The University of Missouri Columbia Garden 'n Grow project was developed by:

**Michele Warmund**, Professor of Horticulture 
with assistance from Jacki Lansman

Illustrations: **Dennis Murphy**
Editing/Design: **Sharon Wood-Turley**
# Garden ‘n Grow Lesson Plans

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Lesson Title</th>
<th>Gardener’s Pages</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Growing Together</td>
<td>• Why is there Hunger?</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Planting 1, 2, 3</td>
<td>• Five Garden Plot Plans</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vegetable Planting Guide</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The Three Sisters</td>
<td>• Three Sisters Garden</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bean Tepee Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Seed or Weed?</td>
<td>• Seed or Weed?</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Weed Scavenger Hunt</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Weed Identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Coddle those Cotyls</td>
<td>• Stages of Germination</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Coddle those Cotyls Worksheet</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Grow, Grow, Grow Your Beans</td>
<td>• Ingredients for Success</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Show Your Results/Comparison of Light vs No Light</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Shine On!</td>
<td>• Shine On!</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Photosynthesis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lights Out!</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sand, Silt, or Clay?</td>
<td>• Sand, Silt, or Clay?</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Relative Particle Sizes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Garden Soil Composition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bottles Up!</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pistils, Petals, and Other Parts</td>
<td>• Parts of a Solitary Flower</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Solitary Flower and Its Parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Parts of a Composite Flower/My Composite Flower and Its Parts</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Fruit or Veggie</td>
<td>• Fruit or Veggie?</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• My Garden Notes</td>
<td></td>
</tr>
<tr>
<td>Lesson</td>
<td>Lesson Title</td>
<td>Gardener’s Pages</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>11</td>
<td>Zoning Out</td>
<td>• Hardiness Zones&lt;br&gt;• Garden Plan&lt;br&gt;• Seed Ordering Chart&lt;br&gt;• My Garden Notes</td>
<td>38</td>
</tr>
<tr>
<td>12</td>
<td>It’s a Plot!</td>
<td>• Garden Plot Graph&lt;br&gt;• My Garden Notes</td>
<td>43</td>
</tr>
<tr>
<td>13</td>
<td>Good, Bad, and Beautiful Bugs</td>
<td>• Insect Body Regions&lt;br&gt;• Insect Mouthparts&lt;br&gt;• Incomplete Metamorphosis&lt;br&gt;• Complete Metamorphosis&lt;br&gt;• Wanted, Dead or Gone&lt;br&gt;• Good Guys&lt;br&gt;• Bad Guys&lt;br&gt;• My Garden Notes</td>
<td>46</td>
</tr>
<tr>
<td>14</td>
<td>What’s Up, Doc?</td>
<td>• Fix It, Doc!&lt;br&gt;• My Garden Notes</td>
<td>54</td>
</tr>
<tr>
<td>15</td>
<td>Hot or Not?</td>
<td>• The Heat Index&lt;br&gt;• How Hot are Your Peppers?&lt;br&gt;• Where’s the Heat?&lt;br&gt;• Salsa Recipe&lt;br&gt;• Word Search&lt;br&gt;• My Garden Notes</td>
<td>57</td>
</tr>
<tr>
<td>16</td>
<td>Bountiful Harvest</td>
<td>• To Pick, or Not to Pick?&lt;br&gt;• My Garden Notes</td>
<td>61</td>
</tr>
<tr>
<td>17</td>
<td>What’s it Worth?</td>
<td>• What’s it Worth?&lt;br&gt;• My Garden Notes</td>
<td>63</td>
</tr>
<tr>
<td>18</td>
<td>Friend, Can You Spare a Tomato?</td>
<td>• My Garden Notes</td>
<td>65</td>
</tr>
<tr>
<td>19</td>
<td>Trading Traits</td>
<td>• Developing a Better Plant&lt;br&gt;• Super-Dooper Veggie&lt;br&gt;• My Super-Dooper Veggie&lt;br&gt;• My Garden Notes</td>
<td>66</td>
</tr>
<tr>
<td>20</td>
<td>Help is On Its Way!</td>
<td>• Draw a Scientist&lt;br&gt;• A Method to this Madness&lt;br&gt;• Draw You as a Scientist&lt;br&gt;• My Garden Notes</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Harvest Record</td>
<td>74</td>
</tr>
</tbody>
</table>
Why is there Hunger?

