Harvesting Hedgerows: Planting Elderberry for Biodiversity and Income

University of California Sustainable Agriculture Research and Education Program

The Cloverleaf Farm

Carmel Berry Company
# 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
Farm 1

- 10’ spacing
- Deep tillage (3’)
- Weekly irrigation
- Removed tubes earlier
6’ spacing
Shallow tillage
Biweekly-monthly irrigation
Left tubes on
Farm 3

10-12’ spacing
No till - spring planting
Biweekly-monthly irrigation
Weed pressure
<table>
<thead>
<tr>
<th></th>
<th>American elderberry</th>
<th>Blue elderberry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final average</td>
<td>4.6 feet</td>
<td>6.8 feet</td>
</tr>
<tr>
<td>Average % increase</td>
<td>265%</td>
<td>1455%</td>
</tr>
<tr>
<td><strong>Diameter</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final average</td>
<td>0.7 inch</td>
<td>1.5 inch</td>
</tr>
<tr>
<td>Average % increase</td>
<td>38%</td>
<td>822%</td>
</tr>
</tbody>
</table>

Handout Table 2
<table>
<thead>
<tr>
<th></th>
<th>American elderberry</th>
<th>Blue elderberry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yield</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Average lb/tree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm 1</td>
<td>1.2 lb</td>
<td>11.2 lb</td>
</tr>
<tr>
<td>Farm 2</td>
<td>0.04 lb</td>
<td>2.2 lb</td>
</tr>
<tr>
<td>Farm 3</td>
<td>0.2 lb</td>
<td>0.3 lb</td>
</tr>
</tbody>
</table>
Average per tree yield
Blue elderberry, second growing season

Handout Figure 1
Growing American Elderberries (Sambucus Canadensis)

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

~ 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.

BENEFITS:
~ Uniformity of harvest
~ Known cultivars with desired traits
~ Mowing means easy to reach all flowers/fruit
# Cost of labor

Hand harvest, hand destemming

<table>
<thead>
<tr>
<th></th>
<th>min/lb</th>
<th>$/lb</th>
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</thead>
<tbody>
<tr>
<td>Harvest</td>
<td>2.77</td>
<td>$0.69</td>
</tr>
<tr>
<td>Destemming</td>
<td>2.80</td>
<td>$0.70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5.57</strong></td>
<td><strong>$1.39</strong></td>
</tr>
</tbody>
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Handout Table 3
Scaling up the post-harvest process--BERRIES

Powered Destemmers
River Hills Harvest TED
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.
Survey respondents self-identified as:

- Caterer
- Chef
- Specialty food maker
- Farmer
- Herbalist
- Other (included ice cream maker, nurse practitioner, community garden...)
- Consumer (Home user of...)

- 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?

- American Black Elderberry: 69%
- European Black Elderberry: 44%
- Blue Elderberry: 31%
- I don't know: 22%
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.
• 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
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 syrups 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 these is consistent supply and competitive pricing.

- Organic appears to be less important for the retailer/wholesale segment than for the end user segment.
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