**American Elderberry Cultivar Development for the Midwest**

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**Outline**

- Introduction
- Wild elderberries
- Origins of cultivated elderberries
- Today’s cultivars
- The future

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**Introduction**

- American elderberry (*Sambucus canadensis* L. or *Sambucus nigra* L. ssp. *canadensis* (L.) R. Bolli)
- Native to much of North America
- Medium to large shrub to small tree
- Suckers from the roots

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**Wild Elderberries**

- *Sambucus* is an important ornamental

*Sambucus nigra* “Black Lace”

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Origins of Cultivated Elderberries

- Humans have enjoyed elderberry for centuries; most of this fruit was harvested from wild plants.
- Development of commercial cultivars is a recent development; one of the first American elderberry cultivars was 'Brainerd’ in 1890.
- Many of the early cultivars were selected from among wild plants; this approach continues today.
- Many home garden elderberry plants are seedlings.
- Only a handful of cultivars are currently available.

Today's Cultivars

- The perfect elderberry cultivar...
  - Plant characteristics
    - Wider adaptation to different climatic conditions
    - Self fruitfulness
    - Increased productivity
    - Vigor, strong canes
    - Fruiting potential on new shoots
    - Resistance or tolerance to disease and insect problems

Today's Cultivars

- Cultivars with origins in New York
  - 'Adams 1', 'Adams 2' (1926)
    - Selected from the wild by William Adams
    - Fruit clusters and berries described as large
    - 'Adams 1' has greenish stems; 'Adams 2' has reddish stems
    - Cross pollination required
  - 'Ezyoff' (1934)
    - Selected from unknown parentage by Samuel Graham
    - Berries separate easily from cluster
    - Average cluster size, average berry size

Today's Cultivars

- Cultivars with origins in New York
  - 'York' (1964)
    - Originated as a cross of ‘Adams 2’ x ‘Ezyoff’
    - Clusters heavy, berries large
    - Lower soluble solids than 'Adams', 'Scotia', or 'Victoria'
    - Ripens after 'Adams 1' and 'Adams 2'
    - Plant large, productive

Today’s Cultivars

- Cultivars with origins in Kentville, Nova Scotia
  - 'Johns' (1954) — Parentage unknown
  - 'Kent' (1957) — Seedling of 'Adams 1'; earlier than 'Adams 1'
  - 'Nova' (1959) — Seedling of 'Adams 2'; large fruit, ripens early, sweeter than 'Kent' and 'Victoria'
  - 'Scotia' (1959) — Seedling of 'Adams 2'; large fruit, ripens early, sweeter than 'Kent' and 'Victoria'
  - 'Victoria' (1957) — Seedling of 'Adams 2'; earlier than 'Adams 2'
Concerns about older cultivars:
- Narrow genetic base among most cultivars
- Maintenance of the identity of cultivars
- Virus infections
- Performance in Midwest

The Missouri Elderberry Improvement Program: major component of the project is cultivar development:
- Collection of native elderberry germplasm
- Replicated evaluation of superior native germplasm
- Development of improved cultivars

The project has several research sites and many collaborators:
- Mount Vernon, MO (University of Missouri)
- Mountain Grove, MO (Missouri State University)
- Jefferson City, MO (Lincoln University)
- Corvallis, OR (USDA-ARS)
- Additional cooperators

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

The elderberry collection – two sites (Mtn. Grove and Mt. Vernon)
- Named cultivars: 6
- Missouri: 35
- Kansas: 2
- Nebraska: 2
- Oklahoma: 7
- Arkansas: 5
- Tennessee: 1
- North Carolina: 3
- New York: 1
- S. nigra selections - 6
- Total: 68 selections and cultivars

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

- Replicated 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

- ‘Wyldewood’ Elderberry (2010)
  - Collected from the wild by Jack Millican near Eufaula, OK, in 1995
  - Provided to the Elderberry Improvement Project in 1998 by Margaret Millican
  - Originally described and tested as ‘Brush Hills 1’ and ‘Wyldewood 1’

