MARKET GARDENING: A Participatory Primer Course

Part #4: Production Systems and Planning

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Outline

• Short Review of Course Syllabus

• Production Systems Overview & Assessment
  – Agroecosystem Analysis
  – Food crops & information sources
  – Growing requirements
  – Production methods
  – Management factors

• Cropping Diversification & Models
# Market Gardening Course

Class Topics Sequence

- #1: Introduction
- #2: Holistic Management
- #3: Business and Marketing Plans
- #4: Crop Production Systems & Planning
- #5: Equipment and Tools; Post Harvest Handling
- #6: Food & Farm Safety and Regulations
- #7: Farmers’ Markets
- #8: Financial Resources & Management

Today’s Topic
How Can I Produce Food as a Market Gardener?

- Field
- Containers
- Hydroponics
- Greenhouse/Hoophouse
Course Textbook - Review -

Building A Sustainable Business

A Guide To Developing A Business Plan For Farms and Rural Businesses

http://www.sare.org/publications/business.htm
“Building A Sustainable Business”
Holistic Management Process
* Review *

1. Identifying stakeholder values
2. Assess your current situation
3. Vision, mission & goals
4. Strategic value & evaluation
5. Presenting, implementing & monitoring
“A Sustainable Business Plan”

• Task 2 - Assessment Factors
  – Farm history
  – Current markets and sales
  – Operations situation
  – Human resources situation
  – Financial situation
  – Sources of risk
Assessing the Current Situation

• SWOT Analysis - Review

**Strengths** = What the organization does well

**Weaknesses** = What is done poorly

**Opportunities** = External events, that if taken advantage of, could improve the organization

**Threats** = External events, that if not addressed, could harm the organization

• SWOT needs to be an inclusive process
Operations Situation Assessment
- Review -

- All Resources Available to Production Operations & Enterprises
  - Physical
  - Biological
  - Production systems
  - Management
  - Human
“A Sustainable Business Plan”
- Cedar Summit Farm Case Study -

- Dave/Florence Minar, Cedar Summit Farm [http://www.cedarsummit.com/]
- 30 years operation before a business plan
- Objectives
  - Evaluate on-farm milk processing to reduce yearly income volatility
  - Create permanent work for several adult children
- Our class example for purposes of following steps in business plan process from our textbook
Cedar Summit Farm Case Study
Assessment Examples

✓ Bio-Physical resources – p. 40
✓ Production systems – p. 43
  ➢ cropping – p. 43; livestock – p. 44
  ➢ calendar – p. 45

✓ Human resources
  ➢ needs – p. 47; skills – p. 49

✓ Planning strategies
  ✓ production – p. 135 & 144
  ✓ calendar – p. 147
  ✓ human resource – p. 150-51

While not a case study of a market gardening enterprise, reviewing their process is very informative.
Cedar Summit Farm Example - Whole Farm Strategy

* Review *

- The System-wide Connections of the Strategies of the 4 Management Areas
  - Marketing
  - Operations
  - Human resources
  - Finances

- It Considers How Each Strategy Affects Each Other
Full Circle of Tasks & Process – * Review *

- Identify values
- Review current situation
- Draft vision, mission, goals
- Research, develop, and evaluate business strategy
- Implement and monitor business plan
• An additional whole farm planning process (i.e., holistic management) based on the concepts of the Sustainable Agriculture.

• Ecosystem definition
  – a functional system of complementary relations between living organisms and their environment,
  – delimited by arbitrarily chosen boundaries,
  – which in space and time appears to maintain a steady yet dynamic equilibrium.

• Agroecosystem definition
  – human manipulation and alteration of an ecosystem for the purpose of establishing agricultural production
What is sustainable agriculture?

- A farm system that mimics as closely as possible the complexity of a healthy and natural ecosystem.

