Growing Longer Lasting Bedding

by Terril A. Nell and Ria T. Leonard

What you do in the greenhouse and on your delivery truck has a significant impact on your plant's quality at retail

Production conditions can have a significant influence on plant performance in the landscape. Yet in many cases, the procedures for producing a long-lasting bedding plant are common-sense techniques that have been used in greenhouses for years. Yet only recently have some of the production techniques been evaluated and the significance of hardening or toning become recognized in our modern production facilities.

The practices that can make a difference include variety selection, fertilization practices, irrigation procedures and use of wetting agents. Each factor has merit and can result in a better plant for the consumer. However, there's a fine line between properly adapting the plant for the retail and landscape situations and producing a plant that's too small or deficient to be marketed.

Variety selection

Choosing the right variety has proven to be one of the major factors influencing how well plants respond to postproduction conditions. Even given an ideal production environment, you'll find that certain varieties won't perform as well as other varieties during transport or in retail or consumer conditions. This has been especially true for our work at the University of Florida on potted flowering plants such as chrysanthemums, poinsettias, kalanchoes and lilies. Current work by floriculturist David Clark has demonstrated that geranium varieties differ in their response to ethylene, an odorless gas that plants are often exposed to during transit, causing petal and bud drop. Varieties differ in percent petal abscission, demonstrating that ethylene sensitivity is a genetically variable characteristic in geraniums.

Most bedding plant breeders and variety evaluation trials concentrate on flower form, growth habit, innovative colors and heat and disease tolerance. How well plants hold up during transport or retail settings isn't tested, so little information is available on variety selection of bedding plants for tolerance to shipping. Many universities and botanical gardens, however, evaluate bedding plant varieties for landscape performance. This information is a resource that growers should utilize to assist in choosing long-lasting varieties that are well adapted to landscape conditions. Avoid varieties that are attractive at the time of sale but fail to perform in the landscape. Many cooperative extension agencies and local garden clubs may also have information on the varieties that perform best in a particular region.

Nutrition and toning

The goal of most bedding plant growers is to produce as many crops as fast as possible by using high levels of water and fertilizer. However, these practices have been shown to have negative effects on the postproduction performance of bedding plants. Plants produced with luxurious amounts of fertilizer and water not only induce "soft growth," but the plants may also dry out more rapidly at retail, increasing the potential for salt damage. Plants produced like this are also not well prepared for the shock of post-greenhouse conditions where low light, high temperatures and water stress are common.

Our research has shown for some potted flowering plants, reduced fertilizer levels, or in some cases terminating fertilizer at the end of the crop, has proven to enhance postproduction performance. For example, potted chrysanthemums grown with low fertilizer levels (150 ppm N) lasted 7 to 14 days longer than plants that received higher levels at each watering. Terminating fertilizer a couple of weeks prior to flowering on chrysanthemums and kalanchoes has been found to increase postproduction longevity. Similarly, foliage plant leaf drop is reduced significantly when plants are grown with low fertilizer levels or when fertilizer is terminated prior to transport.

Preparing plants for different environments to tolerate post-greenhouse conditions is referred to as "toning" or "hardening" or "acclimatization." Fertilizer toning has been recommended for bedding plants as well and is an important step in optimizing their postproduction quality and shelf life. As a general rule, fertilizer concentration should be reduced by one half at bud color on most bedding plants. Discontinuing fertilizer entirely can be done for some bedding plants during the last week or two of production to minimize soluble salt problems and help with toning. But take care not to terminate too early, as landscape growth may be severely limited, as our work at UF has revealed. We grew geranium, vincas, salvias and impatiens at 150 ppm N in our greenhouses and terminated fertilizer one, two, three and four weeks prior to flowering. A control group of plants was fertilized to the end of production for a comparison. Plants were then established in outdoor beds where...
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AFE RESEARCH

Media Surfactant on Retail Wilt of Alpinums and Petunias

improved landscape performance. Plants filled in quicker during the first two weeks of landscape establishment and produced a compact plant of acceptable marketing size without the use of chemical growth retardants. Vinca plants subjected to withering during the retail or landscape phase, however, had a significant reduction in plant quality and size after two weeks in the landscape.

