Gardening is growing plants from seeds or transplants. It is a great hobby and can help build a nutritious diet. Gardening also includes the production of ornamental plants.

This publication will focus on growing flowers. Flowers make our homes and communities bright and cheerful. Watching plants you care for burst forth with beautiful blooms is exciting.

Whether you plan to grow flowers for exhibition or shows, cut flowers for decorating your home or outdoor landscaping, this publication will help you get started. Use the ideas here for inspiration, then let your imagination and curiosity lead you to discovering the colorful world of floriculture.

Keeping Records

Your project will be more fun if you keep some simple records of what you did throughout the summer. Here’s what to include in your garden journal:

- Names, varieties and color of the flowers you sowed, transplanted or used for cut flowers
- Sowing or transplanting dates (Sections 1 to 3)
- Number of plants sown or transplanted in the garden or container (Sections 1 to 3)
- First flowering date
- Dates and descriptions of all fertilizing and maintenance performed
- A copy of your garden or container design (Sections 1 to 3)
- Photos of your project
- Date the plants were finished (or killed by frost) for the year
- Description of the category and results if you exhibited your flowers
- Whether you would recommend this kind of flower
- Notes on what you can improve for next year

Contents

Keeping Records .................................................2
Section 1: Growing Annual Flowers From Seed .........................3
Learning Objectives ..............................................3
Definitions ................................................................3
Introduction .........................................................4
Seed Sources .......................................................4
Annual Flowers to Direct Seed Outdoors .....................5
How to Start Annual Flowers Indoors ..........................6
Planting Steps ......................................................9
Summer Care of the Flower Garden ..........................11
Section 2: Growing Flowers in a Container .............................12
Learning Objectives ...........................................12
You Can Garden Anywhere ..................................13
Container Selection ............................................13
Potting Soil .........................................................14
Consider the Light Level .....................................14
When to Plant .....................................................14
Recipe for Eye-catching Containers .......................15
Maintaining Your Container Garden .....................21
Section 3: Designing Your Flower Garden .........................22
Learning Objectives ...........................................22
Introduction .........................................................23
Location ..............................................................23
Landscape Design ..............................................23
- Color Combinations .....................................25
- Texture .........................................................25
- Maintenance ................................................26
- Conclusion ...................................................26
Section 4: Preparing Cut Flowers for Show .....................27
Learning Objectives

You will be able to:
- Select appropriate annual flower seeds to sow indoors or directly into the soil outdoors
- Transplant indoor-grown seedlings into the soil or containers
- Maintain your planting

Definitions

**Annual**: a plant that lives for only one year. It blooms, sets seed and then dies at the end of the growing season. Marigolds, petunias and zinnias are examples of annual flowers.

**Biennial**: a plant that lives for two years. In the first year, it grows a set of leaves. In the second year, it sends up a flowering stalk, sets seed and then dies. Sweet William and foxglove are examples.

**Perennial**: a plant that lives for three or more years. This includes peonies, daylilies and hostas.

**Floriculture**: growing and maintaining flowering ornamental plants.

**Germination**: the process by which a plant emerges from a seed.
Introduction

Annual flowers are a cheerful addition to the garden and containers. Unlike perennials, annual flowers bloom for a long period and will provide color for most of the summer. Annual flowers live to bloom. You can say they have “flower power”!

While you can buy annual flowers from a garden center, growing plants from seed is extra special. If you look at a seed, it appears so small and lifeless. However, when you sow the seed and nurture it, something extraordinary happens. After several days, a tiny plant will emerge from the soil. As you care for it, that delicate seedling will transform into a vigorously growing plant with many leaves.

After several weeks, the plant that you sowed will produce flower buds that will open and greet the sun. Yes, purchasing a plant from the garden center is faster, but you would miss the great pride that you feel in watching your seeds germinate and grow. This publication will take you through the steps of growing annuals flowers from seed indoors or sowing directly outdoors.

Seed Sources

Local garden centers and hardware stores begin selling annual flower seeds in late winter. If you are looking for a larger selection, online seed companies such as Burpee, Park Seed, Harris Seed and Johnny’s Selected Seed offer a wide assortment of interesting flowers.

Seed packed fresh for this year will germinate better than seed stored at room temperature from previous years. If you have leftover seed from these projects, you can save them for next year if you store them properly. The best way to store seeds is to seal the packets and put them in a jar in a refrigerator. Do not freeze the seeds. To keep the humidity down, place a drying agent (desiccant) such as silica gel in the jar. Frequently, boxes of new shoes will contain packets of silica gel. You can recycle these packets to protect your seeds.

Figure 1. Nasturtium has round leaves and edible flowers. (Esther McGinnis, NDSU)
Some plants will grow relatively quickly and flower if you sow the seed directly into the soil. Examples include nasturtium (Figure 1), French or gem marigolds (Figure 2) and bachelor buttons. Other examples are listed on Table 1. You can plant a row of seeds or an entire flower garden.

