e-GRO Alert

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Premature flowering in annual bedding plants

Getting bedding plants into flower for sales is an important part of spring crop production. However, premature flowering is undesirable. There are a few ways to avoid this problem.

Annual bedding plants are much more marketable when they are sold in bloom. Whether it is informing the customer what the flower looks like, or simply spurring impulse sales, "flower power" is real and it is effective. Although getting crops into flower is a primary goal for bedding plant producers, getting them to flower at the right ***time*** is also important. As seen in Fig. 1, annuals can start flowering prematurely, which can cause a few problems. In the early part of production, root and shoot growth are the primary focus.

Figure 1. These petunias are flowering early in the crop cycle, before flower are needed for successfully marketing the baskets.

When annuals flower prematurely, energy is diverted from vegetative tissue (roots and shoots). In addition to diverting resources, premature flowers can increase disease pressure. When prematurely formed flowers senesce and abscise, the spent flowers can promote diseases such as *Botrytis* unless labor is spent removing flowers or fungicides are applied to control disease.

In order to avoid premature flowering of bedding plants, it is important to understand what controls flowering for the species being grown. The most ubiquitous mechanism controlling annual bedding plant flowering is the day length, or photoperiod. Plants are

classified into one of three primary photoperiod response groups: 1) long-day plants; 2) short-day plants; or 3) day-neutral plants. In addition to the three primary photoperiod response groups, long- and short-day crops can be further classified as having obligate or facultative response, where long or short days are either ***required*** to promote flowering (obligate) or simply flower ***more quickly*** under their respective inductive photoperiods (facultative).

All of the different photoperiod response groups are found across the different annual bedding plants genera, species, and cultivars grown. This can make managing a single photoperiod for all the different crops a challenge, not unlike trying to provide a single temperature or fertilizer regime to accommodate all the different plant species. With all the variation in photoperiodic response groups, it is fair to say that the most common response group in spring annuals is the long-day response (facultative or obligate), followed by day-neutral plants, then short-day plants.

In order to inhibit flowering of those plants with a long- or short-day flowering response, the most effective way to inhibit flowering is to provide non-inductive photoperiods. For long-day plants, this would mean providing short days, and for short-day plants it would be long days. It can never be too early to start managing for photoperiod, as premature flowering can begin during the propagation, for both seedling plugs and rooted cutting liners (Fig. 2). Whether in propagation or finishing, the only way to create truncate a naturally long day to create short days is to use blackout cloth (Fig. 3). Alternatively, the only way long days can be created under naturally short is using one of two photoperiodic lighting

Figure 2. This flat of petunias is flowering right on time. The plants are proportional to the containers and ready for sale, and with flower buds formed and starting to open, the flowers will improve their marketing and impulse sales.

Figure 2. It is never too early to begin managing flowering for production, as unwanted flowering can occur as early as during propagation. As seen here, this tray of rooted verbena cuttings is already flowering in Stage 4- Toning.

Figure 3. Small-scale photoperiod management can be especially useful during propagation or for small numbers of containers. The black plastic hanging over the PVC supports allow this small section of bench to have short days.

Figure 4. Premature flowering can also occur on day-neutral photoperiodic species, like the zonal geranium seen here. Ethephon, the ethylene-generating plant growth regulator, can be applied to promote flower abortion and maintain plants in a vegetative state for these species.

Figure 5. Mechanical removal of flowers by pruning or shearing, as seen with this tray of rooted verbena cuttings, is not always an option. However, there are times when it is an appropriate strategy to remove flowers and, at the same time, improve branching and finished plant quality.

strategies: 1) day-extension; or 2) night-interruption. Day-extension involves providing light before sunrise or after sunset to lengthen the day, whereas night interruption lighting involves providing light between 10:00 p.m. and 2:00 a.m. to break up the night. Regardless of which lighting strategy is used, a minimum of 2 $\mu mol \cdot m^{-2} \cdot s^{-1}$ is needed, which can be provided from low-intensity incandescent bulbs of "flowering lamp" light-emitting diodes (LEDs). Maintain plants under non-inductive conditions until it is time to induce them to initiate flowering in time for sales.

For those bedding plants with a day-neutral response (Fig. 4), a different approach must be taken. With no external environmental cues to control flowering of day-neutral plants, flowering must be controlled by manipulating plant culture, through the use of a plant growth regulator (PGR) or using mechanical control. Ethephon (Collate, Florel, Pistil) is an ethylene-generating PGR. While ethephon may be used to suppress unwanted stem elongation or promote branching, it can also be used to inhibit flowering. Foliar sprays of 250 to 500 ppm ethephon are most common for controlling unwanted flowering. When using ethephon to inhibit flowering, it is important to always remember what other effects ethephon applications could have on treated crops. Thankfully, growth control and enhanced branching are usually welcome side effects when producing spring annuals. While ethephon is an especially useful tool for controlling flowering of day-neutral crops, it can also be helpful for inhibiting flowering of photoperiodic crops when controlling the photoperiodic crops when providing non-inductive photoperiods is not possible or challenging.

Pruning or, more commonly, shearing is another way to inhibit unwanted flowering (Fig. 5). While this can be appropriate for pants with multi-stemmed, spreading habit, it is not appropriate for all crops. Additionally, it can be a labor-intensive approach to controlling flowering. Always carefully sanitize any tools used for pruning or shearing in order to avoid the mechanical transmission of plants pathogens.

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