- Goals include:
  - Providing a more profitable farm income.
  - Promoting environmental stewardship.
  - Promoting stable, prosperous farm families and communities.
Sustainable Agriculture:

- Reduces inputs.
- Uses ecological pest and weed management strategies.
- Cycles nutrients back into the soil for fertility and health.
- Strengthens rural and urban communities.
- Produces viable farm income.
- Promotes healthy family and social values.
- Brings the consumer back into agriculture.
Types of Sustainable Farming

- Organic farming
- Biodynamic
- Permaculture
- Agroecological Systems
- Low-input
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Goal is to find and adopt "integrated and resource-efficient crop and livestock systems that maintain productivity, that are profitable, and that protect the environment and the personal health of farmers and their families," as well as "overcoming the barriers to adoption of more sustainable agricultural systems so these systems can serve as a foundation upon which rural American communities will be revitalized."
The ecosystem model includes functional emergent properties & subsystems (e.g., nutrient cycling, etc).
THE AGROECOSYSTEM CONCEPT

**Figure 2.7**

Functional components of an agroecosystem. In addition to the natural inputs provided by the atmosphere and the sun, an agroecosystem has a whole set of human inputs that come from outside the system. An agroecosystem also has a set of outputs, labeled here as “Consumption and Markets.”
How to Do Agroecosystem Analysis

• Recognition of the whole systems nature of food, feed, & fiber production

• Balancing concerns of
  – environmental soundness
  – social equity
  – economic viability

• Functional interactions between agroecological & social/economic systems

How to Do Agroecosystem Analysis

• Analyze both the immediate and future impacts of agroecosystem design and management so that we can identify the indicators in each system on which to focus the search for alternatives or solutions to problems

• Indicators of agroecosystem sustainability
  – Energy flow
  – Nutrient cycling
  – Population regulation mechanisms
  – Dynamic equilibrium

Crop Production Systems & Planning

✓ Let’s Get Started . . .
# Key Points of Cropping Enterprises

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[http://smallfarms.ifas.ufl.edu/planning_and_management/keypoints.htm](http://smallfarms.ifas.ufl.edu/planning_and_management/keypoints.htm)
So…wadda ya got?
(time to complete your inventory)
And What Do You Want?
Make A Map of Your Property

Show:

- **Buildings**: house, barns, shed, etc.
- **Facilities**: pastures, fences, wells, septic tanks, power lines, sewer lines, etc.
- **Assets**: existing vegetation, pastures, streams, ponds, wetlands, irrigation, defensible space, related features
- **Problems**: easements, weedy areas, etc.
- **What your neighbors are doing**
Well
Trees
Weedy
Bare ground
Marshy
Stream
Water trough
Gate
Fence
Septic
Manure pile

Legend

Acres = 25
Animals = 6 cows, 1 horse, 3 goats
Pastures = 1
Months animals grazed = 9

Soils = sandy clay loam, silt
Grasses present = Tall fescue, orchardgrass, clover, bentgrass
Weeds present = Canada thistle, pigweed

Property Map
Photo documentation

- An excellent way to document and/or assess existing conditions
- Helps you track changes over time
Reasons for Keeping Photo Records

- Provides a low-cost way to track changes
- **Shows value-added features**
- Adds to your personal satisfaction
- **Documents property additions for insurance purposes**
- Aids in the permit application process
Some Photo Hints

• Make sure your photos include dates and descriptions
• Store the photos in a photo album or some other easily accessible organization system
• Use photo reference points
• Establish a schedule for taking photos
Soils & Water Inventory

- Survey
  
  http://websoilsurvey.nrcs.usda.gov/app/

✓ Learn the soil types and properties at your location
What does your watershed look like?
Learn the hydrology, e.g., drainage, at your location
Water Atlas

• http://www.wateratlas.usf.edu/
Market Garden Production System Factors

• **Crop Options**
  – variety and cultivar
  – growing requirements

• **Management Options**
  – field
  – container
  – Greenhouse/hoophouse

• **Diversification**
  – Multiple cropping and/or enterprises
Commercial Crops of Florida

- Types
- Cultivars
- Distribution
## Food Crop Seasonality in Florida

![Image of lettuce at a market](image)

### Four Seasons of FRESHNESS
Florida Produce Availability at a glance

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Food Crops

- A wide variety of food can be grown in south central Florida

- You need to be aware of limitations
  - Varieties
  - Diseases
  - Insects
  - Climate
  - Soil
Vegetable Categories that Can be Grown Successfully in Southcentral Florida

• Temperate
  - Broccoli

• Subtropical
  - Sweet Potato

• Tropical
  - Amaranth
Fruit Categories that Can be Grown Successfully in Southcentral Florida

- **Temperate**
  - Nectarine
  - Muscadine Grape

- **Subtropical**
  - Guava
  - Lychee
  - Mango
  - Sapodilla

- **Tropical**
  - Sapodilla

http://trec.ifas.ufl.edu/fruitscapes/
Herb Categories that Can be Grown Successfully in Southcentral Florida

