5 Berries I

Where: Grand Gallery Room E & F  
MI re-certification credits: 2 (1C, COMM CORE, PRIV CORE)  
CCA Credits: CM (1) PM (1)  
Moderator: Douglas De Leo, MSHS Board, Bangor, MI

9:00 AM  Pollinators for Berries  
  • Rufus Isaacs, Michigan State University

9:30 AM  Strawberry and Raspberry Varieties for Michigan  
  • Eric Hanson, Michigan State University

10:05 AM  Elderberry Production  
  • Patrick Byers, University of Missouri Extension

10:45 AM  Berry Disease Research - Program Directions  
  • Tim Miles, Michigan State University

11:00 AM  Session Ends
Overview of Elderberry Culture
Patrick Byers
Horticulture Field Specialist
MU Extension – Webster County
ByersPL@missouri.edu

Introduction
• American elderberry (Sambucus nigra L.)
• Native to much of North America
• Medium to large shrub to small tree

Outline
• Introduction
  • Choosing a good site for elderberry production
  • Choosing elderberry cultivars
  • Propagation and planting establishment
  • Elderberry cultural practices
  • Harvest and postharvest handling

Elderberry Culture
• Cultivars with origins in Kentville, Nova Scotia
  • ‘Tosca’ (1954) – parentage unknown
  • ‘Tosca’ (1957) – seedling of ‘Adams 2’, earlier than ‘Adams 1’
  • ‘Nova’ (1959) – seedling of ‘Adams 2’, large fruit, ripens early, sweeter than ‘Tosca’ and ‘Victoria’
  • ‘Scotia’ (1959) – seedling of ‘Adams 2’, large fruit, ripens early, sweeter than ‘Tosca’ and ‘Victoria’
  • ‘Victoria’ (1957) – seedling of ‘Adams 2’, earlier than ‘Tosca’

Elderberry Culture
• Cutting from wild and/or cultivars
• Fruit spinesless and large described
• Fruit color can vary
• Flower color and blooms
• Size can vary
• Origin: Available as a clone of Sambucus nigra
• Mouth: Many different sizes
• Earliness and ripening time
• Yield: Production
• Plant: large, produce

Elderberry Culture
• Overview of Elderberry Culture
• Introduction
  • American elderberry (Sambucus nigra L.)
  • European or black elderberry (S. nigra)
  • Blue elderberry (S. n. caerulea)

Elderberry Culture
• Choosing a good site for elderberry
  • Marketing considerations
  • Availability of irrigation water
  • Elevated relative to surrounding land
  • Site specific issues
  • Previous uses of the site
  • Organic production considerations

Elderberry Culture
• Midwestern cultivars
  • ‘Bob Gordon’ (2011)
  • ‘Wildewood’ (2010)
  • ‘Marge’ (2013)
Elderberry Culture

- European Elderberry cultivars
  - ‘Haschburg’
  - ‘Marga’ (2013)
- Danish cultivars

Elderberry Culture

- Propagation
  - Root cuttings
  - Sprouted hardwood cuttings
  - Softwood cuttings
  - Tissue culture
  - Seeds
  - Dormant hardwood cuttings
    - 1, 2, or 3 node cuttings
    - Rooting hormone?

Field nursery production

Collecting elderberry hardwood cuttings

Bed nursery production

Hardwood cuttings in cell packs

Elderberry Culture

- Establishment - plants
  - Bare root or container plants
  - Berms
  - Spacing
    - 3-6 feet between plants
    - 10-12 feet between rows

Elderberry Culture

- Establishment - hardwood cuttings
  - Stick directly in the soil
  - Success percentage can vary

Newly established elderberry planting
Elderberry Culture

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

- Pruning
  - Annual removal of all shoots can improve harvest efficiency
  - Larger, heavier flower clusters
  - Concentrated ripening period
  - Implications for insecticide and SWD management?

- Pruning
  - Selective removal of older shoots

- Fertilization
  - Nitrogen
    - 60-100 lb/acre (4x12" spacing)
  - Other nutrients?
    - Foliage sampling to monitor nutrition?

- Irrigation
  - Elderberries are not drought-tolerant plants
  - Drip or trickle irrigation systems work well—18mm tube with emitters every 18-24"
  - Water needs: 1.5-2" per week

- Weed management
  - Control perennial weeds before planting
  - Plastic mulch for young plantings
  - Weed barrier fabric for older plantings?
  - Mowing
  - Hand removal
  - Herbicides
    - Labeled herbicides: Casoron, Surfex, Gallery, Snapshot, Aim, Roundup Max, Rely, Reglone, Gramoxone
Elderberry Culture

- Pest management – Eriophyid mite
  - Two species of mites discovered in MO
  - Overwinter in elderberry buds
  - Control measures
    - Removal of woody plant parts?
    - Delayed dormant lime sulfur spray?
    - Oil spray?
    - Timing of sprays?

