

Promising Developments in Elderberry Production

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Outline

- Past and present
- Elderberry genome and cultivar developments
- Fertility management
- Propagation
- Pollination
- Elderberry pest identification and management
- Elderberry production budgets
- What else is going on?
- Conclusion

Your Speaker

- Patrick Byers
 - University of Missouri Extension (retired)
 - Farmer
- Co-founder of the Missouri Elderberry Development Program (1997-date)



Past and Present

- American elderberry (*Sambucus nigra canadensis*)
- European or black elderberry (*S. nigra*)
- Blue elderberry (*S. n. caerulea*)

Blue elderberry



European elderberry



American elderberry

Past and Present

- Scale of the industry – US
 - 1997 – little reported commercial production
 - 2017 (US Census of Agriculture)
 - 1226 farms growing elderberry
 - 790 acres of production
 - 2022 (US Census of Agriculture)
 - 2629 farms growing elderberry
 - 1682 acres of production
- Missouri production (2022 Census of Agriculture)
 - 7% of total US farms
 - 36% of total US acreage



Past and Present

- Elderberry is of growing commercial interest
 - Juice products
 - Jelly, jam
 - Wine, spirits, other beverages
 - Health supplements
 - Flower products
 - Food colorant
 - Other plant parts?



Past and Present

- Growing and Marketing Elderberries in Missouri

<https://centerforagroforestry.org/wp-content/uploads/2022/08/Growing-and-Marketing-Elderberries.pdf>

- Missouri Elderberry Production

https://www.youtube.com/watch?v=xve_1Ec3dKg



By Patrick L. Byers, Andrew L. Thomas, and Michael A. Gold, University of Missouri; Mihaela M. Cernusca, North Dakota State University and University of Missouri; Larry D. Godsey, Missouri Valley College and University of Missouri

The American elderberry (*Sambucus canadensis*, also known as *Sambucus nigra* subsp. *canadensis*) is native to much of eastern and midwestern North America. The plant is a medium to large multiple-stemmed shrub, bush or small tree (top right image). Elderberry is commonly found growing in a range of habitats throughout Missouri, but it prefers moist, well-drained, sunny sites, and is often found along roadside ditches and streams.



The American Elderberry plant

Elderberry is a beautiful plant with showy flat cymes of white flowers in June followed by bright purple to black berries in late-summer (middle and bottom right images). Ornamental forms are important landscape plants, and elderberry has been grown for generations as a backyard fruit. Based on identified market size and demand, opportunities exist to increase both the production and processing of elderberry across the value chain. At present, usage of both fruit and flowers for wine, juice, jelly, colorant, and dietary supplement products is on the rise.



The blossoms of the American Elderberry

European elderberry (*Sambucus nigra*) is grown as a commercial fruit crop in Europe and elsewhere. The American elderberry, however, appears to be a better candidate for commercial production in Missouri. This guide outlines production practices and market information for American elderberry, based on research and growers' experiences in Missouri. It is important to note that elderberry remains significantly underdeveloped as a commercial crop. Not very much is known about several aspects of elderberry production, including



The fruit of the American elderberry



Elderberry Cultivar Development

- Midwestern cultivars
 - 'Bob Gordon' (2011)
 - 'Wyldeewood' (2010)
 - 'Ranch'
 - 'Pocahontas' (2019)

'Bob Gordon'



'Wyldeewood'

'Pocahontas'



Elderberry Breeding

- University of Missouri
(<https://elderberry.missouri.edu/elderberry-breeding/>)
 - Established 2020, 2 sites
 - Over 3000 seedlings evaluated
 - 61 advanced selections
 - Replicated trials established in 2024
- Savannah Institute
(<https://www.savannainstitute.org/elderberry/>)



Selection V-92

Elderberry Genomics

- Elderberry genome sequencing
 - approximately 14 billion base pairs
- Elderberry G x E studies
 - Studies with select cultivars at 5 sites across the Midwest
 - Identified cultivars with mite resistance and wide environmental adaptation