Across
1. Ruling body of a country
2. Ways of moving food
3. Poor growing season; “_____ failure”
4. Insects and rodents
5. Fighting in or among nations
6. Rotting and molding
8. Changing raw products into forms we can use
9. Overflowing of rivers and streams
11. Clean, dry places to keep food
12. Robbing
13. Buying and selling between countries

Down
2. Ways of moving food
4. Insects and rodents
6. Rotting and molding
7. Too little money
10. Too little rain to grow crops
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
Sunshine Garden

KEY

Banana Pepper

Red Tomato

Onion sets

Wax beans

Yellow Summer Squash

Scale: 1 square = 1 foot

Planting 1, 2, 3...
## Weird Garden

**KEY**
- Royal Bean
- Burgundy Bean
- Purple Pepper
- Grape Tomato
- Sunburst Squash
- Eight-ball Zucchini

---

<table>
<thead>
<tr>
<th></th>
<th>Purple Pepper</th>
<th>Grape Tomato</th>
<th>Sunburst Squash</th>
<th>Eight-ball Zucchini</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burgundy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Scale: 1 square = 1 foot*
Holiday Garden

**KEY**
- Green Pepper
- Red Tomato
- Hot, Red Pepper
- Green Beans
- *Okra

Scale: 1 square = 1 foot

*After okra seedlings emerge, thin to a distance of 18 inches apart.*
Planting 1, 2, 3...

Scale: 1 square = 1 foot

Relish Tray Garden

KEY

Cherry Tomato

Hot Red Pepper

Cucumber

Okra

*After okra seedlings emerge, thin to a distance of 18 inches apart.
<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Inches between rows</th>
<th>Inches between plants</th>
<th>Seed depth</th>
<th>Days from planting to harvest</th>
<th>South Missouri</th>
<th>Central Missouri</th>
<th>North Missouri</th>
<th>Warm (W) or Cool (C) Season</th>
<th>Recommended varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beans, pole</strong></td>
<td>24”</td>
<td>3”</td>
<td>1-2”</td>
<td>5-60</td>
<td>4/20-5/15</td>
<td>5/1-20</td>
<td>5/10-20</td>
<td>W</td>
<td>Kentucky Wonder, Bluelake</td>
</tr>
<tr>
<td><strong>Beans, lima bush</strong></td>
<td>24”</td>
<td>3”</td>
<td>1-2”</td>
<td>70-80</td>
<td>4/25-5/20</td>
<td>5/5-25</td>
<td>5/10-25</td>
<td>W</td>
<td>Henderson Bush, Fordhook 242</td>
</tr>
<tr>
<td><strong>Brussels Sprouts (plants)</strong></td>
<td>24”</td>
<td>16–24”</td>
<td>1/2”</td>
<td>85-95</td>
<td>3/10-3/30</td>
<td>3/20-4/10</td>
<td>3/25-4/5</td>
<td>C</td>
<td>Jade Cross Hybrid</td>
</tr>
<tr>
<td><strong>Cabbage (plants)</strong></td>
<td>24”</td>
<td>10–24”</td>
<td>1/2”</td>
<td>70-80</td>
<td>3/5-4/5</td>
<td>3/20-4/20</td>
<td>4/1-4/20</td>
<td>C</td>
<td>Stonehead Hybrid, Golden Acre, Market Prize, Royal, Savoy Ace Fortuna, Gourmet, Conquest, Bravo</td>
</tr>
<tr>
<td><strong>Cantaloupe (muskmelon)</strong></td>
<td>48”</td>
<td>18–36”</td>
<td>1”</td>
<td>80-90</td>
<td>4/20-5/15</td>
<td>5/1-5/20</td>
<td>5/10-5/20</td>
<td>W</td>
<td>Burpee Hybrid, Supermarket Hybrid, Saticyc, Hybrid, Ambrosia, Pulsar, Athena, Eclipse</td>
</tr>
<tr>
<td><strong>Carrot</strong></td>
<td>18”</td>
<td>1–2”</td>
<td>1/2”</td>
<td>70-85</td>
<td>3/5-3/25</td>
<td>3/15-4/5</td>
<td>3/25-4/10</td>
<td>C</td>
<td>Nantes Improved, Royal Chantenay, Thumbelina, Amina</td>
</tr>
<tr>
<td><strong>Cauliflower (plants)</strong></td>
<td>24”</td>
<td>24”</td>
<td>1/2”</td>
<td>55-65</td>
<td>3/5-4/5</td>
<td>3/20-4/20</td>
<td>4/1-4/20</td>
<td>C</td>
<td>Snowcrown, Snowball</td>
</tr>
<tr>
<td><strong>Corn, sweet</strong></td>
<td>36”</td>
<td>9”</td>
<td>1–2”</td>
<td>70-85</td>
<td>4/15-8/15</td>
<td>4/25-8/1</td>
<td>5/1-7/20</td>
<td>W</td>
<td>Early Sunglow, Stardust, Apollo, Ambrosia, Autumn Star, Miracle, Golden Cross, Bantam, Iochief, Kandy Corn, Lancelot, How Sweet It Is, Silver Queen, Kandy Korn</td>
</tr>
<tr>
<td><strong>Cucumber</strong></td>
<td>30”</td>
<td>12” or 4 seeds per hill</td>
<td>1”</td>
<td>65-70</td>
<td>4/25-5/30</td>
<td>5/5-5/30</td>
<td>5/10-5/30</td>
<td>W</td>
<td>Dasher II, Marketmore 76, Orient Express, Superset, Sweet Slice, Calypso, Homemade Pickle, Fanfare, Little Leaf (H-19), Salad Bush</td>
</tr>
<tr>
<td>Vegetable</td>
<td>Inches between rows</td>
<td>Inches between plants</td>
<td>Seed depth</td>
<td>Days from planting to harvest</td>
<td>South Missouri</td>
<td>Central Missouri</td>
<td>North Missouri</td>
<td>Warm (W) or Cool (C) Season</td>
<td>Recommended varieties</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------</td>
<td>-----------------------</td>
<td>------------</td>
<td>------------------------------</td>
<td>----------------</td>
<td>------------------</td>
<td>----------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>Squash, winter</td>
<td>48&quot;</td>
<td>48&quot;</td>
<td>1–1 1⁄2&quot;</td>
<td>100</td>
<td>5/1–5/30</td>
<td>5/10–5/30</td>
<td>5/15–5/30</td>
<td>W</td>
<td>Table Queen, Table Ace, Sweet Mama, Early Butternut Hybrid, Vegetable Spaghetti</td>
</tr>
<tr>
<td>Squash</td>
<td>36&quot;</td>
<td>36&quot; or 4 seeds per hill</td>
<td>1–1 1⁄2&quot;</td>
<td>80–90</td>
<td>5/1–5/30</td>
<td>4/1–4/20</td>
<td>4/10–4/20</td>
<td>W</td>
<td>Straightneck types, Crookneck types, Peter Pan, Zucchini varieties</td>
</tr>
</tbody>
</table>
My Garden Notes

