

Elderberry: Culture and Potential in Missouri



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Elderberry

- *Sambucus canadensis*
- Honeysuckle Family
- Native to much of North America
- Medium to large shrub to small tree



Elderberry

- Justification for the project
 - Native, adapted plant
 - Growing market for fruit and flowers
 - Commercial cultivars were developed elsewhere – New York and Canada; native Midwestern germplasm is unexplored
 - Numerous opportunities for cultural studies



Elderberry

- Elderberry Improvement Project initiated in 1997
- Cooperators:
 - Patrick Byers, University of Missouri
 - Andrew Thomas, University of Missouri
 - John Avery, Missouri State University
 - Chad Finn, USDA-ARS
 - Penelope Perkins-Weazie, USDA-ARS
 - Hwei-Yiing Johnson, Lincoln University
 - Sanjun Gu, Lincoln University
 - John Brewer and Marge Millican, Wyldewood Cellars
 - Terry Durham, Eridu Farm
 - Mike Gold, Ina Cernusca, Michelle Hall, MU Agroforestry Center
 - Denis Charlebois, Agri-Food Canada



Elderberry Research Funding

- USDA: \$17,765, \$16,150, \$15,000
- MU – CAFNR: \$9,300
- MU – Agroforestry Center: \$6,480
- MSU – Environmental Safety: \$2,300

- Total: \$66,995

Elderberry


- The project has three components:
 - Collection of native elderberry germplasm
 - Scientific evaluation of superior native germplasm and development of improved cultivars
 - Cultural studies
- The project has several research sites:
 - Mountain Grove, MO (Missouri State University)
 - Mount Vernon, MO (University of Missouri)
 - Jefferson City, MO (Lincoln University)
 - Corvallis, OR (USDA-ARS)

Elderberry




- Collection of native germplasm: 1997 to present
 - Gathered available commercial cultivars
 - Obtained selections from KSU and John Brewer
 - Publicized the project, and asked for superior plants from the public
 - Collection trips
 - 68 cultivars and selections

Elderberry




- Improved cultivars
 - New York cultivars
 - Adams 1 (1926)
 - Adams 2 (1926)
 - Ezyoff (1938)
 - York (1964)
 - Canada cultivars
 - Nova (1960)
 - Scotia (1960)
 - Johns (1954)
 - Kent (1960)
 - Victoria (1960)






Adams 2


Elderberry



- Investigations with native elderberry germplasm: 1998 to present
 - Phenology and plant growth
 - Harvest date
 - Yield, cluster size, berry size
 - Fruit quality
 - Disease and insect problems


Elderberry




- Evaluation of superior native germplasm
 - Planting 1: 2003-2006
 - 12 selections
 - 3 sites – MV, MG, Corvallis
 - 2 named cultivars will be described and released
 - Planting 2: 2008-2011
 - 10 selections
 - 3 sites – MV, MG, Lincoln
 - Hope to release new cultivar
 - Continue looking at pests and diseases



Elderberry




- Evaluation of superior native germplasm
 - Data collection
 - Phenology and plant growth
 - Insect and disease problems
 - Cyme yield, cyme size, berry yield, berry size
 - Juice parameters
 - Antioxidant levels




Elderberry

- Cultural studies
 - Pruning (2000-06)
 - Annual removal of all shoots
 - Removal of all shoots every 2 years
 - Horticultural pruning
 - No pruning



No pruning



Annual removal of all shoots

Elderberry

Table 1. Elderberry yields and pest response from plantings at Mountain Grove (MG) and Mt. Vernon, MO, 2002 to 2006

		Mean fruit yield per plant (g)	Mean # cymes per plant	Mean weight per cyme (g)	Single berry weight (mg)	Eriophyid mites ²	Bacterial leafspot ³
Site	MG	1400 a ²	36.6 a	51 b	67.4 b	3.82 b	3.51 b
	MV	606 b	13.6 b	67 a	90.0 a	4.43 a	4.76 a
Cultivar	Gordon B	1856 a	37.1 a	87 a	86.0 a	4.33 a	4.14 a
	Adams 2	647 b	21.6 b	36 c	63.2 c	3.63 b	3.76 b
	Netzer	414 c	14.5 c	53 b	80.2 b	4.20 a	4.12 a
Pruning Trt	Annual	855 b	10.4 c	86 a	77.5 a	3.99 a	4.05 a
	Bi-annual	1085 a	26.7 b	61 b	75.1 a	4.02 a	4.14 a
	Selective	1086 a	31.6 a	48 c	76.9 a	4.11 a	3.92 a
	Unpruned	940 b	30.1 ab	42 c	76.1 a	4.12 a	3.91 a
Year	2002	423 d	5.9 d	95 a	--	--	--
	2003	1034 b	33.2 b	41 c	--	--	--
	2004	1369 a	22.6 c	68 b	76.5 b	4.83 a	3.94 b
	2005	1307 a	39.0 a	41 c	79.8 a	4.16 b	4.27 a
	2006	822 c	24.2 c	49 c	72.8 c	3.57 c	3.78 b

² Values within sub-columns having similar letters are not statistically different ($P \leq 0.05$)
³ Scale 1 to 5: 1 = severe damage; 5 = no damage

