

2012 Easter Lily Schedule

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Easter 2012 falls on April 8. Coincidentally this is the same date as the 2007 schedule but with an extra day for leap year. The 2012 crop follows a mid-date Easter schedule.

Lily height is always a critical concern. As all growers know the final height is dependent on how well you control stretch during the entire forcing period. Typically growers target a final height that falls within a narrow range. The Easter lily schedule in this article is designed to produce a lily with a final overall stem length of 16". With a pot height of 6" this would be a plant with a final overall display height of 22". If your target overall display height is 18", you need to produce a lily with a final stem length of 12". You can use the charts below (Fig 1 and 2) to track the weekly progress of your lilies to target plants with either a 12-inch, 14-inch or 16-inch stem. Notice that stem length increases at a more rapid rate following visible bud. Lilies typically double in size in the 5 week period from visible bud to bloom but it takes 9 weeks of forcing prior to visible bud to reach the first 50% of final lily height.

The final stem length on an Easter lily is influenced by a number of factors such as maturity of the bulbs when they are dug from the field, number of leaves before visible bud, daylength during forcing, daily temperature regime (especially the day temperature/night temperature difference or DIF), light intensity and end-of-day light quality. Obviously you can't control all of these factors so concentrate on what you can control and use plant growth regulators to help as needed. DIF is a valuable tool. Most growers use a cool morning dip or equal day/night temperatures (zero DIF) to restrain stem stretching. DIF can be used throughout the forcing cycle but cool days are harder to achieve as you get into March and April. Stem stretch also increases as daylength increases and the days continuously lengthen during the 14 week forcing period. Light quality is not easily controlled but it does affect stretching. Stem stretch increases as the ratio of far-red to red light increases at the end-of-day. This happens naturally during the twilight period but also occurs when sunlight is filtered through plant leaves. Crowding of plants from a close spacing and overhanging baskets add to this affect. Pulling black cloth at the end of the day to exclude the twilight period can be used to avoid exposure to a high dose of far-red light and if done consistently can be used to restrain stretching. Leaf number is not completely under your control but bulbs that receive the full 6 weeks of chilling will produce fewer leaves before visible bud than bulbs that do not receive the full chilling regiment. With a mid-date Easter don't skimp on chilling. Program your bulbs with a full 6 weeks before starting greenhouse forcing.

Mid-date Easter schedules are the least challenging. They allow adequate time to fully complete all steps in the 23 week program without cutting corners as is sometimes necessary with early Easter schedules. Mid-date schedules are also advantageous because they do not include a lot of extra time that force growers hold the mature crop in the cooler or to use other stalling tactics to slow growth as is common with late Easter schedules.

For pot-cooled bulbs the normal 23 week schedule includes 3-weeks in the pot at 60-62°F to stimulate root development, 6-weeks of bulb cooling at 40-45°F and then 14-weeks of forcing in the greenhouse at 60-65°F or higher as needed. For case-cooled bulbs the process is still 23

weeks but this includes 6-weeks bulb cooling at 40-45°F and then 17-weeks of greenhouse forcing.

Here are the critical dates to observe on the 2012 schedule. Start bulb programming no later than October 30 or 23 weeks before Easter. For case cooled bulbs this marks the start of the 6-week bulb cooling period. Case cooled bulbs should be potted and greenhouse forcing should begin no later than December 11, 2011 or 17 weeks before Easter. For pot-cooled bulbs and naturally cooled bulbs, bulbs are potted on week 23 and held at 60-62F for 3-weeks or until November 20th (week 20). This allows roots to develop before the 6-week cooling period. Next program the potted bulbs at 40-45F for 6-weeks (from Nov. 20th to January 1). Once bulb cooling is completed begin greenhouse forcing no later than week 14 (January 1).

Once lilies begin to emerge record the average dates of emergence for early, mid and late lilies in your crop. Also record the average daily greenhouse temperature following shoot emergence. You will need this information to calculate the rate of development once you begin leaf counting.

