



Zinnia Cut Flower Production in Utah

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Zinnias are a warm-season annual in Utah. They can be grown in the field or in a high tunnel and thrive in Utah's hot summers once they are established. Zinnias can be successfully direct seeded or transplanted. Earlier harvests may be achieved with transplanting. Zinnias are frost sensitive and should be transplanted after the last freeze date for your area if planting in the field. Zinnias for cut flower production benefit from trellising and do best with moderate soil fertility and frequent harvesting.

Site Preparation

For optimal growth zinnias should be planted in an area with full sun and well-drained soil. Incorporating an inch of low-salt compost into the soil prior to planting increases organic matter and soil fertility, without creating pH or salinity problems. Reference USU's [Compost and Manure Guidelines](#) for compost options. Conduct a routine soil test to determine any soil nutrient needs prior to planting zinnias. Soil testing is particularly important when planting in new locations, and should be repeated every 2 years. USU's Analytical Laboratories performs soil tests. Pricing and information for collecting and submitting a sample is available on their [website](#). See 'Fertilizer' section for general N recommendations.

Transplanting

Sow 1-2 seeds per cell four weeks before the last frost. Cover lightly with soil or vermiculite and gently water overhead or in the tray. Germination will occur within 3 to 5 days if soil temperatures are between 80-85°F. Bottom heating with a seedling heat mat is a good option for achieving these warm temperatures. After germination, reduce heat to about 70°F. Thin to 1 seedling per cell. Avoid allowing plants to become root bound by using 72- or 50-cell trays and seeding no more

than four weeks before the intended transplant date. Double-blooming zinnias may revert back to singles if the transplant is root bound or if roots are heavily disturbed when transplanted. Harden off the plants by moving them outside in a protected area for a few days before transplanting. Reference USU's [Transplant Production](#) for more information on growing and hardening off transplants.

Direct Seeding

Sow directly into the soil after the last frost. Sow 2 to 3 seeds per foot and cover lightly with soil. Water in after planting and keep the soil surface from drying out until emergence. Covering the soil with a light cloth, such as Reemay (Figure 1), at planting aids germination by slowing evaporation and moderating temperature. Thin to the desired spacing after the first true leaves appear.



Figure 1. Zinnia seedling germinated under Reemay fabric.

Spacing

Zinnias do well on a 9x9 or 12x12 inch spacing. Smaller varieties, such as those from the Mexican, Queen, or Zinderella series, are better suited to close spacing while large varieties like Benary's Giant, California, or Dahlia benefit from more room. Beds can be 3 to 5 feet wide, but should not be so wide that harvesting the center row would be difficult to reach.

Pinching

Pinching out the center growing point of the zinnia will force side branching that will result in increased blooms and longer stem length. Pinch when the plant is 8 to 12 inches tall by removing the top 3 to 4 inches of the plant.

Trellising

Although zinnias can be grown without trellising, installing a support system will help ensure a high-quality crop with long, straight stems. A layer of horizontal netting suspended between 4-foot garden stakes works well (Figure 2). For this method, netting can be installed at planting and moved higher as the plants grow, but before buds begin to form. The final height of the trellis will depend on plant growth and should allow for the bulk of the leaves to be below the trellis and flower stems to grow through it.



Figure 2. Horizontal trellising (white netting) pulled tight and suspended between stakes over planting bed.

Irrigation

During establishment, irrigate 2 to 3 times per week to ensure the new transplants stay hydrated. Once established, zinnias are fairly drought-tolerant and irrigation events can be reduced to 1 time per week. Apply 1 to 1.5 inches of water with each irrigation.

Fertilizer

Zinnias are moderate feeders. In general, 0.15 pounds of nitrogen should be added per 100 square feet each year. For example, 0.2 pounds (scant 1/2 cup) of conventional urea fertilizer (46-0-0), or 0.8 pounds (about 2.5 cups) of organic 16-0-0 fertilizer. Apply half of the nitrogen before or at planting and side-dress the other half during the growing season. Phosphorous and potassium should only be applied based on a soil test, as these nutrients can build up in the soil. USU's [Calculating Fertilizer for Small Areas](#) is a useful tool for calculating applications.

Harvest and Storage

Cut zinnias in the cool part of the day just before the blooms are completely open. Knowing exactly when to harvest zinnias is important for extending vase life. Look for blooms that have at least two full rows of petals expanded and a mostly stiff upper stem (Figure 3). If harvested before fully developed, the flowers will quickly droop after harvest. Make deep cuts 2 to 4 nodes below the bloom to encourage long-stemmed re-growth. Florist-grade stems should be at least 12 inches long with a preferred length of 18 to 24 inches. Stems are unmarketable (culls) if they are too short, deformed, or have insect damage. Remove leaves from the bottom of the stem and place in clean buckets filled with cool water immediately after harvest. Adding 1 tablespoon of chlorine bleach per 1 gallon water will help keep the water clean and avoid bacterial growth in storage water, which happens quickly with zinnias. Do not store below 40°F, as cooler temperatures can damage the blooms. Harvest regularly and deadhead unharvested blooms to prolong blooming. For most varieties, expect about a 7 to 10 day vase life. Regularly changing water will help keep the blooms fresh longer. While some varieties may benefit from floral preservative, research on using floral preservative to extend zinnia vase life has been generally inconclusive.



