Vegetable Gardening and Season Extension

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www.uvm.edu/vtvegandberry
Overview

- Introduction

- **Soil Health**: fertilizers, cover crops, compost

- **Pest Management**: insects, diseases, weeds

- **Season Extension**: transplants, mulch, covers

- Resources
my gardens: intensive vs. extensive
working with what I have
at the office: youth agriculture project
...and cover crop demonstrations
in the field: commercial growers
soil health is a key to success
Three Aspects of Soil Health

Chemical

Biological

Physical

Soil Health
**Standard soil tests measure ‘chemical health’**

### SOIL TEST RESULTS

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (salt)</td>
<td>5.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available Phosphate (lb P2O5/A)</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potash (lb K2O/A)</td>
<td>420</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnesium (lb Mg/A)</td>
<td>159</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserve Phosphate (lb P2O5/A)</td>
<td>748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum (lb Al/A)</td>
<td>83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium (lb Ca/A)</td>
<td>1600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective CEC (meq/100g)</td>
<td>5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc (medium) (ppm Zn)</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LIME & NUTRIENTS NEEDED:

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Tons/Acre</th>
<th>Nitrogen (N)</th>
<th>Phosphate (P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;)</th>
<th>Potash (K&lt;sub&gt;2&lt;/sub&gt;O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime</td>
<td>3.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Contribution from Manure</td>
<td>3.0</td>
<td>24</td>
<td>13</td>
<td>44</td>
</tr>
<tr>
<td>Balance needed from fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Rate of lime recommended is to raise soil pH to 6.5.*

*Broadcast lime before or during seedbed preparation and harrow in.*

*High magnesium lime may be the most economical source for your magnesium.*
Soil biology is important but mostly invisible
Soil physical condition is important
permanent beds – on compact or thin soils
many benefits and many sources of OM: manure, compost, cover crops, residues
organic matter: living, dead, or very dead

fuel for soil microbes and their benefits
compost – if a little is good, is a lot better?
Cover crops make sense in the garden, too. Winter rye is reliable but can be hard to kill.
Oats are easy; sow Aug - Sept
buckwheat is a good summer cover crop
grow legume cover crops for Nitrogen
Canada field pea – spring crop
not enough nitrogen (N)
not enough phosphorus (P)
not enough potassium (K)
not enough magnesium
Common Organic Fertilizers

- **N**: dried blood, Chilean nitrate*, seed meals (alfalfa, soy, peanut)
- **P**: rock phos., bone meal, bone char
- **K**: potassium sulfate, sul-po-mag, greensand, wood ash
- **Ca**: lime, gypsum
- **Mg**: lime, sul-po-mag, epsom salts
- **Blends**: pelletized poultry manure, etc.
- **Micros**: borax, chelates, sulfates
Compost ~ 1-1-1 (plus micros)
50# bag has 2 lb N, 1.5 lb P & K
soy meal  7-1-2
Dried Blood
12-0-0

no P or K
NITRATE OF SODA
For Greener Growth
16-0-0
NET WT. 5 LBS.
Conventional N fertilizers

- Ammonium nitrate 33-0-0
- Urea 45-0-0
- Ammonium sulfate 21-0-0
‘Sul-Po-Mag’
0-0-22 + 11% Mg

• mined mineral, source of K and Mg

• If no Mg is needed, use potassium sulfate

• epsom salts for Mg if K, lime not needed
soil health questions?

See: Managing Garden Soil Fertility on UVM Ag Testing Lab home page
pest management

• insects
• diseases
• weeds
• wildlife
IPM

- Prevention (based on lifecycle)
- Monitor / scout for pest
- Apply least toxic control (or not…)
pest prevention

• crop rotation

• sanitation / exclusion

• cultural practices

• tolerant / resistant crops or varieties
crop rotation by families primarily
garden rotation – over time, not just space
from perennial to annual crops; from some families of crops to others
plus cover crops in strips over winter
prompt clean-up shortens rotation cycle
pest-specific scouting and monitoring
PLH ‘hopperburn’
crucifer flea beetle
green peach aphids
purchased beneficial insects
beneficial insects are abundant
insect control strategies

• exclude with a barrier

• trap with lure or crop

• confuse

• deter / kill (insecticide)
row covers
flea beetle, etc.
straw mulch for potato beetle
kaolin clay for cuke beetle
‘zea-later’ (Johnny’s) for corn ear worm
Take a break
Weeds: perennials (quackgrass)
Weeds: annuals
(hairy galinsoga)
weed control strategies

• suppress with a barrier

• hoe or cultivate

• deny resources

• kill with flame or herbicide
mulches affect weeds, temperature moisture
drip irrigation has many advantages
even old time tools have been improved
diseases
sun scald (abiotic disease)
blossom end rot
viruses
root disease
Phytophthora
leaf disease
powdery mildew
post harvest disease
Rhizoctonia
late blight
disease control strategies

• avoid environments that promote

• avoid susceptible hosts

• deter / kill with fungicide / bactericide
mulches minimize soil splash

stake & prune for air movement
raised beds – on heavy soils
remove dead canes & inoculum

promote good air flow
wildlife control strategies

• deterrents/repellents: hair, dogs, soap

• exclusion: fencing, netting

• trapping or killing
problem ID = detective work

- symptoms? holes, spots, wilt, etc.
    (close examination / low magnification)
- distribution on plant and in field
- soil conditions OK?
- environmental event?
- roots healthy?
season extension
why season extension?

• extend ‘frost-free’ growing period

• speed up plant growth

• protect from weather = improve quality
season extension techniques

• greenhouse
• high tunnel
• low tunnel
• cold frame
• row cover
• plastic mulch
• transplants
season extension in a greenhouse
high tunnels
low tunnels
caterpillar tunnels
row covers: promote growth, exclude pests
floating row cover
winter growing
cold frames
‘hot’ frames
many types of plastic mulch
“IRT” mulch: between clear and black
black plastic warms soil by contact
transplants ‘extend’ the season
many other benefits of transplants
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