Begin checking for bud set in mid-January. Bulbs moved to greenhouse on weeks 17 or 14 will complete set bud sometime around the 2nd or 3rd week of January. It is important to maintain both day and night temperatures below 65F during this period. A constant temperature of 60-62F is ideal. The final critical date is February 26. This marks 6-weeks before Easter. To maintain a normal schedule you should be at visible bud by this date. Plants at visible bud 6-weeks before Easter can be forced to bloom in 35 days at an average daily temperature (ADT) of 64F. If visible bud happens before this date you can run cooled temperatures to slow bud development or be ready to ship or hold plants that reach the puffy white bud stage before week 1. If visible bud is attained after this date you will need to run higher temperatures to finish lilies by the targeted shipping date on this schedule, 1-week before Easter. Raising the ADT to 70F will reduce the bud development interval by ~4 days. Raising the ADT to 75F will reduce it ~ another 4 days.

Leaf counting & crop timing:

After bud set is achieved (sometime in mid to late January), use temperature to control the rate of lily development during the remainder of the forcing period. The rates of both leaf and flower development can be adjusted with temperature. By controlling the rate of development you can control when the crop reaches the saleable stage. For example, at 72°F leaves unfold at a rate of 2 per day on average, while at 63°F the rate decreases to 1.5 leaves per day. Likewise, a lily will go from visible bud to bloom in 24 days at 81°F, 31 days at 70°F, 35 days at 64°F and 42 days at 59°F. If you arrive at visible bud 5 to 7 weeks before Easter and you can control temperature within these limits you should be in good shape to finish on time. Finally, plants that bloom early can be held in a cooler for up to two weeks. Storing finished lilies for longer than two weeks is not recommended.

Start leaf counting after bud set is complete. The leaf counting technique is based on the fact that once flower buds initiate, leaf number is set and will not change. However, the exact number of leaves varies from year to year, and also will vary between bulb lots from different sources, and with bulbs exposed to different cooling conditions.

After bud initiation, select five lilies for every 1000 plants in each lily group (per bulb source, emergence time etc). Select plants representative of the overall crop, and then remove, count and record the total number of leaves. Use magnification and a needle to remove and count the smallest, un-expanded leaves. (Note: The shoot tip should show evidence of tiny flower bud formation. If this is not the case, you started counting too early. Wait one week and try again.) Record the number of fully developed leaves (those at a 45° angle to the stem or greater) and the number of undeveloped leaves (those at an angle less than 45° to the stem). Now, divide the number of fully developed leaves by the number of days since shoot emergence. This is the “current rate of leaf development”. Divide the number of undeveloped leaves by the number of days remaining until visible bud. This is the “required rate of leaf development” or the rate you need to maintain as you move forward in the schedule.

If the “current rate of development” is too fast, meaning you will reach visible bud too early, reduce the temperature in the greenhouse. If the “current rate of development” is too slow, meaning you will reach visible bud too late, increase the average greenhouse temperature.

Determine a new current rate each week (the rate since last count) and a new required rate. Determine the new required rate by subtraction - you do not have to destroy any more plants. Simply subtract the number of fully developed leaves from the average total number of leaves previously determined. You can flag your indicator plants and use a marking pen to mark the last leaf you counted as mature.

Height control: The lily schedule has targeted heights at each week during development. You can adjust these targets to fit your needs (e.g. increase plant height if you desire a taller finished product). This schedule is designed to produce a finished plant of about 16”. You can chart the height of your crop against the target heights shown in Figure 1. If you desire shorter lilies (12 or 14” tall) you can compare the weekly height on your crop to the target height in Figure 2. This is essentially graphical tracking. You simply monitor lily height on a regular basis (daily, bi-weekly or weekly) and compare the actual height to the idealized growth curve for the lily height you wish to produce. If average plant height is too short, run a positive DIF to increase stretch. If plant height is too tall, run a negative DIF to slow elongation.