Elderberry



- Cultural studies
 - Leaf foliar nutrient content (2006)
 - Nitrogen fertilization (2007)




Elderberry foliar samples

Elderberry

- Elderberry antioxidant studies
 - Juice studies (Dr. Perkins-Veazie, USDA)
 - Non-fruit studies
- DNA analysis of elderberry species, cultivars, and wild selections
 - TRAP studies (Dr. Johnson, Lincoln University)

Elderberry

- Future directions
 - Continue collection of superior native germplasm
 - Name and release superior selections
 - Enter superior selections into the germplasm repository system
 - Additional cultural studies – fertility management, insect and disease management
 - Additional DNA studies
 - Mechanization of elderberry production
 - Identify funding sources for comprehensive project
 - Identify additional collaborators
 - Breeding ?





Elderberry

- We appreciate the support of:
 - University of Missouri
 - Missouri State University
 - Lincoln University
 - USDA-ARS
 - Kansas State University




Elderberry


- We also appreciate the support of the staff at MSU State Fruit Experiment Station and the MU Southwest Center





2004 Elderberry harvest crew




Elderberry Culture




- Propagation
 - Root cuttings
 - Dormant hardwood cuttings
 - Sprouted hardwood cuttings
 - Softwood cuttings
 - Tissue culture
 - Seeds

Elderberry Culture



- Establishment
 - Bare root or container plants
 - Berms
 - Spacing
 - 4 feet between plants
 - 10-12 feet between rows

Elderberry Culture



- Growth habit
 - Fruits on old wood
 - Produces suckers, which also fruit



Elderberry Culture



- Pruning
 - Annual removal of all shoots






Elderberry Culture




- Pruning
 - Selective removal of older shoots




Elderberry Culture



- Fertilization
 - Nitrogen
 - 60-80 lb/acre (4x12 spacing)
 - Apply at budbreak
 - Other nutrients – as needed
- Irrigation



Elderberry Culture

- Pest management
 - Insect problems
 - Stem borer
 - Elder borer
 - Sawfly
 - Eriophyid mite
 - Stink bug








Elderberry Culture

- Pest management
 - Disease problems
 - Leaf spot
 - Birds




Elderberry Culture

- Harvest
 - July-August
 - Harvest panicles when all berries fully colored
 - Usually 2-3 pickings
 - Mechanization?
 - Can remove berries from stems by freezing

Elderberry Culture

- Yields (averages)
 - Year 1:
 - MO: 1226 lb/acre
 - IL: 1214 lb/acre
 - Year 2
 - MO: 3338 lb/acre
 - IL: 8677 lb/acre
 - Year 3
 - MO: 5621 lb/acre
 - IL: 8582 lb/acre



Elderberry Culture


- Yields (highest)
 - Year 1:
 - MO: 1842 lb/acre
 - IL: 3735 lb/acre
 - Year 2
 - MO: 4868 lb/acre
 - IL: 13495 lb/acre
 - Year 3
 - MO: 7572 lb/acre
 - IL: 13846 lb/acre
 - Highest yield in MO - 11352 lb/acre (year 1!)



Elderberry Culture

- Means of juice characteristics from 2002 elderberry harvest at two locations:

Site	# Samples	°Brix	pH	TA (ml)
Mt. Vernon	34	11.44	4.72	0.85
Mtn. Grove	26	12.59	4.56	0.92
Combined	60	11.94	4.65	0.88



Elderberry Marketing

- Products – from juice
 - Medicinals - concentrate, extract, tincture and syrup
 - Jams, jellies
 - Vinegar
 - Elderberry mead
 - Wines and spirits
 - Enhanced waters, other drinks
 - Colorant



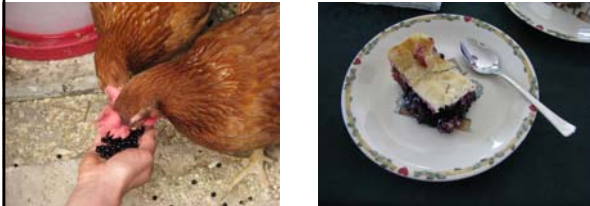
Elderberry Marketing

- Products – from dried fruit
 - Ingredient in energy bar, fruit mixes



Elderberry Marketing

- Products – from fresh or frozen berries
 - Culinary uses




Elderberry Marketing

- Products – from fresh and dried blossoms
 - Flavoring for wines, enhanced waters
 - Teas
 - Soaps




Elderberry Questions

- Cultural management
- Pest management
- Mechanization
- How long will a planting last?
- Economics
- Market development



2008 Elderberry Summit

- Formation of the North American Elderberry Alliance
 - Mission to "increase the awareness of elderberry through research and promotion"
 - Alliance is open to all interested in elderberry



2008 Elderberry Summit

- Future Elderberry Summits
 - 2009 Summit
 - Maine
 - October 17-18, 2009
 - 2010 Elderberry Summit (tentative)
 - Missouri
- Website for North American Elderberry Alliance <http://elderberryalliance.org/>

Elderberries in Missouri

- River Hills Elderberry Growers Association



Elderberry

- Any Questions?
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