Elderberry Culture

- Pest management – Japanese beetle
  - Insecticide applications
  - Mass trapping
  - 1,120,745 beetles killed in 2012 in 4 traps!
  - Source: Dr. Jaime Pinero, Lincoln University

Elderberry Culture

- Pest management – Spotted Wing Drosophila
  - SWD is a new elderberry pest for Missouri
  - SWD numbers appear to build in May and June, and reach damaging levels in June–Sept in MO
  - SWD management in elderberry
    - Baited monitoring traps – place in advance of fruit ripening and monitor regularly
    - Use cultural methods (pruning) to concentrate ripening
    - Exclusion?
    - Spray program
    - Insecticide in the past year has been very successful
    - See pest management guidelines and contact your local extension office for more information

Class Trade Name | Active Ingredient | PHI (days) | Days Residual
--- | --- | --- | ---
Mustang Max (RU) | zeta-cypermethrin | 1 | 7
Danitol (RU) | fenpropathrin | 3 | 7
Brigade (RU) | bifenthrin | 3 | 7
Delegate (2ee) | spinetoram | 1 | 7
Entrust (organic) | spinosad | 1 | 3–5
Pyganic (organic) | pyrethrum | 0 | 2

Elderberry Culture

- Pest management – Insect problems
  - Elder borer
  - Stink bug
  - Bacterial leaf spot (Pseudomonas)

Elderberry Culture

- Pest management – Bacterial leaf spot (Pseudomonas)

Elderberry Culture

- Pest management – Stem borer
  - Elder borer
  - Sawfly
  - Stink bug, including BMSB
  - Green June Beetle
Elderberry Culture

- Pest management
  - Elderberry rust

Elderberry Culture

- Other diseases
  - Phoma
  - Fungal leaf spot
  - Viruses

Fungal leaf spot

Elderberry Culture

- Harvest - blossoms
  - June
  - Harvest when all florets are open
  - Florets may be removed by rubbing over a screen
  - Use immediately, freeze fresh blossoms, or dry for future use

Elderberry Culture

- Harvest - fruit
  - July-August
  - Harvest cymes when all berries fully colored
  - Usually 2-3 pickings
  - Mechanization?

Elderberry Culture

- Let's discuss the harvest decision process...

- Harvest decision is based on:
  - Berry color
  - Condition of the crop
  - Juice chemistry

Elderberry Culture

- Yields
  - Year 1:
    - MO: 1226 lb/acre
    - IA: 1218 lb/acre
  - Year 2
    - MO: 3338 lb/acre
    - IA: 3477 lb/acre
  - Year 3
    - MO: 5621 lb/acre
    - IA: 8677 lb/acre
  - High yields
    - MO: 11352 lb/acre
    - IA: 13846 lb/acre

Postharvest Handling

- Fruit is destemmed
  - 4-10% of fresh weight is stem

- Storage
  - Fresh destemmed – fruit held at 4°C
  - Frozen destemmed – fruit held at -20°C

- Storage time – up to 2 years without loss of quality

Elderberry Culture

- Stem removal
  - Can remove berries from stems by freezing
Relevant, Reliable, Responsive…

Elderberry Culture

<table>
<thead>
<tr>
<th>Site</th>
<th>Brix</th>
<th>pH</th>
<th>TA</th>
<th>O Brix</th>
<th>pH</th>
<th>TA</th>
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<tbody>
<tr>
<td>Mt. Vernon</td>
<td>11.44</td>
<td>4.72</td>
<td>0.85</td>
<td>11.44</td>
<td>4.72</td>
<td>0.85</td>
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<tr>
<td>Mtn. Grove</td>
<td>12.59</td>
<td>4.56</td>
<td>0.92</td>
<td>12.59</td>
<td>4.56</td>
<td>0.92</td>
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<tr>
<td>Combined</td>
<td>11.94</td>
<td>4.65</td>
<td>0.88</td>
<td>11.94</td>
<td>4.65</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Elderberry Marketing

- Fresh or frozen fruit
  - On the stem
  - Destemmed
- Price:
  - On the stem - $0.50 to $1.95/lb
- Fresh, frozen or dried blossoms

Development of Missouri’s Elderberry Industry

- Snapshot – 1997
  - No known commercial elderberry production in Missouri
  - Elderberry products – strictly cottage industry based on wild harvested fruit or concentrate from elsewhere
- Snapshot – 2017
  - Estimated 300 acres of commercial elderberry in Missouri and surrounding states
  - Conservative estimated value of over $900,000 annually for the raw fruit alone
  - Diverse products and markets, based on Missouri elderberries

Industry Development

- Growth of the elderberry industry in Missouri is the result of a partnership among innovative farmers and researchers, with a common goal…to build an industry where none was before!