- ‘Wyldewood’ Elderberry
  - Tall shrub reaching 225 cm, with a spreading to upright growth habit.
  - Timing of spring budbreak is similar to that of ‘Adams 2’.
  - Blossoms in June; florets are easily removed from the cyme for use as a dried product or as a flavoring.
  - We have not investigated the pollination requirements for ‘Wyldewood’; however, fruit set is reliable and prolific.
Today's Cultivars

- **‘Wyldewood’ Elderberry**
  - Harvest season generally 14-26 days later than ‘Adams 2’ and ‘Bob Gordon’; late July in Missouri.
  - Primary shoots ripen fruit over a 3-week period; three harvests at 7-day intervals.
  - Unpruned plants ripen fruit for a 4-week period.

Today’s Cultivars

- **‘Wyldewood’ Elderberry**
  - The fruit cymes presented in an upright position at ripening.
  - The cymes at harvest are medium to large compared to ‘Adams 2’
    - somewhat loose
    - 33.6 g on unpruned plants
    - 83.1 g on plants that are pruned to the ground
  - Yield over 3 years at two sites averaged 2.1 kg/plant
  - Secondary cymes often form from the axils below the main cymes, a characteristic that increases bearing potential of each shoot.

Today's Cultivars

- **‘Wyldewood’ Elderberry**
  - Berries
    - dark purple
    - ripen uniformly in the cymes
    - resistant to shattering
  - Berry weight ranges from 52-111 mg
  - Yield variability was noted between the Mountain Grove and Mount Vernon sites, with Mountain Grove plots producing higher yields but smaller berries than the Mount Vernon plots.
Today's Cultivars

- ‘Wyldewood’ Elderberry
  - Laboratory testing of fruit harvested from both sites over three years indicated:
    - Mean juice pH of 4.7
    - Mean total soluble solids of 9.8 °Brix
    - Mean titratable acidity in terms of tartaric acid of 0.73 g/100 ml

Today’s Cultivars

- ‘Wyldewood’ Elderberry
  - Rated as slightly to moderately susceptible to leaf spot diseases.
  - Eriophyid mites (Eriophyidae) were noted as a slight problem at both sites.
  - Disease and mite susceptibility were not significantly different from ‘Adams 2’

Today’s Cultivars

- ‘Bob Gordon’ Elderberry
  - Identified and collected from the wild by Robert Gordon, Charlotte Cooper, and Andrew Thomas near Osceola, MO, on September 29, 1999.
  - Originally described and tested as ‘Gordon B’

Today’s Cultivars

- ‘Bob Gordon’ Elderberry
  - Medium shrub to 217 cm, with a spreading to upright growth habit.
  - Spring budbreak is later than ‘Adams 2’
  - Blossoms in late May-mid June
  - Florets are easily removed from the cyme for use as a dried product or as a flavoring.
  - We have not investigated the pollination requirements for ‘Bob Gordon’.

Today’s Cultivars

- ‘Bob Gordon’ Elderberry
  - The harvest season for ‘Bob Gordon’ is similar to ‘Adams 2’.
  - Harvest usually begins in mid-late July in Missouri.
  - Primary shoots ripen fruit over a 3 week period, allowing for the harvest of the majority of the fruit in 3 harvests at 7 day intervals.
  - Unpruned plants ripen fruit for a 4 week period
Today’s Cultivars

• ‘Bob Gordon’ Elderberry
  – The fruit cymes of present in a decumbent position at ripening, which may make the berries less attractive to birds
  – The cymes at harvest are large compared to ‘Adams 2’ and somewhat loose
    • Average size of 67.5 g on unpruned plants
    • Average size of 126.6 g on plants that are annually pruned to the ground.
  – Yield in two studies averaged 2.3 kg/plant

Today’s Cultivars

• ‘Bob Gordon’ Elderberry
  – Berries
    • dark purple,
    • ripen uniformly in the cymes
    • resistant to shattering.
  – Berry size averaged 91.6 mg and 88.5 mg in two studies.
  – Yield variability was noted between the Mountain Grove and Mount Vernon sites, with Mountain Grove plots producing higher yields but smaller berries than the Mount Vernon plots.

