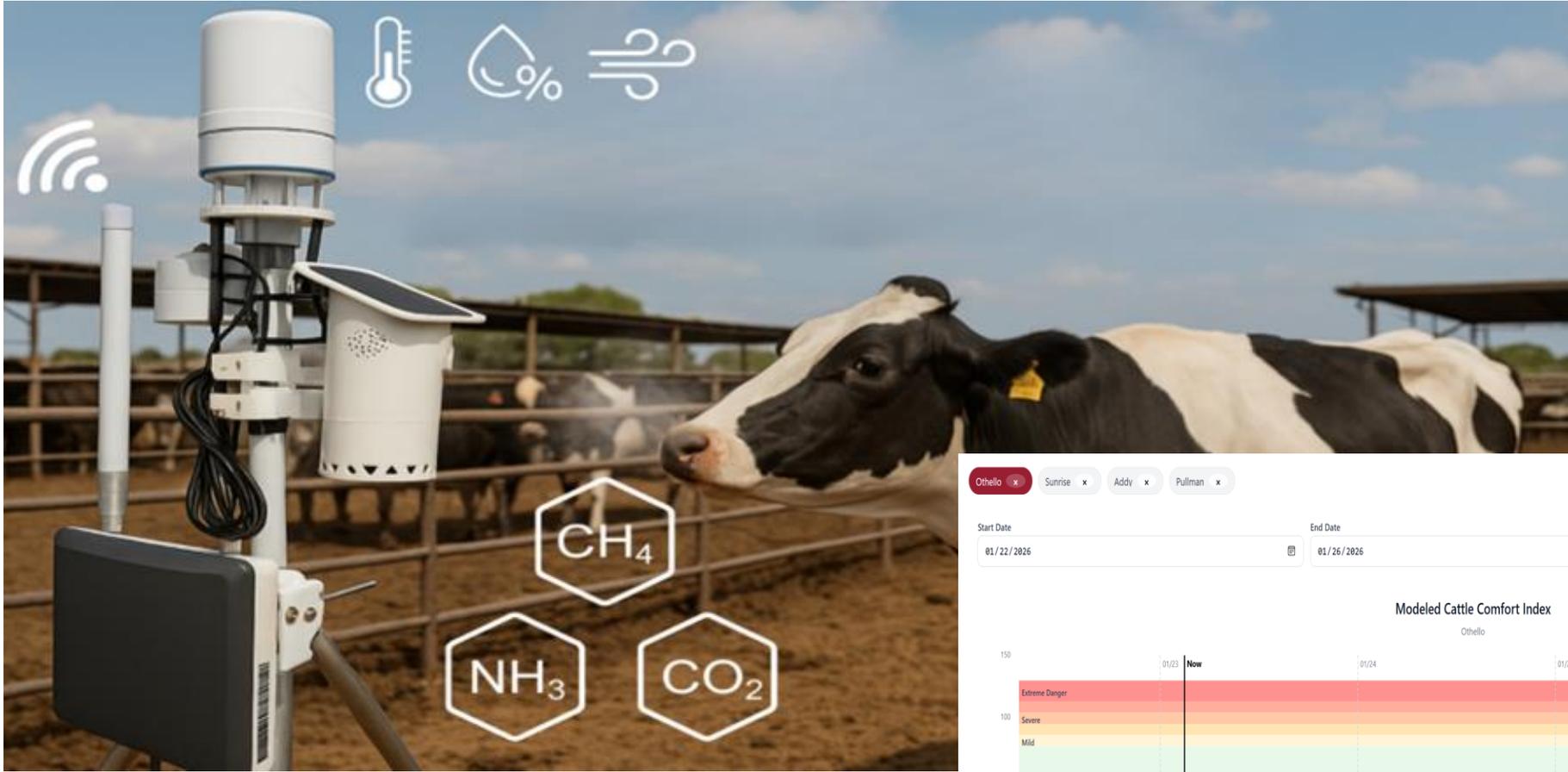


Crop Load: Mapping to Precision Management



- Thinning (Blossom, Green Fruit)
- Nutrients Management
- Chemical Applications

Precision Livestock Farming



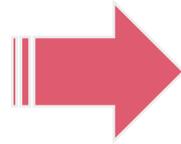
Source: AgWeatherNet

Team: Khot, Dadallage, Smith (WSU),
Leal-Yepes(Cornell), and
AgWeatherNet





Conventional



Smart/Digital Switch

AI-Readiness: Key Enablers

Stakeholder Education

(Data, Metadata)

Data Centers

([De]Centralized,
Democratized)

Smart Farm Testbeds

(Soil-plant-weather
sensing + Control)

(Public-Private Partnerships)

Thank you!

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