

Harvesting Hedgerows: Planting Elderberry for Biodiversity and Income

University of California Sustainable Agriculture
Research and Education Program

The Cloverleaf Farm

Carmel Berry Company

UCDAVIS

**AGRICULTURAL
SUSTAINABILITY INSTITUTE**

College of Agricultural and Environmental Sciences



University of California
Agriculture and Natural Resources

Agroecosystem Benefits of Hedgerows

- Habitat and food sources for birds and other wildlife, pollinators and natural predators
- Provide natural pest control in adjacent crop fields
- Catch field run-off, protect water quality



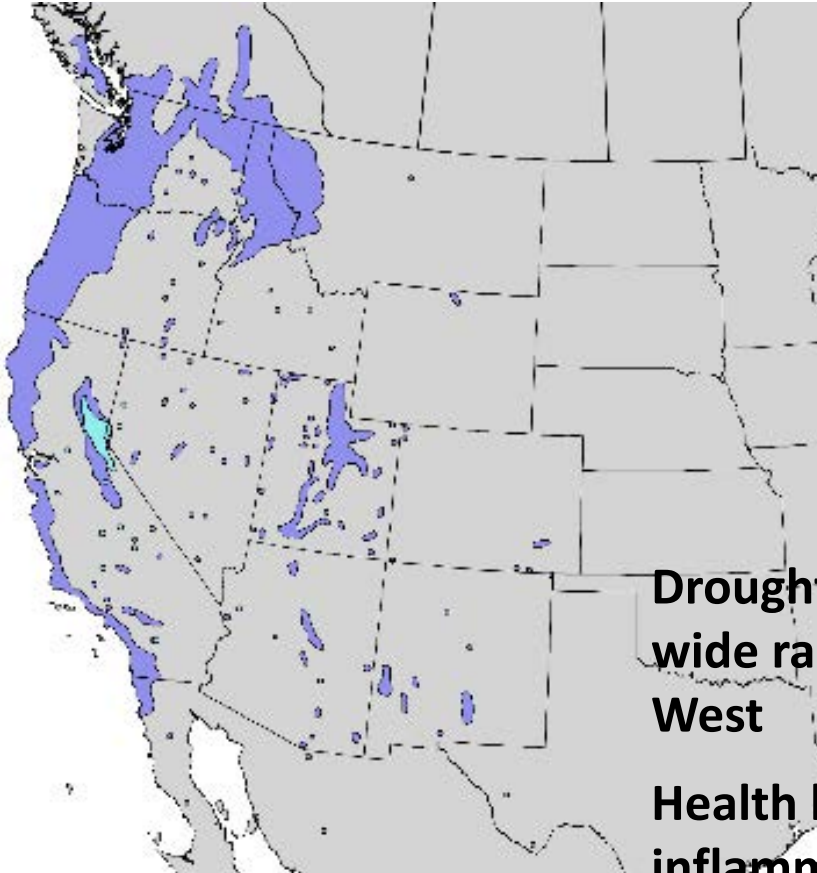
Business Incentives for Hedgerows?

Only 175 miles of hedgerows planted in 20 yrs statewide with NRCS funds, and 3 other technical service providers



Elderberries: a component of native hedgerows

California blue elderberry *Sambucus nigra*, spp. *cerulea*



Drought-tolerant, fire-resilient, adapted to a wide range of climate/elevation zones in the West

Health benefits: anthocyanins (anti-inflammatory, anti-oxidants) and immune-boosting --- market interest

Traditional food of native American tribes

Commercial feasibility of harvesting elderberries from native hedgerows

CDFA Specialty Crop Block Grant (2017-2020)

- **On-farm demonstration trials** of native blue and N. American cultivars of elderberry
- **Food chemistry analysis** of native elderberry (*Sambucus nigra*, spp. *cerulea*)
- **Market assessment** of local elderberry products
- **Outreach:** website, grower guide, grower-buyer mixer, consumer



Katie Fyhrie of Cloverleaf Farm

Today's Workshop and Discussion Session

Speakers:

Katie Fyhrie, The Cloverleaf Farm

Katie Reneker, Carmel Berry Company

Gwenael Engelskirchen, UC SAREP

Not present:

Katie Uhl, Alyson Mitchell, UCD Dept. of Food Science and Technology

American elderberry



Blue elderberry



American elderberry



Blue elderberry



Farm 1

10' spacing
Deep tillage (3')
Weekly irrigation
Removed tubes earlier



Farm 2

6' spacing
Shallower tillage
Biweekly-monthly
irrigation
Left tubes on



Farm 3

10-12' spacing
No till - spring planting
Biweekly-monthly
irrigation
Weed pressure



