# Week 3: Gardening Essentials: From Sunlight to Systems

## Objectives

* Understand the importance and differences of watering and irrigation methods for plant health.
* Identify the pros and cons of various watering and irrigation techniques.
* Recognize and describe the use of common gardening tools.
* Differentiate between common types of soil and their characteristics.
* Explore urban farming techniques and their advantages.
* Discuss the role of light in plant growth and identify plants' light preferences.

## Handouts

* Garden Journal Week 3

## Outline

### **What Farming and Gardening Looks Like**

***Handouts and Video***

* [An Urban Farmer Fights for Food Justice | Women Entrepreneurs](https://www.youtube.com/watch?v=TybSy4lYXcw&ab_channel=TheStoryExchange)

### Watering and Irrigation: Ensuring Plant Health

#### Overview of Watering and Irrigation Methods

Watering and irrigation techniques are foundational to successful gardening and farming. Choosing the right method can significantly impact plant health, resource management, and yield. Here's a concise breakdown of the prevalent types:

1. Hand Watering

* **Description:** Traditional method using a watering can or hose.
* **Pros:** Precise control; ideal for small gardens or pots.
* **Cons:** Time-intensive; less efficient for larger areas.

2. Drip Irrigation

* **Description:** Tubes and emitters delivering water directly to plant bases.
* **Pros:** Efficient; excellent for water-scarce regions.
* **Cons:** Initial cost; requires maintenance.

3. Soaker Hoses

* **Description:** Hoses that release water along their length.
* **Pros:** Even watering; great for elongated garden beds.
* **Cons:** Less precision than drip systems.

4. Sprinkler Irrigation

* **Description:** Mimics rainfall by spraying water overhead.
* **Pros:** Covers vast areas; easy setup.
* **Cons:** Potential for evaporation; unsuitable for plants that need dry foliage.

5. Surface Irrigation

* **Description:** Direct application on soil; includes furrow or flood methods.
* **Pros:** Versatile for diverse crops and soils.
* **Cons:** Risk of waterlogging in poorly drained areas.

6. Subsurface Irrigation

* **Description:** Delivers water beneath the soil.
* **Pros:** Minimizes evaporation; ideal for dry regions.
* **Cons:** Expensive setup; maintenance necessary.

Selecting the right watering or irrigation method is crucial to cater to your plants' specific needs and to adapt to environmental conditions. Evaluating the pros and cons of each method will guide you to make an informed choice.

### Common tools used in gardening

Gardening requires a combination of patience, knowledge, and the right tools. Whether you're a beginner or a seasoned gardener, having the right tools can make all the difference in the ease and enjoyment of your gardening experience. Here's a list of some of the most common gardening tools and their uses:

1. Hand Trowel

* **Description:** A small handheld tool with a pointed, scoop-shaped metal blade.
* **Use:** Ideal for transplanting bedding plants, herbs, and vegetables.

2. Pruning Shears

* **Description:** Handheld cutting tools specifically designed for plants.
* **Use:** Pruning plants, cutting off dead or excess growth, and shaping plants.

3. Garden Rake

* **Description:** A rake with strong, short teeth.
* **Use:** Leveling soil, removing debris, and breaking up hard soils.

4. Garden Hoe

* **Description:** A long-handled tool with a flat blade on one end.
* **Use:** Weeding and breaking up soil.

5. Spade

* **Description:** A long-handled tool with a flat, rectangular metal blade.
* **Use:** Digging holes, edging, lifting sod, and moving small amounts of soil.

6. Garden Fork

* **Description:** Looks like a pitchfork but has shorter, thicker tines.
* **Use:** Loosening, lifting, and turning over soil in gardens.

7. Watering Can

* **Description:** A container with a spout used to water plants.
* **Use:** Providing controlled watering to plants, especially when they're young or potted.

8. Garden Gloves

* **Description:** Protective gloves made from various materials.
* **Use:** Protecting hands from thorns, splinters, and dirt while gardening.

9. Wheelbarrow

* **Description:** A cart with a single wheel at the front, used to transport materials.
* **Use:** Carrying soil, compost, plants, and other garden supplies.

10. Garden Hose with Adjustable Nozzle

* **Description:** A flexible tube used to convey water.
* **Use:** Watering plants, especially in large gardens or lawns.

11. Garden Knife

* **Description:** A versatile tool that's part knife, part saw.
* **Use:** Weeding, transplanting, digging, and pruning.

