

# Petunias

Where would we be without the petunia? Since its introduction in the early 1850s, *Petunia x hybrida* has been one of our most popular bedding plants and is largely responsible for the development of the bedding plant industry. Because of its ease of growing, wide color selection and ability to withstand adverse weather, the petunia has consistently appeared among the top five bedding plants chosen by consumers.

designed by  
cool days/  
warm nights

by  
Mark P. Kaczperski, William H. Carlson,  
Royal D. Heins and John Biernbaum

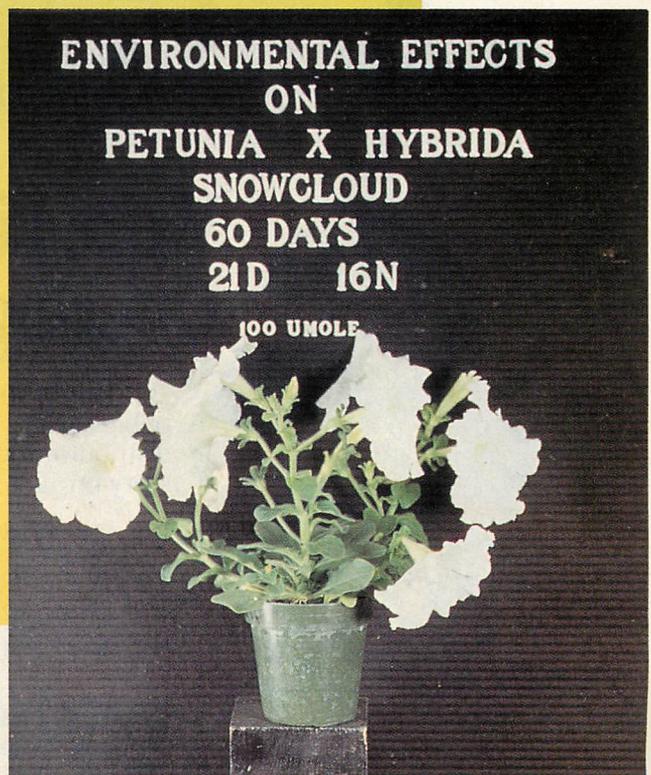
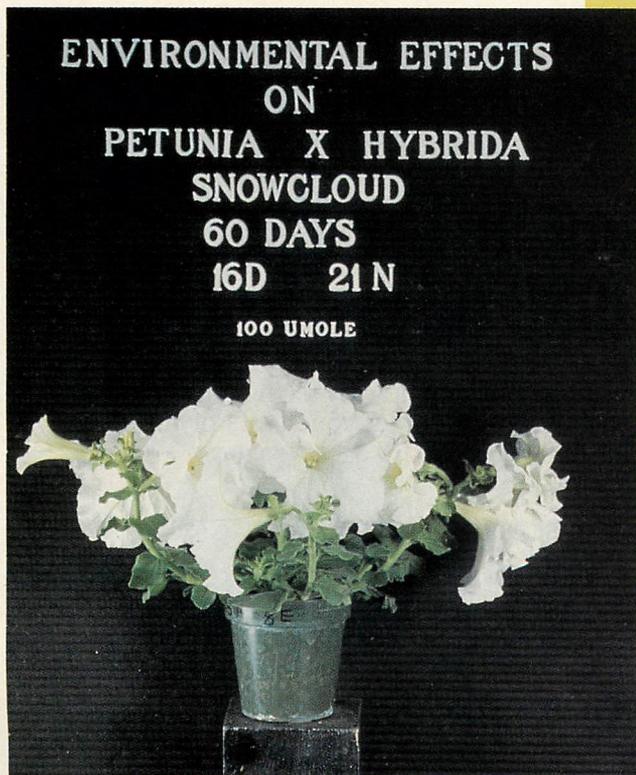


Figure 1. Plant on the left was grown at 16°C (61°F) day temperature and 21°C (70°F) night temperature. The plant on the right was grown at 21°C day temperature and 16°C night temperature. The petunia grown with cool days/warm nights is shorter and has more branches than the warm days/cool nights plant.

The continuous introduction of new petunia varieties will help petunias to maintain their popularity.

Generally speaking, a high quality petunia is one that is compact, well-branched and flowers in the shortest time possible. Height control is a major quality consideration and can be achieved by several methods. One of the most common methods is to apply a growth retardant such as B-Nine or Bonzi—another is to withhold water. Both strategies inhibit internode elongation and therefore shorten the plant. In recent experiments at Michigan State University, we have evaluated another method that may be even more economical and effective: lowering growing temperature.