Today I learned:

Date and time:

General observations:

Daily checklist:
Planting Diagram

Step 1. Build a mound six inches high and 24 inches across.

Step 2. Plant two seeds at each symbol (see key, above left). Plant seeds three inches from the outer edge of the mound.

Step 3. After seeds have germinated, thin to one plant per symbol.
The Three Sisters

Bean Tepee Construction

Step 1. Gather your poles at the location where you are going to build your tepee. You will need six poles. Each pole should be eight to 10 feet in length.

Step 2. Place the poles on the ground in a bundle. About one and one-half feet from one end, lash the poles together securely with rope.

Step 3. Stand the poles upright and space them an equal distance apart in the permanent spot where you want the tepee. The base of the tepee should form a circle about seven and one-half feet in diameter.

Step 4. Fasten string at the bottom of a pole and run the string back and forth (like a ladder) between one pole and the one beside it, covering the area up to where the poles come together. Each gardener can take two poles and run the string from ground level to the top of the tepee. Make sure to leave an opening between two of the poles to walk into the tepee to harvest beans later.

Step 5. Plant beans three inches apart around the base of the tepee. After the seeds germinate, place the bean vines on the string and poles. Direct the growth so the structure is covered with vines.
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
Seed or Weed?

1. What is a weed?

2. What kind of seedlings are these? Label them.
   a. 
   b. 
   c. 
   d. 

3. Why do gardeners keep weeds out of their garden? They compete for:

4. How is mulch used to prevent weed growth?

5. What materials can be used as mulch?

6. When do we apply mulch?

7. What are two ways to control weeds in our garden?
   1. 
   2. 
Weed Scavenger Hunt

Directions: Read each item carefully and follow the instructions. When you find the weed you are looking for, collect the entire plant (roots, stem, leaves, etc.). Label the plant with the number of the corresponding question.

1. Find a weed with grass-like leaves and a triangular stem.

2. Find a weed with grass-like leaves and long fluffy tail-like spikes with many seeds.

3. Find a weed that has hairy, grass-like leaves and a seed head with three to 10 “fingers.”

4. Find a vining weed with leaves with three lobes.

5. Find a weed that makes some people sneeze and has fern-like leaves.

6. Find a weed with yellow flowers that often grows in lawns.

7. Find a weed that is low-growing and has leaves of three and has white flowers.

8. Find a vining weed with white flowers and leaves shaped like arrowheads.

9. Find a low-growing weed that exudes sticky white “milk” when a leaf or stem is picked.

10. Find a low-growing weed with whorls of leaves shaped like a spatula.
Seed or Weed?

Weed Identification

Dandelion

Carpetweed

White Clover

Bindweed

Bindweed

Large Crabgrass

Crabgrass

Common Ragweed

Prostrate Spurge

Yellow Nutsedge

Ivy Leaf Morning Glory

Giant Foxtail

Photos courtesy: Fred Fishel, Extension Assistant Professor, Plant Sciences,
My Garden Notes

General observations:

These seeds had germinated in my garden:

Daily checklist:
1. When conditions are favorable for germination, the seed absorbs water and the **seed coat** or testa ruptures.

