Virtual NCCC 212 2021
Meeting Notes 11/2/2021-11/3/2021

Host of North Carolina State University:
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All reports can be accessed on the meeting homepage:
https://smallfruits.cals.ncsu.edu/nccc-212-2021/

Quick view of each report:

Day 1	**Day 2**
Auburn (Alabama) 2021 Report	Penn State 2021 Report
University of Arkansas 2021 Report	Ontario 2021 Report
British Columbia 2021 Report	Wisconsin-Madison 2021 Report
Michigan State University 2021 Report	USDA-ARS Beltsville 2021 Report
Mississippi State University 2021 Report	Utah 2021 Report
New Hampshire 2021 Report	USDA-ARS HCRU Corvallis 2021 Report
Rutgers (New Jersey) 2021 Report	USDA-ARS HCRU Appendix
Cornell CUAES and NYSAES 2021 Report	USDA-NCGR Corvallis Report
North Carolina State University 2021 Report	Washington State University 2021 Report
North Dakota 2021 Report	
Oregon State University 2021 Report	

Important notes from chat:
Day 1:

Flower Mapping:Video One

Strawberry Flowering Physiology (~ 15 minutes)

https://drive.google.com/file/d/1eQqmSeR-3pDBIC4hLP9h7PXgQZHqkPxY/view?usp=sharing

Video Two

Setting up and installing your Plugable Digital Microscope

https://drive.google.com/file/d/1u1DXH6m9fx_9fhFbTbodMgN2w-y5GMt1/view?usp=sharing

Video Three

Flower Mapping A Strawberry Plug Plant (~ 15 minutes)

https://drive.google.com/file/d/1QbjJl9wXm0tA5OI8ebPBitXHpTwhJMiT/view?usp=sharing

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under sub award number LNE20-395-34268.

Storing Tips:

Hokanson, S.C., F. Takeda, J.M. Enns, and B.L. Black. 2004. Influence of cold storage duration on strawberry runner tip viability and field performance. HortScience 39:1596-1600.

Penny:
I worked with Fumi a bit on this years ago. plastic bags keeps humidity higher, clean cooler with humidity control to 90%, 2-4 C, in dark. Ethylene can increase over time; when carbon dioxide goes up we had problems with recovery of the tips.

Low Tunnel Systems:
A practical guide about low tunnel systems that my research associate, Kaitlyn Orde, put together: https://extension.unh.edu/resource/low-tunnel-strawberry-production-guide
Vapor Pressure Deficit.
VPD is the favorite subject of greenhouse growers, especially hemp.
https://www.cannabissciencetech.com/view/understanding-vpd-and-transpiration-rates-cannabis-cultivation-operations.
Leaf-photosynthesis at different VDPs
Fruit respiration at different VDPs

Day 2:
USDA postdoc position in genomic selection in blueberry:
https://www.zintellect.com/Opportunity/Details/USDA-ARS-2022-0011

Here's information on the Horticultural Crop Entomologist position at WSU NWREC in Mount Vernon. Please pass along: https://wsu.wd5.myworkdayjobs.com/en-US/WSU_Jobs/job/GENERAL-CAMPUS---MT-VERNON/Horticultural-Crops-Entomologist_R-3150

Here is the job posting for the Endowed Berry Crops Professorship - my successor. Please consider applying or encouraging someone whom you think is a good fit to apply:
https://jobs.oregonstate.edu/postings/107263

We, at the NCGR, also have an opening for a postdoc who will work on completing a few projects on molecular characterization of germplasm in Rubus and Pear. If you know of anyone, please contact me and I will e-mail the description- Nahla.bassil@usda.gov

Day 1 (Waiting for video to be transcribed)