Table 1. Annual seeds to sow directly in the soil.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Time to Germination (days)</th>
<th>Number of Days to First Flower</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alyssum</td>
<td><em>Lobularia maritima</em></td>
<td>10 to 14</td>
<td>50 to 60</td>
<td>Seeds frequently are sold as “seed tape;” frost tolerant and can be sown in early May</td>
</tr>
<tr>
<td>Bachelor buttons</td>
<td><em>Centaurea cyanus</em></td>
<td>7 to 14</td>
<td>50 to 60</td>
<td>Plants may reseed for future years</td>
</tr>
<tr>
<td>California poppy</td>
<td><em>Eschscholzia californica</em></td>
<td>10 to 12</td>
<td>60 to 70</td>
<td>Plants may reseed for future years</td>
</tr>
<tr>
<td>Cosmos</td>
<td><em>Cosmos spp.</em></td>
<td>5 to 10</td>
<td>70 to 84</td>
<td>Very easy to grow</td>
</tr>
<tr>
<td>Flax</td>
<td><em>Linum usitatissimum</em></td>
<td>18 to 21</td>
<td>50 to 60</td>
<td>Beautiful blue color</td>
</tr>
<tr>
<td>Marigold (French and gem)</td>
<td><em>Tagetes spp.</em></td>
<td>5 to 7</td>
<td>60 to 70</td>
<td>Easy to grow</td>
</tr>
<tr>
<td>Morning glory</td>
<td><em>Ipomoea purpurea</em></td>
<td>12 to 17</td>
<td>90 to 110</td>
<td>Soak seed in warm water for 24 hours to enhance germination or nick the end of the seed; need trellis to support the vine</td>
</tr>
<tr>
<td>Nasturtium</td>
<td><em>Tropaeolum majus</em></td>
<td>7 to 12</td>
<td>55 to 65</td>
<td>Interesting round leaves</td>
</tr>
<tr>
<td>Sunflower</td>
<td><em>Helianthus annuus</em></td>
<td>5 to 10</td>
<td>75 to 100</td>
<td>Birds and rodents may try to eat the seed</td>
</tr>
<tr>
<td>Zinnia</td>
<td><em>Zinnia spp.</em></td>
<td>5 to 7</td>
<td>50 to 55</td>
<td>Many different kinds of zinnias are available</td>
</tr>
</tbody>
</table>
Wait to sow the seed until the danger of spring freezes are past. For most of the state, the average last freeze date is prior to May 15, but you may have to delay planting by a week to 10 days in northern areas of the state. In general, sowing from May 15 through June 1 is advised based on your location in the state. However, weather can vary from year to year, so your best option is to look at the long-range weather forecast before sowing seeds.

Preparing your garden area is a crucial step. First determine whether the soil is dry enough to be worked. You can do this by picking up a handful of soil and squeezing. If it stays in a mud ball, the soil is too wet to be worked. If the soil ball crumbles, the soil is dry enough.

Remove all weeds, including their roots. Then rake the soil to create a smooth surface and eliminate large clods of soil. Dig a shallow trench to the depth recommended on the seed packet. Reading the information on the seed packet is very important because it contains instructions on how best to grow the plant. If the seed packet doesn’t suggest a seed depth, the rule of thumb is to sow the seed at a depth equal to four times the width of the seed. This is not very deep!

After you have sown the seeds in the trench, lightly cover them with soil. Sowing too deeply can delay germination or prevent emergence.

After planting, water the area and keep it moist. The seeds will germinate. Thinning the seedlings may be necessary. Consult the seed packet for the recommended spacing between plants.

How to Start Annual Flowers Indoors

Starting annual flowers from seed indoors has a couple of big benefits. Most annuals will take several weeks or more to grow large enough to bloom. You can achieve earlier flowering in your garden by starting the seeds indoors in early spring instead of direct sowing in the garden. In addition, starting seeds indoors is a fun project when you are stuck in the house because snow still is on the ground.

Figure 3. Morning glory is a beautiful vine that will flower in late summer.  
(Esther McGinnis, NDSU)
Materials that you will need for starting flowers indoors

- **Seed-starting trays with a humidity dome or cover** — These trays normally are sold with 36, 48 or 72 individual cells. The 36- or 48-cell trays are the best size for this project. You can use trays with 72 cells, but the smaller size of the cells may require you to transplant into larger containers. Having a cover for the tray is helpful because it will keep the humidity high during germination. If you don’t have a cover, you can substitute plastic food wrap.

- **Potting soil** — You need it to fill the seed-starting trays. You can buy bagged potting soil from garden centers and hardware stores. Most potting soil is composed of peat moss and other materials such as perlite or vermiculite. Avoid using garden or field soil in the trays. We also do not recommend peat pellets.

- **Annual flower seeds** that you can start in early to mid-April and transplant in mid- to late May — These include morning glory (Figure 3), love lies bleeding (Figure 4), zinnia (Figure 5) and cosmos (Figure 6). See Table 2 for more suggestions. We do not recommend favorite flowers such as geraniums, impatiens and petunias for this project because these annuals can take 10 to 15 weeks to grow.

- **Labels** — If you are planting more than one variety of flower, labels are necessary. You can buy them from a garden center.

- **Fertilizer** — It can increase the rate of growth. Water-soluble fertilizers are a good choice for fertilizing the flowers.