- **Temperate**
  - Comfrey

- **Subtropical**
  - Sweet Basil

- **Tropical**
  - Chinese Chives
Food Crop Variety Information

✔ EDIS Publications – see http://edis.ifas.ufl.edu/

✔ UF/IFAS Research & Education Centers: Food Crop Trials Reports & Publications – see http://solutionsforyourlife.ufl.edu/map/index.html
• “Vegetarian Newsletter”
  – A Vegetable Crops Extension Publication by UF Horticultural Sciences Department

• “Extension Berry/Vegetable Times”
  – By Gulf Coast Research and Education Center at Balm

• “South Florida Vegetable Pest and Disease Hotline”
  – By Hendry County Extension Office
‘Minor’ Food Crop Variety Information

✓ UF IFAS Manual of Minor Vegetables

✓ ECHO, North Ft. Myers, FL – see http://www.echonet.org/content/SeedBank/1558/seed_listing
Cut Flower Crops for Market Gardening

- Florida was once a major producer (before global imports)!

- Now only grow specialty crops such as:
  - Sunflower
  - Celosia
  - Zinnia
  - Snapdragon
  - Dianthus
  - Assorted Lilies
Crop Variety Seeds

• Seed Company Examples
  – SE USA Region
    • E.O.N.S. (http://www.eonseed.com/)
    • FL Tomato Growers Supply Company (http://www.tomatogrowers.com/)
    • Southern Exposure See Exchange (http://www.southernexposure.com/index.html)
    • E.C.H.O. (http://www.echonet.org/)
  – USA Region
    • Seed Savers Exchange (http://www.seedsavers.org/)
    • Johnny’s Selected Seeds (http://www.johnnyseeds.com/default.aspx)
    • Seeds of Change (http://www.seedsofchange.com/default.aspx)
Edible Mushroom Crops for Market Gardening

- **Oyster Mushroom** (Pleurotus ostreatus)
- **Chanterelle** (Cantharellus cibarius)
- **Shiitake** (Lentinula edodes)
Additional Crops for Market Gardening

Florida's native WILDFLOWERS

http://www.floridawildflowers.com/

Bee College

http://entnemdept.ifas.ufl.edu/honeybee/extension/bee_college.shtml

Honey
Edible Native Plants in Southcentral Florida

Elderberry

Red Mulberry

Plum Flatwoods

American Persimmon
Crop Production Strategy

Develop a Farm Plan to Identify Crops and Production Systems to Meet Seasonal Opportunities for Direct Marketing
Crop Production Seasons

- Spring & Fall – Traditional
- Winter – Surprisingly Good
- Summer – Tough (but very feasible)
Vegetable Crop Production Scheduling

• Experienced vegetable growers plan the harvest period of their crops to avoid unfavorable weather & to take advantage of market windows.

• Many commercial seed catalogs provide days to maturity data as part of variety descriptions. These data are correct for the area where the evaluation occurred, but may be quite misleading for Florida growers due to factors such as:
  – seasonality
  – geography
  – varietal maturity differences

http://edis.ifas.ufl.edu/pdffiles/HS/HS32400.pdf
### Vegetable Crop Production Scheduling Example

**TABLE 1: Crops grown from transplants**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Swiss chard</th>
<th>Parsley</th>
<th>Green onions</th>
<th>Kohlrabi</th>
<th>Head Lettuce</th>
<th>Broccoli</th>
<th>Cauliflower</th>
<th>Pac choi</th>
<th>Collards</th>
<th>Cabbage</th>
<th>Summer squash</th>
<th>Cucumbers</th>
<th>Storage onions</th>
<th>Eggplant</th>
<th>Bell peppers</th>
<th>Tomatoes</th>
<th>Watermelons</th>
<th>Cantaloupes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>successional interval (weeks)</strong></td>
<td>7</td>
<td>7</td>
<td>2-3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>*</td>
<td>3</td>
<td>3-4</td>
<td>4-5</td>
<td>*</td>
<td>8</td>
<td>*</td>
<td>*</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>seed to transplant (weeks)</strong></td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>transplant to harvest (weeks)</strong></td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td><strong>seed-&gt;transplant-&gt;harvest (weeks)</strong></td>
<td>13</td>
<td>18</td>
<td>16</td>
<td>11</td>
<td>10</td>
<td>14</td>
<td>16</td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>12</td>
<td>10</td>
<td>22</td>
<td>15</td>
<td>17</td>
<td>16</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td><strong>direct seed as an alternative (weeks)</strong></td>
<td>10</td>
<td>14</td>
<td>12</td>
<td>9</td>
<td>9</td>
<td>12</td>
<td>14</td>
<td>NR</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>14</td>
</tr>
</tbody>
</table>
### Vegetable Crop Production Scheduling Example

