Container Gardening

Introduction

Though used commonly for ornamentals and perennials, using containers to growing vegetables is an effective way of increasing garden space and food production in urban situations. Container gardening is an excellent option for gardeners who have poor soil, or not enough space or time for a larger garden. These miniature, but productive gardens can be located in a household plot, on concrete, steps, and even on a balcony. Edible crops can also be grown in window boxes and hanging baskets.

When starting a container garden, grow vegetables that take up little space, such as carrots, radishes and lettuce, or crops that bear fruits over a period of time, such as tomatoes and peppers. If possible, select cultivars specifically bred for container culture, which are not necessarily miniature or dwarf and may produce as well as standard types.

Learning Objective

Introduce participants to the fundamental principles of container gardening, including the many alternatives and the flexibility this approach offers.

Learning Outcomes

- Participants will suggest and implement appropriate container gardening methods
- Participants will be able to properly manage and teach about different aspects of growing vegetables in containers

Materials

- flipchart or blackboard
- chalk or markers
- A selection of containers for planting - clay pots, plastic and metal containers, such as buckets, plastic bottles, or plastic crates, jute or plastic sacks, old tires
- shading net – burlap or covering cloth
- drip irrigation piping
- cement bricks (the kind with two holes)
Potting mixes are often preferred for container plants because regular soil tends to compact more easily in containers, especially if it is heavy and rich in clay. This opens the door to some experimentation, since in our conditions we have to prepare our own soil mix.

- drill with appropriate drilling bits
- clippers
- sand, soil and compost
- seeds and/or seedlings
- watering can
- water
- mulch

Lecture Notes and Lesson Plan

Discuss the following questions:

- What types of plants have you seen grown in pots or containers?
- What different and/or unusual types of containers have you seen used?
- Has anybody tried to grow vegetables in containers?

Recall the unit about starting seedlings:

- What are the advantages of starting seedlings in containers, rather than in the ground? (Some possible answers: containers can be moved, kept indoors when necessary, or under protective structures.)

Though plants are only temporarily in containers when seeds are started, the technique used is to grow plants to maturity in containers is the same.

Growing vegetables in containers

Discuss advantages of using containers to grow vegetable plants:

- Rescue plants during cold periods (i.e. some plants can be potted for winter)
- Start the growing season earlier (indoors or under protective structures)
- Add height, variety and texture to the garden (with the use of vertical supports for climbing plants and with the combination of different species in the same container)
- Increase growing capacity when space or soil is scarce and/or garden surfaces are otherwise unproductive. Adopting container growing strategies will expand the amount of vegetable possible to grow. Cemented areas, roofs, steps, walls, etc. can be used to grow.
- Control of soil quality – Some plants may have very specific soil requirements. This is rare with vegetables but more important with ornamentals and herbs.
- Prevent Soil-borne pathogens, which can compromise and hinder some crops. While crop rotation and other interventions can be implemented for in ground soil, it is possible to grow the potentially affected crop in containers and prevent the disease by using a clean/sanitized soil and clean containers.

Review steps of preparing containers for planting.

1. Drill or punch holes in the bottom for drainage. Good drainage is important.
2. Line containers with burlap or shading net to cover big openings, especially plastic crates, structures made with chicken wire or metal meshes
3. Use soil mixed with sand and compost to obtain a light and fine substrate with good drainage and water retention properties, rich in nutrients.
4. Fill containers leaving some room on top for watering and mulching
• When the garden soil is degraded, compacted, or disturbed and needs time to be reconditioned and recovered, container gardening provides a temporary bridge until the original soil is improved and ready to support crops again.

• Weeds - Controlling the soil mix means also fewer weeds should be present.

• Containers allow for easier harvest and collection of seeds. They can prove very useful when planning to produce our own seed, because we have easier access and better control on the flowers (i.e., manual pollination, flower isolation and bagging etc.).

_The following section provides guidelines on all aspects of container gardening. Use accompanying slides or photos to help teach._

**What to grow**

Many species adapt well to containers including herbs and flowers, green ornamentals and succulents. We are particularly interested in vegetables.

• Just about any vegetable or herb! Some of the more popular container crops are salad greens, peppers, eggplant, tomatoes, beans, chard, sugar beets, radish, squash and cucumbers.

• More challenging crops include melons, corn, potatoes, and sweet potatoes. But don’t be afraid to experiment!

**Choosing and preparing containers**

Clay, wood, plastic, and metal are all suitable materials. Containers for vegetable plants must (1) be of adequate size to support fully grown plants, (2) hold soil without spilling, (3) have adequate drainage, and (4) have held only non-toxic materials. Consider using barrels, flower pots, cut-off plastic jugs, window boxes, baskets lined with plastic (with drainage holes punched in it), or even pieces of drainage pipe or cinder block. Wood for use around plants should never be treated with wood preservatives. These may be toxic to plants and harmful to people as well.