- **Spray bottle and a watering can** for watering your seed tray

- **Journal or notebook** to record your observations
Table 2. Flower seeds to start indoors. Many varieties are available for each species, so height and width are listed as a range.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Botanical Name</th>
<th>When to Seed Indoors</th>
<th>Time to Germination (Days)</th>
<th>Sun/Shade</th>
<th>Height</th>
<th>Width</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aster</td>
<td><em>Callistephus chinensis</em></td>
<td>April 1</td>
<td>10-14</td>
<td>Full sun</td>
<td>24 inches</td>
<td>12 inches</td>
<td>Blooms for about 4 weeks</td>
</tr>
<tr>
<td>Celosia</td>
<td><em>Celosia</em> spp.</td>
<td>April 1</td>
<td>8-14</td>
<td>Full sun</td>
<td>24-48 inches</td>
<td>12-18 inches</td>
<td>Wait until May 30 to transplant in garden; needs summer heat to thrive</td>
</tr>
<tr>
<td>Cosmos</td>
<td><em>Cosmos bipinnatus</em></td>
<td>April 15</td>
<td>5-7</td>
<td>Full sun</td>
<td>24-48 inches</td>
<td>16-18 inches</td>
<td>Easy to grow; long bloom season</td>
</tr>
<tr>
<td>Four o’clocks</td>
<td><em>Mirabilis jalapa</em></td>
<td>April 8</td>
<td>8-10</td>
<td>Full sun to part shade</td>
<td>30-36 inches</td>
<td>12-16 inches</td>
<td>Fragrant flowers open in late afternoon; attracts hummingbirds</td>
</tr>
<tr>
<td>Love-in-a-Mist</td>
<td><em>Nigella damascena</em></td>
<td>April 8</td>
<td>10-14</td>
<td>Full sun</td>
<td>12-24 inches</td>
<td>12 inches</td>
<td>Old-fashioned favorite; flowers look like they are in a lacy mist</td>
</tr>
<tr>
<td>Love lies bleeding</td>
<td><em>Amaranthus</em> spp.</td>
<td>April 1</td>
<td>10-14</td>
<td>Full sun</td>
<td>36-60 inches</td>
<td>14-16 inches</td>
<td>Old-fashioned favorite; flowers hang in ropes; great in bouquets; does best in heat of summer</td>
</tr>
<tr>
<td>Marigold (French and gem)</td>
<td><em>Tagetes patula</em> and <em>Tagetes tenuifolia</em></td>
<td>April 1</td>
<td>4-7</td>
<td>Full sun</td>
<td>6-16 inches</td>
<td>6-8 inches</td>
<td>French and gem marigolds are recommended here; African marigolds require seeding in mid-March but are larger and showier</td>
</tr>
<tr>
<td>Morning glory</td>
<td><em>Ipomoea purpurea</em></td>
<td>April 1</td>
<td>8-10</td>
<td>Full sun</td>
<td>8-12 feet</td>
<td>6-8 feet</td>
<td>This is a vigorously growing vine that requires a trellis for support; need to soak the seeds in warm water for 24 hours to aid in germination</td>
</tr>
<tr>
<td>Nasturtium</td>
<td><em>Tropaeolum majus</em></td>
<td>April 15</td>
<td>7-14</td>
<td>Full sun</td>
<td>10-24 inches</td>
<td>10-24 inches</td>
<td>Easy to grow; flowers are edible and are used in salads</td>
</tr>
<tr>
<td>Pot marigold</td>
<td><em>Calendula officinalis</em></td>
<td>April 8</td>
<td>7-14</td>
<td>Full sun</td>
<td>12-24 inches</td>
<td>12 inches</td>
<td>Nice cut flower</td>
</tr>
<tr>
<td>Scarlet runner bean</td>
<td><em>Phaseolus coccineus</em></td>
<td>May 1</td>
<td>4-7</td>
<td>Full sun</td>
<td>6-9 feet</td>
<td>18 inches</td>
<td>Wonderful vining plant; scarlet flowers attract hummingbirds; beans are edible when picked small</td>
</tr>
<tr>
<td>Tithonia</td>
<td><em>Tithonia speciosa</em></td>
<td>April 1</td>
<td>7-14</td>
<td>Full sun</td>
<td>36 inches</td>
<td>14-16 inches</td>
<td>Attracts hummingbirds and butterflies; produces great cut flowers</td>
</tr>
<tr>
<td>Zinnia</td>
<td><em>Zinnia species</em></td>
<td>April 15</td>
<td>5-7</td>
<td>Full sun</td>
<td>12-36 inches</td>
<td>8-16 inches</td>
<td>Many varieties and sizes available; some are compact, others are taller and make great cut flowers</td>
</tr>
</tbody>
</table>
Step 1: Sowing

Once you have gathered your supplies, you can begin sowing. Potting soil tends to be a little dry, so moisten it by mixing it with a small amount of water in a bowl. Fill your seed trays with the pre-moistened potting soil so it is almost level with the top of the cell pack. Do not compress the potting soil because that will make growing difficult for the seed’s roots. Then, drop one or two seeds in each cell. Kids’ fingers are better than adults’ at hand seeding.

Cover the seeds with a small amount of potting soil as recommended on the seed packet. Don’t cover too deeply or the small seedlings won’t be able to poke through the soil. If the seeds are really tiny, do not to cover them at all.

Label the seed tray with the name or names of the flowers and the date you planted the seeds. This information is important for your records.

Water the seed tray gently with a fine mist until all the soil is moist. Note: Do not water with too much force or you will wash the seeds away.

Keep the tray covered with the plastic cover or dome. This will keep the soil moist and you might not have to water again for several days. If the soil does dry out, the seeds cannot grow. Keep the soil moist until you can see the seeds sprout.

Put the tray in a warm area. Keeping the potting soil warm so the seeds will germinate quicker is important. Seeds germinate best at temperatures of approximately 72 to 75 F. If you have a heat mat, you can use it to provide bottom heat to keep the soil warm.

Look closely at the seed tray morning and afternoon. As soon as you can see a majority of the tiny seedlings coming through the soil, remove the plastic cover. Otherwise, the seedlings may rot.

Step 2: Growing

Continue to grow the seedlings. The seedlings first will have a pair of leaves called seed leaves or cotyledons. The cotyledons contain food reserves to help the seedlings germinate and emerge from the potting soil. In some plants, the cotyledons will fall off once the true leaves develop. You may notice that the true leaves are a different shape than the cotyledons.