**TABLE 2: Crops grown from direct seeding**

<table>
<thead>
<tr>
<th></th>
<th>Radishes</th>
<th>Spinach</th>
<th>Arugula</th>
<th>Beets</th>
<th>Turnips</th>
<th>Kale</th>
<th>Peas</th>
<th>Mustard greens</th>
<th>Carrots</th>
<th>Sweet corn</th>
<th>Snap beans</th>
<th>Okra</th>
<th>Southern peas</th>
<th>Edamame</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>successional interval (weeks)</strong></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>*</td>
<td>2</td>
<td>*</td>
<td>2</td>
<td>2</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>seed to harvest (weeks)</strong></td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

The numbers above are generalizations for early-medium maturity varieties.

The earliest varieties available may mature sooner. Late maturity varieties are likely to take 2+ weeks longer.

As the season progresses, rate of crop maturation tends to accelerate. This should be considered when timing sucessional plantings!

* = only one planting

NR = not recommended
Profit or Loss equals revenue minus cost of production

- Revenue ($) = [Yield (lbs) $\times$ Price Received ($/lb)]
- Cost of Production ($) = crop budget total (i.e., pre and post harvest expenses)

Following slides show example crop budgets and yields for 100 ft row field production of different vegetables.
Vegetable Crop Budgets Data

• UF/IFAS Resources
  – Large Scale Commodity Data
    • EDIS publications – see http://edis.ifas.ufl.edu/FE436
    • SW FL Research & Education Center (REC) – see http://www.imok.ufl.edu/LIV/groups/economic/budgInks.htm

  – Small Scale Enterprise Data
    • UF/IFAS Small Farms & Alternative Enterprise Program – see http://smallfarms.ifas.ufl.edu/planning_and_management/budgets.html
Example Vegetable Crop Budget (100 ft row)

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity/100 Ft</th>
<th>Price</th>
<th>Value</th>
<th>Your Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cash Expenses, Pre-Harvest:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td>140</td>
<td>0.08</td>
<td>10.78</td>
<td></td>
</tr>
<tr>
<td>Lime, applied</td>
<td>10.000</td>
<td>0.10</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Fertilizer, mixed</td>
<td>0.200</td>
<td>15.00</td>
<td>3.00</td>
<td></td>
</tr>
<tr>
<td>Side-Dress Fertilizer</td>
<td>0.040</td>
<td>15.00</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Plastic Mulch</td>
<td>0.053</td>
<td>120.00</td>
<td>6.36</td>
<td></td>
</tr>
<tr>
<td>Mulch Removal</td>
<td>0.017</td>
<td>75.00</td>
<td>1.28</td>
<td></td>
</tr>
<tr>
<td>Herbicide</td>
<td>0.017</td>
<td>4.70</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Insecticide</td>
<td>0.017</td>
<td>66.34</td>
<td>1.13</td>
<td></td>
</tr>
<tr>
<td>Fungicide</td>
<td>0.119</td>
<td>28.62</td>
<td>3.41</td>
<td></td>
</tr>
<tr>
<td>Tractor + Machinery</td>
<td>0.020</td>
<td>144.15</td>
<td>2.88</td>
<td></td>
</tr>
<tr>
<td>Truck (pickup)</td>
<td>5.000</td>
<td>0.19</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>Labor</td>
<td>0.500</td>
<td>8.50</td>
<td>4.25</td>
<td></td>
</tr>
<tr>
<td>Irrigation</td>
<td>0.017</td>
<td>408.00</td>
<td>6.94</td>
<td></td>
</tr>
<tr>
<td>Land Rent</td>
<td>0.014</td>
<td>200.00</td>
<td>2.80</td>
<td></td>
</tr>
<tr>
<td>Interest on Oper. Cap.</td>
<td>$45.45</td>
<td>0.07</td>
<td>3.18</td>
<td></td>
</tr>
<tr>
<td><strong>Total Pre-Harvest Cash Expenses w Plastic Mulch</strong></td>
<td></td>
<td></td>
<td><strong>48.63</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Pre-Harvest Cash Expenses w/o Plastic Mulch</strong></td>
<td></td>
<td></td>
<td><strong>40.99</strong></td>
<td></td>
</tr>
</tbody>
</table>

