Small Fruit Production

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Blueberry Production Potential

• Blueberries are a very popular crop
  – Nutritional Value
  – Antioxidant quality
    • Cancer fighting
    • Anti-aging
  – Regional taste
    • Increasing trend to like blueberries more than strawberries
Blueberry Establishment Costs

- Establishment Costs
  - $4,500 to $8,500/A
    - Land preparation
      - $1,000 to $1,500/A
    - Plants
      - $1,500 to $2,000/A
    - Labor
      - $1,000 to $3,000/A
    - Irrigation
      - $1,000 to $2,000/A

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Blueberry Yields and Prices

• **Yield Potential**
  - 3\textsuperscript{rd} year  200 pints/A
  - 4\textsuperscript{th} year  2,000 pints/A
  - 5\textsuperscript{th} year  4,000 pints/A
  - 6\textsuperscript{th} year  6,000 pints/A
  - Full  6,000 to 10,000 pints/A
  1 pint weighs approx. ¾ of a pound

• **Prices**
  - Pick-Your-Own
    • $0.75 to $1.00/lb
  - Pre-Picked
    • $1.50 to $2.00/lb
Blueberry Economics

- Economics
  - Pick-Your-Own
    - $2,000/A/year return over 15 years
  - Pre-Picked
    - $6,000/A/year return over 15 years
Blueberry Production Timeline

• Time from planting
  – Until first harvest
    • 3 years*
  – Until full harvest
    • 5 to 6 years*

  *With proper management

• Productive Life of planting
  • 15 to 20 years**

  ** If well maintained
Blueberry Production

• Site Selection
• Site Preparation
• Fertilization
• Planting Dates
• Plant Spacing
• Varieties
• Pollination
• Mulching
• Irrigation
• Monitoring pH
• Disease Control
• Insect Control
• Weed Control
• Pruning
• Harvesting & Storage
Site Selection

- Soil type
- Soil structure
- Drainage
- Air drainage (frost protection)
- Exposure - Full sunlight (North facing avoids sunscald on fruits)
- Row orientation E-W (allows for additional air movement) or N-S (more even ripening). Each site must be considered individually.
- Field borders can be a source of pests and pathogens. Practice having clean borders around small fruit plantings.
Site Preparation

- Lay off planting strips.
- Spray with Roundup in early fall to kill 3-4 ft wide strips. Allow mowing on either side of strips.
- Apply 4-6 inches organic materials to be incorporated.
- Apply sulfur as needed.
- Till organic materials into the soil
- Apply pre-emergence herbicides for weed seed control
- Apply additional mulch to surface of planting strips and leave until spring.
Monitoring pH

- Take soil sample one to two seasons preceding spring planting.
- Your pH goal is 4.5 to 5.5
- Add sulfur at a rate of 2 lbs. Per 1000 sq feet of bed or strip in early fall.
- Re-test soil in January. Make additional application of sulfur if needed.
- pH may generally change downward .2-.3 point per sulfur application.
- Organic materials added will also affect decrease in pH.
Rabbiteye vs. Northern Highbush

• Rabbiteye
  – Higher yields/plant
  – More aggressive plants
  – More adaptable to varying soil types
  – More heat and drought tolerant
    • Less transpiration
    • Deeper rooted

• Northern Highbush
  – More winter hardy
  – Less prone to frost damage
    • Later blooming
  – Ripens earlier
  – More concentrated harvest season
  – Better yield efficiency
    • More fruit/volume of plant
Varieties*

- **Rabbiteye**
  - Climax*
  - Premeir
  - Garden Blue*
  - Bluebelle*
  - Briteblue*
  - Tifblue*
  - Powderblue
  - Southland

- **Highbush**
  - Blueray*
  - Bluecrop*
  - Berkley*
  - Duke*
  - Jersey*
  - Herbert*
  - * Recommended Varieties

*Consider Early/Mid/Late Season varieties when selecting.
### Possible New Highbush Varieties

- Bluegold (N)
- Bluejay (N)
- Briggitta (?)
- Echota* (S)
- Nelson* (N)
- Ornablue (?)
- O’Neal (S)
- Ozarkblue (S)
- Patriot (N)
- Reka (N)
- Sierra* (N)
- Spartan (N)
- Sunrise (N)
- Toro* (N)

* Promising Varieties
Planting

• Till in composted sawdust, leaf compost, or bark mulches along with pH adjustments into planting strips before actual planting time (preferably in the fall).

