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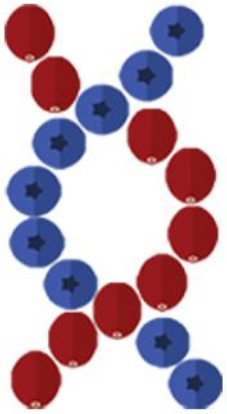
VacCAP Planning Grant



Research and Extension Initiative for Cranberry and Blueberry: Current and Future Needs

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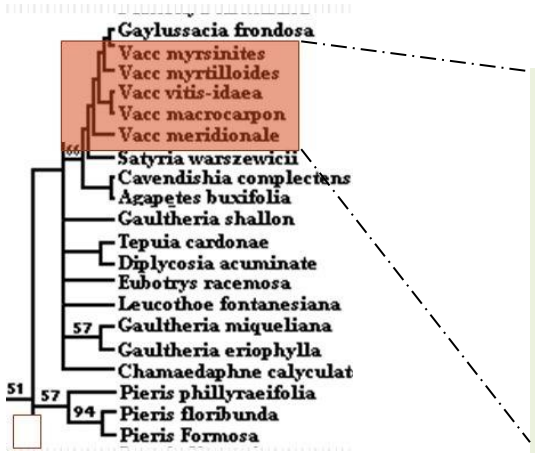
- North America is the world's leading producer of blueberries and cranberries
- Consumer demand for fruit continues to increase

Vaccinium



- **Cranberry**
- **Highbush blueberry**
- Rabbiteye blueberry
- Wild/lowbush blueberry
- Lingonberry
- Bilberry

Phenolics
- Hydroxycinnamic acids
- Flavonols
- Anthocyanin
- Pro-anthocyanin

Terpenoids
- Iridoids

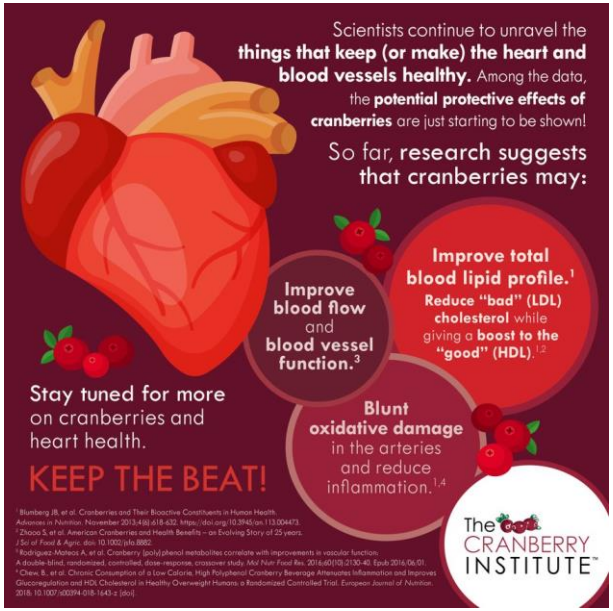
Anti-inflammation
Anti-cancer
Vascular protection
Improve cognitive functions
Glycemic control

Blueberry health research

Cranberry health research

Crop → Bioactives → Health

- Blueberry and cranberry products provide production value—averaging $1.2 billion since 2017—and are the economic backbone of many rural communities in the US