Elderberry and Nitrogen

- Study looked at 0, 50, 100 and 150 lbs actual N per treated acre
- Productivity and plant height are positively influenced by increasing nitrogen rates
- Pest susceptibility and juice quality were not influenced by nitrogen rate



Plant Tissue Analysis

- Reveals the concentration of elements in tissue
- To be meaningful, analysis must entail:
 - standardized tissue sample procedure
 - accurate and precise analytical methods
 - standard references to compare diagnostic sample values
 - means of interpreting diagnostic data and making fertilizer recommendations
- Useful for:
 - Routine nutrient status evaluation
 - Troubleshooting suspected nutrient problems



Leaf Nutrient Analysis (GxE Study)

- Conducted in July 2023, replication in July 2024
- Samples collected from twelve genotypes across four states
- Analysis includes nitrogen, phosphorus, potassium, calcium, magnesium, zinc, iron, manganese, copper



Initial Recommended Leaf Nutrient Levels

- Variability is seen between genotypes and study locations.
- Thanks to Sydney Moore for this work!

Nutrient	Levels
Nitrogen (%)	1.48 - 4.68
Phosphorus (%)	0.065 - 0.537
Potassium (%)	0.114 - 3.08
Calcium (ppm)	0.455 - 4.62
Magnesium (ppm)	0.117 - 1.97
Zinc (ppm)	8.1 - 222
Iron (ppm)	17.2 - 252
Manganese (ppm)	11.4 - 453
Copper (ppm)	1.4 - 39.3

Propagation

- Hardwood cuttings – best propagation material
 - 2 node cuttings work as well as 3 node cuttings
 - Medium to large cuttings work better than small cuttings
- Hardwood cuttings – best time to field stick cuttings is as early as late February in MO
- Thanks to Caleb O’Neal for this work!



Is Elderberry Self-Infertile?

- Recent work suggests that elderberry is functionally self-infertile
- Self-pollination can lead to poor fruit set
- Important to provide for cross-pollination when planning elderberry plantings



Elderberry and Pollination

- American elderberry blossoms and extrafloral nectaries are visited by many insects
- However, the majority of pollination appears to be accomplished by wind
- Possible controlled pollination via drones or sprayers



Eriophyid Mites

- Identification of mites
- Understanding the life cycle
- Identifying overwintering sites



Spotted Wing Drosophila

- Trialing SWD pheromone attractants and trap designs



Jessie's Bug



- *Neurocolpus jessiae*
- Multiple generations per season
- Nymphs are $\frac{1}{4}$ inch long & feed on succulent tissue at the growing points of new shoots, causing recurved leaflets with necrotic leaflet margins and aborted flower clusters



Elderflower Galls

- Flower bud gall-inducing larvae, *Schizomyia umbellicola*, found on American elderberry
- Need to rear adults and examine their morphology and conduct DNA analyses to compare with known species
- Can adults can be controlled in the spring before larvae enter florets?



Elderberry Disease Issues

- Elderberry rust
- Elderberry cane dieback disease (*Heterophoma novae-verbascicola*)
- Leaf spots caused by species of *Alternaria* and *Colletotrichum*




Viruses

- Characterization of viruses in Missouri – no genotype was free of virus infection
- Elderberry carlavirus C and elderberry carlavirus D are the two most prevalent viruses
- 4 cultivars submitted to UA program for virus testing and cleanup
- Establish a collection of “clean” (virus tested) plants



Elderberry Pest Identification and Management

Midwest Fruit Pest Management Guide 2021-2022



Arkansas
University of Arkansas Cooperative Extension Service
AG1304

Illinois
University of Illinois Extension
KSG-18

Indiana
Purdue Extension
ID-465

Iowa
Iowa State University Extension and Outreach
HORT 3035

Kansas
Kansas State Research and Extension
MF3278

Kentucky
University of Kentucky Cooperative Extension Service
ID-232

Minnesota
University of Minnesota Extension

Ohio
Ohio State University Extension
Bulletin 506

Wisconsin
University of Wisconsin-Extension
A4104

https://ag.purdue.edu/department/hla/extension/_docs/id-465.pdf



Elderberry Insect and Disease Management

This guide is the first known spray schedule to be developed for insect and disease control for field-grown elderberry in Missouri. Pesticide products labeled for greenhouse or high-tunnel-grown plants differ from those labeled for field-grown plants. Thus, product labels listed to control pests in this guide must be checked to determine if they may be applied legally when applied to elderberry grown under protected culture. Efficacy ratings for products are not listed in this guide as not all products have been tested at the University of Missouri. Only use pesticides after the pest is accurately identified. Scouting or trapping for pests will determine when a pesticide application is needed to prevent yield or plant loss.

