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Success with Pansies in the Winter Landscape: A Guide for Landscape Professionals

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One of the benefits of living in Georgia and plant hardiness zones 6, 7 and 8 is that we can plant and enjoy pansies in the winter landscape. Pansies are a remarkable winter annual capable of surviving temperatures down to the single digits, freezing solid, then bouncing back with vigor when warm weather returns. Pansies are planted by the millions in Georgia and are one of the top-selling bedding plants for fall landscapes.

Intensive breeding programs provide us with an amazing array of pansy flower colors, ranging from white to rich gold, purple, red, rose, maroon, orange and violet, with many shades in-between. You can also choose from solid colors (called “clear”-faced pansies) to blotches (having a darker, contrasting center, often referred to as “faced” pansies), to two-tones, and all sorts of color blends and pastel shades. Some varieties have petals with crinkled or ruffled edges. Others have large flowers up to 4 inches in diameter.

The modern pansy, *Viola x wittrockiana*, is thought to have evolved from *Viola tricolor*, Johnny Jump-up, a common native of central Europe. The Greeks in the 4th Century B.C. used them as medicinal herbs for curing respiratory problems and colds. By 1850, many pansy strains were available to European gardeners, soon making their way to the North American market. By 1900, pansies were a popular North American annual. Today, there are more than 300 varieties of pansies, including many hybrids bred for improved heat tolerance, unusual flower colors, larger flower size and plant vigor. Johnny Jump-ups are still popular among landscapers, some of whom prefer them and say they are more cold-hardy than pansies.

This publication provides guidelines for the planting and care of pansies to ensure success, including planting time, bed preparation, plant spacing, planting procedures, fertilization, freeze protection, and common insect and disease problems. Since seasonal color is a high-cost investment in the landscape, it is important to get the maximum return on your investment by following these planting and cultural guidelines.

Planting Time Is Critical

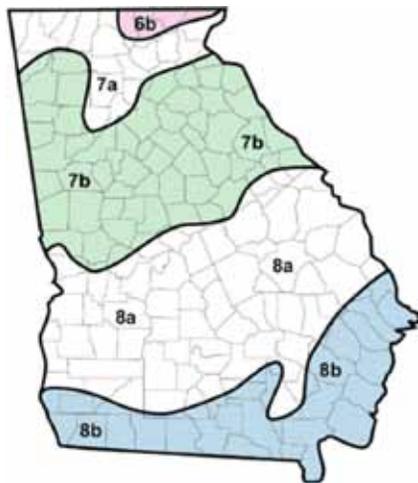


Figure 1. USDA Hardiness Zones in Georgia

Table 1. Suggested planting dates for pansies in Georgia

USDA Hardiness Zone(s)	Suggested Planting Dates
8a and 8b	Oct. 15 - Nov. 1
7b	Oct. 1 - Oct. 15
6b and 7a	Sept. 15 - Oct. 1
Zone	Avg. Min. Tem. (°F)
6b	-5 - 0
7a	0 - 5
7b	5 - 10
8a	10 - 15
8b	15 - 20

The ideal time to plant pansies in Georgia depends on your location. For best results, follow planting dates closely (Table 1, Figure 1). The reason for these specific planting dates is because pansies require soil temperatures between 45 °F and 65 °F for best growth. Pansies planted after soil temperatures go below 45 °F often appear stunted, develop stunted, pale green leaves and flower poorly. Root systems stressed by cold are less efficient in taking up nutrients. When soil temperatures fall below 45 °F, pansy roots literally shut down and stop functioning.

On the other hand, pansies planted too early and exposed to warm temperatures can appear yellow. Their stems stretch, and new growth appears as small rosettes at the ends of stems. The plants flower poorly and become more susceptible to frost damage, insects and diseases.

Selecting Pansies and Buying Plants

Most pansy cultivars are grouped into a series with similar qualities, such as plant size, flower color and heat tolerance (Table 2). Crystal Bowl, for instance, is a popular clear color series containing 11 cultivars.