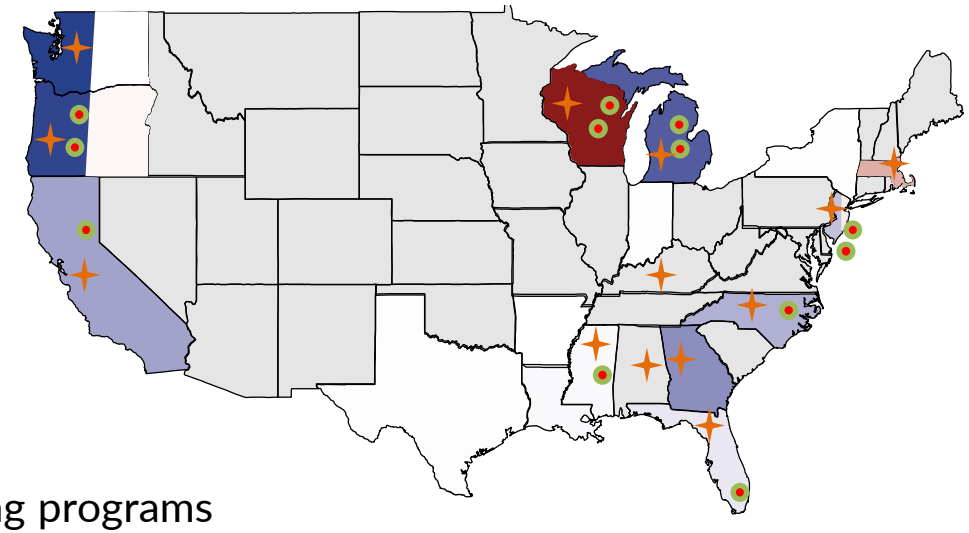


Uses:
- Fresh (~50%, <10%)
- Processed (~50%, >95%)
> 1,000 products

- Breakfast cereals
- Juice drinks
- Snacks
- Bakery
- Confectionary
- Pet food
- Sweet spreads
- Dessert and ice cream
- Healthcare
- Dairy

Blueberry and Cranberry Breeding

- Breeding is an industry top priority
- > 15 breeding programs in US, with >13 commodity groups supporting them
- No coordination of programs (duplications and competition for limited federal funding)
- Breeding by traditional methods (phenotyping based)
- Limited DNA tools for Marker Assisted Breeding
- Limited standardized phenotyping methods



Breeding programs

Commodity groups (e.g. grower associations)

Breeding targets:

- Disease resistance
- Pest resistance
- Fruit quality
- Stress tolerance
- Plant architecture and berry attributes for machine harvestability

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Planning VacCAP

- 2016-2018 *Vaccinium* planning grant (~$50,000)
- Title: Research and extension initiative for blueberry and cranberry: Current and future needs (USDA-NIFA)
- Team: 25 scientists, 11 institutions between the US and Canada

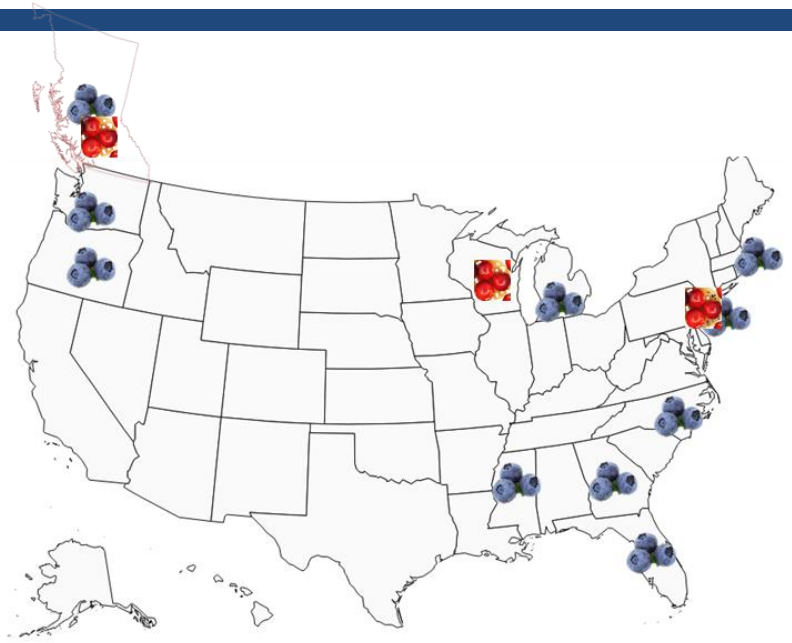
Objectives and Outcomes:

- Established a coordinated *Vaccinium* research team
- Surveyed industry needs to rank breeding traits
- Outlined a USDA-SCRI CAP grant proposal (VacCAP)

Breeding Traits Survey

Survey distributed at 13 grower assoc. meetings

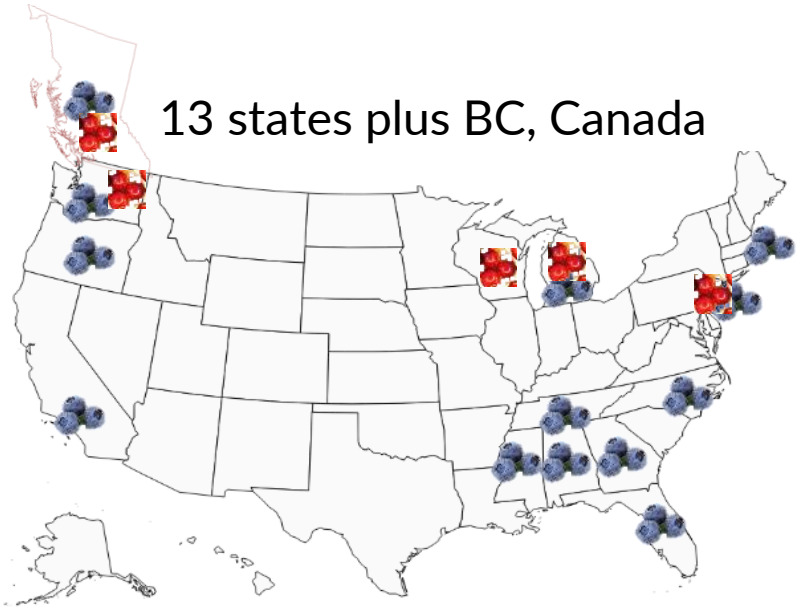
- Cranberry: 3 locations
- Blueberry: 10 locations



>500 respondents

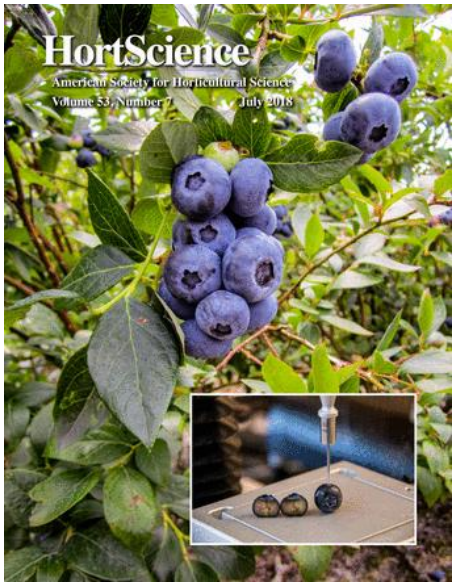
- Growers (>80%)
- Nurseries
- Processers/packing houses
- Breeders/Scientists

13 states plus BC, Canada



Breeding Traits Survey: Results

- These results were the most representative of blueberry and cranberry stakeholder breeding trait priorities, globally
- Fruit quality identified as a top breeding priority:



Breeding Trait Priorities of the Blueberry Industry in the United States and Canada

R. Karina Gallardo
School of Economic Sciences, Puyallup Research and Extension Center, Washington State University, 2606 West Pioneer Street, Puyallup, WA 98371

Gallardo et al., 2018. Hort Science, 53(7): 1021-1028

Breeding Trait Priorities of the Cranberry Industry in the United States and Canada

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Blueberry Traits

- Firmness
- Flavor
- Shelf life

Cranberry Traits

- Firmness
- Fruit size
- Anthocyanin content

Breeding Traits Survey: Blueberry

Improving **firmness, flavor/taste, and shelf-life** is needed for:

- Increased/sustained consumer demand, especially for fresh market
- US consumers like firm/crisp and sweet berries
- Productions that consistently meet consumer preferences is a critical need to sustain growth of consumption/production in US (*IBO report, 2017*)
- Fresh market price $6.11/kg vs processed 1.56/kg
- Overall increase revenue

Breeding Traits Survey: Blueberry

Improving **firmness** is needed for:

- Effective mechanical harvest for the fresh market
- Hand harvest accounts for 25-80% of total production costs
- Labor shortages and rising wages
- Fruit quality is the limiting factor for machine harvested blueberry for the fresh market (Gallardo et al., 2018 HortTechnology, 28(1): 10-16)
- Overall higher profits

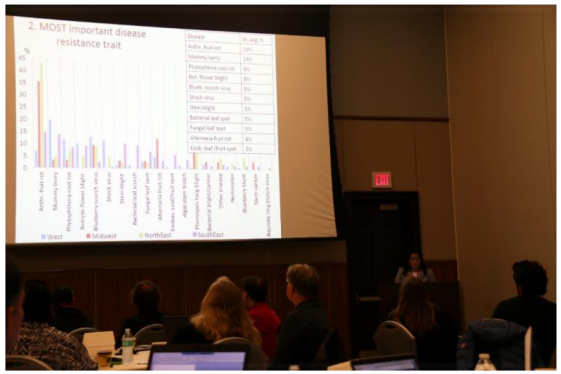
Breeding Traits Survey: Cranberry

Improving **firmness, size, and color** is needed for:

- Effective processing
- > 90% of cranberry is processed [sweetened dried cranberry (SDC) and juice]
- Fruit sold for processing into SDCs are graded based on firmness
- Firm fruits are needed to avoid fruit damages during processing into SDCs
- Uniform color and size are preferred by the processing industry
- Overall higher profits

Vaccinium Planning Meeting

- The results of the survey were sent to stakeholders and presented at the *Vaccinium* planning meeting
- The planning meeting hosted representatives of the blueberry and cranberry industry and a trans-disciplinary team of 26 scientists
- **Stakeholder representatives confirmed it is critical to develop genomic tools that can be used to assist breeding programs to select for high value traits, including fruit quality**



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Planning Grant Outcomes

- The planning grant identified breeding trait priorities in the U.S. cranberry and highbush blueberry industries

- Outcomes of the working group discussions indicated that several trans-disciplinary projects around high-priority fruit quality traits are feasible. These accomplishments provided a rational to strategically plan research activities to support the U.S. blueberry and cranberry industries

- The outcomes of the planning grant, established the foundation to develop the objectives of a Coordinated Agricultural Projects (CAP) project that seek funding to enable a multistate, trans-disciplinary research team to develop DNA and precise high-throughput phenotyping tools to routinely and efficiently use to select blueberry and cranberry cultivars with improved fruit quality traits

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Why a Community Project is Important

- **BUILD CAPACITY**: provide a rational to seek and secure multi-million-dollar projects that can enable the development of expensive genomic resources

- **EXPAND KNOWLEDGE**: facilitate the establishment of collaboration with experts in different field or research which in the end results in increasing knowledge around blueberry and cranberry fruit quality

- **MAXIMIZE USE OF RESOURCES**: foster collaboration and integration of different datasets and at the same time limit duplication of efforts

- **FACILITATE THE USE OF PROJET DELIVERALBES**: provide the rational for establishing a framework to transfer project deliverables to stakeholders

- **BUILD A NETWORK FOR NEW PROJECTS**: create a network that can be leveraged to continue planning other projects on blueberry and cranberry

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Thank You Supporting Organizations

What's Next

- Thank you for reading about the planning grant, which established the foundation of the Vaccinium Coordinated Agricultural Projects (VacCAP). More information about the planning grant and survey can be found at the Vaccinium Planning Grant website.

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