Today’s Cultivars

• ‘Bob Gordon’ Elderberry
  – Laboratory testing of fruit harvested from both sites over three years indicated:
    • mean pH of 4.73
    • total soluble solids of 11.62°Brix
    • titratable acidity in terms of tartaric acid of 0.65 g/100ml
Today's Cultivars

- 'Bob Gordon' Elderberry
  - 'Bob Gordon' was rated as slightly to moderately susceptible to leaf spot diseases
  - Erichyid mites (Eriophyidae) were noted as a slight problem at both sites
  - 'Bob Gordon' had significantly less disease and mite damage than 'Adams 2' in one study while disease and mite susceptibility were not significantly different from 'Adams 2' in a second study.

Today's Cultivars

- Replicated evaluation of superior native germplasm
  - Planting 2: 2008-2011
    - 6 advanced selections, 3 commercial selections (York, Wyldewood, Bob Gordon)
    - Dallas (MO)
    - Clark (AR)
    - Marge (OK)
    - Ocoee (TN)
    - Ozone (AR)
    - Sperandio (MO)
  - 3 sites – MG, MV, and Lincoln University

Today's Cultivars

- 'Marge' Elderberry
  - Selected near Eufaula, Oklahoma, by Marge Millican
  - Original plant was an open pollinated seedling of 'Hasenber'; 'Marge' is considered to be Sambucus nigra, though the male parent is unknown
  - Provided to the project on 4/19/07

Today's Cultivars

- Characteristics of 'Marge'
  - Upright to spreading growth habit
  - Plant is tall, to 3 m
  - Plant has a vigorous growth habit
  - Plant appears hardy and adapted to Midwestern growing conditions

Today's Cultivars

- Characteristics of 'Marge'
  - Produces flowers and fruit on 1 year and older shoots; does not produce on new shoots from the crown
  - Plant is productive
  - Ripe fruit cymes present in a decumbent position at harvest

Today's Cultivars

- Characteristics of 'Marge'
  - Flower and fruit cymes are abundant and small in size
Today’s Cultivars

‘Marge’

Today’s Cultivars

• ‘Marge’ compared to American elderberry germplasm in the trial:
  – Significantly later in budbreak and earlier in full bloom
  – Significantly less damaged by mites – virtually untouched
  – Significantly larger berry weight
  – Significantly lower juice pH
  – Significantly higher total yield and # cymes
  – Exhibits desirable biochemical properties

• Compared to European elderberry germplasm previously evaluated, ‘Marge’ appears to be better adapted to Midwestern growing conditions
• ‘Marge’ is under consideration for cultivar release as a European elderberry with desirable characteristics for Midwestern USA production

The Future

• Replicated evaluation of superior native germplasm
  – Planting 2: 2008-2011
    • 6 advanced selections, 3 commercial selections (York, Wyklewood, Bob Gordon)
      – Dallas (MO)
      – Ozark (AR)
      – Marge (OK)
      – Ocoee (TN)
      – Ozone (AR)
      – Sperandio (MO)
    • 3 sites – MO, AR, and Lincoln University

The Future

• Potential future cultivar releases
  – ‘Ozark’
    • High yielding
    • Interesting biochemical profile
• Other cultivars
  – ‘Ranch’
European Elderberry Cultivars

- Many cultivars
- Much is known about European elderberry production practices
  - Standardization
- Product development
- Flower production as well as fruit production
- Need to evaluate existing European elderberry cultivars and develop new cultivars adapted to Midwestern USA

Any Questions?

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