Challenges to Missouri’s Elderberry Industry

- Additional research is urgently needed
  - Cultivar development
  - Cultural management, especially fertility
  - Weed control
  - Pest management, especially eriophyid mites, SWD, rust and BMSB
  - Mechanization
  - Flowers as a crop
  - Perception of cyanide issues
- Additional economic research is needed

Riverhills Elderberry Workshop

Join us 13-15 June 2019!
Comments or Questions?

• To contact us:
  - Patrick Byers
    - PatrickByers@missouri.edu
    - 417-859-2044
  - Andrew Thomas
    - AndrewTH@missouri.edu
    - 417-966-2148
• http://extension.missouri.edu/greene/ElderberryDevelopmentProject.aspx

Relevant, Reliable, Responsive…
Raspberry and Strawberry Varieties for Michigan
Eric Hanson, Department of Horticulture, Michigan State University Extension hansone@msu.edu

RASPBERRIES

In choosing raspberry varieties, first decide when you want fruit. Primocane fruiting types bear on the current year canes in the fall, and floricane fruiting types bear on two year-old canes in the summer. Floricans can be retained on some of the primocane fruiting types so that they bear a second crop during the following summer (double cropping). Double cropping costs more but provides fresh fruit for longer periods and yields can be higher. Primocane harvest can occur over two months, whereas floricane harvest occurs in 2-4 weeks. We have been able to assess these types in southern Michigan with funding through the NIFA Specialty Crop Research Initiative project (www.tunnelberries.org).

For primocane fruiting, choose varieties that ripen early enough to harvest high yields for your region. Earlier maturing types are best for short growing season locals, and early and later maturing types are good in longer growing season areas or under high tunnels that lengthen seasons. The chart below provides general harvest times for primocane fruit in southern Michigan. Move the bars to the right in more northern locations.

<table>
<thead>
<tr>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
</table>

EARLY PRIMOCANE TYPES

Joan J and Polka are good choices for early season. Both mature about the same time. Both have excellent flavor and are firm. Joan J berries are dark red whereas Polka fruit are a glossy medium red. Both varieties are high yielding and produce abundant canes of medium height. Joan J canes are thornless. Their primary limitations are dark fruit (Joan J) and susceptibility to damage from potato leafhoppers (Polka).

Himbo Top matures a few days after Joan J and Polka. Berries are large and lighter red, but have an average flavor and are less firm, so they may not pack and ship well. Canes are very vigorous and taller than the other types, and Himbo Top fruit are easy to see and pick.

MID-SEASON PRIMOCANE TYPES
Caroline been a popular variety because it is extremely productive and has an outstanding flavor. Berries are somewhat less susceptible to gray mold, but firmness is only average. Plants produce abundant canes that are medium in height. Anne is the best yellow-fruited variety we have tested, producing large berries with a unique pleasant flavor. Berry yields and firmness are average. Heritage is an old variety that fruits later than Caroline or Anne. It is a consistent producer but has mostly been replaced by larger fruited varieties.

Two new varieties that have high potential are Imara and Kweli. Both produce very high quality fruit that are very firm, medium red and glossy, large and flavorful. Fall harvest appears to be in the late mid-season, similar to Heritage or later. Imara is a little earlier than Kweli. Though these are relatively new, they both appear to be good choices for double cropping since the primocane and florican yield potential and quality are excellent. Addison is a very new variety developed in Maryland that appears to be productive with large, firm, flavorful fruit. Berries are a very dark red color. Fruiting season is not entirely clear, but appears to be similar to Heritage or perhaps earlier.

LATE-SEASON PRIMOCANE TYPES

A number of varieties mature later than Heritage so they have limited use for primocane production in Michigan except perhaps in the extreme south or in high tunnels. Further north, fall fruiting will begin too late for good yields. Josephine is a productive variety with excellent flavor and fruit size. The dark red color has limited Josephine acceptance. Kwanza is a new type that produces very large light red berries with excellent flavor. Kwanza has very high primocane yield potential in long season areas, but may perform best in Michigan as a florican fruiter, because our season is too short for high primocane yields. Crimson Night and Double Gold are interesting new late types from Cornell University. They are likely too late to grow in most of Michigan (unless under tunnels). Both produce firm, flavorful fruit. Crimson night is a very dark red and Double Gold is yellow-pink.