Use as a reference point and modify according to your management practices

http://smallfarms.ifas.ufl.edu/planning_and_management/budgets.html
• UF/IFAS Resources
  – Large Scale Commodity Data
    • EDIS publications - see
      http://edis.ifas.ufl.edu/TOPIC_Commercial_Vegetable_Production
  – Small Scale Enterprise Data
    • J. Stephens. 1999. Vegetable Gardening in Florida
    • EDIS publications - see
      FL Vegetable Gardening Guide - http://edis.ifas.ufl.edu/VH021
      Vegetable Gardening - http://edis.ifas.ufl.edu/TOPIC_Vegetable_Gardening
Crop Yields (100 ft row) Examples

<table>
<thead>
<tr>
<th>Crop</th>
<th>Planting Dates in Florida (outdoors)¹</th>
<th>North</th>
<th>Central</th>
<th>South</th>
<th>Pounds yield per100'</th>
<th>Days to Harvest¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans, bush</td>
<td>Mar-Apr Sep</td>
<td>Mar-Apr</td>
<td>Feb-Apr Sep</td>
<td>Sep-Apr</td>
<td>45</td>
<td>50-60</td>
</tr>
<tr>
<td>Beans, pole</td>
<td>Mar-Apr Sep</td>
<td>Mar-Apr</td>
<td>Feb-Apr Sep</td>
<td>Aug-Apr</td>
<td>80</td>
<td>55-70</td>
</tr>
<tr>
<td>Beets</td>
<td>Sep-Mar</td>
<td>Sep-Mar</td>
<td>Oct-Mar</td>
<td>Oct-Feb</td>
<td>75</td>
<td>50-65</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Aug-Feb</td>
<td>Aug-Jan</td>
<td>Sept-Jan</td>
<td></td>
<td>50</td>
<td>75-90</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Sep-Feb</td>
<td>Sep-Jan</td>
<td>Sept-Jan</td>
<td></td>
<td>125</td>
<td>90-110 (70-90)</td>
</tr>
<tr>
<td>Cantaloupes</td>
<td>Mar-Apr</td>
<td>Feb-Apr</td>
<td>Aug-Sep Feb-Mar</td>
<td>150</td>
<td>75-90 (65-75)</td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>Sep-Mar</td>
<td>Oct-Mar</td>
<td>Oct-Feb</td>
<td></td>
<td>100</td>
<td>65-80</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Jan-Feb Aug-Oct</td>
<td>Oct-Jan</td>
<td>Oct-Jan</td>
<td></td>
<td>80</td>
<td>75-90 (55-70)</td>
</tr>
<tr>
<td>Celery</td>
<td>Jan-Mar</td>
<td>Aug-Feb</td>
<td>Oct-Jan</td>
<td></td>
<td>150</td>
<td>115-125 (80-105)</td>
</tr>
<tr>
<td>Chinese cabbage</td>
<td>Oct-Feb</td>
<td>Oct-Jan</td>
<td>Nov-Jan</td>
<td></td>
<td>100</td>
<td>70-90 (60-70)</td>
</tr>
<tr>
<td>Collards</td>
<td>Feb-Apr Aug-Nov</td>
<td>Aug-Mar</td>
<td>Aug-Feb</td>
<td></td>
<td>150</td>
<td>70-80</td>
</tr>
<tr>
<td>Corn, sweet</td>
<td>Mar-Apr Aug</td>
<td>Feb-Mar Aug-Sep</td>
<td>Aug-Mar</td>
<td></td>
<td>115</td>
<td>60-95</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>Feb-Apr Aug-Sep</td>
<td>Feb-Mar Sep</td>
<td>Sep-Mar</td>
<td></td>
<td>100</td>
<td>50-65 (40-50)</td>
</tr>
<tr>
<td>Eggplant</td>
<td>Feb-July</td>
<td>Jan-Mar Aug-Sep</td>
<td>Dec-Feb Aug-Oct</td>
<td>200</td>
<td>90-110 (75-90)</td>
<td></td>
</tr>
<tr>
<td>Endive/Escarole</td>
<td>Feb-Mar Sep</td>
<td>Jan-Feb Sep</td>
<td>Sep-Jan</td>
<td></td>
<td>75</td>
<td>80-95</td>
</tr>
<tr>
<td>Kale</td>
<td>Sep-Feb</td>
<td>Sep-Jan</td>
<td>Sep-Jan</td>
<td></td>
<td>75</td>
<td>70-80 (55)</td>
</tr>
<tr>
<td>Kohlrabi</td>
<td>Sep-Mar</td>
<td>Oct-Mar</td>
<td>Oct-Feb</td>
<td></td>
<td>100</td>
<td>70-80 (50-55)</td>
</tr>
<tr>
<td>Lettuce: Crisp, Butterhead, Leaf &amp; Romaine</td>
<td>Feb-Mar Sep-Oct</td>
<td>Sep-Mar</td>
<td>Sep-Jan</td>
<td></td>
<td>75</td>
<td>50-90</td>
</tr>
</tbody>
</table>