As soon as the seedlings germinate, move the tray near a bright, sunny window but not directly on the window sill. Temperatures on the window sill can be too cold at night and too hot during the day. Optimum temperatures for growing the seedlings range from 65 to 75 F during the day, with slightly cooler temperatures at night.

Alternatively, you can grow the plants under a shop light that contains two fluorescent tubes. Position the fluorescent lights so they are hanging 4 to 6 inches above the plants. You may need to adjust the height of the lights as the plants grow. Fluorescent lighting will produce plants that are bushy and less spindly than plants grown near a window. Incandescent lights will not work because they produce the wrong form of light and they are too hot. The plants will grow best under 12 to 16 hours of light per day.

If more than one seed germinated in each cell, carefully use a scissors to clip off the smaller plant. The remaining plant will have a better chance of growing if it doesn’t have to compete with another plant.

Pay careful attention to watering. Avoid wilted plants because they may not recover or they may be stunted. Too much water can be harmful, too. Plant roots will die if they sit in water. The best practice is to wait to water until the surface of the soil feels dry to the touch. If excess water remains in the bottom of the tray, you can empty it.

After the plants have developed four leaves, begin fertilizing them once a week. This can replace one of the waterings. Mix a garden fertilizer such as Miracle-Gro Water Soluble All Purpose Plant Food to one-quarter of the recommended strength. Full strength
fertilizer may “burn” the plants and cause the leaves to turn brown.

The plants you started indoors might not always grow the way you would like. Plants might grow too tall, spindly and weak. Things that commonly go wrong include:

- Plants started too early in the spring
- Over- or underwatering
- Not enough light — giving seedlings as much sunlight as they need indoors is hard to do

**Step 3: Hardening the Plants**

The plants soon will be ready to transplant outdoors into the flower bed. The next step is to get the plants adjusted to outdoor weather. This is called “hardening the plants.” Begin hardening about a week to 10 days before you plan to plant them into your flower bed or container.

Set the plants outdoors in the afternoon for a couple of hours in a shady, protected spot. The plants cannot handle full sun or wind at first. Each evening, bring the plants indoors. Gradually increase the amount of time outdoors and the amount of sunlight. Make sure the plants do not dry out. By the end of this time, the plants may remain outdoors until you are ready to plant, provided that frost is not in the forecast.

**Step 4: Transplanting**

The plants are ready to be transplanted into the garden or container after danger of frost is past. See Figure 7 for the average last frost date for your area.

A frost is different than a freeze. Frost occurs when tiny ice crystals condense on the plants. On a still night, this can occur when air temperatures are slightly above the freezing point. In other words, plants can be injured when the air temperature registers 36 F or lower on the thermometer. Therefore, consult Figure 7 and the long-term weather forecast before transplanting outdoors.

Prepare the soil as described in the Annual Flowers to Direct Seed Outdoors section. Plan to transplant on a cloudy day or in the evening. This will give tender plants time to recover before the hot sun hits them.

Water the plants in their pots several hours before you are ready to transplant. The plants will be less likely to dry out. They also may be easier to remove from their cell packs.

---

**Figure 7. Average last frost date for North Dakota counties.**

---

Spring 50% Probability Level at 36 Degrees F (1981-2010)

Probability of Later Date in Spring (thru Jul 31) Than Indicated
(Data from NWS Cooperative Network)
To remove the plants, push up on the bottom of each cell and gently hold the plant by the base of the stem. If the plant is stuck, tearing the cell pack is OK. If the plants were growing in pots or cups, turn each pot upside down and gently tap the bottom while holding onto the plant.

Next, dig a hole with a small hand trowel. Make the hole about three times as large as the soil ball around the roots. Plant the transplants ½ inch deeper than what they were in the containers. Plants can wilt quickly if the tender roots are exposed to air. Finally, firm the soil around the root ball by pressing it gently with your hands.

Leave a shallow dip or depression around each plant to catch water. When all the flowers have been planted, water the entire flower bed. This will settle the soil and help the plants become adjusted and begin growing.

Flower plants sometimes grow too spindly and have only one flower on top of a stem that is too tall. To help the plant become bushier and produce more flowers, “pinch” it back when it has three or four sets of leaves. A good time to pinch is when you are transplanting the flowers. Take your thumb and forefinger and pinch out the first set of leaves from each of the stems. Flowers that respond especially well to pinching include marigolds, calendula and zinnia.

Summer Care of the Flower Garden

An important part of maintaining the flower garden is weeding on a regular basis. The key to good weed control is to tackle the job when the weeds are young. You can use a hoe to control the weeds. Don’t hoe too close to your annual flowers because you might injure the roots. If you let the weeds grow too large, you might have to pull each one by hand to save your flowers. Hoeing the flower bed once a week should prevent the weeds from taking over.

After your flowers have established, you can cut back on watering. However, the plants still will need water during the heat of summer if you do not get rain. Watering deeply two or three times a week is better than watering a little every day.

On average, the plants need approximately an inch of water per week. If you water with a sprinkler, put a can or bucket near the sprinkler so you can tell how much water you are applying. Water the flower bed until you collect 1 inch of water or a little more in the can or bucket. Special soaker hoses are available and allow the water to trickle slowly and soak in around the flowers. In hot, dry weather, the plants may need more frequent watering.

