

California/ Washington state/ Dutch Collaboration

SMP1961 - Opportunities for AgFoodTech ('CAWADU')

Rick van de Zedde/ Peter Frans de Jong/ Marcel van Haren/Silke Hemming

12 December 2019, Den Haag



Project team:

Scope: Exploration of High Tech of Greenhouses and Fruit Orchards in California, Washington State & NL.

Team:

- Marcel van Haren: project leader (FME - industry)
- Rick van de Zedde: project leader (WUR)
- Peter Frans de Jong: Fruit orchards expert (WUR)
- Silke Hemming: High Tech Greenhouses (WUR)

Key partners/ collaboration land scape

California:

- Gabe Youtsey (UC ANR/The VINE)
Chief Innovation Officer, co-project leader.



THE VINE
THE VERDE INNOVATION NETWORK
FOR ENTREPRENEURSHIP

 **UNIVERSITY OF CALIFORNIA**
Agriculture and Natural Resources

- Dennis Donohue (Western Growers Association)
Director WG Center of Technology & Innovation.



Washington State:

- Ines Hanrahan Washington(Tree Fruit Research)
Executive Director, Networking link WA State.



The Netherlands:

- Greenhouse: WUR, 7 technology companies.
- Fruit: NFO, WUR, 7 technology companies.



TOPSECTOR
TUINBOUW & UITGANGSMATERIALEN





California-Dutch Collaboration Opportunities for AgFoodTech

E-mail news letters/ events/ networking etc. organized by:



Californian-Dutch collaboration for AgFoodTech

Opportunities to connect!

Building the network and trust between people is one of the most important aspects of innovation and especially international innovation. Working in different time zones on long distance is a challenge, therefore we focus on having moments to meet face to face. The next coming weeks have several of moments, in this newsletter we update you on the moments we organized for



Why work together?

- The Netherlands, California and Washington State have an alignment on a global vision for food and agriculture
- The regions are top global exporters of specialty food and agriculture products.
- Significant parts of the economies and land use are for food production with similar challenges
- Close collaboration will enable AgriFoodTech innovation and prevent duplication of existing solutions.

1st CaWaDu mission on Greenhouses

- 19-21 Mai '19 - Silke Hemming (WUR Greenhouse Horticulture) together with Marcel van Haren (FME): interviews/ site visit/ tour. Discussions on 'Greenhouse of the Future' concept.
- 22-24 Mai 2019 – Indoor Ag Con in Las Vegas. Exploration of combinations with vertical farming.



2019 **INNOVATOR SUMMIT**
TRANSFORMATION OF THE FOOD SYSTEM

05.21
05.22

#InnovatorSummit2019
<http://foodaghealth.solutions>

Colorado State | cdhi | University of California | The Mixing Bowl | UC Davis | UC Davis

Colorado State University | Center for Data-Driven Agriculture and Food Systems | University of California | Agriculture and Natural Resources | The Mixing Bowl | UC Davis | Innovation Institute for Food and Health

The collage includes images of people at a summit, wind turbines, and a person working in a field.



7TH ANNUAL
INDOOR AG+CON
MAY 2019

GROWING THE FUTURE

RED ROCK RESORT | LAS VEGAS, NV | MAY 22-24, 2019

INDOOR AG+CON

INDOOR AG+CON

INDOOR AG+CON

Today's high-tech greenhouses



- Large companies
- Large compartments
- International: lack of skilled labour
- Grower needs to decide on many aspects
 - Yield
 - Product quality
 - Resource use, sustainability
 - Timing, market prediction

Outcome : explore how to connect upcoming projects in NL and California.

2nd Incoming mission from California

- June 4 – 5. Site visit/ tour/ meetings. GES: Concept: Round table discussions on for instance: **Greenhouse of the future**. Interests from RijkZwaan, Hoogendoorn and Koppert Biological Systems and others. Including design- and brainstorm session.
- June 6. Round table sessions at Dutch Ministry of Agriculture



3rd Mission August 2019 to Washington state and California

- To build a large network of Dutch and US companies, plus knowledge institutions and SME cooperatives.
- To boost the local situation with combined Dutch, Californian and Washington State brains and tech power
- Look for topics to work together.
- First visit WA organized by Washington State University Tree Fruit Research, second week in California by Western Growers association

4rd Incoming mission from California

- October 15. Visit of UC Davis delegation to the VertiFarm Summit in Wageningen and kick-off of the Urban Greenhouse Challenge (UC Davis partners with Wageningen UR)
- October 16. Several greenhouse technology company visits in the Netherlands
- October 17. Brainstorm session CA-NL (7 companies) for Greenhouse of the Future at WHC in Naaldwijk



Washington State



The Scale



Size apple Washington state:

84, 000 hectare industry (12 billion pieces of fruit picked by hand every year

Size fruit industry in the Netherlands:

