

Preventing Late-season Leaf Yellowing in Easter Lilies: An Update

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The recent *New England Greenhouse Conference* featured an excellent session on leaf yellowing in lily. **Susan Han** of the University of Massachusetts and **Bill Miller** of Cornell University took turns presenting their latest research finding on this subject. For lily growers the information presented in this session was well worth the price of admission to the conference. For those of you who missed the conference, the key points are summarized in the following article.

When does leaf yellowing occur?

Leaf yellowing in Easter lily can occur as part of either a gradual or a sudden process. Gradual leaf yellowing typically begins as plants reach the visible bud stage of development. With gradual yellowing, leaves at the base of the stem begin to yellow and die one by one. As the disorder progresses the lower stem becomes bare and plants assume a leggy appearance. Sudden or catastrophic yellowing typically occurs in the post-harvest environment after the flowers begin to open. This disorder is characterized by large numbers of leaves simultaneously yellowing and dropping from the stem. Plants afflicted with catastrophic leaf yellowing are unsalable.

What causes leaf yellowing?

Several factors have been linked to leaf yellowing. Lilies treated with growth regulators to control height are more prone to leaf yellowing disorders than untreated plants. The growth regulators used on Easter lilies inhibit the natural production of the hormone gibberellic acid (commonly referred to as GA) in the plant. There are many types of GA produced in plants – over 100 different GA molecules have been identified to date. Gibberellins have many important functions in the plant but GA's ability to increase stem stretch is of most concern for commercial growers. A second key factor in leaf yellowing is root stress, especially stress caused by root rot. Gradual leaf yellowing often follows the occurrence of root rot and plants with poor roots are more susceptible to sudden post-harvest

yellowing. Another key factor involved in sudden post-harvest yellowing is time in cold storage. Lilies subjected to cold storage are more prone to sudden leaf yellowing and as the time in storage increases so does the susceptibility to this disorder.

What remedies have been identified for controlling this problem?

Earlier research reports (1996-1997) indicated that leaf yellowing in lily could be prevented with spray applications of the plant hormone benzyladenine (BA). Materials such as Promalin and Accel were used because they were commercially available and they contained BA as well as a mixture of GA's (GA₄ and GA₇). However, more recent studies indicate that BA is largely ineffective, and that Promalin and Accel suppress leaf yellowing because of the GA₄₊₇. It turns out that a material called Provide that contains only GA₄₊₇ and no BA, is as effective as Promalin at preventing leaf yellowing. In these more recent studies BA alone had no effect on gradual leaf yellowing or on post-harvest yellowing of lilies that were not subjected to cold storage. A possible role for BA in preventing yellowing on cold stored lilies was suggested but the benefit of BA appears to be unclear.

The form of GA is important. While products that contain the combination of GA₄₊₇ are very effective, ProGibb a commercial product that contains GA₃ has no beneficial effect on leaf yellowing.

What are the side effects of these treatments and how should they be applied?

As mentioned earlier, GA increases stem elongation. This can be undesirable but the severity of this effect is influenced by both the timing and rate of GA application. GA must be applied either before or at the onset of leaf yellowing to be effective on gradual leaf yellowing, and prior to cold storage to be effective on sudden leaf yellowing. Typically gradual leaf yellowing starts about the time of visible bud. The effect of a GA application will last for about two months, therefore, an application at visible bud (~35 days before Easter) will last for three to four weeks post-harvest. A GA rate of 25 to 50 ppm appears to be adequate to control leaf yellowing. At these rates expect a two- to three-inch increase in height for applications at time of visible bud. If GA is not applied until a week before cold storage, height may not be adversely affected.

It appears that there is a contradiction between recommendations for controlling crop height and those

for controlling leaf yellowing, is that true?

Yes, in some respects there is a contradiction. We use GA inhibitors such as A-Rest and Sumagic to control lily height but these materials also predispose the lilies to leaf yellowing disorders. In response we are advised to use GA₄₊₇ to prevent yellowing but this treatment reverses the growth regulator and increases height. Perhaps growers need to keep the basics of good crop culture in mind when dealing with this dilemma. Use proper spacing and proper temperature control to reduce reliance on growth regulators. Maintain healthy roots with proper water and fertility management, and check roots regularly so that fungicides can be applied before problems become severe. If possible, hold off on GA₄₊₇ applications until late in the crop to minimize stem stretch. But remember, GA₄₊₇ applications do not reverse leaf yellowing. Therefore, you must apply this spray as soon as the first leaves begin to yellow and thorough coverage of all leaves is critical to satisfactory control.