While using DIF to control height it is important to maintain the proper average daily temperature (ADT) so that crop timing is not adversely affected (see previous comments on Leaf Counting & Timing). For example, assume that your leaf counting calculation calls for an ADT of 63F so that you average 1.5 leaves per day. Now consider two possible scenarios, one that calls for increasing stem stretch and the other that calls for reducing the rate of stem stretch. For ease of calculation, also assume equal day/night lengths. In the first scenario we can run 68F day and 58F night to achieve a positive DIF while also maintaining the 63F overall average daily temperature. In the second case, a 58F day and a 68F night will produce a negative DIF (to restrict stem stretch) and the same 63F ADT needed to maintain the desired rate of leaf development (1.5 leaves/day).

Controlling Lily Height with PGRs:

A-Rest, Abide, Chlormequat E-Pro, Concise, Cycocel, Topflor and Sumagic are all labeled for use on Easter Lilies. PGR applications typically begin when lilies reach 3-5" tall. However, with low concentration split applications, PGRs can be applied at any point in development beginning with emergence. A-Rest, Topflor and Sumagic (or the generic equivalents) can also be used to pre-treat bulbs using bulb soaks. With sprays and drenches, split applications produce the best results. Reduce the concentrations of PGR used when combined with negative or zero DIF.

Early Detection and Quick Action:

Whether we are talking about adjustments to crop timing, manipulating crop height, or controlling insect infestations and disease outbreaks early detection and quick action should be your guiding principle. Problems detected early are typically easy to resolve and result in minimal permanent damage but problems left unattended can greatly reduce crop quality. While taking your regular observations of plant height and leaf unfolding rate you should also scout for insect problems. Be especially conscious of developing hot spots. After treating an insect or disease outbreak, follow up and check to make sure the treatment was effective. Just because you took action does not mean the treatment worked. Look for evidence of disease or conditions that favor disease such as condensation on the glazing. While you're at it check root development. This is especially important right around visible bud as the plants are more prone to root loss at this stage. Monitor the EC and the nutritional status of the potting medium. You can check EC with a simple handheld device and very quickly determine if salt levels are on target or not. Look for pockets of plants showing signs of stress. This may alert you to a physical or mechanical problem such as a clogged emitter line or dripping from overhead baskets.

Each lily crop is a unique challenge and you can never fully anticipate the maturity status of the newly arriving bulbs or the weather patterns you will encounter during greenhouse forcing. However, if you follow the targets on this schedule and monitor development frequently you should be able to handle any circumstance that comes along.

Good luck with the 2012 Easter lily crop.

Figure 1: Use graphical tracking to stay within the proper height range throughout the forcing cycle. This graph shows a typical growth cycle for a final lily height of 16" (± 1 "). By monitoring lily height regularly and comparing your measurements to the targeted height for that date you can assess if you are on track for the target height or too tall or too short. If lily height begins to approach the upper limit use negative DIF and/or PGRs to slow stretching. If weekly height falls to the lower limit, use positive DIF to increase height. Note that about half of the final height growth occurs during the 5-week period from visible bud to bloom.