<table>
<thead>
<tr>
<th>Plants that grow well in containers</th>
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<tbody>
<tr>
<td><strong>Vegetables</strong></td>
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<tr>
<td>Beans, Bush</td>
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<td>Beets</td>
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<td>Cabbage</td>
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<td>Carrots</td>
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<td>Chrysanthemum</td>
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<td>Anise</td>
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<td>Basil</td>
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<td>Borage</td>
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<td>Chives</td>
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<td>Cilantro/Coriander</td>
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<td><strong>Bulbs</strong></td>
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<td>Begonia</td>
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<td>Crocus</td>
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<td>Daffodil</td>
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From Planet Natural
**Types of containers**

- Food-grade, plastic buckets
- Other types of larger plastic containers. Avoid plastic containers that held petroleum products, chemicals, or manure.
- All containers should have holes or slats in the bottom to allow water to drain out.
- Dark colors will create higher temperatures that could injure young tender roots and prevent the full development of a plant’s root system; however for early spring germination this can be helpful.
- Containers made from porous materials (clay, ceramic, concrete, and wood) will dry out more quickly than plastic or metal containers.

It is very important to use the appropriate size of container for each plant. Keep in mind the growing characteristics of each plant, its root system and general dimensions. For annual plants, as vegetables often are, slightly smaller than optimal containers will “force” the cycle. The moderate stress imposed on the plant will cause it to start flowering and producing earlier; however the size of the mature plant will be smaller. We can use this to our advantage - While plants may be less productive, we can achieve a harvest if we planted later in the season or even an additional harvest.

**General Guidelines for selecting container size:**

- Recommended **media** depth (it’s useful to consider both the depth and total volume of your containers):
  - **10-15 cm**: salad greens, mustard greens, garlic, radish, basil, cilantro/coriander, thyme, mint, and marjoram. (Salad greens and some herbs have shallow, fibrous root systems and are well-suited to shallow containers with a large surface area).
  - **20-30 cm**: beans, beets, chard, carrots, chard, cabbage, pepper, eggplant, tomato, squash, rosemary, parsley, lavender, and fennel.
- Required pot volume:
  - **4-12 liters**: herbs, green onions, radishes, onion, chard, pepper, dwarf tomato or cucumber, basil.
  - **16-20 liters**: full-size tomato, cucumber, eggplant, beans, peas, cabbage, and broccoli.

Containers need to be cleaned and sanitized as well, especially if recycled. Soak in a 1:10 commercial bleach dilution and vigorously brush to eliminate soil crust and residues of previous vegetation (See fact sheet XX for complete instructions)

**Growing in containers**

**Temperature**: Plants prefer temperatures between 12.5 and 25° C. Light-colored containers help reduce heat absorption and keep roots cool in hot seasons. During winter months, darker containers can keep roots warmer. Without the insulating effect of the earth around them, the roots of container plants will become hotter or colder more quickly. It might be necessary to shade the containers. Containers can also be grouped to shade each other.
Water: Containers need careful water management because their soil mix tends to retain less water than garden soil and because there is less soil mass to hold water. As a result, plants in containers generally need more frequent watering compared to plants in the ground. Watering needs will vary depending on container size, crops, air temperature, wind, sunlight, and humidity. Higher temperatures cause the soil to dry faster, especially when placed on a concrete patio or in full sun. Daily or twice-daily watering may be necessary.

Guidelines for watering
- Apply water until it runs out the drainage holes.
- The growing medium should always be moist, but not soggy. The soil should NOT have water standing on top of it. When the weather is cool, container plants may be subject to root rot if kept too wet.
- Early morning and late afternoon are the best times to water to decrease evaporation losses.
- Alternatively, containers can be easily set up with drip irrigation.
- Adding mulch helps maintain water content and reduce evaporation losses.
- Use a watering can or nozzle on the end of a hose that produces a soft stream of water. Be careful not to use hot water! It can burn leaves and young roots.
- Drought stress will kill feeder roots and slow plants down. Eating quality and harvest will be greatly reduced if plants are allowed to wilt due to a lack of water.
- Place a saucer under containers to catch excess water and nutrients. Re-use the water.
- Large, mature plants need more water than seedlings and young plants. Small containers dry out more quickly than large containers.

- If the soil appears to be getting excessively dry (plants wilting every day is one sign), group the containers together so that the foliage creates a canopy to help shade the soil and keep it cool.
- On a hot patio, consider putting containers on pallets or other structures that will allow air movement beneath the pots and prevent direct contact with the cement.

