Growing Highbush Blueberries
Highbush Blueberry Plants

- *Vaccinium corymbosum*
- One of 3 types harvested
- Same family as rhododendrons
  - grow in acid, peat soils
  - don’t like heavy, clay soil
- Deciduous
- Long-lived (50+ years)
- Shallow, fibrous roots
- Woody canes
- Fruit on one-year-old shoots
Blueberry Plants

Roots

· Shallow, near surface
· Extend to drip line of leaves
· Fine, fibrous, no root hairs
  · Can’t penetrate heavy soils
  · Low absorptive capacity
· Endomycorrhizal fungi
  · Infect roots
· Aid in water and nutrient uptake
· Less active in fertilized, mineral soils
Blueberry Plants

Canes
- 6 to 8 feet tall at maturity
- Develop from crown in spring
  - None to many each year
  - Depending on variety
- Very vigorous; 3’ in 1st flush
  - 2nd flush often follows
  - Often injured by cold
  - May form flowers on tip buds
Blueberry Plants

Shoot Growth

· Shoots grow in flushes during summer
  · Followed by bud abortion
  · New bud starts another flush
· Fruit buds form on 1 year shoots
  · Swollen rounded buds
  · From small vegetative buds
  · 5-8 buds per shoot
  · 5-10 flowers per bud
Blueberry Plants

Buds

- Fruit buds form in fall on 1 year shoots
  - Swollen rounded buds
  - From small vegetative buds
    - 5-8 buds per shoot
    - 5-10 flowers per bud
  - Buds dormant through winter
- Chilling requirement
  - 600-1,000 hours below 45°
  - Risk of thaw - break dormancy
Blueberry Plants

Flowers

- Buds open from the shoot tips downward
  - 5-12 flowers/bud
- Bloom lasts 7-14 days
  - Early flowering = longer period
- Flower Structure - inverted
  - Long, fused corolla, narrow opening
  - Encourages cross-pollination
- Insect pollination
- Stigma viable 3-6 days
Blueberry Plants

Fruit

- Many seeded berry
  - Clusters of 5-12
- Matures 8-12 weeks after bloom

Ripening

- Blue color develops
- Size can increase 35% after coloring
- Sugar increases after coloring
- Shelf life decreases
Blueberry Varieties

Select only very hardy types

- Avoid very early varieties
  - Frost, poor fruit quality & hardiness
    - e.g. Bluetta, Earliblue
- Avoid very late varieties
  - Frost, hardiness
    - e.g. Lateblue, Coville
# Blueberry Varieties

## Northern New England “Standards”

<table>
<thead>
<tr>
<th>Variety</th>
<th>Ripening</th>
<th>Description</th>
<th>Hardy/Res.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patriot</td>
<td>Early</td>
<td>Large, high quality fruit</td>
<td>V. Hardy</td>
</tr>
<tr>
<td>Northland</td>
<td>Early-mid</td>
<td>Small, dark, good quality</td>
<td>V. Hardy</td>
</tr>
<tr>
<td>Blueray</td>
<td>Mid-early</td>
<td>Large, high quality fruit</td>
<td>Hardy</td>
</tr>
<tr>
<td>Bluecrop</td>
<td>Midseason</td>
<td>Large fruit, attractive</td>
<td>Hardy, MB Res.</td>
</tr>
<tr>
<td>Nelson</td>
<td>Mid-late</td>
<td>Large, good quality fruit</td>
<td>V. Hardy</td>
</tr>
<tr>
<td>Jersey</td>
<td>Late-mid</td>
<td>Med-small, good quality</td>
<td>Hardy, MB Res.</td>
</tr>
</tbody>
</table>
## Blueberry Varieties