American elderberry

Blue elderberry

Height

265%

Average % increase

1455%

4.6 feet

Final average

6.8 feet

Diameter

38%

Average % increase

822%

0.7 inch

Final average

1.5 inch

American elderberry

Blue elderberry

Yield
Average lb/tree

1.2 lb

Farm 1

11.2 lb

0.04 lb

Farm 2

2.2 lb

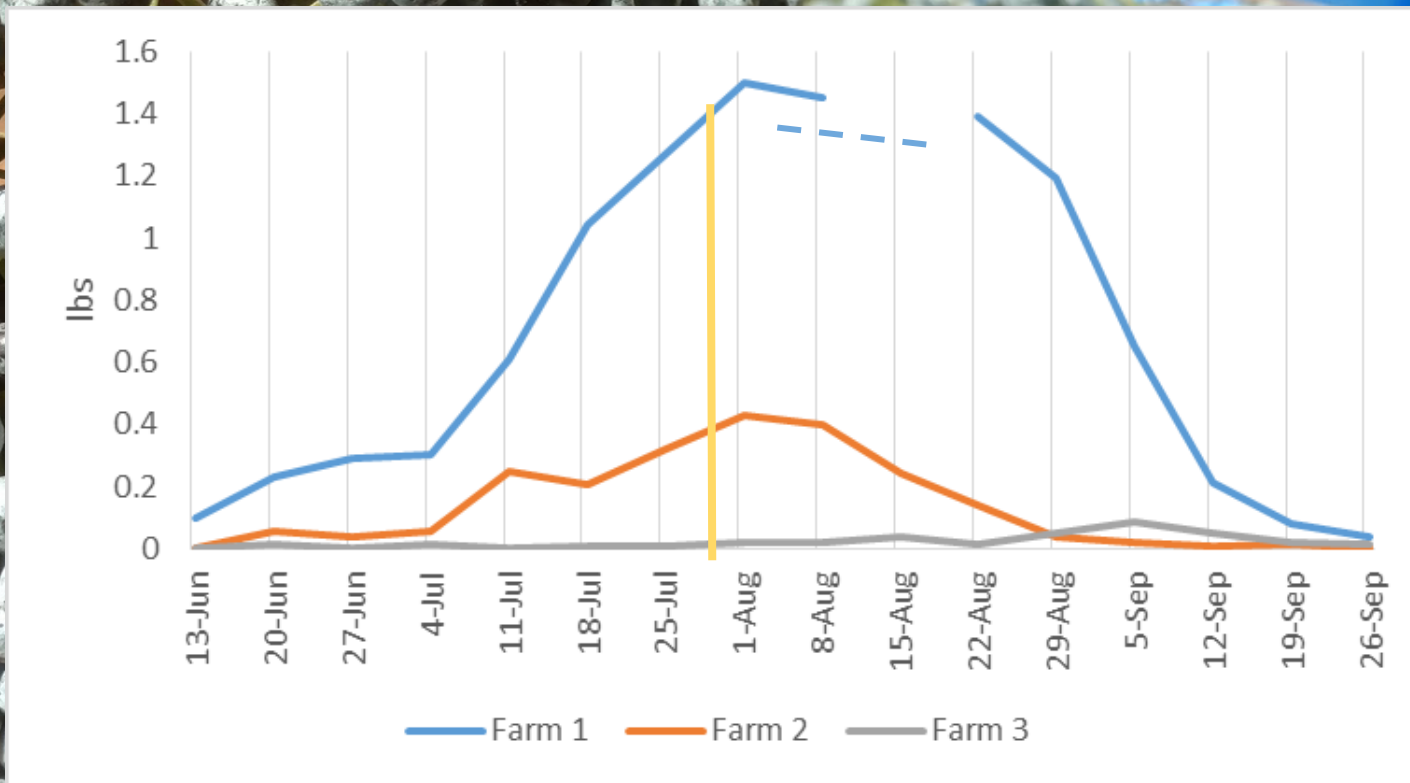
0.2 lb

Farm 3

0.3 lb

Average per tree yield

Blue elderberry, second growing season



Handout Figure 1







<https://www.starkbros.com/products/berry-plants/elderberry-plants/johns-elderberry>

<https://normsfarms.com/blogs/farming-elderberry/news-from-our-elderberry-farm>

Growing American Elderberries (Sambucus Canadensis)



- ~12ft between rows.
 - ~2-4ft between cuttings.
 - ~Landscape cloth or heavy mulch to control weeds.
 - ~Few pests
- Mow to the ground each year beginning yr 2.