Fertilizer: Soil nutrients in containers tend to leach easily due to frequent watering and loss of water from the container. Regardless of the growing media used you will need to fertilize plants regularly. Pay attention to any sign of deficiencies. Compost contains plant nutrients, but not enough for good plant growth. Fertilizing solutions (such as fertilizing teas) made from compost, worm castings or other organic sources are crucial for providing balanced nutrition to container plants.

Appropriately diluted fertilizers can be administered regularly every other week, which will not cause burning damages and will provide adequate amounts of nutrient for the plant. The fertilizer can be organic or synthetic, and it should contain the major nutrients - nitrogen, phosphorous, and potassium. Nitrogen, in particular, is required in large quantities by vegetable crops and is easily lost in the water that drains from the bottom of your containers. Container plants do not have the buffer of large volumes of soil and humus to protect them from over-fertilization.

Guidelines for fertilizing
The questions “how much” and “how often” to fertilize depend on many factors, including type of fertilizer, plant needs, type of container, etc.:
• Even “quick” crops like leaf lettuce that mature in 35-45 days should be fertilized once or twice.
• Long-season crops like tomato, cucumber, eggplant, and pepper may need to be lightly fertilized every 2 weeks or so, to produce a continuous harvest.
• Soluble fertilizers in liquid or powder form are very convenient and effective because the nutrients are immediately available. They are mixed with water and poured around plants according to label directions. Look for a fertilizer with nitrogen, phosphorous, and potassium (N-P-K).
• Many non-organic fertilizers are available for container gardening. They are usually either fast-acting soluble “plant foods” that are mixed with water, or pelletized slow-release fertilizers that are relatively expensive but can provide nutrients for 2-4 months.
• Liquid sea kelp, fish fertilizer, and compost tea are excellent organic fertilizers that you mix with water and apply around plants.
• Blood meal, composted chicken manure, nitrate of soda, and cottonseed meal are all dry organic fertilizers that you can mix into growing media at planting and re-apply as needed.
• Compost, either commercial or backyard, has a pH of 6.8-7.5 (a soil pH of 6.2-7.2 is a good range for most vegetable plants.)
• Don’t fertilize with animal manure unless it has been properly composted. The compost pile temperature needs to reach at least 55 degrees C. for three consecutive days to effectively kill pathogens.

• NOTE: never add lime, wood ashes, or gypsum to any commercial growing media or compost. Lime is already added to commercial soil-less mixes.

### Soil or Growing Media:
Your container plants will grow best in a light, fluffy, growing medium that drains well. Soil-less mixes (containing peat moss, perlite and vermiculite) are excellent, but if the container is small and lightweight, a strong wind can blow plants over. Soil-less mixes are sterile and contain few nutrients, so you must add fertilizer to the container during the growing season.

Growing medium has three main functions: (1) supply roots with nutrients, air, and water, (2) allow for maximum root growth, and (3) physically support the plant.

Roots grow in the spaces between individual particles of soil. Air and water also travel through these pore spaces. Water is the medium that carries nutrients that plants need to fuel their growth, and air is needed for root growth and the health of soil microorganisms that help supply plants with water and nutrients.

Irrigation water moves through the pore spaces, pushing out the air. If excess water cannot drain away, fresh air cannot enter and roots will suffocate.

Some good media mixtures for container vegetables:
• 100% compost
• 100% soil-less mix
• 25% garden soil + 75% compost
• 25% soil-less mix + 25% garden soil + 50% compost
• 25% garden soil + 75% soil-less mix
• 50% soil-less mix + 50% compost

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**Making compost tea:**
Place 2 to 4 liters of compost (such as worm castings) tied up in screen material (like a tea bag) and suspend for 12-24 hours in 16 liters of water. Then dilute the tea with water and apply to root system.
Sunlight: The amount of sunlight that your container garden spot receives may determine which crops can be grown. Southern and western exposures will be the sunniest and warmest, while northern and eastern exposures will be shadier and cooler. You’ll need **6-8 hours of direct sun** for warm-season crops (tomato, pepper, eggplant, squash) and **3-5 hours of direct sun** for cool-season crops (lettuce, spinach, Asian greens). Easy access to water is crucial. Some containers will need watering every day when the weather is hot and dry.

Follow up activities

Divide the students in group. Assign each group a specific task for construction and assembly of a container, including filling it with soil mix and sowing/planting it appropriately. Different soil mixes can be mixed and used. Seedlings can be transplanted or plants repotted.

Assessment questions

1) What containers can be used for gardening?
2) Can you mention some advantages of container gardening?
3) What plants can we grow in containers?
4) How do we fertilize plants in containers?
5) What considerations do we have to keep in mind when watering?