Fertilizing your plants will help them grow faster. Several fertilizers are on the market. The easiest to use is a slow-release fertilizer such as Osmocote Flower and Vegetable that comes in a pelleted form. Sprinkle the slow-release fertilizer on the surface of the soil in the amount indicated on the label. This type of fertilizer will release nutrients for several months. Alternatively, you can use half-strength, water-soluble fertilizer such as Miracle-Gro All Purpose Plant Food and apply it every two weeks.

As flower blooms fade and dry, you can pinch them off with your fingers or cut them off with a shears. This is called “deadheading.” If dead blooms remain on the plant, they will “set seed” and rob energy from the plant. The flower’s job is to produce seeds, so once the flower petal falls off, we need to cut off the seed head so the plant will keep on flowering. Annuals will produce more flowers if we deadhead the seeds.
Growing Flowers in a Container

Learning Objectives

You will be able to:

- Design a flowering container garden
- Plant the container garden
- Maintain the planting for the summer

Figure 8. This container has pizzazz. Learn the secrets of designing an eye-catching container planting. (Esther McGinnis, NDSU)
You Can Garden Anywhere

The beauty of container gardening is that you don’t have to live in a house or have a big yard to have a flower garden. You can garden on your balcony, patio or front step. With a little planning and care, you can have an attractive flower garden from late May until fall.

Container Selection

Be creative with the container you choose. You can use traditional clay, ceramic or plastic pots. Plastic pots are usually lighter and less expensive than ceramic or clay pots.

Nontraditional choices can be fun, too. Plastic totes, old wheel barrels (Figure 9), wagons or buckets work well. If desired, larger hanging baskets provide a different look.

If you are reusing a container from a previous planting, make sure it is clean.

All containers must have holes on the bottom to allow excess water to drain. The plant will die if the roots sit in water for too long. If your container doesn’t have any holes, ask a parent to cut or drill multiple drainage holes (Figure 10).

The number and size of plants will dictate how large your container should be. In general, erring on the side of having a container that’s too large is better than using one that is too small. A container that is too small may fall over in the wind, dry out too quickly or prevent the plants from growing to their mature size.

Figure 9. An old wheelbarrow makes an attractive container garden. (Esther McGinnis, NDSU)

Figure 10. Note the drain holes that have been drilled in the bottom of this pot. (Esther McGinnis, NDSU)
Potting Soil

Potting soil works better in containers than regular soil from a field or yard. Regular soil drains poorly, can have weed seeds or insects, and may contain herbicide residues. Regular soil also compacts easily and may become very hard, which makes getting water difficult for the roots.

You can buy bags of potting soil from hardware stores or garden centers. Avoid reusing potting soil from previous years because the media may harbor plant diseases.

Generally, potting soils contain peat moss as the primary component, with perlite, vermiculite, and/or shredded bark as additional components. New formulations of potting soil have hydrogel beads for moisture retention. These hydrogel beads have not proven to aid in plant growth. Therefore, simpler and cheaper potting soils are fine.

Consider the Light Level

How much light will your container garden receive at its chosen location? Will your plants receive a lot of sun or will they be in shade?

A good practice is to record the amount of light your container garden will receive. If the plants will receive six or more hours of direct sunlight a day, this is considered full sun. Partial shade is less than six hours of direct sun but more than four. Full shade is less than four hours of sunlight. See Tables 3, 4, and 5 to select plants by light level.

When to Plant

North Dakota still can experience cool temperatures in May. The best time to plant a container in North Dakota is between May 15 and June 1. Plants are readily available in the garden centers and temperatures are usually warmer by this time. However, if the weather forecast predicts nighttime temperatures in the 30s or 40s, move the container into the garage until the cold weather is past.

Annual Plants

Most people purchase annual plants for their containers. Annuals are those plants that will survive for only one growing season. They will not survive winter temperatures. We use annuals for containers because they have colorful flowers or foliage, bloom for most of the summer and are inexpensive, compared with perennials. You can use some of the annuals you have grown from seed if you desire.
Recipe for Eye-catching Containers

You can design a stunning container garden by following a simple recipe for success. The recipe calls for thriller, spiller and filler plants.

What does this mean? It means choosing plants with different heights, shapes and forms to create a full and balanced planting. The thriller plant provides the height, the spiller trails over the pot and the filler takes up the rest of the space. (See Figure 11.)

Figure 11. This newly planted container follows the thriller, spiller, filler recipe. Papyrus ‘King Tut’ is the thriller that provides the height. Purple and lime green sweet potato vines are planted on both sides of the papyrus and eventually will trail down the sides of the pot. Finally, the red and white petunia in the front is a filler that provides welcome color to the mix.