### Other Varieties of Note

<table>
<thead>
<tr>
<th>Variety</th>
<th>Season</th>
<th>Fruit Characteristics</th>
<th>Hardiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duke</td>
<td>Early</td>
<td>Med.-fruit, Fair quality</td>
<td>Hardy, frost tol.</td>
</tr>
<tr>
<td>Toro</td>
<td>Midseason</td>
<td>Large, high quality fruit</td>
<td>Hardy</td>
</tr>
<tr>
<td>Herbert</td>
<td>Midseason</td>
<td>Large, soft good quality</td>
<td>Hardy, variable</td>
</tr>
<tr>
<td>Draper</td>
<td>Midseason</td>
<td>Large, good quality</td>
<td>Hardy?</td>
</tr>
<tr>
<td>Elizabeth</td>
<td>Mid-late</td>
<td>Large, good quality</td>
<td>Hardy, variable</td>
</tr>
<tr>
<td>Blue Gold</td>
<td>Mid-late</td>
<td>Med., good quality fruit</td>
<td>Hardy</td>
</tr>
</tbody>
</table>
Half-High Blueberries

*Highbush x Lowbush crosses*
- Short stature for better winter survival

- St. Cloud (48”): best commercial potential
- Northblue (30”): home garden quality
- Friendship (24”): Good fruit quality
- North Country (24”): good ornamental
Blueberry Plants

- What to order
  - Dormant 1-2 year old plants
    - 12-18” tall
  - Rooted cuttings
    - Less costly, high mortality
    - 3+ years (24”+)
    - Expensive
- How many?
  - 650-800 plants per acre
  - $2-5/plant
Planting Blueberries

- Early spring
- Incorporate fertilizer pre-plant
  - according to soil test results
  - pH corrected previous year
- Dig large planting holes
  - Wide, not too deep
- Spread roots
Planting Blueberries

- Backfill
  - 1:1 soil:organic matter
  - compost, peat, etc.
  - no fertilizer
- Same depth as in nursery
- Firm soil around plant base
  - Slight depression
  - Catch, hold water
- Water in thoroughly
- Prune? - very lightly, if at all
Blueberry Planting

Spacing

· 4 - 6’ w/in rows
· 2 - 4’ for half-highs
· 8 - 12’ between rows
· 650-800 plants/acre
Blueberry Establishment

First Season Care

· Remove flower clusters
  · Rub off as they appear
· Continue through years 2 & 3

Photo: MSU
Blueberry Establishment

First Season Care

- Fertilize? - very lightly
- If at all...
- 2-3 oz. of 6-10% N
Blueberry Establishment

First Season Care

- Clean cultivation
- No competition
Blueberry Establishment

Water
  · Trickle or drip
    · Conserves water
    · Simple, inexpensive
    · Requires clean water
  · Filters
  · Overhead
    · Expensive
    · Requires volume
    · Labor intensive
  · Frost control
  · Encourages disease
Blueberry Establishment

Mulch

- within rows, 4-8” deep
- wood chips
- Shavings, sawdust
- Porosity issues
- Bark
- No landscape fabric
Blueberry Establishment

- Establish ground cover
  - Fall of planting year
  - Spring of 2nd year
- Between rows
- Weak perennial grass
  - hard fescue,
  - creeping red fescue
  - Bluegrass
- No conservation mix, etc.
Fertilizing Blueberries

· Maintain soil pH at 4-5-5.2
  · May require maintenance applications of ground sulfur
    · Avoid aluminum sulfate
  · Avoid very low pH (less than 4.2)
    · May require application of lime
Fertilizing Blueberries

**Nitrogen:** high demand

- 100-120 lbs./acre
- Ammonium form (NH₄) preferred
  - Nitrate (NO₃) acceptable
- Apply in split applications

**Sources:**

- Organic matter
- Ammonium sulfate (21% N)
- Urea (46% N)
- MAP (11%), DAP (17%)
- Acid blends, e.g. Miracid (30-10-10),
Fertilizing Blueberries

**Phosphorus:** low demand
- 0-30 lbs./acre
- ↑P can lead to ↓Fe

**Sources**
- Compost, manures
- Superphosphate
- Blends

Photo: MSU
Fertilizing Blueberries

Potassium: med. demand
- Provided by decaying mulches
- Sul-Po-Mag

Photo: MSU
Fertilizing Blueberries

• Iron deficiency:
  • Usually caused by high pH
  • Add sulfur to lower pH
  • Spray iron chelate or FeSO₄