Day 2

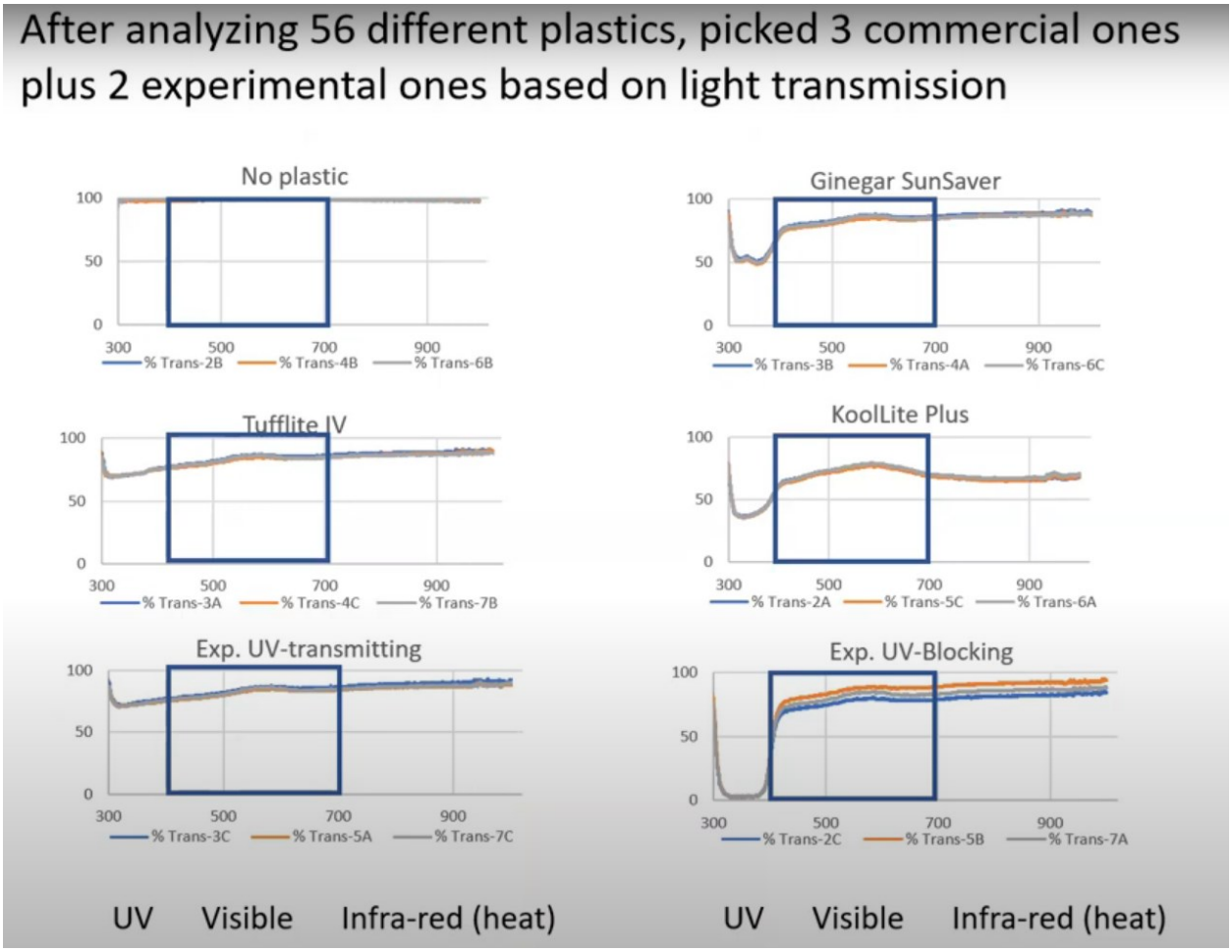
1. **Penn State 2021 Report - Presented by: Kathy**
   Outgrowth of SCRI Project on Plastic Covers
   --Near Lancaster county (SE PA) - PSU SE Research and Extension Center
   -- looking for grower-friendly “failproof” system; 7 different media types
   -- low pH, bicarbonate is high in the water, but wanted to avoid acidification.
   -- without acidify the media was still doing well
   -- next year; use fertigation systems
   Strawberry anthracnose
   - Two projects:
     - Characterizing anthracnose fruit and crown rot fungi in PA Strawberry planting.
     - Identifying weeds host of fruit and crown anthracnose in strawberry fields (Leah Fronk, Sara May, Kari Peter)
     - Both with Dr. Mengju Hu, University of Maryland

   Pestalotia was an issue this year, with a local strawberry nursery who produces about 2 million plug plants - image of material. Their runner does come from a southern source..

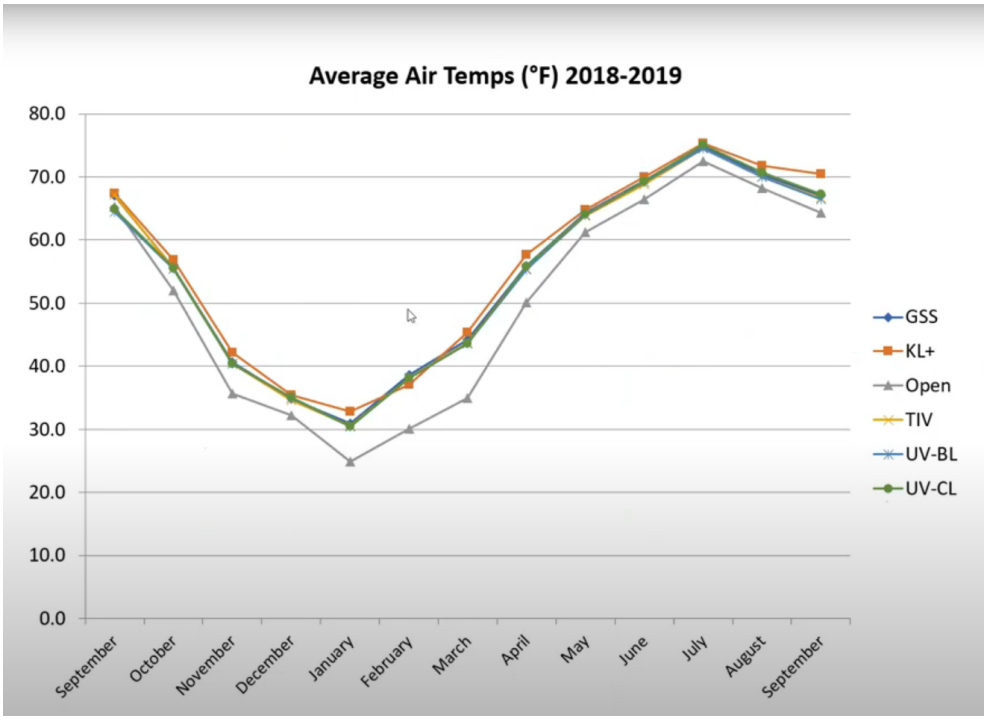
Congratulations to Mark and Gina -- this is an example of why their project is needed.

