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Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education

for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.

- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.



# Container Gardening

## EXTENSION

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Casey Hentges  
Assistant Extension Specialist

Bruce Dunn  
Professor, Floriculture

Katy Layman  
Graduate Student

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Plants add value and beauty to a landscape. They can draw attention to features or hide unsightly views. Vegetables have the added benefit of providing nutritious food. However, bad soil, poor drainage and hard surfaces can severely limit a plant's ability to survive. Furthermore, some people are physically challenged and unable to garden at ground level. All of these factors can be discouraging to grow plants. Container gardening can remedy many of these challenges, allowing everyone to enjoy the opportunity to garden. This fact sheet will help design and build ornamental and vegetable container gardens appropriate for your landscape.

### Consider the Space

The first thing to consider when planning a container garden is where it will be located. Container gardeners can be used in any size location from a small apartment patio to a large backyard landscape. The size of the space will influence the size and number of containers. It is also good to think about the mood of the space. Formal landscapes benefit from symmetry. Creating two identical containers flanking a door or driveway maintains a formal feel (Figure 1). A collection of smaller pots on an intimate balcony or patio helps create a more informal and relaxed feeling.

Containers placed in full sun exposure on concrete surfaces such as on patios and driveways likely will receive eight hours of direct sunlight and are best suited for sun-loving plants. Many vegetables often require full sun as well and would work in these situations. Using drought resistant plants is also a good idea, as the container will get hot during summer afternoons causing the planting media to dry out quicker. For containers that will be indoors or in shaded areas outside, consider plants that can tolerate low to medium levels of light.

### Types of Containers

The physical container that holds the plants is an often overlooked, but important element of a container garden. There are a multitude of shapes, sizes and materials when it comes to containers, but there are a few things to consider first (Table 1).



Figure 1. Containers can be used to draw attention, create a focal point or add symmetry to the garden. (Photo by Todd Johnson)

One of the most important aspects of a container is its size (Figures 2 and 3). Small, tight spaces need a smaller-sized container, while large spaces often need a larger container to make a visual impact. Large containers can hold bigger plants, like shrubs or dwarf trees. Using small containers in large, open spaces can feel haphazard; while using large containers in small areas can feel overwhelming and take up valuable room. A container should be able to fit the root system of the fully-grown plant. Larger plants and/or more plants need more rooting space, therefore a larger container is required.

In addition to sun and wind exposure, smaller containers tend to dry out faster, therefore require more maintenance by the gardener. Also, if the plant(s) are too large for the container, the rooting media will dry out faster. Containers that are porous such as concrete, terracotta, fabric and unglazed ceramic allow for further soil moisture loss. Nonporous materials such as plastic, polystyrene foam, metal and glazed ceramic will reduce moisture loss. The type of container chosen also may

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**Table 1. Comparisons of common containers.**

<i>Material</i>	<i>Weight</i>	<i>Pros</i>	<i>Cons</i>
Plastic	Lightweight	Easy to find Lots of size, shape and color options Very inexpensive Difficult to break	Can break down over time May not have drainage holes Can blow/fall over easily Colors can fade over time
Polystyrene foam	Lightweight	Very lightweight Many designs and colors available	Can chip and damage easily Does not hold up well to being moved May not have drainage holes Can fall/blow over easily
Fabric	Lightweight	Very lightweight Many colors available Fairly inexpensive Fairly resistant to tipping and breaking/tearing	Can break down over time Can require more frequent watering May not be as aesthetically pleasing
Terracotta	Medium to heavyweight	Easy to find Fairly inexpensive Can be decorated and customized	Can be heavy once filled with media Breaks easily Can require more frequent watering
Ceramic	Medium to heavyweight	More colorful Break less easily than terracotta Easy to clean	Can be heavy once filled Unglazed can require more watering Can be expensive
Metal	Medium to heavyweight	Fairly resistant to tipping Accents plant material nicely	Can be heavy when filled with media Typically expensive May rust over time
Concrete	Medium to heavyweight	Lots of size and style options Fairly resistant to tipping Accents plant material nicely	Can be heavy when filled with media Typically expensive Can break or crack easily

depend on what is being planted. Because shallow containers tend to dry out faster, they are often used for succulents (Figure 4).