6,599 hectare of apple

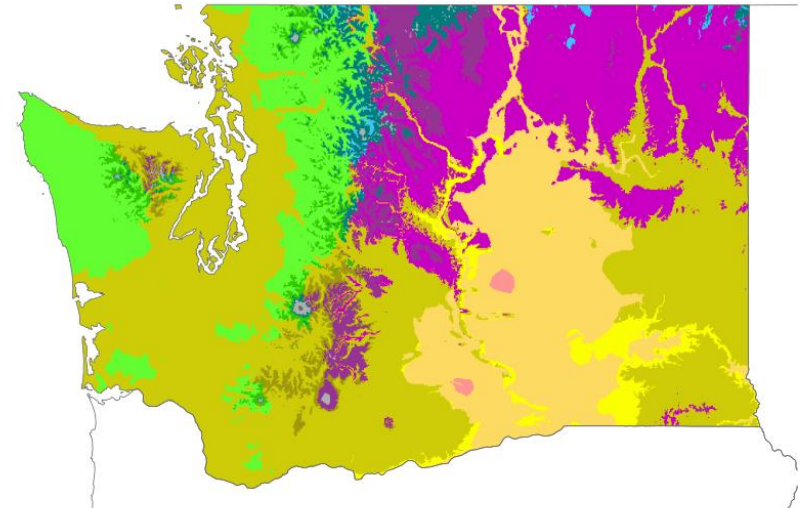
9,971 hectare of pear



Challenges Washington State

- H-2A program allows agricultural employers to hire non-immigrant temporary foreign workers
- Rules get more and more strict.
 - Growers have small village for seasonal workers
 - Availability
- Very dry season, water supply from river

Köppen climate types of Washington state



Köppen climate type

EF (Ice-cap)	Dsb (Warm-summer mediterranean continental)	Csb (Warm-summer mediterranean)
ET (Tundra)	Dsa (Hot-summer mediterranean continental)	Csa (Hot-summer mediterranean)
Dfc (Subarctic)	Cfc (Subpolar oceanic)	BSk (Cold semi-arid)
Dfb (Warm-summer humid continental)	Cfb (Oceanic)	BWk (Cold desert)
Dsc (Dry-summer subarctic)	Csc (Cold-summer mediterranean)	

*Isotherm used to distinguish temperate (C) and continental (D) climates is -3°C
Data sources: Köppen types calculated from data from PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>
Outline map from US Census Bureau

Research focus Fruit Orchard automation

- Adopting tree structure to robotic harvest
- Testing of 2 different robots
- Use of platforms to increase picking speed
- Replant disease
- Spray application
- Water stress regulated growth
- Crop protection



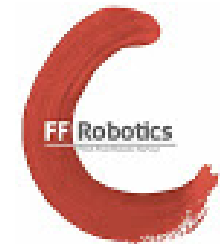
Two robotic initiatives for apple harvest



■ Abundant Robotics



https://www.youtube.com/watch?time_continue=1&v=XwpUxEY8D10



■ FF Robotics



<https://www.youtube.com/watch?v=rpPHR-mZEOQ>

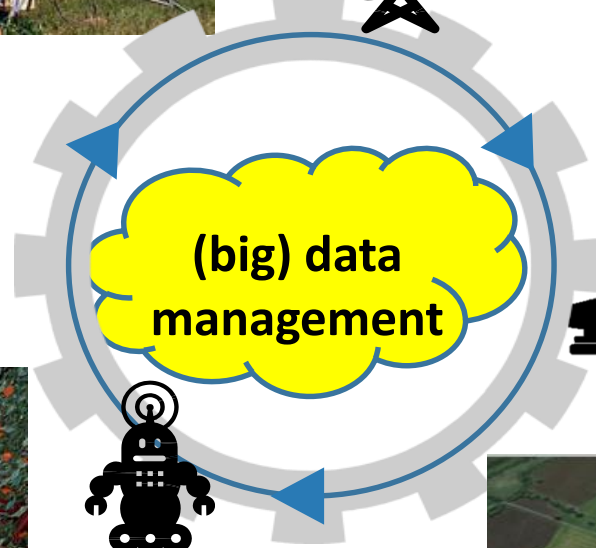
California – focus fruit orchards

- Similar topics as in WA
- Wider range of crops from vegetables to peaches
- Larger initiative to work together to automate harvest for all different crops in order to get the big companies on board like Google, IBM etc
- Adopting tree structure to robot (not so focussed as WA)
- Cooperation with UC Davis and UC Riverside