https://edis.ifas.ufl.edu/vh021
### Crop Yields (100 ft row) Examples (cont.)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Planting Dates in Florida (outdoors)</th>
<th>Pounds yield per100'</th>
<th>Days to Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mustard</td>
<td>Sep-May, Sep-Mar, Sep-Mar</td>
<td>100</td>
<td>40-60</td>
</tr>
<tr>
<td>Okra</td>
<td>Mar-July, Mar-Aug, Aug-Sep</td>
<td>70</td>
<td>50-75</td>
</tr>
<tr>
<td>Onions, Bulbing</td>
<td>Sep-Dec, Sep-Dec, Sep-Nov</td>
<td>100</td>
<td>120-160 (110-120)</td>
</tr>
<tr>
<td>Onions, Bunching (Green onions)</td>
<td>Aug-Mar, Aug-Mar, Sep-Mar</td>
<td>100</td>
<td>50-75 (30-40)</td>
</tr>
<tr>
<td>Onions, Shallots</td>
<td>“, “, “</td>
<td>100</td>
<td>(30-40)</td>
</tr>
<tr>
<td>Peas, English</td>
<td>Jan-Mar, Sep-Mar, Sep-Feb</td>
<td>40</td>
<td>50-70</td>
</tr>
<tr>
<td>Peas, southern</td>
<td>Mar-Aug, Mar-Sep, Aug-Apr</td>
<td>80</td>
<td>60-90</td>
</tr>
<tr>
<td>Peppers</td>
<td>Feb-Apr, Jul-Aug, Jan-Mar, Aug-Sep</td>
<td>50</td>
<td>80-100 (60-80)</td>
</tr>
<tr>
<td>Potatoes</td>
<td>Jan-Mar, Jan-Feb, Sep-Jan</td>
<td>150</td>
<td>85-110</td>
</tr>
<tr>
<td>Potatoes, sweet</td>
<td>Mar-Jun, Feb-Jun, Feb-Jun</td>
<td>300</td>
<td>(120-140)</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>Mar-Apr, Feb-Mar, Jan-Feb, Aug-Sep</td>
<td>300</td>
<td>90-120 (80-110)</td>
</tr>
<tr>
<td>Radish</td>
<td>Sep-Mar, Sep-Mar, Oct-Mar</td>
<td>40</td>
<td>20-30</td>
</tr>
<tr>
<td>Spinach</td>
<td>Oct-Nov, Oct-Nov, Oct-Jan</td>
<td>40</td>
<td>45-60</td>
</tr>
<tr>
<td>Squash, Winter</td>
<td>Mar-Aug, Mar-Aug, Jan-Feb, Sep</td>
<td>300</td>
<td>80-110 (70-90)</td>
</tr>
<tr>
<td>Tomatoes, Stake</td>
<td>Feb-Apr, Jan-Mar, Aug-Mar</td>
<td>200</td>
<td>90-110 (75-90)</td>
</tr>
<tr>
<td>Tomatoes, Ground</td>
<td>“, “, “</td>
<td>200</td>
<td>90-110 (75-90)</td>
</tr>
<tr>
<td>Tomatoes, Container</td>
<td>“, “, “</td>
<td>200</td>
<td>90-110 (75-90)</td>
</tr>
<tr>
<td>Turnips</td>
<td>Jan-Apr, Aug-Oct, Jan-Mar, Sep-Nov</td>
<td>150</td>
<td>40-60</td>
</tr>
</tbody>
</table>