Traditionally, petunias have been grown at day temperatures of 70° to 75° F and at night temperatures ranging from 50° to 62° F. Our research examined the effects of various alternative combinations of day and night temperatures on the growth and quality of petunias.

Petunias were produced in 3½" pots under several day/night temperature combinations. Seed was germinated in 75° F under lights. After 14 days, the seedlings were transplanted and grown under one of the temperature combinations to flower. Temperatures of 50°, 59°, 68°, 77° and 86° F were

combined as both day and night temperatures for a total of 25 treatment combinations. Since petunias are long day plants, 18-hour days were used with six-hour nights.

#### Cool temperatures control height

Cool temperatures produce shorter plants. Night temperatures of 50°, 59° or 68° F combined with day temperatures of 50° or 59° F control plant height. At higher temperatures, height cannot be adequately controlled with temperature alone. At night/day combinations greater than 68°/59° F, plants require growth retardants.

The plants exposed to all 25 treatments produced the same number of leaves and internodes. Thus, the increase in total plant height is due to an increase in the average internodal length of the main stem. Cooler temperatures (68°/59° F, night/day and below) produce shorter internodes, while warmer temperatures produce longer internodes.

#### Day temperature affects flower position

Day temperature affects flower position in relation to total plant height. Night temperature has no effect. With cool day temperatures, petunias produce flowers positioned above the foliage where they can be easily seen. At

warm day temperatures of 68° F and above, foliage growth is faster than bud development, consequently hiding the flowers. As a result, more buds need to open on a warm-day flat than on a cool-day flat to show the same amount of color.

#### Day temperature affects lateral branching

Day temperature has a significant effect on the number of lateral breaks; the cooler the day temperature, the greater the number of breaks. At low day temperatures (50° F), plants produce an average of eight lateral branches independent of night temperature.

As day temperature increases, fewer lateral branches develop. At a high day temperature of 86° F, plants produce half the number of lateral branches as at 50° F.

Even more noticeable is the effect of day temperature on the length of the lateral branches. The cooler the day temperature, the longer the branches regardless of night temperature. As day temperature increases from 50° F to 86° F, the length of the lateral branches decreases from 3" to only ½" in length.

Although, lateral branches are longer on plants exposed to cool temperatures, they don't contribute to



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The plants exposed to all 25 treatments produced the same number of leaves and internodes. Thus, the increase in total plant height is due to an increase in the average internodal length of the main stem. Cooler temperatures (68°/59° F, night/day and below) produce shorter internodes, while warmer temperatures produce longer internodes.

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Even more noticeable is the effect of day temperature on the length of the lateral branches. The cooler the day temperature, the longer the branches regardless of night temperature. As day temperature increases from 50° F to 86° F, the length of the lateral branches decreases from 3" to only ½" in length.

Although, lateral branches are longer on plants exposed to cool temperatures, they don't contribute to

overall plant height, and in fact add fullness to the plants.

### Temperature affects time to flower

An average day/night temperature of 77° F gives the shortest time to flower—but the plants are of poor quality: tall and leggy with few breaks and susceptible to bud abortion. Growing petunias under cool temperatures improves quality—but growing cool also increases time to flower.

Petunias grown at 59° F nights and 50° F days are stocky and well-branched but require 105 days to flower from seed. A petunia grown at a constant temperature of 77° F is tall and spindly but flowers in only 46 days. Flower delay is a major drawback of cool growing conditions.

Time to flower in petunias is a response to average daily temperature. Petunias grown under low night and high day temperatures will flower at the same time as petunias grown under high night and low day temperatures—as long as the *average* daily temperatures of the two crops are the same. However, the plants grown under warm days will be of lesser quality compared to the plants grown under cool days.

The benefits of cool growing conditions can be retained while still shortening time to flower, by growing with cool days and warm nights. However, this method will result in some delay in flowering.

### Temperature = timing and quality

Growing with lowered day temperatures and increased night temperatures is becoming more cost-effective as greenhouses add heat blankets and other energy-saving devices. These devices offset the costs associated with raising night temperatures. Combined with savings on growth retardant costs, they can help make this growing method a profitable way to produce quality plants.

Temperature is an effective tool to design a quality petunia. Low day and night temperatures can be used to control plant height. Low day temperatures can increase the size and number of lateral branches. The expense and inconvenience of growth retardants can be minimized. If you can tolerate the longer production time, you can produce high quality petunia bedding plants with the cool-day growing regimes.

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May 1988