(Esther McGinnis, NDSU)
The “thriller” plant is the tallest in the pot and is the star or focal point. Good thriller plants include annual salvia (Figure 12), purple fountain grass (Figure 13) and cannas (Figure 14). Plants that are sold as “spikes” such as Dracaena and Cordyline are popular traditional thrillers. Table 3 lists a number of plants that can be used as thrillers. The thriller can be planted in the middle of the container if it will be viewed from all sides or toward the back if the container will be placed against a wall.
Table 3. Thriller plants to add pizzazz to your containers.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Light Level</th>
<th>Moisture</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angelonia</td>
<td>Angelonia angustifolia</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Can be used as filler or thriller in smaller pots</td>
</tr>
<tr>
<td>Big leaf coleus</td>
<td>Solenostemon scutellarioides</td>
<td>Partial to full shade</td>
<td>Moist</td>
<td>A coleus with large leaves can be used as the thriller for shade containers</td>
</tr>
<tr>
<td>Canna</td>
<td>Canna spp.</td>
<td>Full sun</td>
<td>Medium</td>
<td>Choose from dwarf or taller cultivars</td>
</tr>
<tr>
<td>Carex</td>
<td>Carex spp.</td>
<td>Partial to full shade</td>
<td>Medium</td>
<td>Use like an ornamental grass; cultivars such as 'Toffee Twist' have tan foliage</td>
</tr>
<tr>
<td>Cleome</td>
<td>Cleome hassleriana</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Varieties run from 3 to 5 feet tall</td>
</tr>
<tr>
<td>Cordyline spike</td>
<td>Cordyline indivisa</td>
<td>Full sun</td>
<td>Medium</td>
<td>Burgundy-colored spike; great texture</td>
</tr>
<tr>
<td>Dracaena spike</td>
<td>Dracaena indivisa</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Great vertical element</td>
</tr>
<tr>
<td>Gaura</td>
<td>Gaura lindheimeri</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Delicate white or pink blossoms scattered up and down the stem; best in larger containers</td>
</tr>
<tr>
<td>Ornamental millet</td>
<td>Pennisetum glaucum</td>
<td>Full sun</td>
<td>Medium</td>
<td>Resembles a purple corn plant; this is for a large container</td>
</tr>
<tr>
<td>Papyrus</td>
<td>Cyperus papyrus</td>
<td>Full sun to partial shade</td>
<td>Medium to moist</td>
<td>Choose from dwarf ('Baby Tut') or full-size varieties ('King Tut')</td>
</tr>
<tr>
<td>Purple fountain grass</td>
<td>Pennisetum setaceum 'Rubrum'</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Purple foliage with interesting seedheads; new cultivars are available</td>
</tr>
</tbody>
</table>
The “spiller” is a plant that will trail or cascade down the front or side of the pot. The spiller softens the effect of the planting. Trailing begonias (Figure 15) and sweet potato vines (Figure 16) are good examples. A single spiller can be used in the front. Alternatively, two or more spillers can be used, with at least one on each side of the pot. See Table 4 for a list.

**Figure 15. Begonias with a trailing habit make good spillers for shade.** (Esther McGinnis, NDSU)

**Figure 16. Lime green and purple sweet potato vines are vigorous spillers.** (Esther McGinnis, NDSU)

### Table 4. Spiller plants to cascade out of the container.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Light Level</th>
<th>Moisture</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacopa</td>
<td><em>Sutera cordata</em></td>
<td>Full sun</td>
<td>Medium</td>
<td>Delicate vining plant with white or purple flowers</td>
</tr>
<tr>
<td>Begonia (tuberosus)</td>
<td><em>Begonia x tuberhybrida</em></td>
<td>Partial shade</td>
<td>Moist</td>
<td>Dragon wing begonias work well in shade</td>
</tr>
<tr>
<td>Calibrachoa</td>
<td><em>Calibrachoa</em> spp.</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Resembles petunias but the flowers are smaller; great for smaller containers</td>
</tr>
<tr>
<td>Dichondra</td>
<td><em>Dichondra</em> spp.</td>
<td>Full sun to partial shade</td>
<td>Medium to dry</td>
<td>Silvery foliage; normally doesn’t flower</td>
</tr>
<tr>
<td>Fan flower</td>
<td><em>Scaevola</em> spp.</td>
<td>Full sun</td>
<td>Medium to dry</td>
<td>Interesting fan-shaped flowers</td>
</tr>
<tr>
<td>Fuchsia</td>
<td><em>Fuchsia</em> spp.</td>
<td>Partial shade</td>
<td>Moist</td>
<td>Doesn’t handle summer heat or sun well; rather finicky</td>
</tr>
<tr>
<td>Lobelia</td>
<td><em>Lobelia erinus</em></td>
<td>Partial shade</td>
<td>Moist</td>
<td>Look for trailing varieties</td>
</tr>
<tr>
<td>Petunia</td>
<td><em>Petunia x hybrida</em></td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Look for trailing varieties</td>
</tr>
<tr>
<td>Nasturtium</td>
<td><em>Tropaeolum</em> spp.</td>
<td>Full sun</td>
<td>Medium</td>
<td>Cheerful red, orange or yellow flowers</td>
</tr>
<tr>
<td>Sweet potato vine</td>
<td><em>Ipomoea batatas</em></td>
<td>Full sun</td>
<td>Medium</td>
<td>Can choose from lime green, purple or tricolor varieties; normally doesn’t flower in North Dakota</td>
</tr>
<tr>
<td>Verbena</td>
<td><em>Verbena</em> spp.</td>
<td>Full sun</td>
<td>Medium to dry</td>
<td>Choose a trailing variety</td>
</tr>
<tr>
<td>Vinca vine</td>
<td><em>Vinca major</em></td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Variegated leaves; normally doesn’t flower</td>
</tr>
</tbody>
</table>
Finally, the “filler” does as its name suggests — it fills in the rest of the space and ties all the plants together. These plants tend to have more of a mounded effect and are placed in front or around the thriller. Examples are coleus (Figure 17), marigolds (Figure 18) and geraniums (Figure 19), to name a few. Depending upon the pot size, you may use one or many fillers. See Table 5 for a list.
Table 5. Filler plants to add volume to the container.