***Handouts and Video***

* [All The Essential Tools You Need In Your Garden Shed](https://youtu.be/DiTnZ55hqAc?si=KfPgxIOdGoSzZU2_)

### Common Types of Soil

Soil is a complex mixture of minerals, organic matter, water, and air. Understanding the type of soil in your garden can greatly impact plant health and growth. Here are some common types of soil and their characteristics:

1. Sandy Soil

* **Texture:** Coarse, gritty.
* **Drainage:** Drains quickly.
* **Nutrient Content:** Low; nutrients wash out easily due to fast drainage.
* **Planting Tips:** Often needs organic matter to improve nutrient and water retention.

2. Silt Soil

* **Texture:** Smooth, feels floury when dry and slippery when wet.
* **Drainage:** Moderate.
* **Nutrient Content:** High; holds more nutrients than sandy soil.
* **Planting Tips:** Prone to compaction; may need aeration.

3. Clay Soil

* **Texture:** Sticky when wet; hard when dry.
* **Drainage:** Slow; can lead to waterlogged conditions.
* **Nutrient Content:** High; but slow drainage can make it hard for plant roots to access them.
* **Planting Tips:** Often requires amendment with organic matter to improve drainage.

4. Loamy Soil

* **Texture:** Combination of sand, silt, and clay; crumbly.
* **Drainage:** Well-draining.
* **Nutrient Content:** High; considered the ideal garden soil.
* **Planting Tips:** Needs less amendment; supports most plants well.

5. Peaty Soil

* **Texture:** Dark, spongy due to high organic matter.
* **Drainage:** Retains water well, but can drain quickly once saturated.
* **Nutrient Content:** High, but may be acidic.
* **Planting Tips:** Often needs lime to balance pH; retains water well which can be beneficial in dry areas.

6. Saline Soil

* **Texture:** Varies; presence of salt is the defining characteristic.
* **Drainage:** Varies.
* **Nutrient Content:** Can be nutrient-rich but high salt content can be harmful to plants.
* **Planting Tips:** Requires good drainage and sometimes gypsum amendments to reduce salinity.

7. Chalky Soil

* **Texture:** Often stony.
* **Drainage:** Well-draining.
* **Nutrient Content:** Alkaline with variable nutrient levels; often deficient in certain minerals.
* **Planting Tips:** Might need organic matter and specific fertilizers to balance nutrient content.

***Handouts and Video***

* [Types of Soil in your Garden - Great Lawns Made Simple](https://youtu.be/RhxxoEZWCLY?si=bCQ1q6tHlhq2-gd1)

### Urban Farming: Common Systems Explored

#### Container Gardens

* **Definition**: Growing plants in various container types, from pots to barrels.
* **Advantages**:
  + Ideal for locations with limited ground space or poor soil.
  + Suitable for diverse plants, including vegetables, herbs, and flowers.
  + Flexibility to relocate for optimal sunlight or weather conditions.

#### Raised Beds

* **Definition**: Growing plants in elevated soil, typically framed.
* **Advantages**:
  + Enhanced drainage, soil quality control, and maintenance ease.
  + A solution for areas with poor native soil or water-logging concerns.
  + Can be designed for wheelchair accessibility.

#### Passive Hydroponic Systems

* **Definition**: Soil-less cultivation where plants receive nutrients through a water-based solution.
* **Advantages**:
  + Consumes less water than traditional methods.
  + No need for weeding.
  + Suitable for schools seeking an innovative teaching approach or maximizing indoor space yield.
  + A gateway to teaching sustainable agriculture techniques.

***Handouts and Video***

* [Growing Food in Urban Small Spaces - Urban Gardening](https://www.youtube.com/watch?v=-qI0F9kT9Zs&pp=ygUeZGlmZmVyZW50IHR5cGVzIG9mIHVyYmFuIGZhcm1z)

### Lighting in Plant Growth

Light is pivotal for plant development and vitality. Beyond just offering illumination, the correct intensity and quality of light are paramount. Let's delve into its significance and how much plants generally prefer:

#### The Role of Light in Key Plant Processes

1. **Photosynthesis**
   * **Description:** The mechanism by which plants transform light energy into sugars.
   * **Significance:** Fuels plant growth by providing necessary energy and nutrients.
2. **Photoperiodism**
   * **Description:** Plants' physiological reactions to day length, influencing flowering times.
   * **Significance:** Enables gardeners to optimize plant growth and yield by controlling light exposure.
3. **Phototropism**
   * **Description:** Plants grow directionally in response to light.
   * **Significance:** Ensures plants receive maximum light exposure, crucial for photosynthesis.
4. **Color Spectrum**
   * **Description:** Plants utilize different light wavelengths for diverse growth stages.
   * **Significance:** Recognizing this assists in adjusting artificial lighting for optimal plant growth.