CHALLENGES:

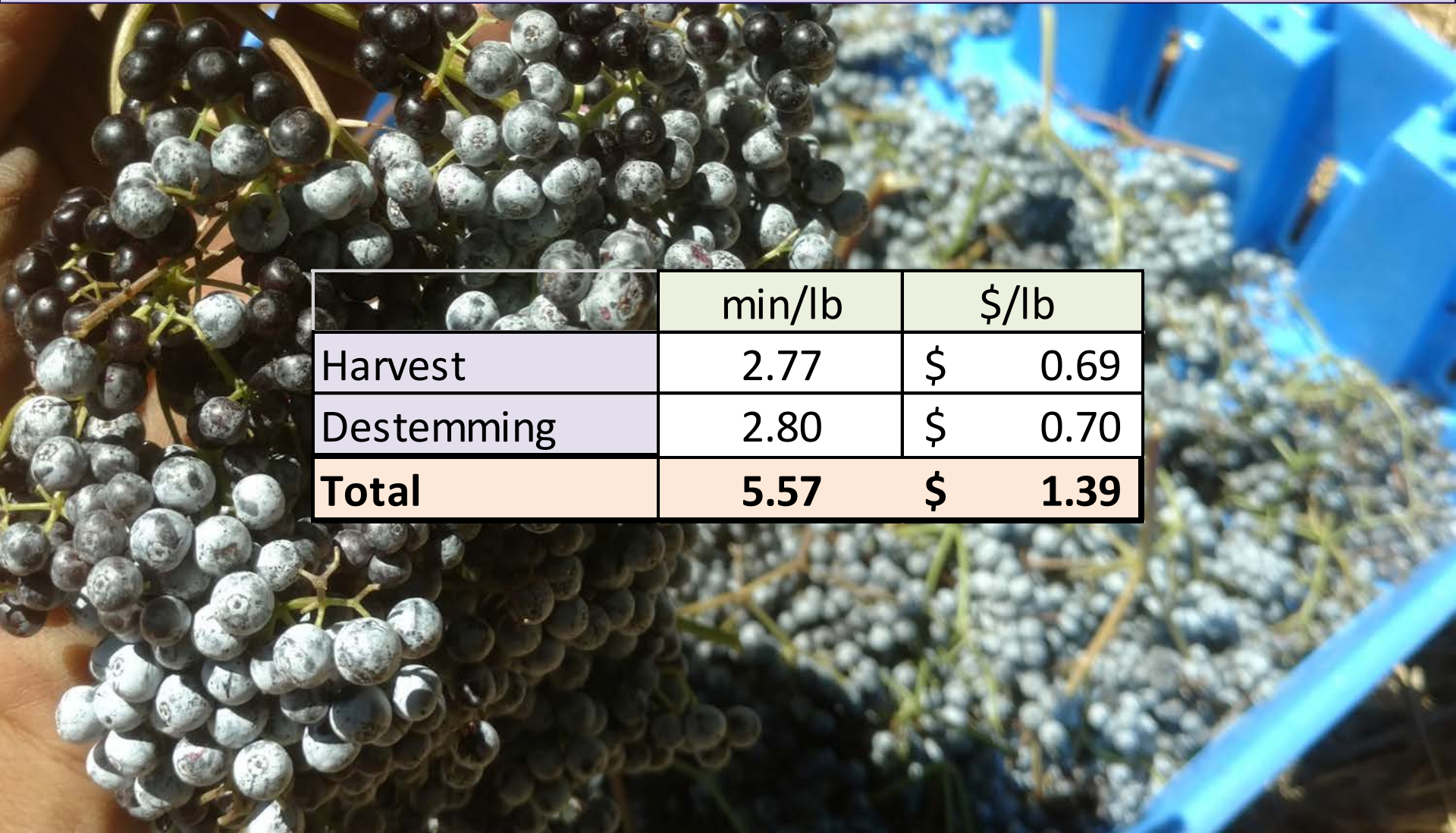
- ~Need water (and fertilizer)!
- ~Mysterious issues with fruit set
- ~Birds!