2. The **radical** and the **cotyledons** begin to emerge from the seed coat. The seed uses food stored in the cotyledons to grow.

3. The radical grows out of the seed into the soil (even if the seed is upside down). The shoot or **hypocotyl** elongates upward out of the seed and lifts the cotyledons and the **epicotyl** out of the ground. The epicotyl is the part of the shoot above the cotyledons.

4. The small plant, called a **seedling**, begins to absorb nutrients from the soil and to make its own food by the process of **photosynthesis**. The leaves that develop after the cotyledons are **true leaves**. Once true leaves develop, the cotyledons turn yellow and die as the true leaves take over producing food for the plant.
The Five Parts of a Bean Seed

Draw and label the parts of a bean seed.

Fill in the blank:

<table>
<thead>
<tr>
<th>Part of the Seed</th>
<th>Function of Seed Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ______________</td>
<td>Protects the seed from injury and prevents drying.</td>
</tr>
<tr>
<td>2. ______________</td>
<td>Stores food for use by embryo during germination.</td>
</tr>
<tr>
<td>3. ______________</td>
<td>Lifts the cotyledons out of the seed.</td>
</tr>
<tr>
<td>4. ______________</td>
<td>Connects the cotyledons to the first true leaves.</td>
</tr>
<tr>
<td>5. ______________</td>
<td>Absorbs water, oxygen, and nutrients needed for plant growth.</td>
</tr>
</tbody>
</table>
My Garden Notes

Date and time:

Today I learned:

General observations:

These seeds had germinated in my garden:

Daily checklist:
Ingredients for success

Choose one of the ingredients for growing plants (light, water, soil, nutrients, air). Design an experiment to determine how a certain ingredient affects the growth of your bean plants. Be creative and have fun!

Which ingredient you will study: ____________________________

How will you conduct your experiment?

________________________________________________________

________________________________________________________

________________________________________________________

________________________________________________________

Our Prediction: Which pot of beans will grow the best?

________________________________________________________

________________________________________________________

________________________________________________________

How will you gather your data?

Suggestion: Every two days measure your plants with a ruler. Record your measurements each time and make a graph using these numbers. At the end of two weeks, illustrate on the graph how many leaves the plant grew during this time. For example:

<table>
<thead>
<tr>
<th>Day</th>
<th>Pot 1 — Light</th>
<th>Pot 2 — No Light</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of leaves</td>
<td>Plant height (cm)</td>
</tr>
<tr>
<td>Day 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Day 4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Day 6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Day 8</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Day 10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Day 12</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Day 14</td>
<td>8</td>
<td>18</td>
</tr>
</tbody>
</table>
Show your results

After two weeks, you will present a brief TV news broadcast to the other gardeners.

You may wish to use your graphs to report your discoveries. The graph below shows how the data in the table on the previous page would look.

Comparison of light vs. no light
My Garden Notes

Date and time:

Today I learned:

General observations:

These seeds had germinated in my garden:

Daily checklist:
Shine On!

1. Where do plants get their food?

2. How does photosynthesis begin?

3. What in the leaves absorb the light?

4. What do the roots contribute to photosynthesis?

5. What is the name of the sugar produced during photosynthesis?

6. What is the equation for photosynthesis?

7. What happens when a plant produces more food than it needs?

8. What does the plant release during photosynthesis?
Photosynthesis

water + carbon dioxide $\xrightarrow{\text{light energy}}$ glucose + oxygen
Lights Out!

Directions: Cut out three or four shapes from cardboard. Make sure your shapes are large enough to cover nearly half of a plant leaf. Paperclip each shape to a different leaf on a plant in your garden.

Today:

What is the weather like?

What do you think will happen to the covered leaves during the next two weeks?

Following Days:

What was the weather like during the days leaves were covered?

Two Weeks Later:

What happened to the leaves covered with cardboard?

What happened to the chlorophyll on the covered leaf?

Why did this occur?
My Garden Notes

Today I learned:

Date and time:

General observations:

Daily checklist:
Sand, Silt, or Clay?

1. What is soil and what is it made of?

2. What are some functions of soil?

3. What is soil texture?

4. Why is soil texture important?

5. What is soil structure and why is it important?
Sand, Silt, or Clay?

Relative Particle Sizes

Garden Soil Composition

- 25% Water
- 25% Air
- 43% to 50% Sand, silt, clay and minerals
- 0% to 7% Organic Matter
Sand, Silt, or Clay?

Bottles Up!

Fill a clear jar that has a lid one-third full of soil, then add water until the jar is nearly full. Make sure the lid is screwed on tightly, then shake your jar. Place your jar in a place where it will not be disturbed until the next garden session.

