

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

Gary L. Wade and Paul A. Thomas
University of Georgia

One of the benefits of living in the Southeast 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 the Southeast and are the top-selling bedding plant for landscapes.

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

Planting Time Is Critical

The ideal time to plant pansies in Georgia depends upon where you are planting. For best results, planting dates should be followed closely (Table 1).

The reason for these specific planting dates is that pansies require soil temperatures between 45 degrees F and 65 degrees F for best growth. Pansies planted after soil temperatures go below 45 degrees F show stunted, pale green leaves, little growth and, most importantly, little or no flowering. Cold-stressed root systems are less efficient in taking up nutrients. During very cold weather, when soil

temperatures fall below 45 degrees F, plant roots literally shut down.

On the other hand, pansies planted too early and exposed to warm temperatures often appear yellow; the stems stretch and the new growth will appear as small rosettes at the ends of stems. As a result, the plants flower poorly and become more susceptible to frost damage and/or disease.

Selecting Pansies and Buying Plants

Most pansy cultivars are grouped into a series (with similar qualities, such as plant size and heat tolerance). 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. 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 should 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.

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 ensure good drainage but will improve the visibility of the color display.

If the bed you are planting previously contained summer annuals, make certain you remove and discard the old vegetation to avoid carry-over of insects and diseases. Also, rake to the side of the bed any existing mulch and avoid incorporating it into the soil. This can be added back to the bed after planting, although some firms prefer to use new mulch to avoid carry-over of diseases and insects. Avoid incorporating the old mulch into the bed, because the microbes in the soil will compete with plants for nitrogen as they feed on and break down the organic matter.

Table 1. Suggested planting dates for fall pansies in the Southeast.

USDA Hardiness Zone(s)	Suggested Planting Dates	Average Minimum Temperature (degrees F)
6b	Sept. 15-Oct. 1	-5 to 0
7a	Sept. 15-Oct. 1	0 to 5
7b	Oct. 1- Oct. 15	5 to 10
8a	Oct. 15-Nov. 1	10 to 15
8b	Oct. 15-Nov. 1	15 to 20

If you are preparing a new bed or revitalizing an existing bed, organic materials can improve the soil. Organic amendments help improve a soil's water and nutrient-hold ability. Compost and rotted animal manure are frequently used as amendments. For best results, make certain the organic amendment used is fully decomposed. Uncomposted bark products should not be used as a soil amendment due to potential nitrogen depletion problems described above. 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. Approximately 1 cubic yard of organic matter per 100 square feet of surface area is needed. Considerably less organic matter may be required if the bed was cropped previously. Avoid high amounts of organic matter (more than 25% by volume), because humic acids and organic salts released by the organic matter can cause problems.

Next, take a soil sample for pH and nutrient testing. This should be done at least 4 weeks before planting the bed to ensure the return of the lab results. 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 are fine for summer annuals but not for fall pansies. High rates of ammoniacal-nitrogen will cause pansy stems to stretch and become succulent during the warm fall weather. This weakens the 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 degrees F. Pansies can 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 ppm of a soluble greenhouse fertilizer such as 20-10-20 will work well for the first weeks of September and October. Avoid high rates of nitrogen during September and later in April and May, because the plants grow fast and can stretch in warm weather under high nutrition. (See section on "Care of Established Beds.")

Pansy plants are usually planted at a 6-, 8- or 10-inch spacing between plants. (See Table 2) Although the 6-inch spacing results in a fuller appearing bed, plants may become crowded and more susceptible to spider mites and diseases. A wider spacing allows better air circulation between plants and helps avoid this problem.

Once the plants are installed, next place a mulch on the soil surface. Fine-textured mulches such as pine straw or pine bark mini-nuggets stay seated better on the bed than coarse-textured mulches. Use your hands to carefully

apply mulch around the plants and avoid covering the foliage.

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 and any other plants also in the bed (see Table 3). Otherwise, stunting of the plants and foliar damage may result.

Freeze Protection and Cold Weather Response

When air temperature drops below 25 degrees 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. On one site in a city planting, for instance, soil temperature on the south-facing slope of a pansy bed was approximately 45 degrees 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. This 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 degrees F for a considerable length of time, when dehydrating winds accompany the cold, and when the soil is in jeopardy of freezing. Healthy

Table 2. Number of plants required at various plant spacings.

Distance between Plants	Number of Plants Required per 100 sq.ft. of Bed Area
6-inches	400
8-inches	227
10-inches	143

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 temperature drops below 60 degrees 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], and perhaps magnesium nitrate [Mg(NO₃)₂] are recommended. Using these formulations also allows the landscape manager to better maintain the appropriate soil pH.

Fertilization frequency depends on the vigor and performance of the planting. Consult the label for recommended application rate. 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.

By March 15, soil temperatures are on the rise, and you can begin using fertilizers containing ammoniacal nitrogen once again. The standard fertility program you use for 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.