Media Surfactant on Retail Water Retention of Alpinums and Petunias

Wetting agents, also known as media surfactants, have been proven effective in retaining water and reducing the days to wilt in the retail setting. Media surfactants are easy and safe to use and can be added directly to a greenhouse irrigation system. Dr. Jeff Million at the University of Florida found the media surfactant Pimatin delayed retail withering and improved water retention on impatiens and petunias (see Table 1). This surfactant was most effective when applied the day before marketability, compared with a week before marketability. Adding surfactants prior to transport and marketing is an important and critical step in the process of dealing with unfavorable retail conditions.

Transport conditions

During transport, bedding plants can be affected by darkness, temperature, drying out, mechanical stress.
(vibration) and ethylene exposure. Improper conditions during transport can cause leaf yellowing, leaf drop, bud drop or petal shattering. If the plant experiences any of these symptoms due to improper transport conditions, it may not perform well in the landscape. These problems can become more severe if improper production conditions were maintained. Overfertilization and excessive watering can predispose plants to increased sensitivity and degradation during transport.

The key to minimizing transport injury and stress is proper transport conditions and a short transport time. Most bedding plants should be transported below 60°F. Of course, a wide range of bedding plant species is usually transported on the same vehicle, making optimum temperatures needed for each type of bedding plant difficult to maintain. For mixed loads of bedding plants, transport temperatures of 50°F to 55°F are optimal. Cooler temperatures would be advantageous for some plants but may cause chilling injury on others. To help combat this problem, it's imperative to keep transport time as brief as possible.

The exposure to ethylene during transport is another area of concern. Some bedding plants like marigolds and zinnia aren't susceptible to ethylene, while geranium, salvia and impatiens are. Ethylene may cause bud drop, leaf drop, leaf yellowing and petal shattering. Maintaining cool temperatures during transport will minimize ethylene's damaging effect on susceptible bedding plant species.

### At the store

One of the biggest challenges in the bedding plant industry is proper care at the retail setting, especially in mass-market outlets. Many bedding plants offered for sale in the retail sector suffer from bright light, high temperatures, and prolonged and frequent wilting.

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Table 1. The use of PsiMatric media surfactant on retail wilting and water retention of Super Elfin Lipstick Impatiens and Midnight Madness petunias applied at end of production.

<table>
<thead>
<tr>
<th>Bedding plant</th>
<th>Media surfactant</th>
<th>Time to wilt (days)</th>
<th>Water retained (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impatiens</td>
<td>No</td>
<td>3.0</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>4.3</td>
<td>168</td>
</tr>
<tr>
<td>Petunia</td>
<td>No</td>
<td>1.6</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>2.2</td>
<td>150</td>
</tr>
</tbody>
</table>

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![Image of a hanging garden basket filled with plants]

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**To Increase Bedding Plant Performance:**
- Select long-lasting varieties.
- Reduce fertility.
- Reduce irrigation frequency.
- Use media surfactants.
- Keep away from ethylene sources.
- Transport at 50°F to 55°F for no longer than two days.
- Never let wilt in retail.

**At Retail:**
- Unpack immediately.
- Place in shaded area.
- Keep well watered.
- Never let wilt.
- Discard damaged plants.

Plants need to be unpacked immediately upon arrival and placed in proper light conditions. A shaded, cool area is best to help maintain quality, especially in warm regions. Keeping plants adequately watered before they wilt is crucial. As mentioned earlier, using media surfactants can help with reducing the time to wilt at the retail level. Every effort needs to be made to train sales personnel in the proper care and handling of bedding plants.

**Longevity starts with you**
Delivering high-quality bedding plants to consumers must be a priority to continue the growing trend in the bedding plant industry. Properly sized, healthy looking plants are paramount to good sales. Varieties should be chosen carefully for their long lasting characteristics in the landscape. Maintaining plant appearance by proper culture, adequate toning and the use of media surfactants can assist in increasing tolerance to wilting or high temperatures during transit and retail conditions. Bedding plants must continue to be cared for properly in the retail setting to bridge the gap between grower and consumer. The continued growth and performance of bedding plants in the landscape depends on all sectors of the industry working together for customer satisfaction to prevail.

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