BENEFITS:

- ~Uniformity of harvest
- ~Known cultivars with desired traits
- ~Mowing means easy to reach all flowers/fruit

Cost of labor

Hand harvest, hand destemming



	min/lb	\$/lb
Harvest	2.77	\$ 0.69
Destemming	2.80	\$ 0.70
Total	5.57	\$ 1.39

Scaling up the post-harvest process--BERRIES

Powered Destemmers

River Hills HarvestTED



Modified Grape Destemmer Enoitalia



Powered Juicers

Control for no higher than 30 psi

Commercial
ColdPress Juicers



Grape Bladder
Press



Scaling up the post-harvest process--FLOWERS

Destem first, then dry

Preliminary trials show a shaker-style table can destem the fresh flowers effectively.

This did not work with our modified grape destemmer!



Dry first, then destem by hand

Drying racks in dry, dark conditions with dehumidifier running in room.



Other drying methods:
Dehydrators- LOW temp!!
Freeze dryers

Elderberry Market Surveys

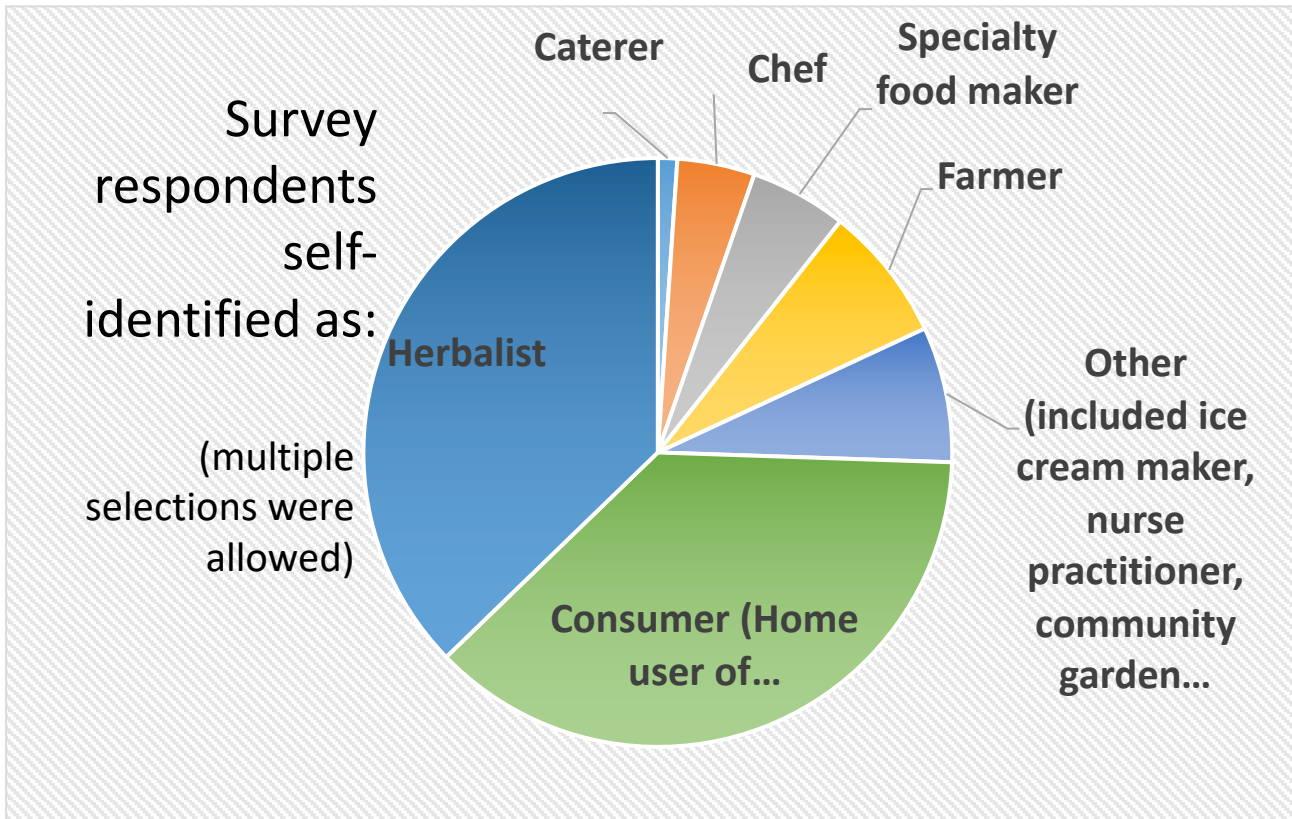
UC SAREP conducted **3** different **market surveys** to understand buyer purchasing habits and characteristics of elder products already on the market:

1 - Online survey of California **herbalists, chefs, specialty food producers** disseminated via email and Facebook. The survey was open from July 25th through November 15th, 2019 and respondents were asked to share the survey link with other potential respondents (“snowball” method). We received **63 valid responses**.