1. When you return, observe, measure, and sketch the layers.
   Label the layers of particles on your diagram.

2. Why are there different layers in the jar?

3. How do the layers of soils from different locations compare?

4. What problems might you face if you had a garden with a lot of clay or sandy soil?
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
Parts of a Solitary Flower

Write in the function of each flower part in the space provided.
Examine your flower closely with the hand lens. Draw a picture of it, and label its parts (use the “Parts of a Solitary Flower” Gardener’s Page as a reference.)
Parts of a Composite Flower

My Composite Flower and Its Parts

Examine your composite flower closely with the hand lense. Draw a picture of it, and label its parts (use the “Parts of a Composite Flower” illustration, above, as a reference.)
My Garden Notes

Date and time:

Today I learned:

- 
- 
- 
- 
- 
- 
- 
- 

General observations:

- Bugs
- Plants
- Birds
- Animals

Daily checklist:

- Weather
  - Sunny
  - Partial Sun
  - Rain
  - Overcast
  - Windy

- Soil Conditions
  - Dusty & Dry
  - Wet & Sticky
  - Sandy
  - Rocky
  - Odor

- Plant Problems
  - Blemishes
  - Stunted
  - Holes
  - Wilting
  - Rotting
Fruit or Veggie?

1. Mark each of the following with a F for fruit or V for vegetable. After each vegetable name identify whether or not it is a leaf (l), stem (s), root (r), or petiole (p).

- Lettuce _____  
- Tomato _____  
- Eggplant _____  
- Celery _____  
- Beets _____  
- Cucumber _____  
- Carrot _____  
- Zucchini _____  
- Squash _____  
- Broccoli _____  
- Pepper _____  
- Potato _____  
- Cabbage _____  
- Green Beans _____  
- Sweet Potato _____  
- Watermelon _____  
- Radish _____  
- Pumpkin _____  
- Spinach _____  
- Collards _____

2. What is a true fruit?

3. What is a true vegetable?

4. List everything you had to eat or drink yesterday.

5. What vegetables are good sources of vitamins A and C?

6. What vegetables are good sources of fiber?
My Garden Notes

My Garden Notes

Date and time:

Today I learned:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

General observations:

- Bugs
- Plants
- Birds
- Animals

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Daily checklist:

- Weather
  - Sunny
  - Partial Sun
  - Rain
  - Overcast
  - Windy

- Soil Conditions
  - Dusty Dry
  - Wet & Sticky
  - Sandy
  - Rocky
  - Odor

- Plant Problems
  - Blistchess
  - Stunted
  - Holes
  - Wilting
  - Rotting
Hardiness Zones

<table>
<thead>
<tr>
<th>City</th>
<th>Spring frost free date</th>
<th>Fall first freeze date</th>
<th>Approximate length of growing season (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Girardeau</td>
<td>May 18</td>
<td>Oct. 21</td>
<td>180</td>
</tr>
<tr>
<td>Columbia</td>
<td>May 10</td>
<td>Oct. 17</td>
<td>164</td>
</tr>
<tr>
<td>Kansas City</td>
<td>May 4</td>
<td>Oct. 18</td>
<td>163</td>
</tr>
<tr>
<td>Kirksville</td>
<td>May 11</td>
<td>Oct. 12</td>
<td>157</td>
</tr>
<tr>
<td>Maryville</td>
<td>May 22</td>
<td>Oct. 5</td>
<td>149</td>
</tr>
<tr>
<td>Poplar Bluff</td>
<td>May 19</td>
<td>Oct. 28</td>
<td>190</td>
</tr>
<tr>
<td>Rolla</td>
<td>May 9</td>
<td>Oct. 11</td>
<td>153</td>
</tr>
<tr>
<td>Springfield</td>
<td>May 10</td>
<td>Oct. 18</td>
<td>165</td>
</tr>
</tbody>
</table>

The frost free date for our garden is _______.
This is usually the latest date in the spring your area has a frost.

The earliest date of frost for our garden is _______.
This is usually the earliest date in fall your area has a frost.

The approximate length of our growing season is _______ days.