Deadheading (removing spent blossoms) from frost damaged flowers and cleaning up beds by removing debris and leaves should be a top priority with pansies. This not only prevents insect and disease problems but also improves the visibility of the color display. Bi-monthly deadheading is an essential requirement of a professional color display. Also, trim lanky branches periodically to encourage branching, compact growth and improved flowering.

Take a soil sample in early spring and get the soil tested again. Soil pH should be between 5.4 to 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 1 to 3 lb per 100 gallons of either iron sulfate or aluminum sulfate to help lower the pH. Lightly rinse pansies after application to prevent any foliage injury from the drenches. Continue these corrective treatments until the substrate 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. Magnesium (Mg) deficiency can be encountered if the pH falls too low or if calcium levels are

too high with respect to Mg levels.

Boron deficiency: The symptoms of this deficiency are very specific. The younger, developing leaves are small, thickened and puckered. In many instances, the main shoot will stop growth completely (abort), and lateral shoots will attempt to expand, developing the thick, puckered leaves mentioned above.

The first stage of treatment should involve reducing substrate pH (if above the recommended range) to 5.4 to 5.8 to make boron more available to the plant. Apply a substrate drench of borax at oz per 100 gallons, or use solubor at oz per 100 gallons. Lightly rinse off foliage after the application, as boron solutions can burn leaves.

Prior to the boron drench, check the levels of calcium and magnesium in the substrate. 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 Ca is out of proportion to Mg, include 1 lb per 100 gallons of Epsom salts (MgSO₄ & H₂O) in your boron drench. Do not apply more than two boron drenches during the growing season; excessive boron will also cause problems on pansies. Unfortunately, plant recovery from boron deficiency is a slow process, and it may be better to replace the plants instead of applying the boron corrective drench.

Iron deficiency: Symptoms of iron deficiency are 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 assuring the substrate pH is within the recommended range. If the pH is too high, follow the recommendations given earlier to lower it to 5.4 to 5.8 using iron sulfate. Not only will this treatment lower the pH, it also increases the iron supply in the substrate solution. If further treatment is needed, use a foliar spray of 10% iron chelate (Sequestrene 330 Fe) at 4 oz per 100

Table 3. Partial list of pre-emergent herbicides registered for use on pansies.

Trade Name	Manufacturer
Betasan	Zeneca
Eptam	Zeneca
Pennant	Ciba Plant Protection
Surflan	Dow Elanco
XL	Dow Elanco

gallons.

Magnesium deficiency: Symptoms of magnesium deficiency on pansy are interveinal chlorosis of the newly matured (not the youngest, still expanding) leaves followed by general yellowing of the leaves, beginning at the margins. Marginal necrosis can follow in severe cases. If magnesium deficiency is suspected, check the Ca to Mg ratio as mentioned above. If it is greater than 5:2, apply a substrate drench of 2 lb Epsom salts 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 substrate levels of Ca to assure that the Mg applications do not cause Ca to become deficient.

Other Environmental Considerations

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

Insects and Related Pests

There are a wide variety of pansy pests, some of them with the potential to be serious problems. The following are common pests of pansies:

Green peach aphid: These aphids are pests of pansies during production as well as in the landscape. The small adult is light to dark green or pink with 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, the foliage of gladiolus, and hyacinth where it causes reduced vigor, curling, distortion of leaves, hardening of buds, and distorted flowers. The foxglove aphid is a medium sized, greenish yellow, shiny aphid with cylindrical tapering cornicles. There is usually a dark green patch of pigmented material showing through the cuticle at the base of each cornicle. It can produce sexual forms and lay eggs on many different host plants.

Pansyworms: These are spiny caterpillars that grow to 1 1/4 inches long. They are orange-red with a black stripe down each side (the black stripe has white spots along it). The spines are arranged in six rows along the top and sides. Pansyworms are the immature stages of the variegated fritillary, one of a group of four-footed butterflies called "fritillaries." Pansyworms feed on pansy, violet, alyssum, Johnny-jump-up and other plants in that family as well as moonseed, passion flower, sedum and portulaca.

Cutworms: Two kinds of cutworms are likely to feed on pansies: black cutworms and variegated cutworms. The black cutworm is a dark greasy-gray to black, fat caterpillar with a paler line down the back. The older caterpillars are

capable of surviving some cold weather and feeding resumes with warmer temperatures (>46 degrees F); adults, young larvae and pupae are susceptible to freezing. As the caterpillars mature, they become increasingly repelled by light. Larger 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 wingspan of 1 1/2 inches.

The variegated cutworm feeds on almost any succulent broadleaf plant; leaves, buds, flowers, fruit, stalks, tubers or roots of flowers and vegetables; field crops; and flowering crops (It does not feed on grasses.). The most has pale grayish-brown tinged forewings that are reddish and shaded about the middle and darker brown around the outer margin. The hind wings are iridescent pearly white with margins shaded with shining light brown. The wingspan is 1 3/4 inches. The eggs are laid in dense clusters of about 60. Tiny variegated cutworm caterpillars are green with indistinct lines and few hairs; the head is black. Mature larvae are 1 3/4 inches long. Color varies from light to dark dull brown with a greenish tinge. All stages can be found throughout the growing season. Birds are fond of variegated cutworms and this pest has numerous parasites.