2 - Interviews with **14 sellers and retailers of elder products** (specialty markets, natural food grocery stores, online herb purveyors, a wellness product brand, and several other food businesses) conducted in summer/fall of 2019.

3 - Data collection on elder products on shelves at **21 retail establishments** either online or in Northern California also conducted in summer/fall of 2019.

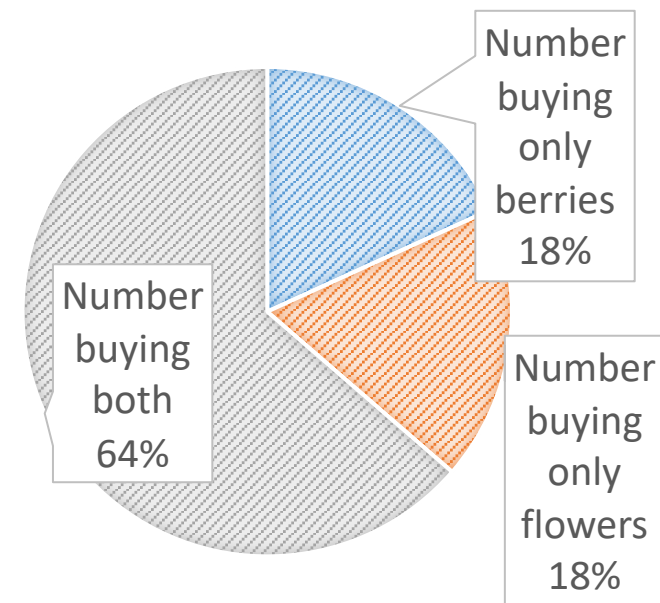
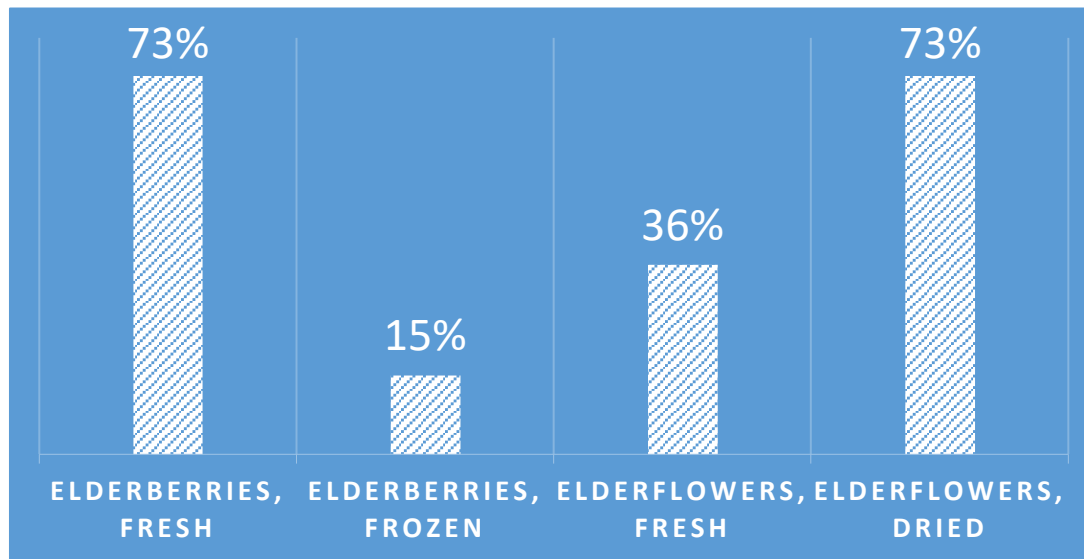
End User Segment



