GROWING BERRIES in Vermont

Vern Grubinger
April 2014
tonight’s outline

• introduction
• soil / site preparation
• strawberries
• blueberries
• raspberries
• ‘other’
• SWD

We’ll take breaks for you to collect questions
I work primarily with commercial farmers

Norma Norris Berry Farm, Monkton
Adam’s Berry Farm, Burlington
Paul Mazza’s Fruits and Vegetables, Essex
Cherry Hill Farm, Springfield
some data on Vermont berries

- ~350 farms with $8 million sales (2007)
- Strawberries: 5,000 lb/A* $2.75/lb
- Blueberries: 3,000 lb/A $3/lb
- Raspberries: 1,300 lb/A $5.50/lb

Increases expected for 2012 Census data!
* 3x these yields are possible
I’m also a home fruit grower
cover crop trials at my office
UVM Extension youth agriculture project
‘small fruits’
Pre-Plant Preparation

• Turn under sod / clear area of growth

• Soil test, add amendments, organic matter

• Cover crop for a year if possible

• Repeat soil test, fertilize before planting
Soil Health is Key to Success
Three Aspects of Soil Health

Chemical

Biological

Physical

Soil Health
Soil test = chemical / nutrient status

SOIL TEST RESULTS

<table>
<thead>
<tr>
<th></th>
<th>LOW</th>
<th>MEDIUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (salt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available Phosphate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(lb P2O5/A)</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Potash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(lb K2O/A)</td>
<td>420</td>
<td></td>
</tr>
<tr>
<td>Magnesium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(lb Mg/A)</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td>Reserve Phosphate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(lb P2O5)/A)</td>
<td>748</td>
<td></td>
</tr>
<tr>
<td>Aluminum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(lb Al/A)</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(lb Ca/A)</td>
<td>1600</td>
<td></td>
</tr>
<tr>
<td>Effective CEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(meq/100g)</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>Zinc (medium)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ppm Zn)</td>
<td>0.6</td>
<td></td>
</tr>
</tbody>
</table>

LIME AND FERTILIZER RECOMMENDATIONS

Alfalfa or alfalfa with grass, Seeding down
Dairy or beef manure at 5 tons per acre

<table>
<thead>
<tr>
<th></th>
<th>LIME TONS/acre</th>
<th>NITROGEN (N)</th>
<th>PHOSPHATE (P2O5)</th>
<th>POTASH (K2O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIME &amp; NUTRIENTS NEEDED</td>
<td>3.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CONTRIBUTION FROM MANURE</td>
<td>24</td>
<td>13</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>BALANCE NEEDED FROM FERTILIZER</td>
<td>3.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Rate of lime recommended is to raise soil pH to 6.5
Broadcast lime before or during seedbed preparation and hay or
H.
many soil options for adding nutrients
Leaf analysis is best for perennial fruit nutrient management.

Table 27. Critical nutrient values for blueberry tissue analysis.

<table>
<thead>
<tr>
<th>Element</th>
<th>Deficient</th>
<th>Below Normal</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>1.65</td>
<td>1.70</td>
<td>1.90</td>
</tr>
<tr>
<td>P (%)</td>
<td>0.05</td>
<td>0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>K (%)</td>
<td>0.35</td>
<td>0.40</td>
<td>0.55</td>
</tr>
<tr>
<td>Ca (%)</td>
<td>0.35</td>
<td>0.40</td>
<td>0.60</td>
</tr>
<tr>
<td>Mg (%)</td>
<td>0.18</td>
<td>0.20</td>
<td>0.25</td>
</tr>
<tr>
<td>Mn (ppm)</td>
<td>45</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>Fe (ppm)</td>
<td>65</td>
<td>70</td>
<td>200</td>
</tr>
<tr>
<td>Cu (ppm)</td>
<td>4</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>B (ppm)</td>
<td>29</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Zn (ppm)</td>
<td>14</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

Source: PennState University
soil physical health - soil structure
soil physical health: compaction, drainage
raised beds, subsoiling, cover crops...
carbon feeds the biology and helps improve
soil physical condition: mature compost
aged manure: not quite compost
fresh manure: more available nutrients, weeds
cover crops: oats - October
winter rye - April
Small Fruit Success Depends On