**Warm season** crops grow best at daily temperatures above 70 degrees F.
Examples of warm season crops are: _______________________________________

**Cool season** crops grow best at average daily temperatures below 70 degrees F.
Examples of cool season crops are: _______________________________________

Zone 5
Zone 6
Zone 7
Garden Plan

1. Our garden zone:

2. Our frost dates for
   Spring: _________  Fall: _________

3. The amount of sunlight on our garden site:

   ![Sunlight options]

4. Drainage of our site:

   ![Drainage options]

5. Plants I’d like to grow in my garden next year:

   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
# Seed Ordering Chart

<table>
<thead>
<tr>
<th>Name of Seed</th>
<th>Name of Catalog</th>
<th>Amount of Seed</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subtotal $ 

Shipping/Handling $ 

TOTAL $ 


My Garden Notes

Date and time:

Today I learned:

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________

General observations:

__________________________

__________________________

__________________________

__________________________

Daily checklist:
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
Insect Body Regions

- Head
- Thorax
- Abdomen
- Antenna
- Compound eye
- Mouthparts
- Legs
Insect Mouthparts

**CHEWING**
Types of insects with chewing mouthparts:

**SPONGING**
Types of insects with sponging mouthparts:

**PIERCING-SUCKING**
Types of insects with piercing-sucking mouthparts:

**SIPHONING**
Types of insects with siphoning mouthparts:

**RASPING-SUCKING**
Types of insects with rasping-sucking mouthparts:

- Jaw or mandible
- Sponging part
- Beak
- Proboscis
- Proboscis and rasping mandibles
Good, Bad, Beautiful

Incomplete Metamorphosis

Nymphs

Egg

Adult
Complete Metamorphosis

- Egg
- Larvae
- Pupa
- Adult
Good, Bad, Beautiful

WANTED

DEAD OR GONE!

Name: __________________________ Distinguishing features: __________________________

Crime: __________________________
The Good Guys

• **Ladybird beetle**: adult feeds on aphids, mites, and other soft-bodied insects.

(Wayne Bailey photo)

• **Ladybird beetle larvae**: also feeds on aphids, mites, and other soft-bodied insects.

(Wayne Bailey photo)

• **Green lacewing adult**: feeds on nectar, pollen, and honeydew.

(Lee Jenkins photo)

• **Green lacewing larvae**: feeds on mites, aphids, hornworms, mealybugs, whiteflies, and psyllids.

(source unknown)

• **Honeybees**: the primary insects that pollinate flowers, fruits, and vegetables.

(Lee Jenkins photo)

• **Praying mantis**: feeds on any insect it is capable of catching.

(Lee Jenkins photo)

• **Spined soldier bugs**: attack many harmful insects including corn earworm, cucumber beetles, and Mexican bean beetle.

(source unknown)

• **Assassin bugs**: attack many harmful insects including caterpillars and beetles.

(Lee Jenkins photo)

• **Butterflies and moths**: important pollinators of flowers, fruits, and vegetables.

(Lee Jenkins photo)

• **Flower flies**: important pollinators of flowers, fruits, and vegetables.

(Lee Jenkins photo)
The Bad Guys

• Tobacco hornworm: feeds on eggplant, pepper, potato, tobacco, and tomato.

• Corn earworm: feeds on tobacco, tomato, geranium, impatiens, marigolds, and petunias.

• Flea beetles: chew leaves of many garden vegetables, black-eyed Susan and marigolds.

• Mexican bean beetle: feeds on most varieties of bean plants.

• Striped cucumber beetles: feed on cucumber, cantaloupe, muskmelon, and squash.

• Spotted cucumber beetles: feed on cucumber, cantaloupe, muskmelon, squash, corn, and ornamentals.

• Squash bug: feeds on cucumber, gourd, melon, pumpkin, and squash.

• Stinkbug: feeds on vegetables, fruits, and nuts including beans, broccoli, cabbage, corn, peaches, strawberries, and tomato.

• Aphids: feed on a wide range of plants including shrubs, trees, fruit, vegetables, and ornamentals.

• Leafhoppers: primarily affect bean, beet, carrot, grape, potato, roses, and apples.
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
Fix It, Doc!

**Defining the problem**

What type of plant is this?

What does the normal condition of the plant look like?

What is abnormal about this plant? List any signs or symptoms that you observe.

Examine the entire plant and those around it. Where did the initial damage occur?

**Finding patterns**

Is the abnormality scattered on one or only a few plants?  
If so, the problem is likely caused by living factors.

- Yes  
- No

Is the abnormality visible on several different types of plants in the area?  
If so, the problem is likely caused by non-living factors.

- Yes  
- No

**Development or spread of the damage**

Is there a progressive spread of the abnormality on one plant, nearby plants over time?  
If so, the problem is likely caused by a living organism.

- Yes  
- No

Did the abnormality appear to happen at one time (not spread progressively) and is there a clear boundary between damaged and undamaged tissues?  
If so, the problem is likely caused by a nonliving factor.

- Yes  
- No
Fix It, Doc! (continued)

*Determining the cause of the abnormality*

Was the abnormality caused by a living organism?

- [ ] Yes  
  - [x] No

Do you see symptoms or signs of pathogens?

- [ ] Yes
  - [ ] No

Do you see symptoms or signs of insects, mites, or other animals?

- [ ] Yes
  - [ ] No

*Was the abnormality caused by a nonliving factor?*

Do you see any evidence of mechanical injury (breakage or wounds from a hoe)?