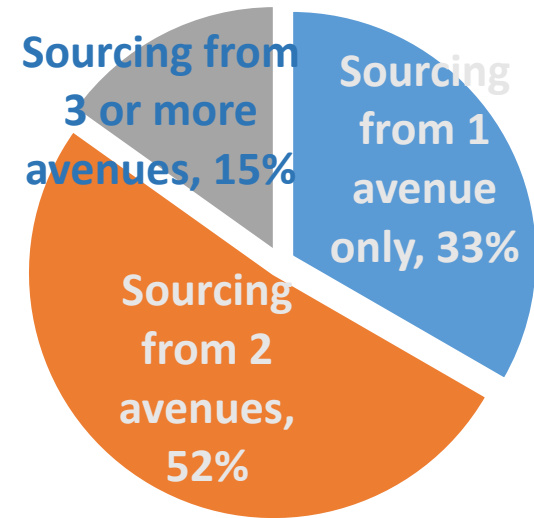
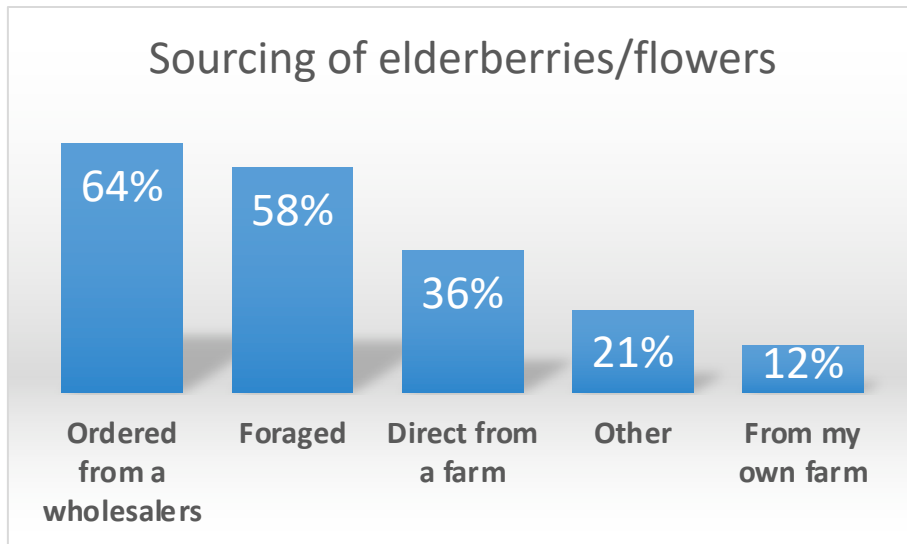
- 67% of respondents (n = 33) did not find enough supply to meet their needs
- 88% (n = 32) said they would “definitely” purchase California-grown elder were it available.

In *what form* were end users purchasing elder?

- Most are buying **both** berries and flowers
- Most berries are sourced fresh; most flowers are sourced dried

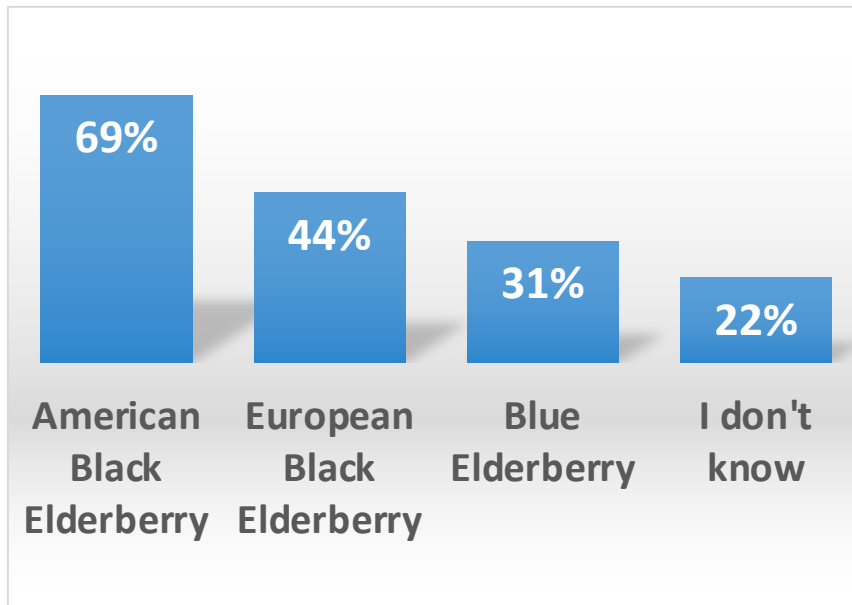


Where were end users sourcing elder?

