



A well-branched pansy grown under high light conditions (greater than 4,000 foot candles). (Photos pages 12 and 14 courtesy of James Faust)

over-watering creates root rot problems. Additional shade helps growers better manage watering, but too much shade can reduce growth and the quality of leaves and shoots.

Flower size is reduced at high temperatures, but the rate of flower development can be very fast. The time from transplanting a plug to flower can take as little as 2-3 weeks when the average daily temperatures are around 75° F.

Late summer pansies tend to be “thin” and have a “stretched” appearance. This appears to be a result of rapid flowering caused by long days, high light levels and warm temperatures. The result is a plant that quickly “bolts,” or quickly produces a flower on the primary shoot before the lateral shoots begin to develop. Regular PGR applications are required to keep plants compact and to maintain plant quality. Bonzi and Sumagic are the most effective PGRs on pansies, but using the proper application method is critical. B-Nine/Cycocel tank mixes and A-Rest are also effective. We have not had much success using Florel on late summer pansies. In our trials, we observed that Florel consistently delayed flowering, which might be desirable, but did not improve branching or reduce stem elongation. Spring pansies do not usually require plant growth regulators to produce compact plants.

UNDERSTANDING LIGHT

Both the amount of light, or light quantity,

and the day length impact pansy quality.

Photoperiod. Pansies are facultative, long-day plants, thus flowering occurs fastest under long days, but most varieties will flower under short days. Winter flowering improves, in terms of flower number and time to flower, when night-interruption lighting is provided. Night-interruption lighting can be provided with incandescent, fluorescent or high-pressure sodium lighting. Incandescent lighting results in additional plant stretch, so further plant growth regulators may be required. High-pressure sodium lamps can be mounted on irrigation booms and allowed to move over the crop throughout the night to provide a night-interruption treatment to the entire bay.

Light Quantity. Pansies are a relatively high-light-requiring crop. Whereas many floriculture crops perform well receiving 2,000-4,000 foot candles or 10 moles per day (20 percent of outside summer light levels), pansies perform best when receiving greater than 4,000 foot candles or 20 moles of light per day (greater than 40 percent outside summer light levels). Time to flower is reduced, while flower number and branching increase, under high light quantities.

Excessively high light levels can cause leaf curling, leaf cupping or leaf discoloration. The margins of the leaves will bend upwards relative to the mid-vein, forming a V-shaped leaf. Occasionally, the outer edge of the leaf will curl upwards, creating a spoon-like appearance. Typically, leaf curl is more pronounced on small plants. Pansies will usually grow out of these symptoms as they get larger and are able to utilize higher light levels. Excessively low light levels result in floppy plants that flower and branch poorly.

IMPACT ON GROWTH AND FLOWERING

Roots. Pansy root growth improves dramatically as temperatures decrease from 75-55° F. At 55° F, cell packs can be so full that the roots push the sides of the plastic outward, while at temperatures greater than 70° F, the roots of mature plants may be insufficient to hold the root ball intact. Pansy roots are more susceptible to root rot organisms (Pythium and Thielaviopsis) at warm temperatures.

Leaves. Leaf color is dark green and shiny under lower light conditions. Low-light leaves are also thinner and more pliable than high-light leaves. Under high-light conditions, the leaves are lighter green, slightly duller and thicker.

Petiole length increases and the leaves are held upright under low-light conditions. High-light plants have shorter petioles and

horizontally light plants or a much “full” appearance. In experiments, higher temperatures achieved good expansion as

Flowers. Time to flower is influenced by temperature. The rate of flower development is reduced at 75° F and at 65° F. Lowering the temperature to 55° F will reduce flower size. Lowering the temperature below 70° F will increase the time to flower.

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A poorly-branched pansy with flowers grown under low light conditions (2,000 foot candles).



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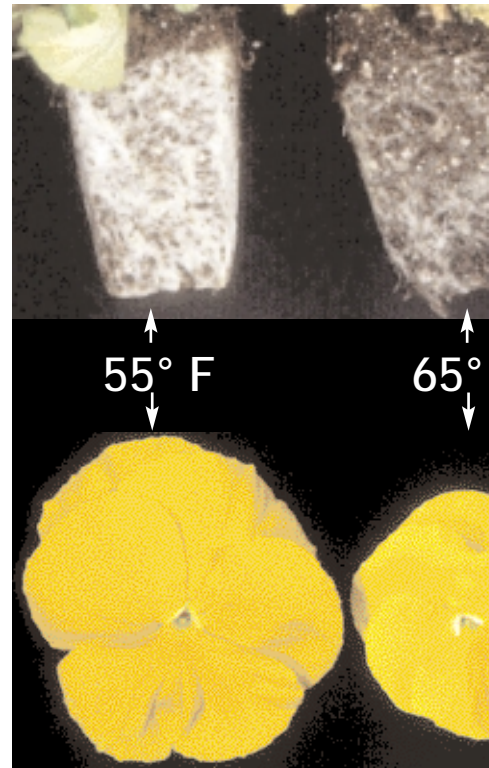
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The effect of temperature on pansies. Top: Root growth is superior at 55° F. Bottom: Flower size decreases as temperature increases from 55-75° F.

THE GROWING ENVIRONMENT

For summer/fall pansy production, the greenhouse environment is superior to the outdoor environment, which is frequently hotter than outdoor temperatures. High temperatures are much lower inside the greenhouse. High temperatures and high light levels in shade is the worst environment in which to grow pansies.

Pansies grown outdoors in full sunlight often exhibit stress symptoms (see "Leaves" discussion on page 10). These symptoms seem most often to occur on young plants. As the plants grow and mature, they are able to tolerate higher light levels, so the stress symptoms are less of a problem, providing shade cloth will be used. However, then placing the pansies inside a hot greenhouse, where shade cloth provides sufficient shade, will result in a situation that is not desirable in most situations.

Retractable-roof greenhouses or retractable-roof structures provide an ideal environment for growing pansies, as they provide the benefits of outdoor conditions while they can provide the protection of a greenhouse from the heat. Shading for a few hours in the early morning or late p.m., can reduce temperature stress while the plants are receiving high light levels.

The bottom line is that pansies are difficult to grow when the temperatures are between 55-75° F. Pansy production is incredibly challenging. To avoid the late summer markets, if possible, grow pansies in a retractable shade structure, then a combination of retractable shade cloth and shade drench applications and plant growth regulators can produce the best quality possible during the heat of summer.

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