Note: making information available after the project is over is key. (Current location provided) SCRI TunnelBerries: (note - cannot access without fee or sign in) https://blogs.cornell.edu/berriers/productions/tunnel-production/

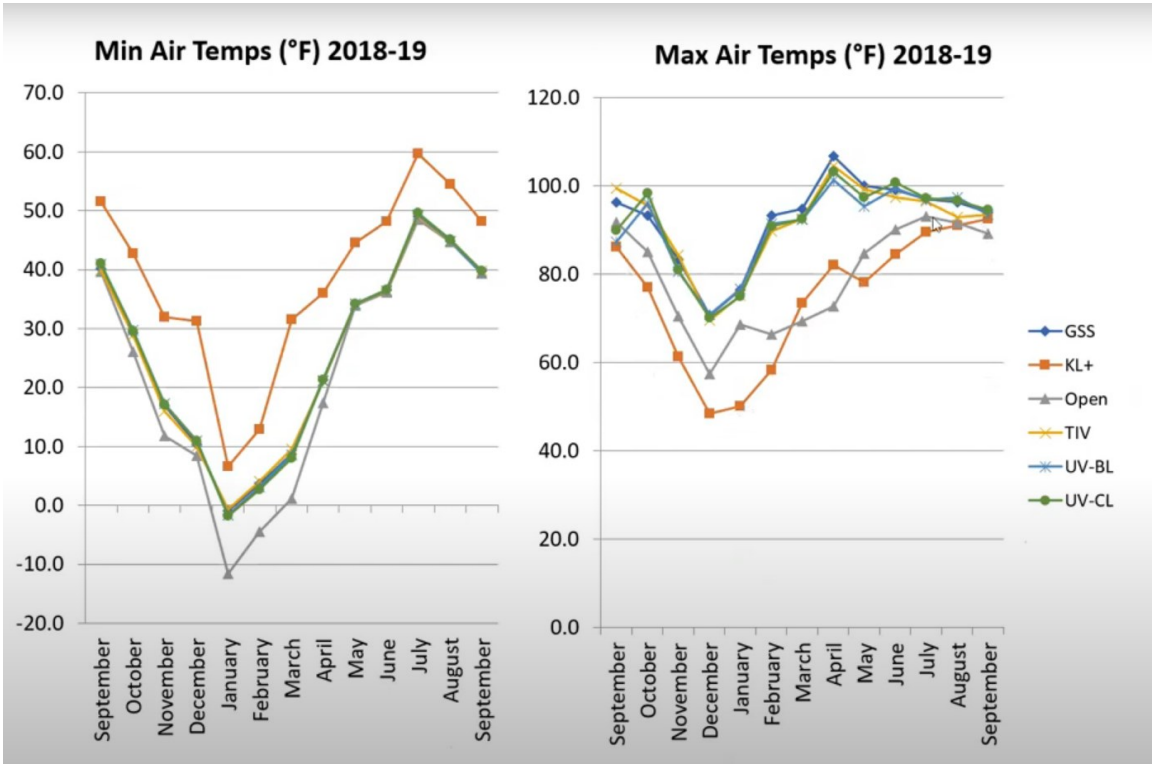
Containerized raspberries - https://www.youtube.com/watch?v=gxHWgFT2uR0
Note: Eric used 50/50 bark/petemedia, We used 50/50 petemedia/perlite, but over wintering was the issue with container raspberry production that we ran into. Regarding Brent's temperature issues - shade cloth is probably the best option.



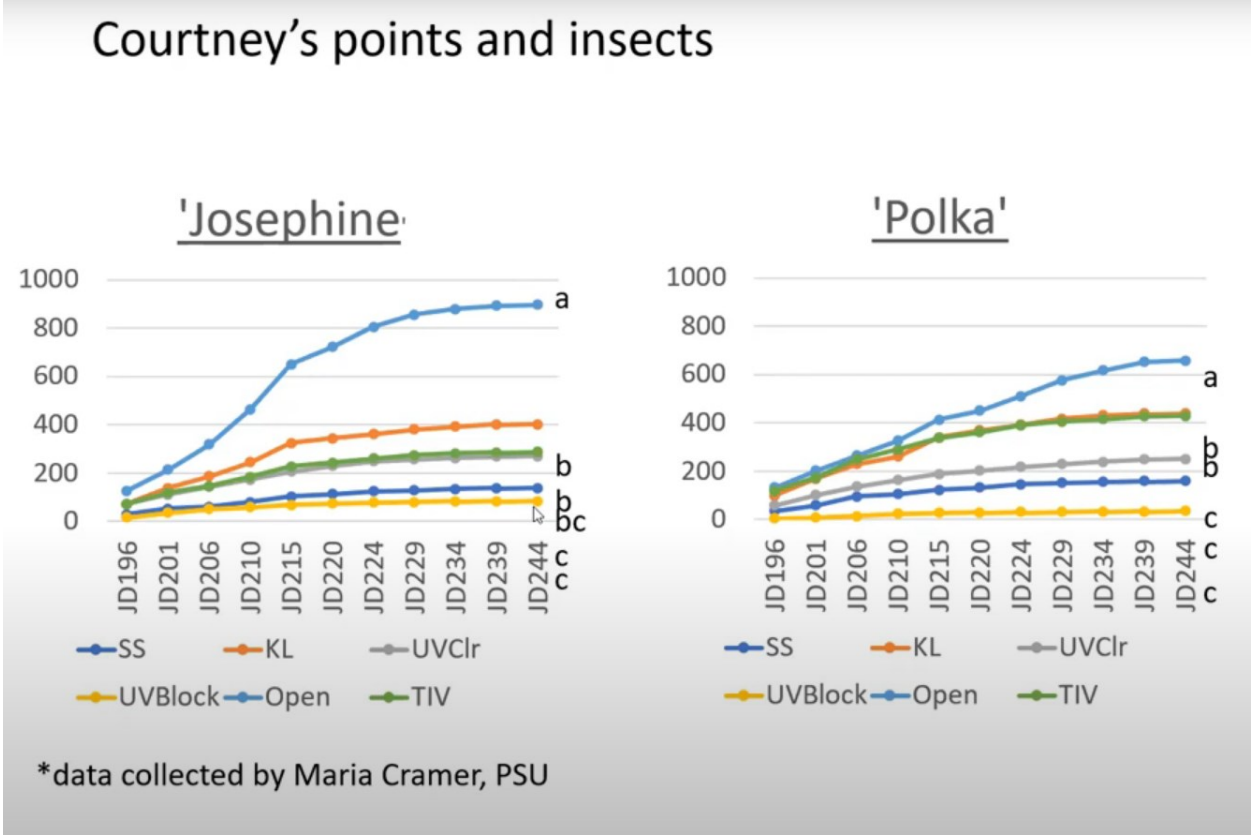
We found no difference in the differences in temperature in the plastic used for covering, compared to outside temperature:



We did find a difference in the minimums and maximums:



You see a reduction in Japanese beetles if you use UV:



There is a Chemical Ecologist at Penn State looking for some Blackberry breeder connection.

2. **Ontario 2021 Report - Presented by: Erica**

Strawberry Anthracnose Resistance Project

Resistance Survey

--Frequency of resistance of fungus

Fungicide trials - 9 registered products

--harvested from the end of July to the end of October

--Switch (fludioxonil + cyprodinil) was clearly the better product, comparatively.

Crown-size evaluation project

--specific to our climate here; Alvian and San Andres cultivars.

--still analysing the results, because harvest ended a couple weeks ago. (ideally repeat)

**Early alert of airborne fungal disease and the determination of fungicide resistance in several Southern Ontario horticultural crops using air sampling monitoring.*

Blueberry distribution of four major plant parasitic nematodes associated with highbush blueberry in Southern Ontario.

--continuing surveying for 2022 and 2023

Strawberry, Raspberry, and Blueberry

--Berry Trial Network (ongoing)

3. **Wisconsin-Madison 2021 Report - Presented by:**

   1) Cranberry fruit maturity and its relationship to fruit firmness.
   2) Attracting wild pollinators with native wildflower plantings to improve pollination services in cranberry.
   3) Evaluation of new products to increase frost tolerance of cranberry buds.
   4) VacciniumCAP: Leveraging genetic and genomic resources to enable development of blueberry and cranberry cultivars with improved fruit quality attributes.
   5) Cranberry Phenotyping and Breeding.
   6) Analysis of cold responsive genes in cranberry leaves and buds.
   7) Raspberry Pi powered digital system for tracking cranberry growth and development
   8) Effects of ericoid mycorrhizal fungi on performance of V. macrocarpon and V. oxycoccos under abiotic stresses related to climate change

   Grapes:

   1) Assessing Mass Trapping for the Management of Social Wasps in Vineyards.
   2) Assessing attract-and-kill as a new management strategy for Japanese beetle in vineyards.
   3) Supporting Seedless Table Grape Production in Wisconsin.

   Raspberry:

   1) Impact of mulch treatments on managing the devastating pest spotted wing drosophila and on fruit yield and quality. (Plastic, reflective mulch; multiple types)

   Strawberry:

   1) Transitioning to organic day-neutral strawberry production in the Upper Midwest- A systems approach.
   2) Trap cropping to improve tarnished plant bug management in north central strawberry.

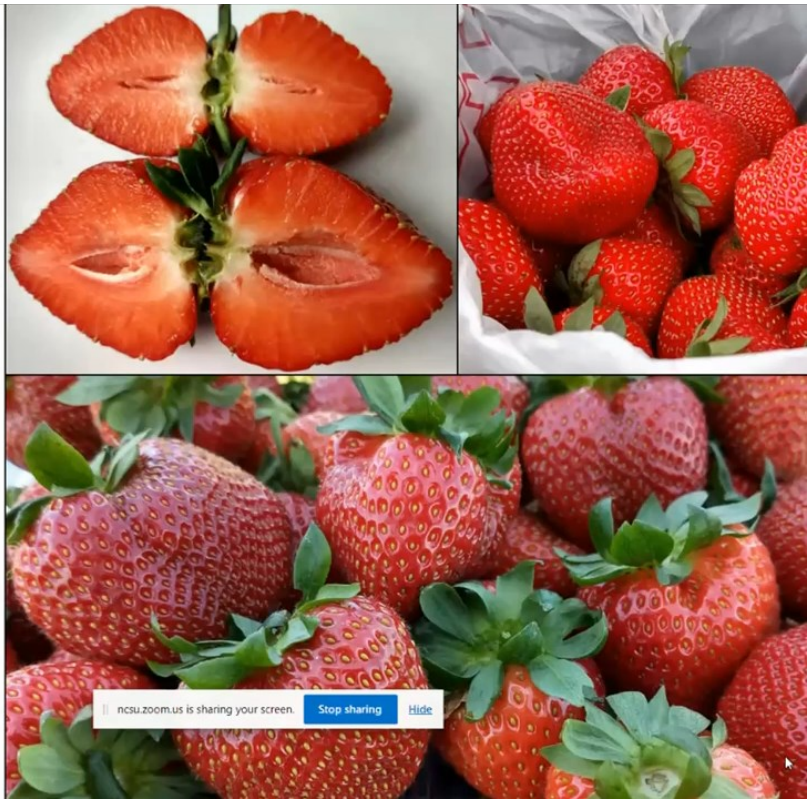
4. **USDA-ARS Beltsville 2021 Report - Presented by:**