[1] https://edis.ifas.ufl.edu/vh021
Crop Yields (100 ft row)  
Examples (cont.)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Planting Dates in Florida (outdoors)¹</th>
<th>Pounds yield per100’</th>
<th>Days to Harvest⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watermelon, Large</td>
<td>North: Mar-Apr, July-Aug; Central: Jan-Mar; South: Jan-Mar Aug-Sep</td>
<td>400</td>
<td>85-95 (80-90)</td>
</tr>
<tr>
<td>Watermelon, Small</td>
<td>&quot;</td>
<td>400</td>
<td>85-95 (80-90)</td>
</tr>
<tr>
<td>Watermelon, Seedless</td>
<td>&quot;</td>
<td>400</td>
<td>85-95 (80-90)</td>
</tr>
</tbody>
</table>

¹ North: north of State Rds 40; Central: between State Rds 40 and 70; South: south of State Rd 70.  
² Rotate crops to avoid soil pest problems; avoid planting vegetables belonging to the same family in successive seasons.  
³ Transplantability categories: I, easily survives transplanting; II, survives with care; III, use seeds or containerized transplants only.  
⁴ Days from seeding to harvest: Values in parentheses are days from transplanting to first harvest.

https://edis.ifas.ufl.edu/vh021
Management

Soil Testing

- UF/IFAS Soil Lab
  http://soilslab.ifas.ufl.edu/

- Alternative Soils Labs
  http://attra.ncat.org/attra-pub/soil-lab.html
Management

Pests Considerations

- **FL = Subtropical Pest “Wonderland”**
- **Soil Pests**
  - Nematodes
  - Wilts, Root Rots
- **Foliage & Fruit Diseases**
- **Plant Viruses (insect vectors)**
- **Vertebrate Pests**
  - Deer, Crow, Raccoon, Coyote
- **Decide Management Approach**
  - Organic, “Soft” Pesticides, Traditional
Management

Weed Considerations

• Easily Underestimated
• Cultural Practices
• Consider Mulches
  – Plastic
  – Organic Material
Management

• Irrigation Considerations
  – Overhead/Sprinklers
  – Drip Irrigation
    (recommended)
Management

– Drip Irrigation Benefits
  • Irrigate larger areas
  • Reduces disease
  • Aids in fertilizer application
  • Can use many small pumps and wells
Irrigation Management

- **Best Management Practices**
  (http://solutionsforyourlife.ufl.edu/hot_topics/agriculture/bmps.html)
  - Water efficiency example

**FIGURE 1:** Depiction of irrigation resulting in poor DU and excessive watering

**FIGURE 2:** Depiction of irrigation resulting in poor DU and insufficient irrigation in parts of the field

**FIGURE 3:** Depiction of irrigation resulting in good DU but poor irrigation efficiency

**FIGURE 4:** Depiction of irrigation sufficiently watering the entire field with good DU and irrigation efficiency
Irrigation Management

• Best Management Practices
  – Water efficiency example
    • Soil moisture monitoring equipment
    • Tensiometer example
Irrigation Management

- Florida Automated Weather Network Resource
  http://fawn.ifas.ufl.edu/
  - Evapotranspiration data
  - Freeze warnings
  - Temperature data and forecasts
An example Florida market garden in the field
Production Systems

• Field Example
  – Square foot gardening
  – View these videos

http://www.youtube.com/watch?v=LaVyG0Pq7nc

http://www.youtube.com/watch?v=-cTFJEOaoQ1U

http://www.youtube.com/watch?v=S3te05Vgmhs&feature=related
• Field Example
  – “Double dug” gardening
  – View these videos

http://youtube.com/watch?v=jx9pM9tPOWM&feature=related

http://youtube.com/watch?v=UkU5nwGU_kA&feature=related
Container Production System

- Container Example
  - Earthbox®
  - View this video

http://www.youtube.com/watch?v=c_fJ25Mubck
Production System

- Additional Container Ideas
  - Pots and cans
  - Buckets and baskets
  - Styrofoam ice chests
  - Plastic bags
  - Drums

Strawberry Barrel

Soil less media (gravel, sand, sawdust, bark, vermiculite, etc)
Container Production System

Example

http://www.envirotechecinc.com/groexx/index.html
What is GroExx?