• a location that receives ‘full’ sunlight
• well-drained soil at least ~12 inches deep
• plants adapted to the location = winter hardy
• managing diseases, insects, weeds, wildlife
• providing adequate nutrition, water, pruning
• ability to do what’s required in a timely manner
<table>
<thead>
<tr>
<th>Fruit</th>
<th>Years to Bearing</th>
<th>Lb of Fruit per Plant</th>
<th>Harvest Period</th>
<th>Cultural Demands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackberry</td>
<td>2</td>
<td>2-3</td>
<td>late July - Aug.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Blueberry</td>
<td>3-6</td>
<td>3-10</td>
<td>late July - Sept.</td>
<td>Low</td>
</tr>
<tr>
<td>Currant</td>
<td>2-4</td>
<td>6-8</td>
<td>July</td>
<td>Low</td>
</tr>
<tr>
<td>Elderberry</td>
<td>2-4</td>
<td>4-8</td>
<td>Aug. - Sept.</td>
<td>Low</td>
</tr>
<tr>
<td>Gooseberry</td>
<td>2-4</td>
<td>2-4</td>
<td>July - Aug.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Raspberry</td>
<td>2</td>
<td>1-2</td>
<td>July or Sept.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Strawberry (June)</td>
<td>2</td>
<td>1-3</td>
<td>June – early July</td>
<td>Moderate</td>
</tr>
<tr>
<td>Strawberry (DN)</td>
<td>1</td>
<td>1</td>
<td>June - Oct.</td>
<td>High</td>
</tr>
<tr>
<td>Grapes (Amer.)</td>
<td>3</td>
<td>20</td>
<td>early Sept. - Oct.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Grapes (Vinifera)</td>
<td>3</td>
<td>10</td>
<td>early Sept. - Oct.</td>
<td>High</td>
</tr>
</tbody>
</table>

http://www.gardening.cornell.edu/fruit/homefruit/2beforeyoubegin.pdf
Why Plants May Fail to Fruit

late spring frost

winter injury

cold or rainy weather during bloom

inadequate pollination

disease, insect damage to buds

poor plant nutrition

lack of cross-pollination if needed
Strawberries
Strawberry basics

• High maintenance & risk, but high reward

• Fruit year after planting (June-bearers)

• Tend to decline thereafter = replant often

• Require ‘renovation’ to keep productive

• May be affected by many insects and diseases
Planting Strawberries

- Set plants at ‘root line’, 1-2 ft. apart, in 4 ft. rows
- Remove flowers first year, keep weeded, watered
- Let runners fill out 16-24” wide, mulch between rows
- Mulch plants with 6” of straw around Thanksgiving
- Harvest fruit next summer
- Renovate promptly after harvest, or turn under
renovating strawberries
strawberry renovation

• mow off old leaves – above crowns
• spread 1 inch of soil on plants
• narrow the rows back to 12-18 inches
• hand weed in the rows
• apply N fertilizer (1 lb N/1,000 sq. ft,)
• irrigate throughout summer
• mulch for the winter
Remove old leaves

Apply layer soil/compost
Some strawberry varieties for VT

- Earliglow
- Annapolis
- Cavendish
- Cabot
- Mesabi
- Jewel
- Sparkle

See: [www.noursefarms.com](http://www.noursefarms.com) “comparison chart”
small fruit variety traits

• harvest period (early, mid, late season)
• flavor
• berry size
• disease resistance
• yield
• firmness
• suitability for freezing
common strawberry pests

- TPB
- spider mites
- slugs
- spittle bug
- fruit rots
- root rots
- leaf spots
- birds, deer, etc.
frost damage
winter injury
root rot complex
Tarnished Plant Bug damage
‘scouting’
cyclamen mites
Questions?
blueberry basics

- **must** have acid soil with pH 4.5 – 5.2
- long-term crop, take time to prepare site
- mulching and pruning are required
- birds, winter injury may be a problem
- mummy berry, SWD are concerns
planting blueberries

• test soil a year in advance – pH!
• add nutrients, organic matter, sulfur?
• till wide rows spaced 8-14 ft. apart
• set plants 6 - 8 ft. apart in the row
• mulch around the plants
• irrigate during dry periods
iron deficiency = high pH
color dye test kits
Sulfur rate depends on pH and soil texture: It’s a lot easier to add before planting!
wood is the best mulch – any type if aged a little
drip irrigation is a plus for all fruits
the plants start small, live a long time
Perennial grasses (ryegrass and fescues) are good for walkways. Sow in September, if possible. Keep mowed
Annual pruning is critical!
Here canes are mostly one age
blueberries fruit on second year growth
pruning blueberries

• prune yearly; ideally leave 2-3 new canes

• early years: want few strong upright canes

• always remove dead, diseased canes

• cut off low or spindly growth

• remove oldest canes after 6-8 years
Blueberry varieties for VT

- Bluecrop
- Blueray
- Patriot
- Nelson
- Jersey
- Northland*
- Spartan*
common blueberry pests