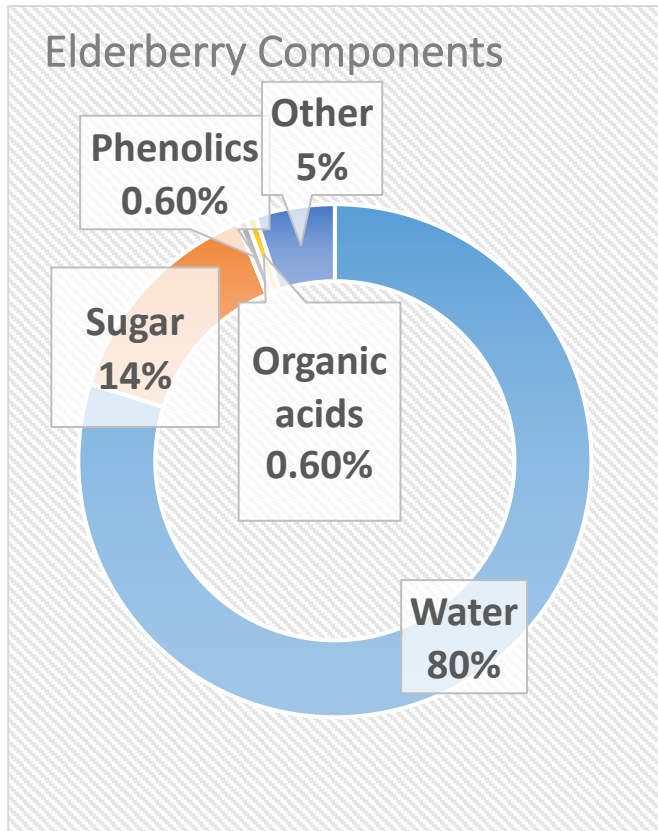


- 67% were sourcing via multiple channels
- 64% ordered from a wholesaler
- 58% said that they forage for elder
- 36% were getting their elder direct from a farm

What subspecies of elder were end users sourcing?

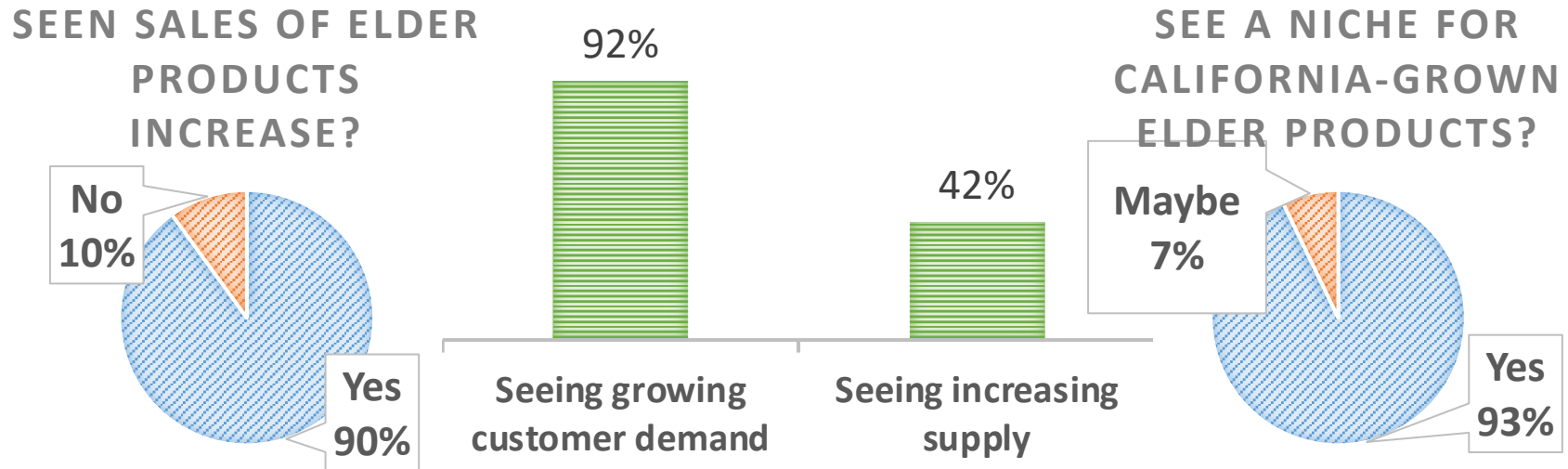


Nutritional Comparison: Blue v Black Elderberry



- High variation within subspecies and between subspecies
 - Growing location and conditions
 - Farming or cultivation practices
 - Genetics
- Trends across elderberry subspecies
 - High levels of phenolic compounds
 - Common phenolic compounds: cyanidin-based anthocyanins, quercetin-based flavonols, phenolic acids
- The preliminary data on the [California blue elderberry](#) demonstrates a compositional make-up similar to the European and [American elderberry varieties](#), a promising start to showing that it could perform similarly in elderberry-based products.