• New modular portable cropping system for:
  - Agriculture = First Harvest
  - Landscape = GroSoxx

• Uses Mesh Enclosure
  - Contains Customizable Planting mix inside
  - Air on all sides = no anaerobic conditions
  - Superior to grow bags

• Irrigation inside soxx
  - Easy fertigation
  - Controlled moisture
Installation of Soxx with Blower Truck
Combined With Hoop Houses
Planting In Soxx
Planting Between Soxx
Vine Cucumbers
Basil
Strawberries
Hydroponic Production System

Empty Pots

V E R T I C A L T O W E R

Nasturtium (Edible Flowers)

View video:
http://vfd.ifas.ufl.edu/suwanneevalley/hydroponicgreenhouse/vertical_towers.shtml
Hydroponic Production System

• Additional Container Ideas

Floating Water Gardens

View video: http://vfd.ifas.ufl.edu/suwanneevalley/hydroponicgreenhouse/floating_systems.shtml
Hydroponic Production System

- Hanging Bag System
Hydroponic Production System

• “VerZontal” Systems
Hydroponic Production
Crop Choices

• Can I grow the same crops with hydroponic systems as field systems?

View video:
http://vfd.ifas.ufl.edu/suwanneevalley/hydroponicgreenhouse/hydroponic_crop_choices.shtml
Crop Production Diversification
- Benefits -

• Increased resource efficiency
  – nutrients, water, space, equipment, etc

• Crop synergisms
  – e.g., enhanced pest and disease control

• Expanded growing and harvest seasons

• Exploit profitable niche markets

• Reduced risks of production

• Promote local ag economic development

• Enhanced agroecosystem sustainability
Crop Production Diversification

- Challenges -

- Market development. Expect to conduct substantial research.

- Information on varietal performance, best management practices and post-harvest handling and storage may be hard to find.

- Seed selection may be limited and plant establishment may be difficult.

- Pest management information for alternative crops may not be available.

- A need to modify or replace equipment. Consider that hand labor may occasionally be the only viable option.
Crop Production Diversification - Challenges -

- Harvesting, post-harvest handling and storage considerations, with possible additional costs.
- Locating local businesses and infrastructure for handling, transporting, processing, storing and marketing.
- Price swings for alternative crops.
- Contracts. Sometimes contracts are not available for alternative crops every year – or at all.
Diversified Crop Production
- Examples -

Strip Cropping of Vegetables

Agroforestry (Alley Cropping)
Crop diversification can be applied at various scales.
Agroecosystem Property Example “Succession”

**Early Stages**
1. Bare soil
2. Annual monoculture
3. Annual polyculture
4. Polyculture of mixed annuals and short-lived perennials
5. Annual/perennial polyculture with tree seedlings
6. Agroforestry
7. Tree crop agroecosystem

**Late Stages**

Example Techniques:
- agroforestry,
- interplanting
- rotational cropping

✔ Mimick natural ecosystems for enhanced stability.
ACKNOWLEDGMENTS

Robert C. Hochmuth
UF/IFAS North Florida Research and Education Center – Suwannee Valley
Live Oak, Florida

“Developing a Plan for Vegetables, Herbs, & Cut Flowers”
“Non-Traditional Gardens: Crazy and Fun Stuff”

Susan Donaldson
University of Nevada Cooperative Extension

“Living On the Land: Stewardship for Small Acreages Program”
Oregon State University Extension

“An Introduction to Sustainable Farming”
Market Gardening
Online Resources

- Agroecosystem Analysis Reading List 2008, Univ. of NE - see http://cari.unl.edu/Agroecology.shtml

- ATTRA Publications – see http://attra.ncat.org/
  - Market Gardening
  - Horticultural Crops
  - Specialty Cut Flowers Production and Marketing
  - Agroforestry Overview


Market Gardening
Online Resources


- S.A.R.E. Diversifying Cropping Systems
  http://www.sare.org/publications/diversify.htm

- UF/IFAS/FAMU Small Farm & Alternative Enterprise Program
  http://smallfarms.ifas.ufl.edu/

- UF/IFAS Virtual Field Day website
  http://vfd.ifas.ufl.edu
Online Reading Assignments

  – Market Gardening
  – Horticultural Crops
• Peet, M. Sustainable Practices for Vegetable Production in the South.
  [http://www.cals.ncsu.edu/sustainable/peet/](http://www.cals.ncsu.edu/sustainable/peet/)
• SARE, Steel in the Field: A Farmer’s Guide to Weed Management Tools