Pansy plants are available in a wide variety of containers, from cell packs (36 or 24 plants/tray) to 3-inch and 4-inch pots. Plants in larger pots generally have a larger, more developed root system and are the preferred choice in the professional landscape industry.

Pansy quality at time of purchase is extremely important because it determines to a great extent how the plants will perform in the landscape. Before purchasing plants, make certain they are healthy and free of insects and diseases. The crown of the plant should be compact and have deep green leaves. Avoid purchasing over-grown, leggy plants or plants that are root-bound in their containers. These plants are stressed and will have a difficult time

getting established after planting. Look at the roots to make certain they are healthy, showing an abundance of white fibrous roots along the external portion of the root ball.



Antique Shades Series



Crystal Bowl Series



Jolly Joker Pansy

Table 2. Major pansy series by flower type

Clear	Blotched
Atlas	Happy Face
Banner	Imperial Antique Shades
Berna	Joker
Clear Sky	Lyric
Crown	Majestic Giant
Crystal Bowl	Maxim
Presto	Medallion
	Regal
	Skyline
	Super Majestic Giant

Planting Procedures

Like other types of seasonal color, pansies must have well-drained soils and cannot tolerate wet feet. Planting pansies on elevated beds, 6 to 10 inches above the existing grade, will not only assure good drainage but will also improve the visibility of the color display.

If the bed to be planted previously contained summer annuals, remove and discard the old vegetation to avoid carry-over of insects and diseases. Some landscape firms also discard the old mulch to prevent disease carry-over. Avoid incorporating the old mulch into the bed as an amendment, because micro-organisms in the soil will feed on it and break it down into humus. As they feed on the organic matter, the microorganisms utilize nitrogen in the soil. As a result, nitrogen levels in the soil may be depleted, causing plants to appear anemic and hungry.

When preparing a new bed or revitalizing an existing bed, adding organic materials can improve the soil. Organic amendments improve a soil's water and nutrient holding ability. Compost and composted animal manure are frequently used as amendments. A 25 percent by volume quantity of amendment is recommended for best results; this equals 3 inches of organic matter incorporated into the top 12 inches of soil. If organic amendments are purchased in bulk, 1 cubic yard per 100 square feet will provide approximately 3 inches on the soil surface. Considerably less organic matter may be required if the bed was previously cropped. Avoid high amounts of organic matter (more than 25 percent by volume); the humic acids and organic salts it releases can cause plant problems.

Once the organic matter is incorporated, take a soil sample for pH and nutrient testing. Soil testing is available through your local county Extension office for a nominal fee. Pansies prefer a pH in the range of 5.4 to 5.8. A soil pH above 5.8 can result in boron and iron deficiencies; therefore, avoid liming pansy beds out of habit, unless the soil test indicates a need for lime.

Fertilization requirements of pansies differ from other types of seasonal color. Avoid using fertilizers containing high amounts of slow-release ammoniacal nitrogen. These fertilizers are commonly used on summer annuals but are not recommended for pansies. High rates of ammoniacal nitrogen can cause pansy stems to stretch and become succulent during warm fall weather, which weakens plants and makes them more susceptible to winter injury. Ammoniacal nitrogen also is slow to be absorbed by the plants during the winter months when soil temperatures drop below 45 °F. Pansies can literally starve during the winter months even though the soil contains high amounts of ammoniacal nitrogen.

Generally, a thorough drenching of the soil at transplant with 150 parts per million of a soluble greenhouse fertilizer, such as 15-2-20, will get the plants off to a good start. Avoid high rates of nitrogen during September and later in April and May, because the plants grow quickly and can stretch in warm weather under high nutrition. (For recommendations on maintenance fertilization, see "Care of Established Beds.")

Pansy plants are usually planted at spacings of 6 inches, 8 inches or 10 inches between plants (Table 3). Although a 6-inch spacing makes the bed appear more full, plants may become crowded and more susceptible to spider mites and diseases. A wider spacing allows better air circulation between plants and helps avoid these problems.

Some firms use a planting grid to ensure uniform spacing. Figure 2 shows a simple planting grid that can be built from wood and nylon cord or monofilament fishing line wrapped around nails.