Wholesale/Retailer Segment *TRENDS*

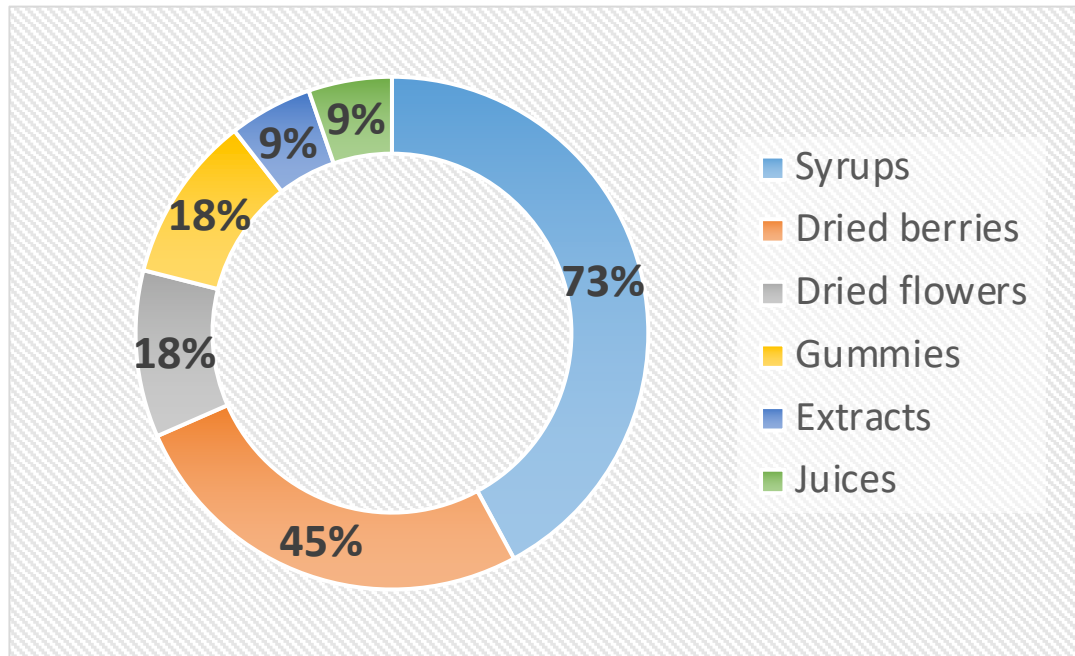


- 90% of respondents (n = 10) said they have seen sales of elder products increase in the past 3 to 5 years
- 92% (n = 12) saw growing customer demand, only 42% also saw growing elder supply.
- 93% (n = 14) said they saw a niche in their business for products made with California-grown elder.



Types of Elder Products

Most popular product types



73% (n = 11) cited syrups as being the most popular type of product among their customers, followed by dried berries (45%), gummies (18%) and dried flowers (18%).

Key Take-Aways

- The 'end user' buyer segment (herbalists, home users, chefs) reported using both **berries and flowers**, and expressed interest in **fresh, frozen, and/or dried** - indicating more flexibility around the type of post-harvest processing.
- Specialty food entrepreneurs, herb purveyors and natural food stores demonstrated interest in purchasing **dried elderberries and/or elderflowers**, as well as value-added products.
 - The majority said **syrops** are the most popular type of value-added product among their customers, followed by dried berries, gummies and dried flowers.
- Retailers are interested in sourcing **California-grown**, especially where there is consistent supply and competitive pricing.
- **Organic** appears to be less important for the retailer/wholesale segment than for the end user segment.



CARMEL BERRY



Next Steps and Ongoing Questions:

- Propagation and breeding of blue elderberry
- Longer-term growth and yield potential of American elderberry in CA
- Pruning of blue elderberry and what we can learn from Native American traditional management
- Best management practices for maximizing beneficial compounds, minimizing cyanogenic glycosides
- Effects of post-harvest handling and storage on beneficial compounds: processing temp & duration

For more information:

<https://asi.ucdavis.edu/programs/ucsarep/research-initiatives/are/elderberry>