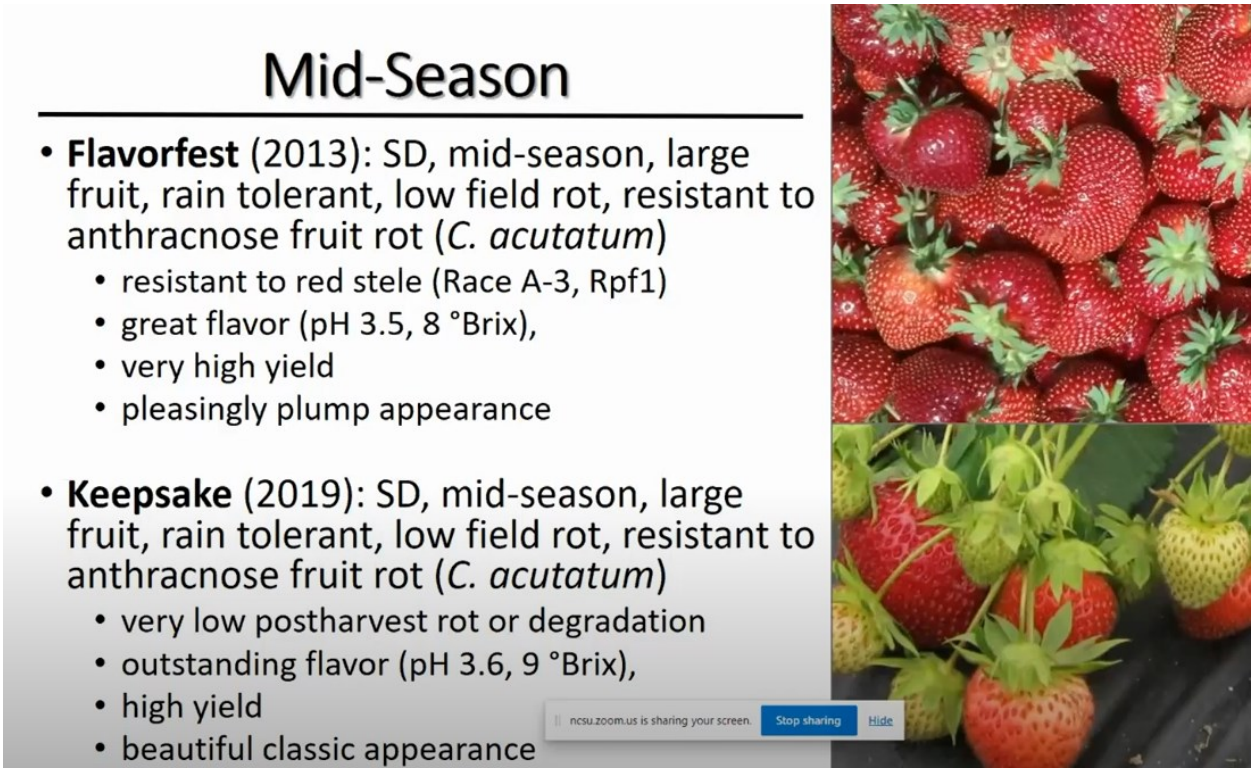
   Mild-winter
   Pandemic affected resources.
   Harvested from first of May past mid-June. Entire region had big yields.
   Cicada invasion - novel

Colletotrichum siamense, appeared fall 2020

Cordial - (friendly)
2021

- late-season
- very high yield 30Klbs/A (48Klbs/A, 2.9lb/plant, 2021)
- low field rot
- resistant to anthracnose fruit rot (*C. acutatum*)
- very low postharvest rot or degradation
- rain tolerant
- large fruit
- beautiful blocky appearance
- firm and tough
- good flavor (pH 3.8, 8 °Brix)





5. **Utah 2021 Report - Presented by: Brent Black**
   Objective 1 - Develop small fruit germplasm through cooperative breeding and evaluation programs.

   Grapes. County Extension faculty conducted a grape cultivar trial at the Thanksgiving Point facility in northern Utah County. This is in a typical landscaped setting and on clay soil. A progress report on this planting was published as an Extension fact sheet in 2021.

   Elderberry.
   - Aggieblue™ Rendezvous released to several nurseries (not yet commercially available)
   - Evaluation planting at Kaysville
   - Some collapse shortly after harvest this year.
     - Leave drop, but plants are still alive
     - No fungal root rot

   Raspberry.
   - High tunnel raspberries
     - Fall bearers for earlier production
     - Soil heating strategies
   - Cultivar comparison

        - Yield and fruiting season
        - Flavor preference
- Strawberry.
    - Jennifer Reeve - Organic systems -
    - WSARE - Organic adaptation
        - Nitrogen efficiency
        - Iron uptake
    - Cultivar comparison
        - Yield and fruiting season
        - Flavor preference
    - Interested in candidate cultivars (current selections are in table)

Random peripheral things

- BMSB
    - Diane Alston and Lori Spears are collaborating on a multistate project.
    - Several parasitic organisms have been identified in Utah
- SWD
    - In Utah, but not a major problem
    - Not trapped in 2021(record heat and dry)
- SCRI grant on tart cherries
    - Looking for graduate students
- Bringhurst biography now published

Cultivars tested in the USU strawberry work on organic system adaptability
AC Valley Sunset
AC Wendy
Allstar
Annapolis
Brunswick
Camerosa
Cavendish
Chandler
Clancy
Darselect
Dickens
Earliglow
Flavorfest
Jewel
Malwina
Mayflower
Monterey
Seascape
Sonata
Sparkle
Yambu

Objective 2. Develop practices for small fruit production tailored for climatic and market needs of growers.