If you want to be a little more creative and add some whimsy into the garden, practically anything that will hold soil and allow drainage can be planted as a container garden, for example, old garden equipment, cooking pots and boots (Figure 5).

Typically, all containers need drainage at or near the bottom, unless creating a bog container garden in which plants prefer to have their roots submerged in water. Most landscape plants need adequate drainage. Standing water can cause disease problems and lead to plant death. Therefore, any excess water needs a place to be able to drain out of the bottom of the container. If the container does not have holes, add ½-inch holes spaced 2 inches apart.

In windy locations, consider using a heavy container with a large base to prevent it from blowing over. Light-colored containers are often best in sunny areas, as dark colored containers heat up quickly and can kill the roots. Taller containers can make gardening accessible to people with limited mobility, as there is a reduced need to bend and stoop.

Some containers are designed specifically for certain plants. A strawberry pot is a container that has many holes

for plants, allowing the strawberry fruit to hang down the side (Figure 6). Some orchids require specialized containers depending on their growth habit. African violets that do not like water on their leaves do best in a porous clay pot which nests inside a glazed pot. These two pots are typically sold together. Some styles of gardening may require a certain type of container. Bonsai, which are typically trees or shrubs purposefully pruned and placed in smaller containers, is one example.

### **Media**

It is important to use artificial or soilless media – available at most garden centers – when creating container gardens. Topsoil or ordinary garden soil compacts too easily in containers and can limit the amount of water and air reaching the roots of your plants, causing them to die. Artificial media is specially designed for use in containers, and will not compact the way soil does. Additionally, it tends to be lighter, making container movement easier. One of the benefits of container gardening is being able to provide the best growing media for the desired plants. Some plants such as blueberries prefer a lower pH. By growing in a container, gardeners can adjust the pH easier than they would be able to adjust a garden bed. Other plants



Figure 9. Several 55-gallon drums have been cut in half to create garden tables for vegetable production. (Photo by Casey Hentges)

## Maintenance

Container gardens, especially those in hot, sunny locations, need more water than plants in the ground. Containers may need to be watered twice a day, depending on temperatures, plant selections, media and size. Drainage holes in the bottoms can help prevent overwatering.

Containers with flowering plants often benefit from dead-heading, or the removal of dead flowers. It makes the garden look cleaner and can encourage more flowers. Outdoor container gardens with annual plants must be replanted every spring, as they cannot survive the winter. Plants considered perennials may not be winter hardy in a container. They will be exposed to cooler temperatures during the winter months unlike the plants in the ground which are insulated by the surrounding soil.

Container plants need to be fertilized occasionally. They can be fertilized with a general purpose liquid fertilizer during watering, or a slow-release fertilizer once a season by following manufacturer recommendations. Applying slow-release fertilizer early in the growing season can provide the necessary nutrients if plants are chlorotic or are growing slowly.

Containers can be reused from year to year. If you plan to reuse them for a new planting, it is best to remove any old

plant debris and/or media, wash it with a 10 percent bleach solution, then rinse it thoroughly. This will sanitize it, reducing the potential spread of diseases or insects.

Some containers may not be freeze proof and should be brought into a protected location during cold temperature to prevent cracking or breaking.

This fact sheet has laid out certain steps a gardener can take to ensure the best chances for a successful container garden. While there are fundamentals to garden design, the design of the container garden should be based on the gardener's preference.

## Additional Resources

HLA-6441 Homeowner Garden Design Series: Elements and Principles of Design

HLA 6455 Construction of Table Gardens

Using Moisture Crystals: <https://youtu.be/5A9ty8k0ha8>

Making Potting Mix:

<https://www.youtube.com/watch?v=5wJLuW73eao>

Planting a Spiller, Thriller and Filler:

<https://youtu.be/Qbz75W8HURk>

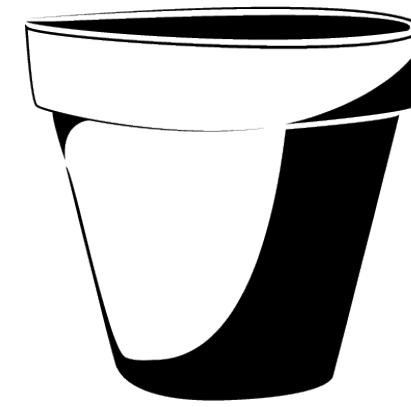
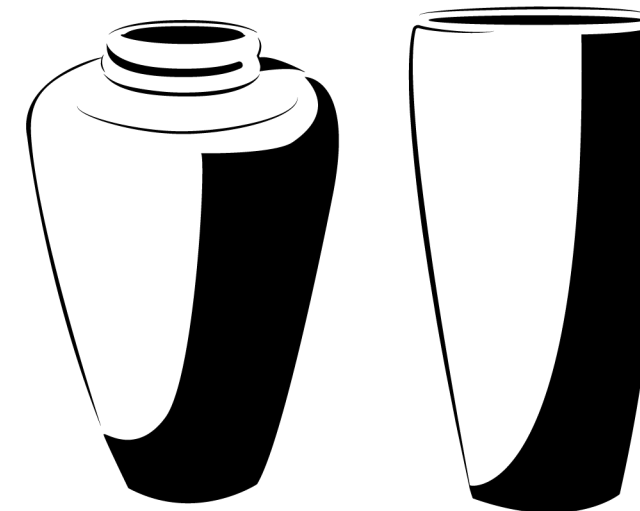


Figure 2. Standard containers come in a range of sizes. They typically are as tall as they are wide at the opening providing adequate space for plant roots. (Illustration by Vince Giannotti)



A

B

Figure 3. Containers can be used to add height. However, be aware of the opening on containers. While a container may provide the appropriate height and rooting volume, a narrow opening (A) will reduce the number of plants you can incorporate. Also, when it comes time to remove the plant, the roots will have grown, making it difficult to remove the rootball without damaging the plant or container. Container B would allow you to remove the plant by pulling it straight up. It also has a wider opening allowing for more planting space. (Illustration by Vince Giannotti)

may prefer more drainage, such as succulents in which case a succulent media should be utilized. Growing in containers allows the gardener to have control over the media, which can either be hand mixed or purchased, as many garden centers have different types of soil media for containers.

Media should not be reused from year to year. Over the course of the year, the media's ability to hold moisture and nutrients declines and potentially harbors disease. At the end of the season, old media should be removed and the container



Figure 4. Succulent containers are typically wide and shallow to allow for more plants that need excellent drainage, but do not need as much rooting space. (Photo by Todd Johnson)



Figure 5. Adding whimsical containers into the garden can be a fun way to personalize your garden. Just about anything, that holds potting soil and allows for drainage, can be used as a container for varying situations and time periods. (Photo by Todd Johnson)

should be cleaned and sterilized with a 10 percent bleach solution. The bleach solution can be easily made by adding 1 cup of bleach to 9 cups of water.

## Color

Ornamental container gardens are excellent at adding splashes of color. The colors you choose can deeply affect the feeling of an area. Warm colors such as reds, yellows and oranges have been shown to encourage activity, even raising blood pressure and breathing rates in people. Cool colors such as purples, blues and greens are more relaxing to the eye and mind. A patio used for entertaining may benefit from the use of warm colors, while a balcony used for relaxing in the evenings can benefit from cool colors. Combining plants of various colors can get overwhelming very fast. Choosing too many different colors can make a container look busy and impulsive, so it is best to stay within a color harmony. Fact



**Figure 6.** This strawberry pot has been used to display various small succulents. (Photo by Todd Johnson)

sheet HLA-6441, Elements and Principles of Design from the Homeowner Garden Design series, goes in depth on various design elements, including color harmonies.

### Plant Selection

When selecting plants, it is often beneficial to have a theme in mind. The color harmony could be the theme, or the types of plants selected could be the theme. A container could contain ornamentals, succulents, herbs, vegetables or any other types of plants. No matter the theme, the most important thing is to select plants that require similar growing requirements. A succulent cannot be planted with a water-loving plant and a plant that requires full-sun cannot coexist in the same container as a shade-loving plant.

Another aspect to consider when planning a container garden is the structure of the plants within. Some variation in height and form creates interest within the container. Plant growth habits can generally be found on a plant tag or online. A simple rule to follow is to have a thriller, a filler and a spiller within each container (Table 2). Figure 7 shows a container with all three elements.