Table 3. Number of plants required at various plant spacings

Distance between Plants	Plants Required/100 sq.ft.
6 in.	400
8 in.	227
10 in.	143



Lay out the plants according to the planting plan before removing them from their pots.

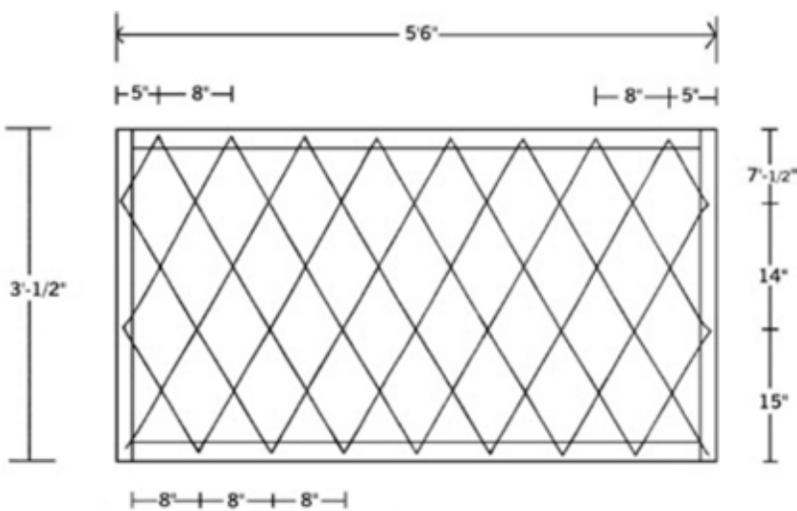


Figure 2. Planting grid for an 8-inch spacing.

Water is one of the most critical steps of the planting procedure. A thorough watering immediately after planting will eliminate air pockets around plant roots.

Some professionals also apply a pre-emergent herbicide to the bed if the site is known to have a history of weed problems. Make certain the herbicide you use is labeled for pansies (see Table 4), otherwise, plant stunting and foliar damage may result. For more information on weed control in pansies see Cooperative Extension Circular 867-12, *Weed Control in Pansies* at <http://pubs.caes.uga.edu/caespubs/pubcd/C867-12/C867-12.htm>

Table 4. Pre-emergence herbicides for controlling broadleaf and grass weeds in pansies

Trade Names	Active Ingredient
Dimension	dithiopyr
Pendulum 2G (Granular)	pendimethalin
Pennant	metolachlor
Surflan (Granular and Sprayable)	oryzalin
XL	benefin and oryzalin

Source: Dr. Mark Czarnota, UGA Ornamental Weed Specialist

Freeze Protection and Cold Weather Response

When the air temperature drops below 25 °F, pansy foliage will wilt and turn a gray-green color. This is a normal defense response to cold weather. Soil temperature gradients, especially in raised beds, can vary greatly due to micro-climate differences. For example, on one site in metro Atlanta, soil temperature on the south-facing slope of a pansy bed was approximately 45 °F on a cold winter day, while 10 feet away, soil on the northern side of the same bed was frozen solid to the depth of the root ball. The roots could not absorb water from the frozen soil, and the plants on the north side of the bed dehydrated and died. Frozen soils combined with drying winds can spell disaster for a pansy bed, even though the plants were healthy prior to these conditions.

Pine straw, applied 2 to 4 inches thick over the top of the entire bed (plants and all) during extreme cold is one of the best ways to save a pansy planting from freeze injury. Pine straw helps trap heat in the soil, prevents it from freezing and greatly reduces exposure to cold, desiccating wind. Carefully rake the pine straw off the bed when the cold weather passes. Special frost protection fabrics have also been used successfully. These special freeze protection measures are generally taken only when the air temperature is expected to drop below 20 °F for several hours, when dehydrating winds accompany the cold, and when the soil is in jeopardy of freezing. Healthy plants can generally survive short periods of temperatures down to the single digits without protection.