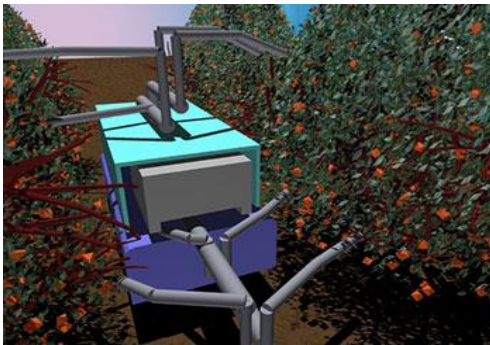
Links with on-going PPS Fruit 4.0



Monitoring with sensors



Analysis & Task map

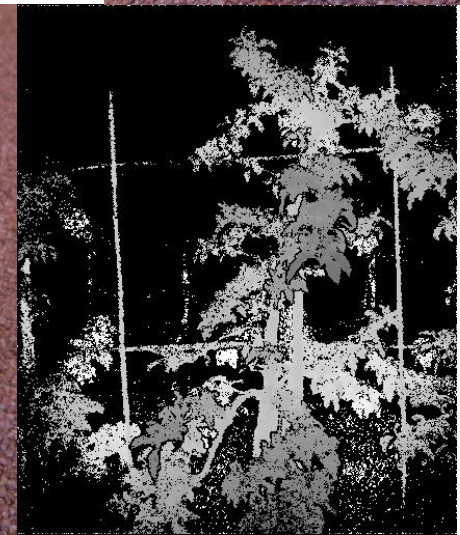
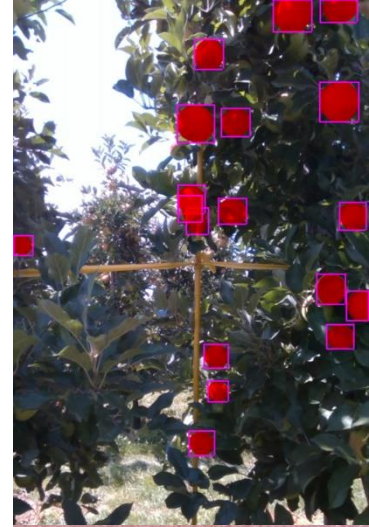


Management



Fruit 4.0 - big data per tree

- Monitoring orchard with sensors
- Measure and count flower clusters and fruits, colour and size of apples, shoot length, chlorophyll content, etc
- CaWaDu follow-up: Next year proposal Fruit 4.0 the sequel -> include cooperation US



5th Mission California

- November 7-8 – Fresno.
- CaWaDu representatives: Marcel van Haren (FME)/ Peter Frans de Jong.
- Brainstorm with ministers on fruit orchard automation and local SMEs.
- Opportunities/ insights, renewal of cooperation.

CDEA and the Netherlands renew commitment to cooperate on climate smart agriculture



Posted on November 7, 2019 by Office of Public Affairs

CDEA and the Netherlands have reaffirmed their commitment to work together on climate smart agriculture in addition to water management, ag-tech, food waste, antimicrobial resistance, and dairy farming. CDEA secretary Karen Ross and the Netherlands assistant vice minister for agriculture, Guido Landheer, met today in Fresno to sign a letter of intent renewing an international collaboration that began in 2015. The parties agreed to exchange knowledge and expertise to work towards climate smart agriculture by fostering innovation and sharing ag technology solutions.



"The ongoing collaboration that exists between the Netherlands and California speaks to our innovative spirit and shared

CDEA secretary Karen Ross and Guido Landheer, assistant vice minister for agriculture in the Netherlands, met today in Fresno to renew a letter of intent for collaboration and cooperation on climate change adaptation strategies.



Brainstorm Fruit Orchard Automation & Robotics (28 nov `19)

- Location: Tiel, 7 Participating companies.
- Outcome:
 - Use knowledge from Roadmap Fruit 4.0
 - Industry wants to speed up this proces!
 - Adapt tree to robot and vice versa.
 - Goal: Design the ideal future orchard / dream.
- Follow-up: Feb 2020 US visit to validate dream (via NL-works).

Project management summary

- SMP budget has been spent in 2019.
- Not two, but 3 out-going and 2 incoming mission were organised with co-funding from other projects.
- Some consortium partners in the proposal left, new companies joined.
- Follow-up project proposals are being written/have been approved to realize collaboration within the CaWaDu consortium.

Follow-up ideas/ work in progress:

■ High-Tech Greenhouses:

- Action 1. Via Heiner Leith (UC Davis), work towards a demo and training center in California
- Action 2. Via Gabe Youtsey: ANR is collaborating with UC Davis on a grant for “AI for the **Food** System” from the NSF/USDA with international partners. WUR has indicated to be interested, follow up meeting scheduled.

<https://www.nsf.gov/pubs/2020/nsf20503/nsf20503.htm>

- Action 3. Link this initiative to the consortium partners of the approved PPS AGROS WP1 ‘Autonomous Greenhouse’ and the combination with NWO Synergia.



Follow-up ideas/ work in progress:

- Fruit Orchards: Link California/ Washington initiatives with PPS Fruit 4.0.
 - Action 1: Follow-up visit scheduled in February/March 2020.
 - Action 2: draft project scope:
 - Cooperation on robotic picking
 - Better spraying technique
 - Advanced water use
 - Adapt cultivation systems to technology
 - (Further) development of data platform for growers

The end

Questions?

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