• birds
• mummyberry disease
• cane blights
• fruit rots
• fruit worms
• witches broom
• SWD
Bird netting pays back fast
Diseases must be prevented not cured
mummy berry twig blight
mummy berry ‘mushrooms’
blueberry ‘fruit worm’ trap
Questions?
raspberries
raspberry basics

• highly perishable, highly desirable fruit

• summer or fall-bearing types

• individual canes fruit once then die

• plantings decline in 5-10 years due to virus

• summer red raspberries most suited to VT
planting raspberries

- soil test and amend with nutrients, OM
- set plants 1 inch deeper than in nursery
- space rows 8+ ft. apart, plants ~2 ft. apart
- mulch edge of rows or cultivate to contain
- remove canes annually; tip back or trellis
- avoid over-fertilizing, especially at planting
pruning summer raspberries

• Remove spent, diseased, weak canes

• Thin to 4 or 5 strongest canes per sq. ft.

• Tip back canes over ~5’ tall or trellis

• Remove canes growing outside the row
common raspberry pests

- Viruses
- Fruit rots – Botrytis
- Cane blights
- Root rots
- Japanese beetles
- Cane borers
- SWD
tissue culture plants
cane blights
Japanese beetles
Japanese beetle management

If use traps: 100 ft. away to pull beetles out of crop

Knock beetles off by hand into soapy tray

Cover crop with insect netting

Apply kaolin clay to crop

Apply entomopathogenic nematodes to soil
bird deterrents may be needed
### red raspberry varieties for VT

<table>
<thead>
<tr>
<th>Summer:</th>
<th>Fall:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boyne</td>
<td>August Red</td>
</tr>
<tr>
<td>Killarney</td>
<td>Autumn Bliss</td>
</tr>
<tr>
<td>Newburgh</td>
<td>Polana</td>
</tr>
<tr>
<td>Latham</td>
<td>Caroline</td>
</tr>
<tr>
<td>Prelude</td>
<td></td>
</tr>
<tr>
<td>Encore</td>
<td></td>
</tr>
</tbody>
</table>
Questions?
currants and gooseberries
Spotted Wing Drosophila

Relatively new pest – still spreading?

Attacks firm ripe fruit in late summer and fall

Fruits rot rapidly

All fruits with soft skins are susceptible

Overwinters in cold climates
Spotted Wing Drosophila (*Drosophila suzukii*)

Female

Male

Spots

Ovipositor
SWD management

- Harvest all ripe fruit promptly
- Refrigerate all harvested fruit
- Remove all rotten / dropped fruit
- Consider insect netting for exclusion
traps for monitoring SWD
insect netting
Effect of ProTek 80 Netting on SWD Catches in Blueberries
Grubinger's Blueberry Patch, Dummerston VT

SWD caught per 2-cup trap

- out
- in

Date:
- 6/22
- 6/29
- 7/6
- 7/13
- 7/20
- 7/27
- 8/3
- 8/10
- 8/17
- 8/24
Effect of ProTekNet 25 on SWD in Raspberries
Deer Ridge Farm, Guilford VT

[Graph showing the number of SWD caught in 2-cup traps from 7/16 to 9/10, with two lines indicating 'In' and 'Out' conditions.]
Trapping Out: no evidence it works
ProTekNet 80gr has 1 x .85 mm mesh

- 13’ x 328’ = $553
  $5,649/acre @ 7 yrs = $807/acre/yr.

ProTekNet 25gr has .35 x .35 mesh

- 20’ x 820’ = $1,618
  $4,298/acre @ 3 yrs = $1,433/acre/yr.

http://www.duboisag.com/en
currants and gooseberries
currants and gooseberries

- Hardy and easy to grow
- Like cool, moist locations, rich peaty soil
- Some shade OK

- Legal, but may host white pine blister rust
- Black currants pose the most risk
- Many varieties - look for WPBR resistance
currants, gooseberry basics

- Heavy feeders, mix in manure pre-plant
- Fertilize, and mulch annually
- Prune to leave 8 strong canes, from 1-4 yr old
- Keep an eye out for WPBR, PM
- Wait for fruit to turn color before harvesting
white pine blister rust
grapes
grape basics

• Choose hardy, disease resistant varieties

• On a site with full sun and good drainage

• Remove 90% of new growth each year

• Train or trellis vines
grape types

• V. labrusca: Concord, Niagra (American)

• V. vinifera: not very hardy

• Hybrids: intermediate hardiness

• Table grapes: seedless/seeded
“New” Cold-Hardy Wine Grape Cultivars

St. Croix

Frontenac

La Crescent