<table>
<thead>
<tr>
<th>Name</th>
<th>Botanical Name</th>
<th>Light Level</th>
<th>Moisture Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ageratum</td>
<td>Ageratum houstonianum</td>
<td>Full sun</td>
<td>Medium</td>
<td>Comes in pink, purple and blue</td>
</tr>
<tr>
<td>Alyssum</td>
<td>Lobularia maritima</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Sweet fragrance; smallest filler plant on this table</td>
</tr>
<tr>
<td>Begonia (rex)</td>
<td>Begonia rex-cultorum</td>
<td>Partial to full shade</td>
<td>Moist</td>
<td>Grown as a beautiful foliage plant</td>
</tr>
<tr>
<td>Begonia (wax)</td>
<td>Begonia semperflorens</td>
<td>Partial shade</td>
<td>Moist</td>
<td>Begonias are very sensitive to temperatures lower than 50 F</td>
</tr>
<tr>
<td>Coleus</td>
<td>Solenostemon scutellarioides</td>
<td>Full sun to full shade</td>
<td>Moist</td>
<td>Read the label; some varieties are sun-tolerant; others are shade-tolerant</td>
</tr>
<tr>
<td>Dusty Miller</td>
<td>Senecio cineraria</td>
<td>Full sun</td>
<td>Medium</td>
<td>Great silver foliage plant</td>
</tr>
<tr>
<td>Euphorbia</td>
<td>Euphorbia graminea</td>
<td>Full sun</td>
<td>Medium</td>
<td>A true “filler” with small white flowers; also drought-tolerant; The variety ‘Glamour’ is seed-started</td>
</tr>
<tr>
<td>Geranium</td>
<td>Pelargonium x hortorum</td>
<td>Full sun</td>
<td>Medium</td>
<td>Traditional filler plant</td>
</tr>
<tr>
<td>Impatiens</td>
<td>Impatiens walleriana</td>
<td>Partial to full shade</td>
<td>Moist</td>
<td>Susceptible to impatiens downy mildew</td>
</tr>
<tr>
<td>(standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impatiens</td>
<td>Impatiens hawkeri</td>
<td>Full sun (if well-watered); best in partial shade</td>
<td>Moist</td>
<td>More expensive than standard impatiens</td>
</tr>
<tr>
<td>(New Guinea)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lantana</td>
<td>Lantana camara</td>
<td>Full sun</td>
<td>Medium</td>
<td>Do not overwater</td>
</tr>
<tr>
<td>Marigold</td>
<td>Tagetes spp.</td>
<td>Full sun</td>
<td>Medium</td>
<td>Easy plant to grow</td>
</tr>
<tr>
<td>Pansy</td>
<td>Viola x wittrockiana</td>
<td>Partial shade</td>
<td>Moist</td>
<td>Doesn’t flower as much during heat of summer; best in spring or fall</td>
</tr>
<tr>
<td>Petunia</td>
<td>Petunia spp.</td>
<td>Full sun to partial shade</td>
<td>Medium</td>
<td>Choose a shorter variety for filler</td>
</tr>
</tbody>
</table>

Figure 20 ties it all together. The cordyline spike is the thriller and the maroon blades give the container a vertical emphasis. The lime green of the spiller (called moneywort) contrasts with the maroon spike and cascades down the pot. Finally, calibrachoa and lobelia are the fillers that add volume to the planting. Overall, this is a nicely balanced container with contrasting forms and colors.

For additional ideas, look through gardening magazines or visit local garden centers to see examples of container gardens. Please note: Some plants may be used in more than one category, depending upon its habit. For example, a petunia can be a spiller or a filler, depending upon its growth habit and size.
Maintaining Your Container Garden

When you plant your container garden, the plants will be small and will not need much water or fertilizer. As the plants grow, check the container every day to see if the plants need water. The best way to do this is to stick your finger into the soil. If the soil feels dry, you will need to water it. By the middle of summer, you most likely will be watering the container almost every day. Make sure you have a water source close to your container garden.

Your plants will need fertilizer because the amount of nutrients in the potting soil is limited. See Section 1, Summer Care of the Flower Garden for fertilizer and deadheading recommendations. If you use a slow-release fertilizer such as Osmocote Flower and Vegetable, you may need to replenish it before the end of the season, depending upon watering frequency.

Figure 20. This container planting only uses four plants, but it has a very full and balanced look. (Esther McGinnis, NDSU)
You will be able to:

- Draw a flower garden design by hand or on the computer
- Take into account the number of plants, their size and texture
- Plan a color combination

Figure 21. This circular planting around a bird bath is attractive and simple. (Esther McGinnis, NDSU)
Introduction

The plants that you have grown from seed will need a home in the great outdoors. If you have a small number of plants, you can add the plants to an existing flower bed that has room or you can plant them in containers.

You may be even more ambitious and may want to design an entire flower bed from scratch. In that case, you may need to purchase plants from a garden center or nursery to supplement the number of plants you grew from seed. Whether your garden is big or small, you have many factors to consider before you begin transplanting.

Location

Location is the most important factor to consider. Will your flower bed be in sun or shade for the majority of the day? Most of the annual flowers that we have recommended in the previous section should be planted in full sun. A full-sun garden is defined as a garden that receives six or more hours of direct sunlight each day. Designing a beautiful shade garden is possible, but you would need to purchase plants that flourish in partial or full shade, such as impatiens, wax begonias and coleus.

Your garden location should be close to a water source. Watering with a garden hose is much easier than hauling water in buckets.

Landscape Design

Once you have chosen a location, begin drawing a design for the garden bed. You can draw the design on paper or you can use one of the free garden design apps that are available.

First, measure the length and width of the garden bed. If you are hand drawing your design, draw an outline of the area using a ruler. As a scale, let ½ or 1 inch on the paper represent 1 foot of the flower bed. Mark the measurements in feet on your plan.

Rectangular flower beds are quite traditional and easy to design. Curved flower beds are generally more relaxed than rectangular or square beds (Figures 21 and 22). Corners of flower beds can be rounded to form bold, sweeping curves.

