ASHS &

The American Pomological Society

Founded 1848

To promote the study and culture of fruit and nuts • To disseminate information pertaining to fruit and nut cultivars • To register new fruit and nut cultivars

Workshop 13: Native Fruits of the Midwest
2:00 PM
- Pawpaw and the American Persimmon: Niche Tree Fruit Crops for the Midwest and Eastern United States Kirk Pomper, Kentucky State University; Sheri Crabtree, Kentucky State Univ; Jeremiah Lowe, Kentucky State Univ; Jerry Lehman, Indiana Nut Growers Association

2:20 PM
- Nut Crops of the Midwest Michele R. Warmund, Ph.D., Univ of Missouri

2:40 PM
- Elderberry Research and Development In Missouri Patrick Byers, Greene County Extension Office; Andrew Thomas, University of Missouri; John Avery, Missouri State University; Chad Finn, USDA ARS HCRL; Penelope Perkins-Veazie, North Carolina State University; Hwei-Yiing Li-Johnson, Lincoln University; Sanjun Gu, Lincoln University

3:00 PM
- Blackberry Breeding In the Midwest John Clark, University of Arkansas

3:30-4:00 PM
- Discussion

4:00-5:00 PM Fruit and Nut Tasting

5:00-6:00 PM American Pomological Society Business Meeting
Pawpaw and the American Persimmon: Niche Tree Fruit Crops for the Midwest and Eastern United States

Kirk Pomper, Sheri Crabtree, Jeremiah Lowe, Kentucky State University, Land Grant Program, Frankfort, KY

and Jerry Lehman

Indiana Nut Growers Association
American Persimmon

- *Diospyros virginiana*
- Slow growing, moderate sized tree
- Fruit: 1-2 inches in diameter
- Lose astringency when ripe; sweet

J. Lowe
Flowers usually dioecious; staminate and pistillate flowers are borne on separate trees; female trees may have a small number of male flowers.
Native Range (*Diospyros virginiana*)

http://plants.usda.gov
D. virginiana 60 or 90 Chromosome Races

Adapted from Baldwin and Culp (1941)
Seedless Persimmon Fruit

- Most named varieties are 90-chromosome type.
- When 90-chromosome type are grown in Kentucky and pollinated by the 60-chromosome type, the seeds abort and many of the fruit are seedless or have few seeds.
- ‘Meader’ is self-fruitful and will set seedless fruit.
Fruit Production

- Seedlings bear fruit in 4-9 years
- Grafted trees can begin fruiting in 3-5 years
- Fruit is hand-picked with care to maintain the cap for fresh market
- Bearing trees may yield 35 to 75 pounds/tree
Persimmon Pests and Diseases

- Insect pests include psyllid, persimmon borer, fall webworm, bagworm, hickory horned devil, and twig girdler
- The ambrosia beetle is a new pest in KY
- Leaf spot, persimmon wilt, and other diseases
Domesticating Persimmon

- Latter half of the 19th century:
  - Logan Martin (Borden, IN), James A. Little (Cartersburg, IN), Samuel Miller (Bluffton, MO), F. O. Harrington (York Center, IA), and James Troop (Purdue University)

- More recently:
  - J. C. McDaniel (Univ. of Illinois), James Claypool, Jerry Lehman, and Don Compton
* Females observed to sport male flowers
** Males observed to sport female flowers

(from J. Raymond)
A-Z  VALENE BEAUTY  DOLLYWOOD D-128
MORRIS BURTON  NC-10

L. Brumley
Processing

- Fruit of most varieties contain black flecks in the pulp, which are not attractive in the processed product.
- ‘Meader,’ ‘Killen,’ and ‘Morris Burton’ are varieties that contain few or no black specks.
Promising Persimmon Cultivars

- ‘Early Golden’
  - (Alton IL, 1880)
- ‘Yates’
  - (Southern Indiana, 1983)
- ‘John Rick’
  - (Seedling of Killen, 1958)
- ‘Morris Burton’
  - (Indiana, 1957)
- Others: NC-10 (Campbell), Elmo, Dollywood (other Claypool selections?)
Challenges for Persimmon

- Little information on cultivar performance
  - Yield trials
- Limited science based cultural recommendations
  - Fertilization, training, etc.
- Harvest and Processing issues
The North American Pawpaw

- *Asimina triloba* (L.) Dunal.