A thriller is the main focal point of the container. It might be the tallest plant, have the largest or showiest flowers or have interesting foliage. It should draw the most attention out of all the plants within a container. When planting in the container garden, it is typically placed toward the back of the container if it will be viewed from one side or placed in the center if it will be viewed from all sides (Figure 8).

A spiller is a plant that spills over the edge. The foliage drapes over the sides of the container, softening the look. These plants elongate the overall appearance of the container

**Table 2. Plants that fit within the thriller, filler and spiller categories.**

<i>Thrillers</i>	<i>Fillers</i>	<i>Spillers</i>
Ornamental grass	Fan flower	Sweet potato vine
Dwarf canna	Verbena	Petunia
Shasta Daisy	Coleus	Calibrachoa
Fountain grass	Lantana	Nasturtium
Agave	Echevaria	Sedum
Bananas	Dusty miller	Vinca

garden and balance out the height of the thriller. Many spillers have flowers, but they tend to be simpler or smaller than the thriller. They are typically planted along the front and sides of the container garden.

A filler fills in the space between the thriller and spiller. It usually has more dainty flowers than the thriller or spiller, if it has any at all. It is shorter than the thriller, but may not trail over the sides like the spiller. The filler is the unifying presence of the container garden and supports the other two elements.

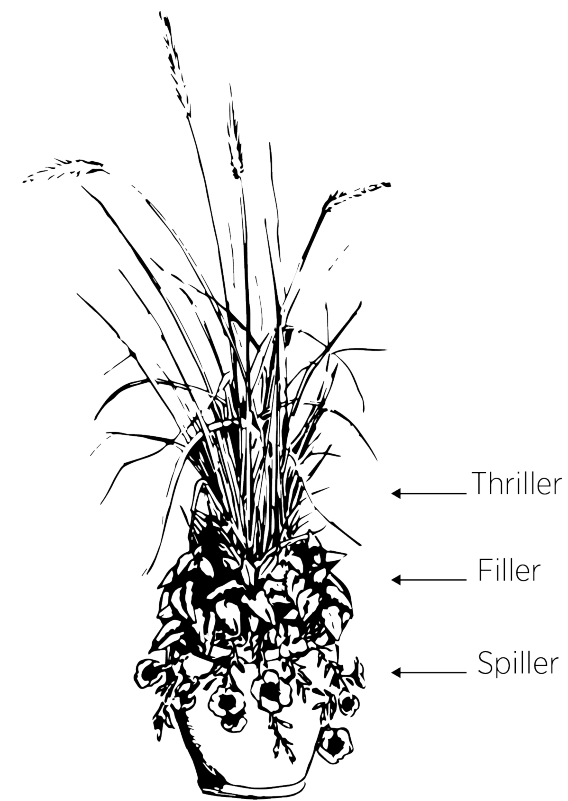
These three elements help organize most containers. However, different locations can require different combinations of the elements. A hanging basket might look good with several spillers and may not need a thriller or a filler. A tree or shrub-like thriller in a large container may benefit from a spiller, but no filler. Another good rule is to use odd numbers of plants equally spaced for fillers and spillers.

### Planting

Planting in a container garden is not much different than planting a regular garden or flowerbed. In especially large containers, adding polystyrene foam or plastic bottles to the bottom can reduce the overall weight. It can then be filled with media. It is a good idea to leave an inch or so between the top of the media and the top of the container, so media does not wash out every time it is watered. Do not pack the media tightly into the container. Roots need air and compacting the media prevents them from getting oxygen. Plants should be checked for circling roots before they go into the container. The roots on any root-bound plants should be loosened gently. Once the plants are in the container, make sure the root ball is covered with media. Any exposed roots can dry the plant out quickly, causing it to die. Once all the plants are in the container, it should be watered in well to help settle the media. Each time the container is watered, water it until water comes out the bottom of the container. This encourages deeper root growth and helps to flush out any salts that can build up. To prevent leaking or staining, you may want to put a saucer underneath the container. Water should not constantly stand in the saucer as this can again lead to disease and death of the plants and harbor mosquito larva.