#### Plant Light Preferences

Different plants have unique light needs, commonly grouped as:

1. **Full Sun**
   * **Duration:** 6+ hours of direct sunlight daily.
   * **Examples:** Most vegetables, roses, and numerous flowers.
2. **Partial Sun/Shade**
   * **Duration:** 3-6 hours of direct sunlight daily.
   * **Examples:** Impatiens, begonias, hostas.
3. **Full Shade**
   * **Duration:** Fewer than 3 hours of direct sunlight daily.
   * **Examples:** Ferns, mosses, and some woodland species.
4. **Dappled Sun**
   * **Duration:** Filtered light all day, often beneath trees.
   * **Examples:** Various woodland species and ground covers.

## Garden Journal 3: Water, Tools, and Soil Magic

**Objective:** Recognize the essential role of water, appreciate the various gardening tools, and understand the diverse types of soil.

**Duration:** 15 to 20 minutes

**Instructions**:

1. **Reflection**: Start by thinking about a time when you watered a plant. How did it make the plant feel? What tools, if any, did you use?
2. **Observation**: Look at the different watering methods and tools provided in the lesson today. Which method or tool do you find the most fascinating and why?
3. **Journal Entry**:
   * Draw or illustrate one watering method or tool that you find interesting.
   * Write a few sentences about why you chose it and how you think it benefits plants.
   * Next, think about the soils you learned about. Which type of soil would you prefer for your garden and why?
   * Sketch the texture of that soil or something you might grow in it.
4. **Personal Connection**: Think about a tool you use in your daily life, not related to gardening. How does it help you? Can you imagine a garden equivalent?

**Class Sharing**: After journaling, volunteers can share their illustrations and thoughts on the watering methods, tools, and soil they chose.

***Handouts and Video***

* *Share and Discuss "Garden Journal Entry 3"*

## Activity 1: Growing Microgreens

1. **Prepare the Soil Mix:**
   * Fill a 1-gallon jug with water and add half the recommended amount of water-soluble fertilizer (microgreens require less fertilizer).
   * Mix this fertilizer water with dry coco coir until the coir is fully moistened.
2. **Setup the Container:**
   * Fill your container 2/3 full with the prepared moistened coco coir soil.
3. **Sowing the Seeds:**
   * Evenly spread the microgreen seeds across the soil. Ensure they cover the soil but aren’t piled on top of one another.
   * Gently cover the seeds with a thin layer of the moistened coco coir soil.
4. **Watering and Fertilization:**
   * Ensure the bottom basin is filled with water. The self-wicking system will draw water up to the microgreens, providing consistent moisture.
   * Regularly check the basin to ensure it doesn't run dry and refill as necessary.
5. **Light Requirements:**
   * Place the container in a location that receives 8-12 hours of sunlight daily. If using artificial grow lights, ensure they are on for this duration.
6. **Monitor Growth:**
   * Watch for your microgreens to sprout and grow. They will typically be ready for harvest when they reach 3-4 inches in height, usually between 14-21 days.
7. **Harvesting:**
   * Using gardening scissors or shears, cut the microgreens close to the soil line. Do not pull out the root system.
   * Microgreens can be harvested only once.
8. **Post-Harvest:**
   * Compost the remaining plant material and soil. If composting isn't an option, discard them appropriately.

## Note:

Microgreens are a great source of nutrients and can be easily grown indoors or outdoors. Keep an eye out for any signs of disease or pests and take action accordingly.

## Activity 2: Laying the Groundwork for Week 4 Journal

For the impending Week 4 journal entry, students will delve deep into understanding the myriad challenges garden plants confront. A hands-on experience awaits them with this preparatory activity:

**Activity Set-Up**: Secure a head of lettuce and position it outdoors in your designated gardening spot for an entire week.

**Expected Outcomes**: It's anticipated that the lettuce may become a magnet for pests, undergo leaf desiccation, or bear signs of insect-induced wear and tear, reflecting the authentic challenges garden plants regularly contend with.

**Purpose**: This exercise is fashioned to offer students an immersive learning experience, highlighting everyday plant adversities. Observations gleaned from this activity are designed to add richness and nuance to their Week 4 journal reflections.

## Materials

* Small container with self-wicking system
* Coco coir soil
* Microgreen seed mix
* 1-gallon jug
* Water-soluble fertilizer
* Basin (to store water)
* Sunlight or artificial grow lights
* Gardening scissors or shears