- Slow growing, moderate sized tree; pyramidal in full sun

- Fruit:
  - Clusters of 1-13 fruit
  - Fruit up to 2 lbs.
Native Range (Asimina triloba)

http://plants.usda.gov
Pawpaw Flowering and Harvest

- Flowers: monoecious
- Cross-pollinate (self-fruitful?)
- Pollinated by flies and beetles
- Ripe fruit-soft
- Color change not a reliable indicator of ripeness
- Harvest from the same tree over several weeks
Pawpaw Pests and Diseases

- Leaf and fruit spot (*Phylosticta*)
- Japanese beetles
- Leaf rollers
- Zebra swallowtail butterfly-not necessarily a pest
- *Talponia plummeriana* - pawpaw peduncle borer
The Pawpaw Fruit

- Tropical-like flavor and aroma
  - banana, mango, and pineapple
- Nutritious and high in antioxidant activity
- blended fruit drinks, ice creams, yogurt, etc.
The Potential of Pawpaw

- Fresh market-unique flavor
- Appearance-not unappealing
- Post harvest handling issues
  - Bruising
  - Short shelf-life of about 7 days at room temp
  - Storage for 2-3 wks under refrigeration
The Potential of Pawpaw

- Processing pulp
  - Hand processing
  - Labor intensive
Pawpaw Market Potential

- Farmers Markets
  - Fruit: $1 each
  - $2 to $3/pound
- Gourmet Market
  - Frozen pulp
  - Ice cream
- Restaurants
Domesticating Pawpaw

- In 1916, best pawpaw contest sponsored by the American Genetics Association
  - "intelligent breeding" would result in commercial quality varieties and an industry would begin (Popenoe 1916, 1917).
- An industry did not develop
- One reason for the failure of pawpaw to become popular could be rapid perishability of fruit
New Interest in Pawpaw

- From 1950 and 1985, interest grew nurtured by individuals in the Northern Nut Growers Association
- The PawPaw Foundation was founded in 1988, by R. Neal Peterson
- Ohio Pawpaw Festival (1999-present), Ohio Pawpaw Growers Association (2000), and Appalachian Pawpaw Growers Association (2008)
The Kentucky State University Pawpaw Research Program

- **Program Leaders:**
  - Brett Callaway (1990-1993)
  - Desmond Layne (1994-1997)
  - Kirk Pomper (1998-Present)

- **USDA National Clonal Germplasm Repository for Pawpaw; satellite of Corvallis, OR (1994)**
- **2000 accessions from 17 different States; over 45 cultivars**
PawPaw Foundation Collections

- Neal Peterson and Harry Swartz
  - germplasm collection (1981)
- Screening of about 1500 accessions at the University of Maryland
  - Open pollinated seedlings from collections of Buckman, Zimmerman, Hershey, Allard, the Blandy Experimental Farm, Ray Schlaanstine, and some modern cultivars
- Pawpaw Regional Variety Trial initiated in 1994 by R. Neal Peterson and Desmond Layne
  - 10 cultivars and 18 PPF advanced selections
# Pawpaw Regional Variety Trials (1995-2000)