Yellow woollybear: The yellow woollybear feeds on a wide range of ornamental, garden and field crops as well as weeds. The yellow woollybear is densely covered with pale yellow, brownish yellow, red or white hairs. A fully grown caterpillar may be almost 2 inches long. The moth has a wingspan of nearly 1 inches and is nearly pure white, except for the abdomen and a few black spots on each wing. The eggs are laid in clusters of 50 to 60 and are usually covered with scales from the body of the moth. After feeding for about four weeks, woollybears are fully grown and begin to seek sheltered places in which to pupate. Several generations occur each year. Several natural enemies limit yellow woollybear populations. Eggs are parasitized by *Trichogramma* wasps and the caterpillars are susceptible to diseases caused by *Bacillus thuringiensis* and a granulosis virus. This insect usually does not become a problem on crops being sprayed for other pests.

Slugs: Although more closely related to octopuses than insects, slugs and snails are much like some insects in their biology. Their damage to pansies resembles the damage done by some caterpillars, too. Slugs require a high moisture substrate and tend to burrow into soft, open or coarse soil during the day or to rest under boards, logs, flats and other debris.

Young slugs hatch from eggs about two weeks after being laid when temperatures are at 68 degrees F. Some slugs are apparently not repelled by light but are repelled by rising temperatures. Slugs emerge to forage with a decrease in light intensity together with a fall in temperature below 70 degrees F.

As temperatures rise, slugs crawl down to their hiding places on the soil surface to rest and absorb water through the skin. As temperatures start to fall, slugs actively begin foraging. Thus slugs may be active during the day after a cooling shower as long as the temperatures decline or remain steady. Slugs are very sensitive to ambient temperature and can detect temperature changes as gradual as 1 degree F per half hour. Slugs prefer to remain at 62 to 65 degrees F, although they lay eggs and develop normally (but more slowly) at lower temperatures. Development ceases below 40 degrees F. Most slugs can withstand slight freezing temperatures, although their tendency to take shelter in cold weather usually protects them from freezing.

Birds (up to 6 percent of the diet of starlings), moles, toads, shrews, carnivorous ground beetles, rove beetles and firefly beetles feed on slugs. Sciomyzid flies, trombidid mites, sporozoa, cestodes, ciliates and nematodes also parasitize slugs. In addition, slugs are preyed upon by omnivorous slugs such as the spotted garden slug. Dry weather may kill up to 90 percent of slug eggs and young per year.

Chemical control of slugs usually depends upon baits of methiocarb or metaldehyde. Even at best, probably no more than 10 percent of the population will be controlled with a single application of baits. Baits are more effective if placed close to some sort of protection, especially under stones and other refuges.

Diseases

Crown and root rot diseases: Although it usually is not a major problem during pansy production, crown rot caused by the common soilborne fungus, *Phytophthora parasitica*, is the most important disease on pansies in the landscape. It is most active in warm, wet weather and thus occurs on pansy in the fall and late spring. The fungus infects the plant at or just above the soil line. The crown lesion becomes a greenish-brown, soft, watery rot. The entire plant dies. *Phytophthora parasitica* attacks many bedding plants, including petunia, snapdragon, vinca, hibiscus and coleus.

Black root rot: Black root rot, caused by the soilborne fungus *Thielaviopsis basicola*, can also be very serious on pansy. This fungus attacks the fine feeder roots. Infected roots are black due to the presence of the fungus. *Thielaviopsis basicola* also causes a root rot on Helleri holly and vinca. This fungus is common in soils across the south, and it is active over a very wide temperature range. The fungus infects the feeder roots and gradually kills the entire root system.

Black root rot has been a serious problem in pansy beds for the past five to seven years. It appears to be related to hot temperatures during production.

Botrytis blight: Botrytis blight is a common but only slightly damaging disease of pansies caused by *Botrytis cinerea*. This is an airborne fungus that attacks almost any flower and dead, dying or damaged plant tissue. During production, the greatest losses due to Botrytis occur late in production. Occasionally, this fungus also can attack germinating seed or seedlings, particularly if they are injured or excessively crowded. High rates of fertilization, death of lower leaves, low light intensity, frequent watering, early flower production, and crowded plants all favor Botrytis blight development.

Use fungicides if conditions are favorable for the development of Botrytis blight, particularly late in the production program.

Leafspot diseases: Pansies are susceptible to several leafspot diseases, but the most common ones are anthracnose (caused by the fungi *Colletotrichum gloeosporioides* and *C. violae-tricoloris*) and scab or sport anthracnose (caused by *Sphaceloma violae*). The leafspots vary in color from white to brown to black and often have a water-soaked margin. The spots may or may not have concentric rings and spore-producing structures.

While leafspot diseases are fairly common on pansy, they seldom cause much damage. These diseases are best controlled through proper sanitation, such as removal of plant debris.

Prior to treating for these or any disease, it is essential to have the disease organism properly identified.

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