Care of Established Beds

When the weather cools and soil temperatures drop below 60 °F, begin a liquid feed program using a fertilizer containing at least 50 percent of its nitrogen in nitrate form. A standard 15-2-20, high-nitrate pansy formula fertilizer applied at 14-day intervals through March 15 provides excellent results. Formulations with nitrogen derived from potassium nitrate (KNO₃), calcium nitrate [Ca(NO₃)₂] or magnesium nitrate [Mg(NO₃)₂] are recommended. These formulations also have little effect on soil pH, so nutrient deficiencies are less likely to occur.

Fertilization frequency depends on the vigor and performance of the planting. Consult the label for recommended application rates. If a period of warm weather occurs, cut back on the liquid feed to avoid foliar stretching during the mid-winter. When foliar feeding is done, apply enough liquid not only to wet the foliage but also to saturate the root zone to a 4- to 6-inch depth.

Soil temperatures usually are on the rise by March 15, so fertilizers containing ammoniacal nitrogen can be used at that time. The standard fertility program used on summer annuals – 200 ppm 20-20-20 or a slow release/granular fertilizer – should work well for pansies during the remainder of the growing season.

Removing frost-damaged flowers and old, faded flowers should be a top priority with pansies. This not only improves the appearance of the color display but also prevents the onset of seed pods that consume the plant's energy. It also reduces the changes of fungal blight diseases that feed on old blossoms. Also trim lanky branches periodically to encourage branching, compact growth and improved flowering.

Get the soil tested again during the growing season. Soil pH should be between 5.4 and 5.8 for best growth. A soil pH above 5.8 can result in boron and iron deficiency; and high pH may lead to an increased incidence of black root rot, *Thielaviopsis basicola* (Jones, 1993). If the soil pH rises above 5.8, drench at 10-day intervals with either iron sulfate or aluminum sulfate (1 to 3 pounds per 100 gallons) to lower the pH into the desired range. Lightly rinse pansies after application to prevent foliage injury from the drenches. Continue these corrective treatments until the soil pH drops and stays in the 5.4 to 5.8 range.

Nutritional Disorders

Pansies are relatively free from nutritional disorders when grown at the proper pH; however, when the soil pH is allowed to climb above 5.8, micronutrient deficiencies can be a problem.

Boron deficiency: Boron deficiency symptoms are very specific: the main shoot stops growing and the young, developing leaves become small, thickened and puckered.

Boron deficiency can be caused by an elevated pH above 5.8, so the first step in correcting the problem would be to lower soil pH to the recommended range (see "Care of Established Beds" for recommendations for lowering pH). In addition, a soil drench of borax at a rate of ½ ounce per 100 gallons, or a commercial product called Solubor, can be used to make boron more available to the plant. Calcium tends to tie up boron, especially when the calcium-to-magnesium ratio is too high (greater than about 5:2, Ca to Mg). If the Ca:Mg ratio is too high, include epsom salts (1 pound per 100 gallons of water) in the boron drench. Lightly rinse foliage after the application, as boron solutions can burn leaves. Do not apply more than two boron drenches during the growing season because excess boron can cause other problems. Unfortunately, plant recovery from boron deficiency is a slow process, often taking two to three weeks for normal growth to resume.



Boron Deficiency
(NC State University)



Iron Deficiency
(NC State University)

Iron deficiency: Iron deficiency symptoms begin with interveinal chlorosis (yellowing) of primarily the youngest leaves, followed by marginal burning in severe cases. As with boron deficiency, the first step in treating iron deficiency is making sure soil pH is within the recommended range. If the pH is too high, lower it with a soil drench of iron sulfate (1 to 3 pounds per 100 gallons). Not only will this treatment lower soil pH, it also will increase iron levels in the soil solution. If further treatment is needed, use a foliar spray of 10 percent iron chelate (Sequestrene 330 Fe) at 4 ounces per 100 gallons.