- [ ] Yes
  - [ ] No

Could the damage be caused by temperature, light, moisture, or oxygen extremes?

- [ ] Yes
  - [ ] No

Could the damage be caused by a misapplied pesticide, a pollutant, or a nutritional disorder?

- [ ] Yes
  - [ ] No

My diagnosis of the abnormality is:

__________________________________________________________________________

__________________________________________________________________________

I recommend treating the problem in the following way:

__________________________________________________________________________

__________________________________________________________________________
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
**The Heat Index**

### How Hot are Your Peppers?

<table>
<thead>
<tr>
<th>Name</th>
<th>Scoville Heat Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Capsaicin</td>
<td>16,000,000</td>
</tr>
<tr>
<td>Habanero</td>
<td>100,000 to 300,000</td>
</tr>
<tr>
<td>Scotch Bonnet</td>
<td>100,000 to 250,000</td>
</tr>
<tr>
<td>Jamaican Hot</td>
<td>100,000 to 200,000</td>
</tr>
<tr>
<td>Thai</td>
<td>50,000 to 100,000</td>
</tr>
<tr>
<td>Cayenne</td>
<td>30,000 to 50,000</td>
</tr>
<tr>
<td>Serrano</td>
<td>10,000 to 23,000</td>
</tr>
<tr>
<td>Wax</td>
<td>5,000 to 10,000</td>
</tr>
<tr>
<td>Jalapeno</td>
<td>2,500 to 5,000</td>
</tr>
<tr>
<td>Rocotillo</td>
<td>1,500 to 2,500</td>
</tr>
<tr>
<td>Anaheim</td>
<td>1,000 to 1,500</td>
</tr>
<tr>
<td>New Mexico</td>
<td>500 to 1,000</td>
</tr>
<tr>
<td>Pepperoncini</td>
<td>100 to 500</td>
</tr>
<tr>
<td>Bell Pepper</td>
<td>0</td>
</tr>
</tbody>
</table>

**Where's the Heat?**

- **Stem**
- **Placenta**
- **Seeds**
- **Fruit wall**
Salsa Recipe

Salsa to Go

1 lb. fresh tomatoes
1 8-oz. can tomato sauce
½ to ¾ onion
1 clove garlic
1 to 2 jalapeno peppers

Chop and mix ingredients.
Store in refrigerator.

Salsa for the Masses

6 lbs. peeled tomatoes
6 Tbsp. of jalapeno peppers (sliced)
1 Tbsp. garlic powder
3 tsp. salt
1 white onion

You can simmer this on the stove for 30 minutes to an hour.
Then pour into blender and blend to desired consistency.
Or pour directly into blender, chop, and serve.

Store in refrigerator.
Word Search

Hot or Not?

Circle the following words contained in the puzzle:

CAPSAICIN  CHOCOLATE  NUTRITIOUS  JALAPENO  PUNGENT
HABANERO  BANANA  CAYENNE  PIMIENTO  VITAMIN C
FRESH  CHERRY  HOT  CHILI  PLACENTA
GREEN  RED  YELLOW  BELL  PEPPER
SEED  CRISP  SCOVILLE  ORANGE  MILK

V A B W O L L E Y C H C
O R A N G E W O E H N R
S C N T M J F R B I U I
E T A L O C O H C L T S
L V N O D H R I A I R P
L B A E T E A V Y U I A
I H E L P S I A E P T T
V S J P P T H C N U I N
O P E A A I D S N NO E
C P C M L L M R E G U C
S M I L K A L I R R S A
T N E G N U P E E J F L
C H E R R Y E E B N O P
G R E O T N M S N B T C
H D H A B A N E R O P O
My Garden Notes

Today I learned:


General observations:


Daily checklist:
To Pick, or Not to Pick

We harvest these crops when:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td>• Pods are firm, crisp and not wrinkled.</td>
</tr>
<tr>
<td></td>
<td>• Seeds are not bulging.</td>
</tr>
<tr>
<td>Corn</td>
<td>• Ears of corn are well-filled with dark green husks and brown silks.</td>
</tr>
<tr>
<td></td>
<td>• Kernels have milky fluid when punctured with a fingernail.</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>• Any stage before they turn yellow.</td>
</tr>
<tr>
<td></td>
<td>• Small cucumbers are generally used for pickles.</td>
</tr>
<tr>
<td></td>
<td>• Larger ones (less than 8 inches) are for slicing.</td>
</tr>
<tr>
<td>Okra</td>
<td>• Pods are 2-3 inches long. Okra gets tough and woody quickly.</td>
</tr>
<tr>
<td></td>
<td>• Short hairs on the pods can irritate bare skin.</td>
</tr>
<tr>
<td></td>
<td>• A knife is useful to cut the pods off the plant.</td>
</tr>
<tr>
<td>Onions</td>
<td>• Green onions are ready for harvest at any size.</td>
</tr>
<tr>
<td></td>
<td>• Bulb onions are harvested when the tops fall over and are yellowish.</td>
</tr>
<tr>
<td></td>
<td>• After digging bulb onions, leave them out in the sun to dry for a few days</td>
</tr>
<tr>
<td></td>
<td>to toughen the skin.</td>
</tr>
<tr>
<td>Peppers</td>
<td>• Any size while they are firm, crisp, and unwrinkled.</td>
</tr>
<tr>
<td></td>
<td>• Leave them on the plant to mature and develop a color.</td>
</tr>
<tr>
<td></td>
<td>• Use rubber gloves when harvesting hot peppers to protect skin from irritation.</td>
</tr>
<tr>
<td>Summer Squash</td>
<td>• Squash is 6 to 8 inches long.</td>
</tr>
<tr>
<td></td>
<td>• Pick often as they grow quickly in hot weather.</td>
</tr>
<tr>
<td></td>
<td>• If squash gets too big, it is tough and seedy, but can be grated for</td>
</tr>
<tr>
<td></td>
<td>baked breads.</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>• Fruit are firm with some color.</td>
</tr>
<tr>
<td></td>
<td>• They have the best flavor when they fully develop color on the plant.</td>
</tr>
</tbody>
</table>

Answer these questions:

1. Which vegetables were too big today?

2. Which vegetables need to be harvested often so they don’t get too large?

3. What happened when tomatoes were frozen?
My Garden Notes

Date and time:

Today I learned:

---

General observations:

---

Daily checklist:
What’s it Worth?

<table>
<thead>
<tr>
<th>Produce Item</th>
<th>Price of Produce Item</th>
<th>Weight of Produce Item</th>
<th>Price X Weight</th>
<th>Value of Produce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total weight: __________ Total value: __________
My Garden Notes

Date and time:

Today I learned:

General observations:

Daily checklist:
## Trading Traits

### Developing a Better Plant

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Possible Advantages</th>
<th>Possible Disadvantages</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection</td>
<td>Save seeds with the traits wanted to plant the next season.</td>
<td>• Low labor and cost.</td>
<td>• The plants are less uniform.</td>
<td>Seed from self-pollinated vegetables (tomatoes, peppers, beans, etc.).</td>
</tr>
<tr>
<td>Plant Breeding</td>
<td>Transfer of pollen to get different traits.</td>
<td>• May get the result you want faster.</td>
<td>• Some good traits may be lost.</td>
<td>Most of the varieties of plants listed in seed catalogs.</td>
</tr>
<tr>
<td>Mutation</td>
<td>A change in a gene or a group of genes that can be passed on to offspring.</td>
<td>• May get plants with useful traits.</td>
<td>• Results may be unpredictable.</td>
<td>Potatoes, apples, nectarines, thornless blackberries, several plants.</td>
</tr>
<tr>
<td>Genetic Engineering</td>
<td>Transfer of genes from one organism to another without harming the environment.</td>
<td>• May produce a safer or more nutritious food</td>
<td>• May not always be successful.</td>
<td>FlavrSavr tomato.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• May not always be successful.</td>
<td>• Controversial.</td>
<td>Bt corn or potato.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Roundup Ready soybeans.</td>
</tr>
</tbody>
</table>
Super-Dooper Veggie

You are a scientist who is developing a new variety of a crop with new and different traits. Your goal is to create a crop that will be easy to grow, harvest, pack and ship, plus it will be something that kids will want to eat!

Select a vegetable of your choice and think about why this vegetable needs to be improved. Assume that you can include traits from any other organism to create your new crop. List the qualities you want your vegetable to have and where you might find each quality (what other fruit, vegetable, or other organism).

What is the name of your new vegetable?

What are the traits of your new vegetable? (size, shape, color, smell, texture, etc.)

Where and how does it grow?

What improvements will be made for harvesting, shipping and storage?

How will it resist diseases and insects?

Describe the nutrients in your “super veggie”
Trading Traits

My Super-Dooper Veggie
My Garden Notes

Today I learned:

General observations:

Daily checklist:
Help is on its Way!

Draw a Scientist
A Method to this Madness!

What is the “scientific method,” and why do scientists use it?

Name the steps of the scientific method, and explain each step.

Step 1.

Step 2.

Step 3.

Step 4.
Help is on its Way!

Draw You as a Scientist
My Garden Notes

Today I learned:

General observations:

Daily checklist:
### Garden ’n Grow

#### Harvest Record

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Weight/Quantity</th>
<th>Date Harvested</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Harvest Record

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Weight/Quantity</th>
<th>Date Harvested</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable</td>
<td>Weight/Quantity</td>
<td>Date Harvested</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>