6. **Washington State University 2021 Report - Presented by:**

People

Wendy Hoashi-Erhardt
Small Fruit Breeding

Gabe LaHue
Soil Science

Deirdre Griffin-LaHue
Soil Science

Chakradhar Mattupalli
Plant Pathology

Gwen Hoheisel
Extension

Chris Benedict
Extension

Lisa DeVetter
Small Fruit Horticulture

Unknown?
Entomologist

Heat wave - promoted loss

-- This has prompted heat-stress

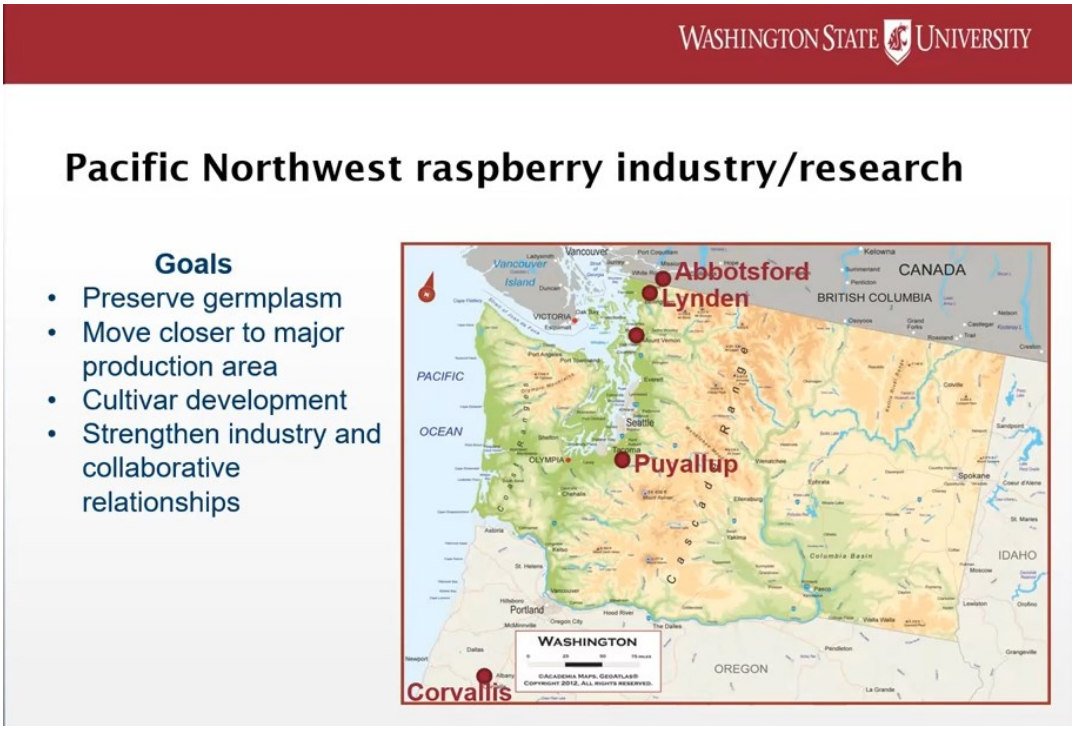
Save the Date

ISHS RUBUS +RIBES 2023

Resiliency in Rubus and Ribes Cultivation

- **July 15-18, 2023 - Pre-symposium tour in WA and OR**
- **July 19-21, 2023 - Symposium in OR**

Objective 1 - Develop small fruit germplasm through cooperative breeding and evaluation programs.



Raspberry Breeding Objectives:

- Machine harvestability
- High yield
- Fruit firmness and integrity
- Fruit quality: size, color, flavor, sol. Solids
- Root rot tolerance
- RBDV resistance

Cultivars sold in 2020 in WA, OR, and BC by the thousands, in order:

Wake_Haven
Meeker
Wake_Field
Cascade_Premier
Cascade_Harvest

IQF Performance of Cascade Premier and WSU 2188

NCSFR Project with Walters Ag Research and industry partners

We expect to release WSU 2188 as a cultivar is 2023

An interesting story for international tech transfer of material: Cascade Gem - WSU 1605

Not licensed in US

30,000 Long canes in UK ordered in 2022

400,000 ordered 2023

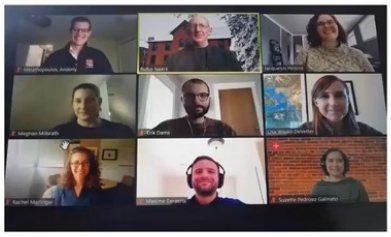
New way to tech transfer - positive for the department

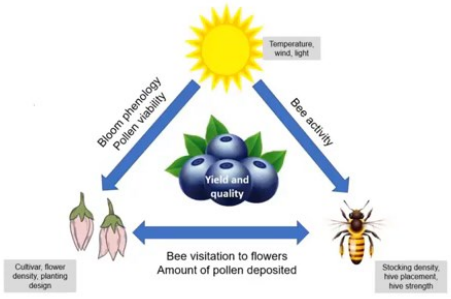
Objective 2 - Develop practices for small fruit production tailored for climatic and market needs of growers.