### Vegetables in Container Gardens

Another trend that has taken hold recently is using vegetables to make lovely and edible container gardens. Tomatoes, onions, peppers, eggplants, carrots, lettuce, garlic, Swiss chard, cucumber and squash are just a few of the



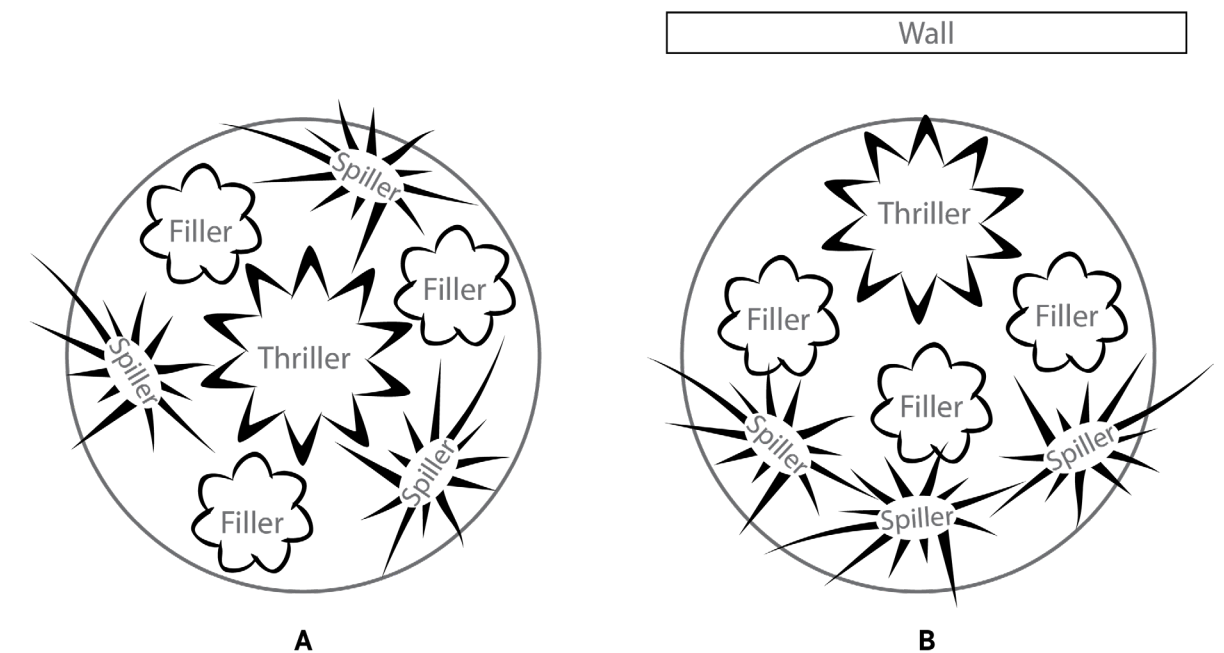
**Figure 7.** A container with a thriller, a filler and a spiller. (Illustration by Vince Giannotti)

vegetables that are commonly found in container gardens. Vegetable container gardening is different from ornamental container gardening. With vegetables, the goal is food production. To make that as simple as possible, a few things need to change.

Larger containers are generally required. Many popular plants, like tomatoes and peppers, a 5-gallon container is needed. Five-gallon buckets may not be pretty, but they are cheap and support good production. Larger troughs or barrels (Figure 9) can be turned into containers that contain several different vegetables and can be very productive.

Vegetables generally need lots of sun and lots of water. Most vegetables need at least six hours of sun a day, so shady areas will limit production. Some lettuces and herbs prefer less sunlight, so they should be chosen if the container is in an area with limited sun exposure.

When creating containers with multiple vegetable species, it is important to select plants with similar water and light requirements. Plants that prefer dry conditions will not work well with tomatoes and cucumbers, which need more water. Vining vegetables, like green beans and tomatoes, often need a trellis or support system. The plants can be trained with tomato cages, bamboo or wooden trellises as they get larger. When using trellises, it is important to have a very heavy container. The extra height can cause containers to tip over easily in windy conditions, so weigh the container down if a lighter weight container is used. Vegetable containers are not just limited to vegetables. Herbs and ornamentals can be grown in the same containers as vegetables. Flowering plants can help bring in beneficial insects, pollinators and add an attractive splash of color alongside the vegetables.



**Figure 8.** Depending on the location of your container, you may want to organize the plants so it will be visually pleasing from all sides (A). If it is placed against a backdrop, you can plant it so the plants are facing the front of the container (B). (Illustration by Vince Giannotti)