Magnesium deficiency: Magnesium deficiency symptoms begin with interveinal chlorosis of the newly matured (not the youngest, still expanding) leaves, followed by a general yellowing of the leaves beginning at the margins. Marginal necrosis can follow in severe cases. Magnesium deficiency can occur when soil pH falls below 5.4 or if the soil has high calcium levels. If magnesium deficiency is suspected, check the calcium-to-magnesium ratio on the soil test results. If it is greater than 5:2, apply a soil drench of epsom salts (2 pounds per 100 gallons of water). Do not make applications more than once every four weeks. If multiple applications are needed, be sure to monitor both foliar and soil levels of Ca to ensure that the Mg applications do not cause Ca to become deficient.



Magnesium Deficiency
(The Plant Pixie, Wilmington, NC)

Other Environmental Considerations

Excess soil moisture decreases both the oxygen content of the soil and root growth. Carefully monitor irrigation and try to keep pansies slightly on the dry side to "harden" growth prior to cold weather. If beds are continuously wet, even in periods of normal rainfall, consider making drainage adjustments.

Heat may also be a problem, causing pansy stems to stretch and become leggy. This is a particular problem when pansies are planted too early in the season. The F1 hybrids, such as the "Majestic Giants" series, "Regal" series, "Imperial" series and "Crown" series, are known to have superior heat tolerance.

Insects and Related Pests

There are a wide variety of pests that affect pansies, and some can cause serious problems. Landscape professionals should contact their local county Extension agent for recommendations on dealing with each pest. The *Georgia Pest Management Handbook*, available online at www.ent.uga.edu/pmh/ offers the most up-to-date control measures for each pest. The following are common pests of pansies:

Green Peach Aphid: The green peach aphid can affect pansies during production in the nursery as well as in the landscape. The adult aphid can be light green, dark green or pink, and has red eyes. Three dark lines run down its back. Wings may or may not be present. The green peach aphid is resistant to many insecticides, including the new pyrethroids.

Foxglove Aphid: The foxglove aphid infests pansy, calceolaria, hyacinth and the foliage of gladiolus, where it causes reduced vigor, curling and distortion of leaves, hardening of buds and malformed flowers. The foxglove aphid is greenish-yellow and shiny with cylindrical tapering cornicles (small upright backward-pointing tubes on the last segment of their bodies).

Pansyworms: Pansyworms feed on pansy, violet, alyssum and Johnny-jump-up as well as moonseed, passion flower, sedum and portulaca. They are spiny orange-red caterpillars up to 1 ¼ inches long, with a black stripe down each side of their body. Spines are arranged in six rows along the top and sides of their bodies. Pansyworm is the immature stage of a variegated four-footed butterfly called fritillary.

Cutworms: Two kinds of cutworms are likely to feed on pansies: black cutworms and variegated cutworms. The black cutworm is a dark, shiny-gray-to-black caterpillar with a light-gray line down the back. Black cutworms burrow into the soil during the day and emerge to feed at dusk or in cloudy weather. The adult is a dark brown moth with mottled wings and a wing-span of 1 ½ inches.

The variegated cutworm feeds on almost any succulent broadleaf plant's leaves, buds, flowers, fruit, stems and tubers, or roots of flowers and vegetables as well as field crops. The young caterpillars (larvae) are green with a black head and turn light brown with a greenish tinge with age. Mature larvae are 1 ¾ inches long. The adult moth has pale grayish-brown forewings and iridescent pearly white hind wings.

Yellow Woollybear: The yellow woollybear feeds on a wide range of ornamental, garden and field crops as well as weeds. The larvae, up to 2 inches long, are covered with pale yellow, brownish-yellow, red or white hairs. The adult moth has white wings with a few dark spots on each wing. Several generations occur each year. Several natural enemies limit yellow woollybear populations and the insect usually does not become a problem on crops sprayed for other pests.

Slugs: The feeding done by slugs resembles that of caterpillars. Slugs require high moisture and tend to burrow into soft, open or coarse soil during the day or rest under boards, logs, flats and other debris.

Slugs are more of a problem during cool springs when temperatures are in the 60s and 70s since their activity decreases as temperatures rise. They hide in cool, damp places during the day and often feed at night while temperatures are cooler and leaves are moist. They are most active after a cool spring rain. They take shelter during cold periods and can survive light freezes.