FLORICANE FRUITING TYPES

Recommended florican fruiting types have not changed much because few cultivars have been released lately. Prelude and Nova are good early season types. Prelude berries are a little smaller but have a slightly better flavor. Nova canes may be a little more cold hardy than Prelude canes. Both varieties produce some primocane fruit. Encore is an excellent late season variety. Berries are large, firm and flavorful. Canes are hardy enough for most sites designated USDA Hardiness zones 5 and 6. Tulumagic is a mid-season variety that show promise, but has not been adequately tested to recommend widely.

STRAWBERRIES

Michigan strawberry acreage has been declining but this crop is still important because returns can be good and strawberries can spread farm risk over different crops. Most recommended short-day varieties (June-bearing) have been available for many years. However, new varieties are released regularly that may have potential for use in Michigan. We compared several new and old types in a 2017 planted trial in East Lansing. The planting was on a loam soil and managed in a matted row system, and harvested in 2018. Below are descriptions of some standard recommended cultivars as well as initial observations of some newer types.
Recommended varieties for Michigan in the early season include Honeoye and Earliglow. **Honeoye** is more productive and larger fruited than Earliglow, but Earliglow has superior flavor. Galletta and Wendy are two other early season types that had high quality fruit and were productive. Galletta in particular maintained berry size through the late pickings. Yambu is a newer early season type that begins maturing with Honeoye, but Yambu has better flavor.

**Jewel** and **Allstar** have been Michigan standards in the mid season for some time. Jewel is still one of the highest quality varieties in this season, with excellent flavored large berries. Allstar is also productive and flavorful but has a lighter red color. Archer, Clancy, Flavorfest and Mayflower were four newer mid-season types tested. All had modest yields in this trial. Archer and Flavorfest produced the largest berries.

**Cavandish** is a common late season variety in Michigan. Newer late season types tested in 2018 include Record, Valley Sunset and Malwina. Record was productive while yields were disappointing for Valley Sunset and Malwina. All three produced very large berries. Malwina was the latest variety in the trial.

**Redstart** and **Wasatch** are two day-neutral types included in the trial for observation. Neither were outstanding and Redstart in particular did not behave as a day-neutral. We only harvested fruit from these in June, so productivity later in the season was not quantified.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Season</th>
<th>Yield (kg/plot)</th>
<th>Marketable</th>
<th>g/berry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archer</td>
<td>mid</td>
<td>4.9</td>
<td>4.8</td>
<td>14.3</td>
</tr>
<tr>
<td>Clancy</td>
<td>mid</td>
<td>6.7</td>
<td>6.6</td>
<td>11.6</td>
</tr>
<tr>
<td>Flavorfest</td>
<td>mid</td>
<td>7.1</td>
<td>7.0</td>
<td>14.0</td>
</tr>
<tr>
<td>Galletta</td>
<td>early</td>
<td>6.5</td>
<td>6.4</td>
<td>12.1</td>
</tr>
<tr>
<td>Honeoye</td>
<td>early</td>
<td>8.7</td>
<td>8.6</td>
<td>9.4</td>
</tr>
<tr>
<td>Jewel</td>
<td>mid</td>
<td>10.0</td>
<td>9.8</td>
<td>10.6</td>
</tr>
<tr>
<td>Malwina</td>
<td>late</td>
<td>4.1</td>
<td>4.1</td>
<td>16.4</td>
</tr>
<tr>
<td>Mayflower</td>
<td>mid</td>
<td>6.7</td>
<td>6.6</td>
<td>11.3</td>
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<tr>
<td>Record</td>
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<td>11.1</td>
<td>10.9</td>
<td>16.1</td>
</tr>
<tr>
<td>Redstart</td>
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<td>7.0</td>
<td>6.9</td>
<td>10.7</td>
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<tr>
<td>Valley Sunset</td>
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<td>14.0</td>
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<tr>
<td>Wasatch</td>
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<td>6.2</td>
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</tr>
<tr>
<td>Wendy</td>
<td>early</td>
<td>7.8</td>
<td>7.7</td>
<td>10.9</td>
</tr>
<tr>
<td>Yambu</td>
<td>early</td>
<td>8.8</td>
<td>8.6</td>
<td>11.9</td>
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</tbody>
</table>

1 kg is equivalent to about 2400 lbs/acre.