Other Highlights – *Objective 2*

- Gwen Hoheisel, Extension – Blueberry **cold hardiness model** soon available on **WSU AgWeatherNet**
- Chakradhar Mattupalli, Pathology – Blueberry mummy berry ascospore release model complete and will undergo beta testing in 2022
- Gabe LaHue, Soil Science – Nitrogen (N) mineralization provides **meaningful contribution** to plant available N, but **SOM didn't impact N fertilizer requirement** and plants fertilized with low N rate (33-55 kg N ha^{-1}) **equivalent to** medium and high rates (67-84 and 102-118 kg N ha^{-1}, respectively)

Optimizing Blueberry Pollination





Decision Aid System (DAS)

Proposal #: 2020-02627

Field- and Landscape-Level Honey Bee Stocking Density Effects on Crop Visitation

Maxime Eeraerts, Bob Gillespie, and Lisa Wasko DeVetter

- **Field-level stocking density** not a good predictor of total honey bee abundance
- **Landscape-level stocking density** at 500- and 1,000 m was a good predictor of total honey bee abundance
- Presence of **semi-natural habitat** did not reduce honey bee abundance on blueberry flowers
- Presence of **alleyway floral vegetation** did not reduce honey bee abundance on blueberry flowers

BEES AND BERRIES

Objective 3 - Evaluate pre- and postharvest fruit quality components, including enhanced flavor, texture/firmness, shelf life, and phytonutrients.

Objective 4 – Identify opportunities and collaborate on the development of extension resources for multistate, regional, national, and/or international audiences.

Soil-Biodegradable and Non-Degradable Plastic Mulches in Raspberry and Strawberry – *Objective 4*

Raspberry and strawberry **yields and quality equivalent** when grown with **soil-biodegradable (BDMs)** and **non-degradable plastic mulches**

https://smallfruits.wsu.edu/plastic-mulches/

- Free trainings available
- Website w/resources
- Newsletter and social media
- Email: lisa.devetter@wsu.edu

BDMs allowed in organic, but….

7. **USDA-ARS HCRU Corvallis 2021 Report - Presented by:**

Blueberry Breeding Program

- Evaluating selections for…
  - Fruit quality
  - Firmness and potential mechanical harvest for fresh market
  - Cold storage
  - Climate change- heat, disease, chilling requirements
  - Performance under organic conditions
    - Mummy berry
- Set up grower trials with promising advanced selections

Additional projects

- Vaccinium CAP project
  - Identify DNA markers associated with fruit characteristics that reduce fruit bruising, contribute to an extension of fruit shelf life, and match consumer preferences.
- Breeding Insights- genomic selection
- *Evaluating Vaccinium germplasm for heat tolerance, drought tolerance, and cold tolerance* Todd Anderson

Dave Bryla's contributions on the report for blueberries:

- *Effects of fertigation and granular application of phosphorus fertilizers on mineral nutrition and root colonization by mycorrhizal fungi in northern highbush blueberry.*
- *Comparison of methods for applying boron fertilizers in northern highbush blueberry*
- *Comprehensive Management Strategies for Use of Biostimulants in Blueberry*
- *Tools and practices for mitigating heat damage in blueberries.*
- *Use of biochar as an alternative soil amendment for conventional and organic production of northern highbush blueberry.*
- *Maintaining optimal root temperatures in highbush blueberry.*
- *Strategies for dealing with drought in blueberry.*
- *Ion-specific limitations of various salts in highbush blueberry.*
- *Irrigation and Cost and Benefits of Substrate Production of Blueberries in Oregon.*
- *Fertigation Practices for Increasing Calcium Content and Improving Fruit Quality and Shelf Life of Conventional and Organic Blueberries*.

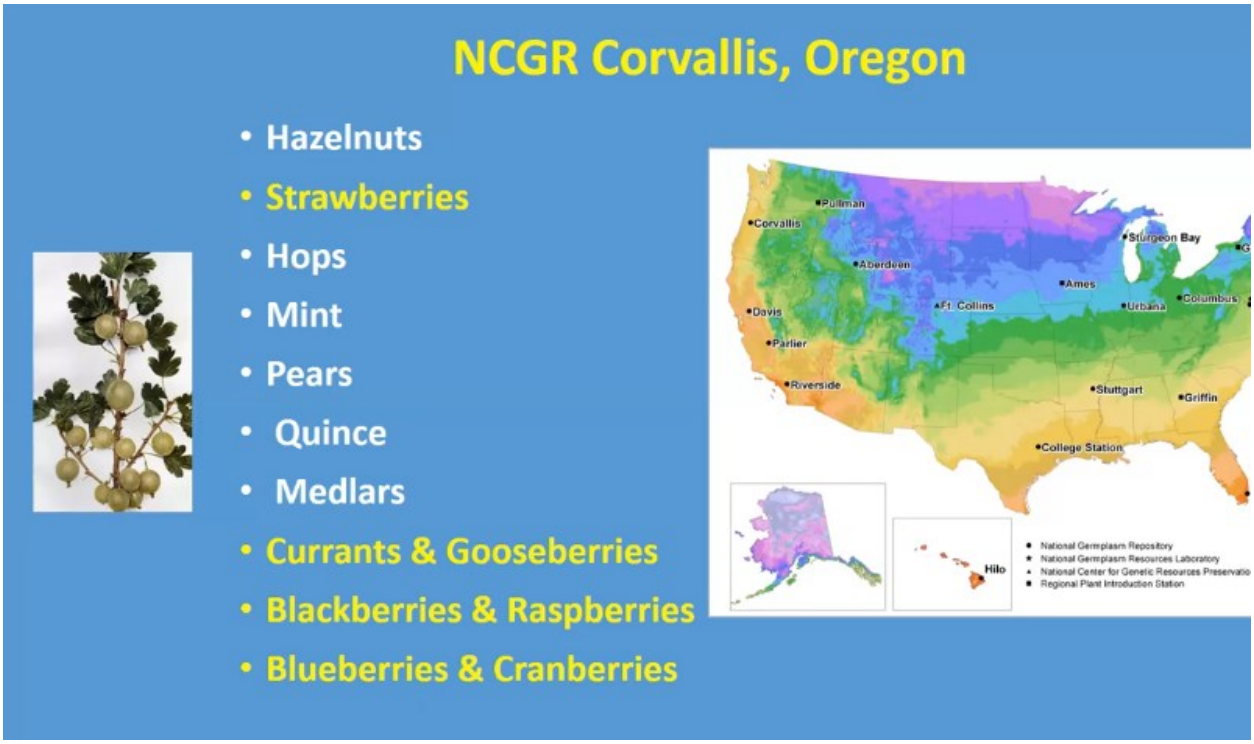
… and his contributions for the raspberry and blackberry research:

- *Pulsed drip irrigation increases growth and fruit production of red raspberry.*
- *Developing new crop coefficients for irrigating trailing blackberry.*

The eastern and western blackberry hybrids showed some potential for heat resistance.
Working on releasing several selections: 3 blackberries and 1 raspberry (info coming)
Blueberry Breeding Insights Project: Genomic selection with marker data
Pairwise group: creating markers for different GWAS studies - sequencing data
NCGR - creating markers for fingerprinting raspberry germplasm
--Margaret Worthington is working with them for genetic mapping
Chromosome behavior with hexaploid through dodecaploid - important for research
Nematode tolerance in red raspberry germplasm

8. **Bob Martin: Virus Database for NCPN crops:**
    - NCPN - Creating a virus database for the cropbase
        - berry crops, tree fruits, grapes, hops, sweet potatoes, roses, and citrus
        - Geographic distribution, how it spreads, validated test, timing for sample testing
        - Requesting images from the group - blueberry disease in different cultivars - red ring spot - browns leaves curls, etc.
        - Blueberry - used HTS to identify viruses - found ludia virus and BBA
            - PCR testing being used
            - BBA is widespread in the midwest
            - Ludia virus ~ 302/600 tested positive
                - Symptomless in the germplasm
                - Factor in mixed infections

9. **USDA-NCGR Corvallis Report - Presented by:**



Rubus

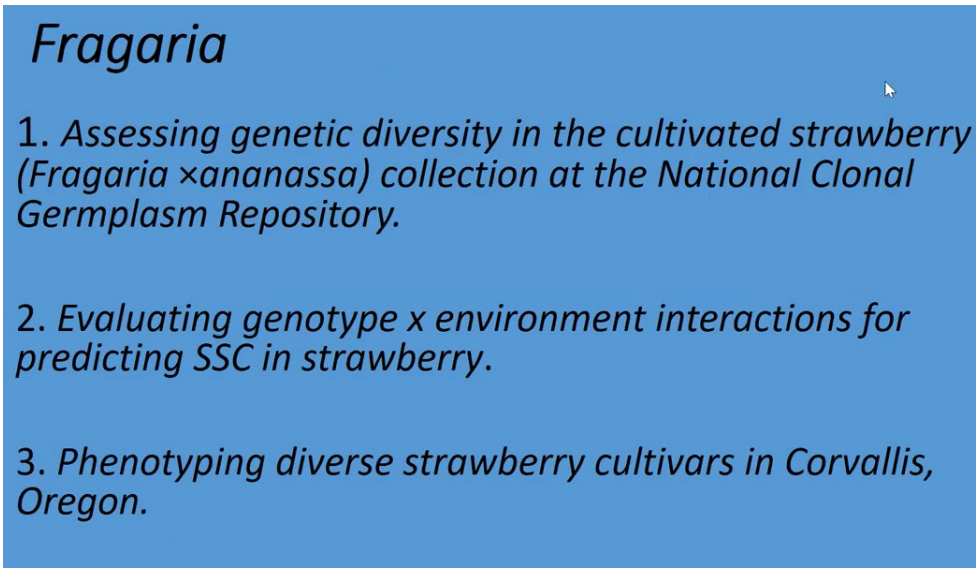
1. *Developing two fingerprinting sets in red raspberry*
2. *Fine mapping black raspberry aphid resistance to the North American large raspberry aphid*
3. *Analysis of a multi-environment trial for black raspberry quality traits*:
4. *GWAS study by phenotyping diverse Rubus species and cultivars*

Ribes, Lonicera, Sambucus

1. *Developing a Ribes fingerprinting set for germplasm management*.
2. *Expand blue honeysuckle collection.*
3. *Researching pollen incompatibility and developing seed germination protocols in divers Sambucus germplasm.*

Vaccinium

1. *Confirming identity of blueberry cultivars by DNA Fingerprinting*
2. *Determining amount of unreduced pollen for diverse Vaccinium species.*
3. *Evaluating* Vaccinium *germplasm for heat tolerance, drought tolerance, and cold tolerance.*
4. *Phenotyping blueberry for fruit quality traits.*
5. *Developing a high throughput genotyping platform for blueberry cranberry.*
6. *Assisting Breeding Insight (BI) in enabling genomic selection in blueberry.*
7. *Testing Allegro Targeted Genotyping for blueberry genome wide association.*



Berry collections summary for the National Clonal Germplasm Repository. GRIN-Global searches for accessions can be obtained by searching: https://npgsweb.ars-grin.gov/gringlobal/search.aspx