Slugs are eaten by birds, moles, toads and some carnivorous ground beetles and are parasitized by certain flies, mites and nematodes; however, their worst enemy is dry weather because they must have a moist environment to survive.

Chemical control of slugs usually involves the use of baits containing methiocarb or metaldehyde. For best control, place the bait close to where slugs tend to harbor – under stones, mulch, leaves and other debris at ground level.



Green Peach Aphid
(Scott Bauer, USDA, Bugwood.org)



Foxglove Aphid
(Charles Olsen, Bugwood.org)



Black Cutworm
(Merle Shepard, Bugwood.org)



Variegated Cutworm
(R.J. Reynolds Tobacco Co., Bugwood.org)



Yellow Woollybear
(David Cappaert, Michigan State University, Bugwood.org)



Damage from slugs
(R.J. Reynolds Tobacco Co., Bugwood.org)

Diseases

Listed below are some of the common diseases affecting pansies. For disease control recommendations, contact your local county Extension agent or consult the *Georgia Pest Management Handbook*, available online at www.ent.uga.edu/pmh/.

Crown and Root Rot Diseases: Crown rot is the most common disease problem of pansies in the landscape, caused by a soil-borne fungus, *Phytophthora parasitica*. It is most active in warm, wet weather and commonly occurs during the late spring and fall. The fungus infects the plant at or just above the soil line. Symptoms are greenish-brown, soft, water-soaked lesions on the stem. When the main stem is infected, the entire plant dies.

Black Root Rot: Black root rot, caused by the soil-borne fungus *Thielaviopsis basicola*, has become a serious problem of pansies in both production greenhouses and landscapes during recent years. This fungus attacks the fine feeder roots, kills them and turns them black. Gradually, the entire root system can die. Black root rot fungus is common in soils across the South, and it is active over a very wide temperature range.

Botrytis Blight: Botrytis blight, caused by the fungus *Botrytis cinerea*, is sometimes a problem with pansies. It is an airborne fungus that attacks flowers as well as dead, dying or damaged plant tissue. High rates of fertilization, death of lower leaves, low light intensity, frequent watering and crowded plants all favor botrytis blight development.

Downy Mildew: Downy mildew is caused by a fungus-like organism called *Peronospora*. Symptoms include light-colored blotches with gray-purple spores on the underside of leaves. The top of the leaves appear chlorotic. As the disease advances, the spores congregate and the leaf takes on a gray, fuzzy texture. Eventually, leaves curl and become distorted. The damage resembles aphid damage.

Leafspot Diseases: Pansies are susceptible to several leafspot diseases. *Cercospora* leaf spot is the most common disease of pansy in the southeastern United States. It is characterized by irregular purple lesions on the lower leaves. In the advanced stages, the leaf spots develop tan centers with purple borders. Other common leafspot diseases of pansies are anthracnose (caused by the fungi *Colletotrichum gloeosporioides* and *C. violae-tricoloris*) and scab or spot anthracnose (caused by *Sphaceloma violae*).

Leafspots vary in color from white to brown or black and often have a water-soaked margin. The spots may have a dark brown border or halo and exhibit spore-producing structures within the spots (appearing as tiny black dots). While leafspot diseases are common on pansy, they seldom cause significant damage. Leafspot diseases are best controlled through proper sanitation, such as removal of plant debris.

In order to properly treat plant diseases, it is important to identify which specific organism is causing the problem. The University of Georgia has a plant diagnostic clinic to which Extension agents can submit samples for identification and control recommendations. Contact your county Extension office for information on sample submission.



Crown Rot on Pansy
(L.W. Barnes, Texas A&M University, Bugwood.org)



Black Root Rot on Pansy
(L.W. Barnes, Texas A&M University, Department of Plant Pathology)



Downy Mildew on Pansy
(L.W. Barnes, Texas A&M University, Bugwood.org)



Cercospora leafspot on Pansy (L.W. Barnes, Texas A&M University, Bugwood.org)

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