Pesticides suggested in this publication have been labeled by the Pesticides Regulation Division of the Environmental Protection Agency. At the time this guide was developed, these pesticides were registered for use as indicated on the product label. However, these registrations can change at any time. It is the pesticide user's responsibility to carefully read and follow all

current label directions for the pesticide being applied. Also, strictly adhere to use of personal protective equipment application rates, reentry periods after spraying, and pre-harvest intervals. The pesticide label is a legal document.

Some of the pesticides suggested in this guide are on the EPA Restricted Use List and users must be certified private applicators to purchase and apply these materials. The EPA requires records for restricted use pesticide applications. [Pesticide training and licensing information](https://agriculture.mo.gov/plants/pesticides/licensing.php) is available at: <https://agriculture.mo.gov/plants/pesticides/licensing.php>. It is essential to keep accurate records of products used, rates and dates of application, areas treated, plant growth stages, targeted pests, and weather conditions. A [form for record-keeping requirements for restricted-use pesticides](https://extension.missouri.edu/publications/mp693) is available at: <https://extension.missouri.edu/publications/mp693>. For more information, contact your local University of Missouri Extension specialist.

Table 1. Products labeled for control of common mites and insects on elderberry.

Pest/Problem	Material	Product/Acre	Comments
Dormant to green tip			
Eriophyid mites (Figures 1 and 2)	Damoli	0.75 to 1.5 gal./100 gals. water	
Pre-bloom			
Eriophyid mites	M-Pede	1% to 2% solution	Organic option. Apply before leaf curl occurs.
	PyGanic 5EC	4.5 to 15.61 fl. oz.	Organic option before leaf curl. No more than 10 applications/season.
	Trilogy	1% to 2% solution	Organic option.



Figure 1. Inward leaflet curl caused by eriophyid mites (*Phyllocoptes wisconsinensis*).



Figure 2. Stunted leaflets with interveinal puckering caused by eriophyid mites (*Phyllocoptes n. sp.*).

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extension.missouri.edu

ipm1037

<https://extension.missouri.edu/media/wysiwyg/Extensiondata/Pub/pdf/agguides/pests/ipm1037.pdf>

Elderberry Planning and Production Budgets

HOME / PUBLICATIONS / ELDERBERRY PLANNING BUDGET

Elderberry Planning Budget

New November 2024

Editor's note

The following abstract describes a publication that is only available as a downloadable PDF.

See the [Elderberry Planning Budget \(XLSX\)](#) for related information.

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Using this budget, farmers can estimate the costs and returns for growing elderberry. Table 1 presents estimates for Missouri based on assumptions and prices in October 2024. Production area is assumed to have 908 elderberry plants (4-foot-by-12-foot row spacing) growing in an open field on 1 acre with irrigation. Detailed assumptions and capital investments are summarized in Tables 2, 3 and 4. Assumptions in this budget can be modified for your situation. Use the "Your estimate" column to plan your elderberry operation's costs and returns.

- <https://extension.missouri.edu/publications/g716>

What Else is Going On?

- Mechanization
- Novel processing techniques for elderberry as an ingredient
- Human health research – brain health, diabetes, viral infections
- Diversification of elderberry processed products and marketing
- Interest in blue elderberry

2nd International Elderberry Conference

- June 18-20, 2025
- Columbia, MO and area elderberry farms
- Check at <https://elderberry.missouri.edu/event/2025-international-elderberry-symposium/> for updated information



Advancing
American Elderberry

Comments or Questions?

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