Figure 3. Left: Zinnia bloom not ready to harvest (2nd row of outer petals not fully expanded). Right: Zinnia bloom ready to harvest (2nd row of outer petals fully expanded).

Economics

Zinnias are a fairly common flower and command a modest price from florists. Zinnia sales at farmer's markets are typically high and they are excellent additions to mixed bouquets. Wholesale price for zinnias range from 25 to 50 cents per stem depending on type and color of bloom. When selling to florists, zinnias are typically bundled in groups of ten (larger bloom types could be bundled in fives). In the Wasatch Front markets, USU trial zinnias sold for \$1 per stem.

Table 1. Insect pests of zinnia.

Insect	Identification	Control
<i>Aphids</i>	Soft-bodied, sap-sucking insect. Can be green, yellow, or black. Populations can build up very rapidly. Sticky honeydew from the aphids can accumulate on leaves and stems.	Encourage natural predators by avoiding broad-spectrum insecticide applications. Ladybeetle releases inside a high tunnel can be effective, but they will leave the area over time. Apply insecticidal soaps and oils are the best choice for most situations.
<i>Western Flower Thrips</i>	Very small insect with fringed wings feed on flower buds and leaves. Leaves will develop a stippled appearance and petals deformed or discolored.	Chemical control is difficult, Malathion only protects for 2 days and kills beneficial insects. Rotate chemical insecticides used to avoid population resistance. Keep weeds (often host plants) clear of the area.
<i>Twospotted Spider Mites</i>	Very small (0.02”), feed primarily on the underside of leaves and cause stippling (light dots) on the leaves that turn bronze then brown and fall off (Figure 5). Sometimes confused for leaf burn. Form webbing that covers leaves.	Provide adequate irrigation to avoid stress. Control surrounding weeds. Keep dust to a minimum (avoid rototilling between rows) as dust increases mite activity. Avoid/limit broad-spectrum insecticide treatments as mite outbreaks often follow. Spray plants with water, insecticidal oils, or soaps.

Table 2. Common diseases of zinnia.

Disease	Identification	Control
<i>Root, stem, and crown rots</i>	Fungi that infect roots and crowns of plants. Dull-colored foliage or wilting followed by yellowing of plants. Plants may be stunted and then eventually die. Roots are dark, soft, or decayed.	Avoid excessive irrigation/moisture. Plant in well-drained soil. Where soil is heavy, use raised beds to improve drainage. Dig out and destroy infected plants.
<i>Powdery Mildew</i>	A fungal disease that produces a white or light gray powder on leaves, stems and occasionally flowers. Early season infestations should be controlled. If late in the season, chemical control may not be warranted.	Keep area weed and debris free. Sprinkler irrigation reduces incidence compared to drip irrigation. Spray with copper fungicide. Cut down, remove and destroy all stems of the plant after fall freezes.
<i>Tomato Spotted Wilt Virus (TSWV)</i>	Viral disease that has a wide host range. It causes yellow ringspots on leaves that can turn brown/black. Spread by thrips, a common insect pest.	Prevent infection by purchasing clean plant material, eliminating weeds (hosts) from the area, and immediately removing infected plants. Chemical control of thrips (table 1) may be warranted, but is difficult.

USU Zinnia Trials

In 2019, two zinnia trials were conducted at the Greenville Research Farm in North Logan, UT (USDA Hardiness Zone 5).

Study 1: Field

Though typically seeded in mid- to late-May after the danger of frost has passed, ‘Benary’s Giant Salmon Rose’ zinnia was direct seeded into the field on June 3, due to the unseasonably cold and wet weather in spring 2019. Seeds were planted every 6 inches and thinned to 12

inches apart in the row with 24 inches between rows. Plants were sprinkler irrigated and were not trellised. Harvest was terminated by a killing frost on October 1. Table 3 shows harvest data from the field grown zinnia.

Table 3. Study 1 harvest data of field grown 'Benary's Giant Salmon Rose' zinnia.

Total Marketable Stems/Plant	Total Cull Stems/Plant	First Harvest	Peak Harvest
5.8	8.1	31-Jul	19-Aug

Study 2: Shade-covered high tunnel

Six zinnia series mixes were transplanted into a [low-cost high tunnel](#) with the plastic removed and replaced with 30% shade cloth. The six series were 'Benary's Giant', 'Cupcake', 'Dahlia', 'Pompon', 'Queen', and 'State Fair'. Transplants were planted on May 20, and spaced 12 inches apart in a grid pattern in 4 foot beds. Plants were drip irrigated and trellised with horizontal netting. Table 4 shows harvest data from the six different variety mixes.

in the fall with a high tunnel. High tunnels provide about 3°F temperature increase at the night. If temperatures dip low enough, high tunnels will not protect the very frost-sensitive zinnias. Low tunnels within high tunnels may provide additional protection, but were not used. Low tunnels are most effective during the spring when plants are small. Zinnias in our trial were so large by the end of the season that low tunnel protection was not an option.