<table>
<thead>
<tr>
<th>State</th>
<th>Cooperator</th>
<th>Institution</th>
<th>Location</th>
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<tbody>
<tr>
<td>Indiana</td>
<td>Bruce Bordelon</td>
<td>Purdue University</td>
<td>West Lafayette</td>
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<tr>
<td>Iowa</td>
<td>Patrick O’Malley and Tom Wahl</td>
<td>Iowa State University</td>
<td>Crawfordsville, Iowa</td>
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<tr>
<td>Kentucky</td>
<td>Kirk Pomper</td>
<td>Kentucky State Univ.</td>
<td>Frankfort, Ky.</td>
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<tr>
<td>Kentucky</td>
<td>Joseph Masabni</td>
<td>Univ. of Kentucky</td>
<td>Princeton, Ky.</td>
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<td>Nebraska</td>
<td>Stan Matzke/Bill Gustafson</td>
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<td>Lincoln, Nebr.</td>
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<td>New York</td>
<td>Ian Merwin</td>
<td>Cornell University</td>
<td>Ithaca, N.Y.</td>
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<td>North Carolina</td>
<td>Mike Parker</td>
<td>N.C. State University</td>
<td>Raleigh, N.C.</td>
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<td>Ohio</td>
<td>Brad Bergefurd</td>
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<td>Oregon</td>
<td>Kim Hummer</td>
<td>USDA-NCGR</td>
<td>Corvallis, Ore.</td>
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<tr>
<td>South Carolina</td>
<td>Greg Reighard</td>
<td>Clemson University</td>
<td>Clemson, S.C.</td>
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RVT Fruit Production on Mature Trees 2004-2006 in Frankfort, KY

<table>
<thead>
<tr>
<th>Clone</th>
<th>Average fruit weight (g)</th>
<th>Average number of fruit per tree</th>
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<tbody>
<tr>
<td>Potomac</td>
<td>235 a</td>
<td>44 ghi</td>
</tr>
<tr>
<td>5-5</td>
<td>188 b</td>
<td>39 hi</td>
</tr>
<tr>
<td>Wabash</td>
<td>185 b</td>
<td>65 fg</td>
</tr>
<tr>
<td>Susquehanna</td>
<td>184 b</td>
<td>39 i</td>
</tr>
<tr>
<td>NC-1</td>
<td>179 bc</td>
<td>44 ghi</td>
</tr>
<tr>
<td>Overleese</td>
<td>170 bcd</td>
<td>54 fghi</td>
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<tr>
<td>8-20</td>
<td>170 bcd</td>
<td>59 fghi</td>
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<tr>
<td>1-68</td>
<td>167 bcd</td>
<td>90 cde</td>
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<tr>
<td>2-10</td>
<td>160 cde</td>
<td>52 fghi</td>
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<tr>
<td>Shenandoah</td>
<td>156 def</td>
<td>78 def</td>
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<tr>
<td>Sunflower</td>
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<td>74 def</td>
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<tr>
<td>9-58</td>
<td>146 efg</td>
<td>79 def</td>
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<tr>
<td>10-35</td>
<td>145 efg</td>
<td>105 abc</td>
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## RVT Fruit Production on Mature Trees 2004-2006 in Frankfort, KY

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<th>Clone</th>
<th>Average fruit weight (g)</th>
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<tr>
<td>3-11</td>
<td>137 efgh</td>
<td>68 ef</td>
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<tr>
<td>7-90</td>
<td>135 fghi</td>
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<tr>
<td>1-23</td>
<td>126 ghij</td>
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<td>11-13</td>
<td>124 hij</td>
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<tr>
<td>Taytwo</td>
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<tr>
<td>2-54</td>
<td>121 hijk</td>
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<tr>
<td>3-21</td>
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<td>Mitchell</td>
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<tr>
<td>PA-Golden</td>
<td>108 jklm</td>
<td><strong>118 ab</strong></td>
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<tr>
<td>Taylor</td>
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<td>68 efg</td>
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<tr>
<td>Wells</td>
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<td>64 fgh</td>
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<tr>
<td>9-47</td>
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<tr>
<td>Rappahannock</td>
<td>96 lm</td>
<td>96 bcd</td>
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<td>Wilson</td>
<td>89 mn</td>
<td><strong>128 a</strong></td>
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<tr>
<td>Middletown</td>
<td>75 n</td>
<td>74 def</td>
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Challenges for Pawpaw

- Can yields and quality be improved:
  - Training systems and rootstocks (KSU)
  - Fruit thinning (KSU)
  - Nutrient management
- Harvest, post-harvest, and processing issues
  - New cultivars (firmer fruit)
- Market development
  - Education
  - How large is the market?
Questions?