• Magnesium deficiency:
  • Less available in acid soils
  • Correct with MgSO₄
  • Spray or soil apply
Fertilizing Blueberries

- Frontload slowly soluble fertilizers (pre-plant)
  - Use soil test + supplement analysis to find rates
  - Compost, meals, etc.
- Apply fertilizer at bud break
  - 1 - 2 year old plants
    - Sidedress once after 6 weeks
  - 3 years and beyond
    - Sidedress twice at 6 week intervals
      - ~35-40 lbs. N/acre per application
      - ~0.75 oz./plant
- Apply in a ring 15” from base of plants
Pruning Blueberries

Years 1 to 3:
Remove broken branches & weak growth
Remove most flowers

Years 4 and on:
Prune to 6 to 12 canes, 1 -6 years old
Thin out weak fruiting shoots
Pruning Blueberries

Step 1.

Remove 1 to 4 of the oldest canes (over 6 years old)

Thin new canes, leaving 1 to 4 of the most vigorous to replace the old canes
Pruning Blueberries

Step 2.

- Remove weak one year shoots - thin, less than 6” long, few buds
- Remove winter injured shoots - chocolate brown color
Pruning Blueberries

Strong shoot
Weak shoot
Cane

Flower bud
Vegetative (shoot) bud
Pruning Blueberries

Before

After
Pruning Blueberries

Renovating neglected bushes

- Cut all canes to the ground
  = 3-4 years to re-establish
- Remove 1/4 - 1/3 of oldest canes every year for 3-4 years
  = no loss of production
Harvesting Blueberries

- Starts late July to mid August, may go until frost in fall
- Harvest when fruit has been *completely* blue for 1 to 3 days
- Harvest fruit when cool and dry, refrigerate immediately
Handling Blueberry Fruit

- Harvest hand or mechanical
- Pick fruit cool & dry
- Use shallow containers
- Cool immediately
- Store fresh fruit at 32°F
Marketing Blueberries

· Pick-Your-Own
  · Timing, labor and price issues
· Pre-Picked
  · Labor, labor and labor issues
· Retail
  · Demand?; price resistance?
· Wholesale
  · Demand?
· Storage & transportation
Blueberries: Bottom Line

- Establishment Costs (years 1-2)
  - $4000 - $6000
  - Prep, plants, irrigation, labor, etc.

- Maintenance Costs (years 4+)
  - $6000 - $7000
  - mostly labor

- Net returns (above costs)
  - $2000 - $6000

- Dependent upon:
  - Yield (4,000-8,000 lbs./acre)
  - Price ($1.00 - $2.00/lb.)
Blueberry Problems

**Birds**

- **Netting (best method)**
  - Apply over structure
  - Anchor edges

- **Deterrents**
  - Scare-eyes, owls, etc.
  - Set up as fruit ripens
  - Move 2 to 3 times daily
  - Take down after harvest
Blueberry Problems

Insect: *Blueberry Maggot*

*Adult:* Fruit fly, lays eggs in fruit during ripening

*Larvae:* Maggot, feeds inside fruit, causing shriveling

Traps: Sticky yellow boards or red spheres, one per bush

Insecticides: apply just prior to start of ripening
  - Aza-Direct, Pyrethrum
Blueberry Problems

Fungi: *Mummy Berry*
Overwinters in mummified fruit

“Mushrooms” form in spring, shoot spores onto shoots

Shoot Blight Phase

White ooze = spores, infect flowers, leading to fruit rot, “mummies”
Blueberry Problems

**Fungi: Mummy Berry**

- Remove mummies as they appear
- Rake up mummies from ground in fall or spring, or cultivate then into the soil at bud break
- Apply mulch early spring ~2” deep to bury mummies
- Fungicides?
Blueberry Problems

**Fungi: Witches Broom**

- Alternate host = *Balsam Fir*
- Can’t spread from blueberry to blueberry
- Spores travel great distance
- Remove entire canes that have brooms
- If brooms come from base of plant (no new canes), remove plant.