Table 4. Study 2 harvest data of six zinnia varieties grown in a shaded high tunnel.

Variety	Marketable Stems/plant	Cull Stems/plant	First Harvest	Peak Harvest
Benary's	3.2	2.5	23-Jul	9-Sep
Cupcake	1.4	8.8	23-Jul	22-Jul
Dahlia	2.2	1.1	30-Jul	5-Aug
Pompon	5.2	9.8	30-Jul	9-Sep
Queen	3.9	6.3	23-Jul	9-Sep
State Fair	5.6	3.3	30-Jul	29-Jul

Trial Evaluation

Although these two studies were not replications of each other and direct comparison is not possible, interesting observations can still be made of the two. Harvest from plants direct seeded into an unprotected field began only one week later than those transplanted into a shaded high tunnel (Figure 4). While the total number of stems per plant was greater in the field than in the high tunnel, the high tunnel had fewer culls (44%) than the field (58%). Interestingly, the harvest window was not extended later

Variety Discussion

The highest yielding variety with the least culls was 'State Fair'. 'Benary's', 'Dahlia' and 'State Fair' had good stem length with medium to large bloom size and standard zinnia colors. 'Cupcake' zinnias had very low yields with the best blooms coming on early and high cull rates thereafter. 'Pompon' had high yields, but also the highest cull rates. 'Queen' zinnias had moderate yields and were the favored by florists for their interesting coloration. A summary of each series is given on the next page.

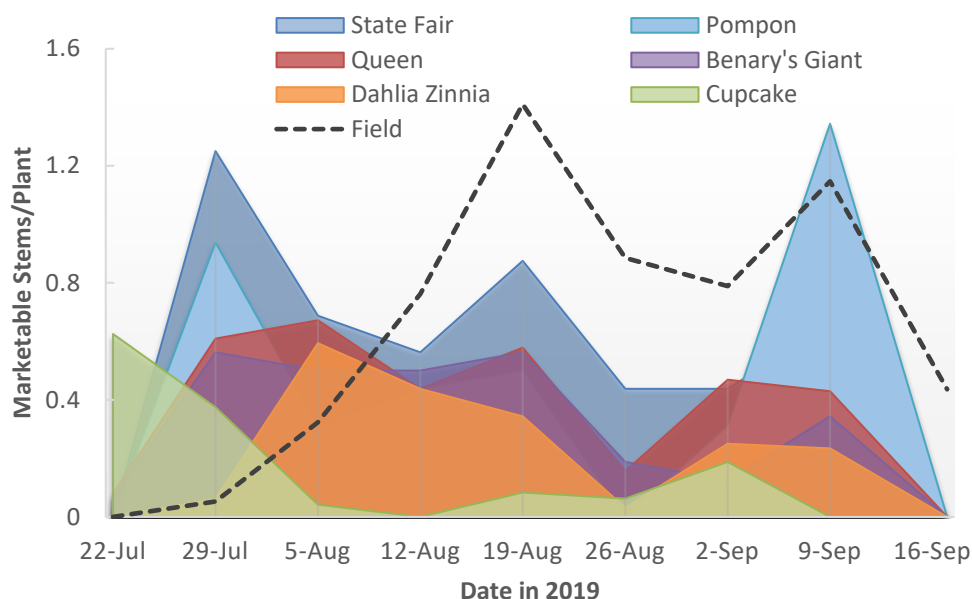


Figure 4. Marketable yield per week of each trialed series grown in a shaded high tunnel. Dotted line represents marketable yield of the 'Benary's Giant Salmon Rose' grown in the field.

Zinnia Series Descriptions



'Benary's Giant' is a well-known series. It grows large and has classic bloom colors. In our trials stem length was long, yield was good, and culls were relatively low.



'Dahlia' series is similar to Benary's Giant in size and stem length, but had lower yields. It has classic bold zinnia colors and large blooms.



'Queen' had smaller blooms, similar to Pompon, and long enough stems to be marketable. It has muted coloration that blends well with other colors and was popular in our markets.



'Cupcake' is a scabiosa-type with double-blooming, frilly top petals. Our trials had low yields of double-blooms and high cull rates. Stems were short and mostly unmarketable. Stress (transplant, heat, uneven irrigation) may cause reversion to less-desirable single blooms.



'Pompon' has small blooms and, in our trials, weak stems. They did have desirable pale colors in the white, yellow, orange, pink, and coral ranges. Pompon had greatest yield early and late in the season.



'State Fair' is another series similar to 'Benary's Giant' and performed very well in our trials. It had standard, bold zinnia colors on long, strong stems. It had the lowest cull rates in our trials.

Additional Resources

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