• Plant in spring as soon as soil can be worked.

• Mix additional Canadian peat moss to the existing soil in each hole (water holding capacity).

• Water immediately after planting.
Plant Spacing

- 5 ft. between plants (Northern HB)
- 6 ft. between plants (Rabbiteye)
- 10 ft. between rows
- 50-60 sq ft per plant
Fertilization

- Non-bearing plants (Year 1-3)
  - 1.5, 2.5, 3.0 oz. per plant of Ammonium sulfate (21-0-0-24) at bloom time
  - 1.5, 2.5, 3.0 oz. Amm. Sulfate per plant six weeks later.

- Bearing plants (Year 4-6)
  - 4.0, 5.0, 5.5 oz. Per plant of Ammonium sulfate at bloom time
  - 4.0, 5.0, 5.5 oz. Per plant six weeks later.

*Do not feed blueberries during dormant season. If pH is above 4.5, use Ammonium sulfate. If pH is below 4.5, use Urea at half the above rates.*
Pollination

- **Rabbiteye**
  - Many varieties will not self-pollinate
  - Plant 2 or more varieties that overlap bloom periods
  - However, there have been successful plantings of ‘Tifblue’

- **Highbush**
  - Mixed feelings about cross-pollination
  - Generally not required
  - Some researchers suggest a yield increase from cross-pollination
Pollination

- Highbush blueberries are moderately to highly self-fertile, however most will benefit from cross pollination.
- Consider interplanting varieties to assure good pollination.
- Abundant insect pollinators are needed to achieve optimal pollination.
- Pollinating insects have a tendency to work in early day so remember to do any spraying later when bees are less active.
Soil Amendments vs. Mulching

- Hardwood or Pine Bark Mulch
- Rotted/decomposed sawdust
- Chopped corncobs
- Combinations of these
- Chipped materials- No ??

Apply to a depth of 3-4 inches and replenish whenever necessary.

Avoid uncomposted materials such as leaves and grass clippings.
Irrigation

• Blueberry plants require 1 inch of water per week.

• Trickle irrigation both conserves moisture and supplies the plant with adequate water while avoiding an increase in foliar disease.

• Mulches help to keep even moisture on growing plants and consistent root temperatures.
Disease Control

- Practice good sanitation
- Remove old fruit from previous years (mummies)
- Rake and remove all trimmings, twigs and leaves
- Mow grass strips between rows
- Soil treatments include Subdue for root diseases
- Home sprays include dormant oils, lime sulfur, and Captan
- Consult your Pest Management Guide
Insect Control

- Maintain healthy plants with good cultural practices— proper nutrition, clean mulches
- Properly identify the pest before attempting to control
- Dormant oils, Sevin, Malathion,
- Consult your Pest Management Guide
Weed Control

- Till and clean strips when planting.
- Treat with pre-emergence herbicide (Surflan or others)
- Mulch with organic mulch such as composted sawdust or hardwood bark mulch.
- Since roots are shallow, use minimal mechanical weeding.
- Spot spray young weeds with Roundup **absolutely avoiding** new shoots of blueberry plant.
- Emerged grasses controlled with Poast.

(Always read label when applying weed control materials.)
Pruning
Pruning
Harvesting

• A mature blueberry plant will produce 6 to 10 pounds (7 to 10 pints) of fruit per year.
• Berries turn blue 3 to 4 days before attaining maximum sweetness and flavor.
• Pick every 7 to 10 days.
• Reddish tinge berries should be avoided as they are not yet ripe.
• Pick in the morning after dew has evaporated and berries are dry.
• Berries picked in the afternoon must be cooled to reduce field heat.
• Store berries in 32 deg. and dry. Moisture causes fungal diseases during storage.
Blueberry Storage and Marketing

• Storage
  – Refrigerate berries as quickly as possible
  – Shelf Life @ 85% RH
    • 2 weeks @ 32°F
    • 1 weeks @ 40°F
    • 2 days @ 72°F

• Marketing
  – Direct
    • Pick-Your-Own
    • On-Farm Sales
    • Satellite Sales
  – Wholesale
    • Why?
    • We haven’t met the direct demand.
CONTRIBUTION TO DIET
Almost all brambles are processed; perhaps 10% of the crop is sold fresh. Among the products using bramble fruit:

<table>
<thead>
<tr>
<th>Product</th>
<th>Percentage of crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preserves, jam, jelly</td>
<td>40</td>
</tr>
<tr>
<td>Bakery products</td>
<td>25</td>
</tr>
<tr>
<td>Individually quick-frozen berries</td>
<td>18</td>
</tr>
<tr>
<td>Juices, extracts</td>
<td>7</td>
</tr>
<tr>
<td>Ice cream, yogurt</td>
<td>5</td>
</tr>
<tr>
<td>Canned berries</td>
<td>5</td>
</tr>
</tbody>
</table>
Brambles
Blackberries & Raspberries

• Bramble Biology
  – Biennial Shoots
    • Live for 2 years and die
  – Perennial Roots
    • Suckers develop from crown and root tissue
  – Shallow Rooted
    • 90% in the upper 20”
  – Fruiting Types
    • Primocane/ fall bearing
      – Flower/fruit on current year’s growth
      – Managed as an annual
    • Floricane/summer fruiting
      – Flowers fruit on one year old canes
Raspberries

• Raspberry Physiology
  – Adapted to cool climates
    • Cool summers with mild winters
  – Photosynthetic Maximum around 70°F (red raspberry)
    • Photosynthesis severely reduced above 85°F
  – Floricane/summer fruiting cvs are marginal for most of VA
  – Primocane/fall fruiting cvs may have more widespread potential
  – Dramatically different than blackberry
    • Thrives in the S.E.
Brambles
Blackberries and Raspberries

• General Culture
  – Primocane fruiting
    • Temporary trellising needed for some cultivars
    • Harvested late summer through to 1st frost
    • Mowed close to ground late winter
  – Floricane fruiting
    • Trellising required
    • Early to mid summer season
    • Pruning (late winter)
      – Spent floricanes removed
      – Stands thinned (4-5 canes/ft or row)
Raspberries

- Red,
  - Floricane, ‘Latham’
  - Primocane, ‘Caroline’
- Gold or Yellow, ‘Anne’
  - Primocane only
- Black, ‘Jewel’
  - Prolific growth (need to tip during summer)
  - Most winter tender
- Purple, ‘Royalty’
  - Hybrid crosses of red and black
  - Manage as you would red or black

Spacing
Red and Gold= 24 inches
Black= 30 inches
Purple= 36 inches
Raspberries

• General Culture Points
  – Use virus tested, tissue cultured plants
  – Wait until after danger of frost before planting
  – Potassium applied in the fall before planting.
  – Nitrogen (Calcium nitrate) incorporated just before planting—not into root system area.
  – Burning young roots is very easy.
  – Good straw mulch the first year, then you may use a bark mulch after.
  – Establish good sod in row middles to discourage weeds that carry diseases to raspberry.
Raspberry Trellis System

Floricanes (second year) lean outward while new primocanes may grow up through the middle of the trellis.
Blackberries

Recommended Cultivars:

Chester

‘Navajo’

‘Apache’

‘Triple Crown’

New-

(Prime Jim and Prime Jan still need further evaluation in our area- tend to break when picked.)

Spacing

Thorny types= 48 inches

Thornless types= 6-8 feet in rows.
Blackberry Trellis Systems

Works well for upright, erect types.
Blackberry Trellis Systems

Shift trellis (Thornless Blackberry)
Blackberries
Blackberries and Raspberries

- Harvest & Post Harvest - Maintaining fruit quality
  - Good air drainage
  - Pest and Pathogen Control - maintain good fungicide schedules
  - Harvest in early morning
  - Remove field heat quickly
  - Handle berries gently
  - Use small containers (berry weight)
  - Cover to minimize moisture loss
  - Store at 31-32 degrees
Small Fruit Production

• Sources of Plants
  – Barbara Jones, Jones Farms, Bailey NC (Certified virus indexed blackberry plants) email jonesfarmsnc@aol.com
  – Finch Blueberries, Bailey NC, www.danfinch.com/berrys
  – A.G. Ammon Nursery, Chatsworth, NJ, Phone: 609-726-1370
Questions?

Wythe Morris
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Sources of Information:
The Mid-Atlantic Berry Guide for Commercial Growers
Penn State University

Additional Materials Provided by
Dr. Allen Straw, Dr. Jeremy Pattison
Vegetable & Small Fruit Specialists
Virginia Cooperative Extension
& North Carolina State University