Figure 22. The curved planting scheme adds interest to this garden. (Esther McGinnis, NDSU)
Next, add the plants to the design. First, you need to know the height of the plants that you intend to use. The seed packet should list the height. If you purchased the plant, the label will give the height. Place shorter plants in the front, medium plants in the middle and tall ones in the back (Figure 23). Write the names of the plants on the design.

As you draw your plan, consider how much space each plant will occupy. You can find this information on the seed packet or plant label. Calculate the number of plants and write this number on your plan. Your design will have more impact if you include multiple plants of each species instead of only one (Figure 24).

Figure 23. In this planting, the flowers are arranged by height. The petunias are in the front of the planting. The zinnias are in the middle and tall verbena is in the back. (Esther McGinnis, NDSU)

Figure 24. Grouping many plants of the same species will have more impact than just a single plant. (Esther McGinnis, NDSU)
Color Combinations

The flower colors you choose are very important in making the flower bed attractive. Some color combinations work because the colors are harmonious. Other combinations create excitement in the garden because they use contrasting colors. Flower beds are usually more interesting if the gardener uses combinations of two or three colors. The following is a list of colors that go well together, but don’t be afraid to experiment with other combinations. There is no wrong color combination. It is a matter of personal taste.

Three-color combinations
- Yellow, orange and red
- Pink, violet and blue (or dark purple)
- Lime green, yellow and orange
- Yellow, purple and green

Two-color combinations
- Fuchsia and lime green
- Yellow and purple
- Yellow and red
- Pink and purple
- Pink and yellow
- Orange and blue
- Red and silver
- Red and green
- White goes with all colors

Texture

Texture is the coarseness or fineness of the plant. For example, the plants in Figures 25 and 26 are considered to have coarse-textured leaves because the leaves are wide. In contrast, the signet marigold in Figure 27 has a fine texture. The leaves and the flowers have a lacy feel. Combining contrasting textures give the garden much interest.
Maintenance

Please see the first section for detailed information on how to fertilize and maintain your garden.

Conclusion

When planning your garden, you may need to draw two or three different designs before you decide on one that pleases you. Changing your garden on paper is easier than moving the plants after they have begun to grow. Planning before you plant helps avoid mistakes.

Figure 26. This coleus also is considered to have a coarse texture. (Esther McGinnis, NDSU)

Figure 27. This signet marigold has a fine texture. (Esther McGinnis, NDSU)
Exhibiting your flowers at county fairs, achievement days and flower shows is fun. After doing the work to grow your flowers, you proudly can display them for the public. This publication will prepare you to exhibit your flowers and optimize your chances of earning the desired ribbon.

Here are some guides for displaying your flowers at county fairs, achievement days or flower shows:

- Obtain a list of the flower exhibit categories. This list is very important because it tells what types of flowers can be entered and how many of each kind you will need. Before the show, plan which classes you wish to enter.

- Read and follow the show rules very carefully. If rules aren’t followed, exhibits often are disqualified or will not receive high marks. Always exhibit the specified number of flowers.

- Choose your best-quality flowers for showing. Avoid flowers and foliage that have significant insect or disease damage. Overly mature flowers are not appropriate, either, because they will start to brown during the show. Select straight, unbroken flower stems.

- Cut flowers the preceding evening or early in the morning on the day of the show. Flowers harvested in the morning or evening will be better hydrated than those harvested during the heat of the day. You will need a bucket of cool water and a knife. A sharp knife will make a cleaner cut than pruning shears because some shears may compress
the stem's water-conducting vessels. Cut the flower stem at its maximum length because you will trim the stems more later. The cut should be angled to prevent the stem from suctioning itself to the bottom of the bucket and limiting water uptake. As you harvest each flower, immediately place the cut stem into the bucket of cool water. Any delay will cause bubbles to form in the stem's water-conducting vessels. The level of water in the bucket should be approximately half the length of the stems. Remove leaves that are below the water line because they may rot and increase bacteria levels in the water. Harvest extra flower stems in case a stem breaks or the flower wilts.

After harvesting, leave the bucket of flowers in a cool, dark spot indoors for several (three to 12) hours. This cooling treatment is called conditioning. Conditioning is very important because it lets the flowers soak up water so they won’t wilt so quickly when you take them to the show.

The rules usually will explain what type of container should be used for your display. Often, the containers can be clear glass pint or quart canning jars. Flowers usually are judged on their quality, not the fanciness of the container. Make sure to select a container that is proportionate in size to your flowers. Short-stemmed flowers will not make an attractive display in an overly large container and vice versa. Be sure the container holds enough water to keep the flowers well-supplied while on display.

Add water to the container with the proper amount of flower food (floral preservative) to extend the life of the flowers. Flower food can be found in floral shops and garden centers.

Recut the stems to the optimum length just prior to exhibiting and immediately place the stems in the water with the flower food. This fresh cut will help the flowers take up more water.

When you are arranging the correct number of flowers in your container, remove any leaves that will be submerged below the water line. The leaves above the water line should be left unless damaged. Gently wash or brush off any dirt that may be sticking to the leaves.

Uniformity is very important in a category that requires more than one flower. The stems should all be the same length. The flowers should be about the same size and at approximately the same maturity level. All the flowers in your entry should be the same color, rather than mixed.

Protect your flowers on the way to the show so they don’t become bruised or broken. Take along a few extra flowers so that you will be able to replace any that are damaged on the way to the show.

Figure 29. Dahlias are a lovely source of cut flowers. (Esther McGinnis, NDSU)