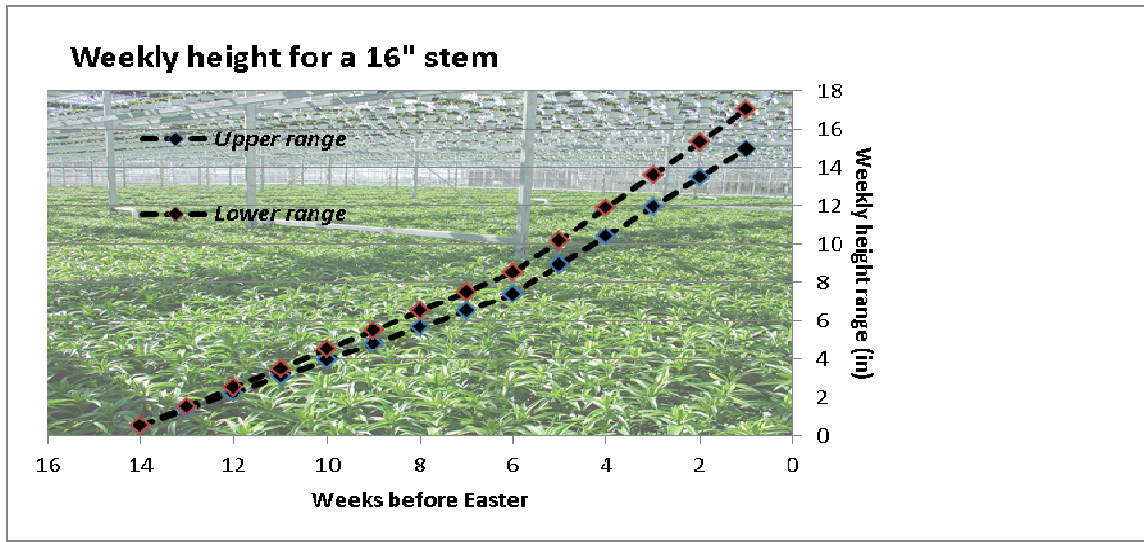


Figure 2. This graph shows the targeted weekly height to achieve final stem lengths of either 12" or 14". As in Figure 1, weekly height may stray above or below the target height, so you need to check each week and make adjustments in culture to either slow or speed stem stretch in order to remain on target.

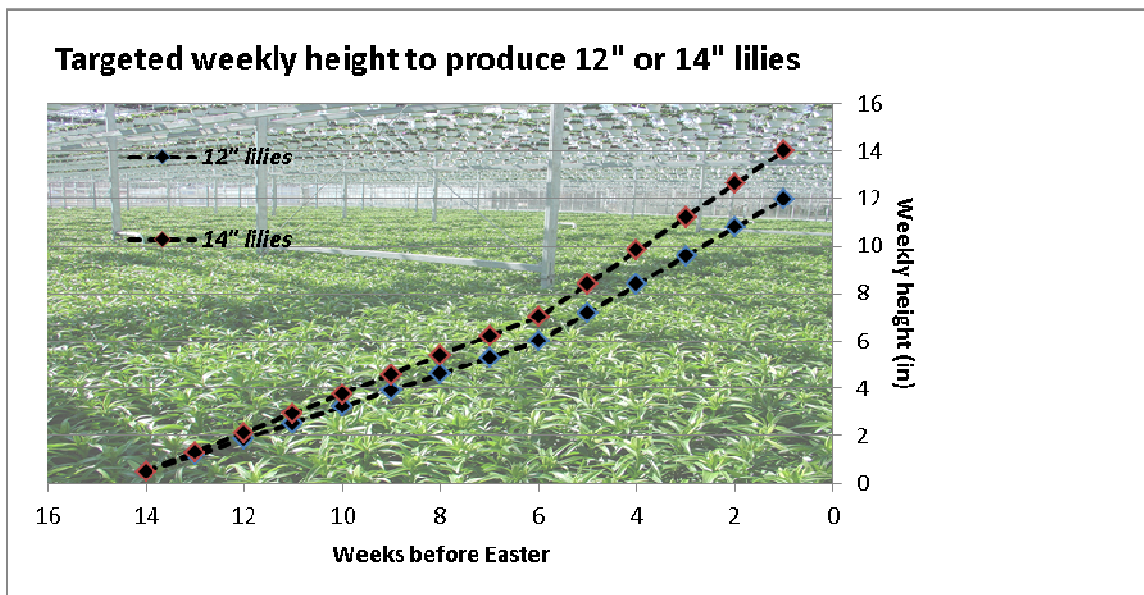


Figure 3. Uneven lily growth results when hanging baskets shade the Easter crop. With the extremely late Easter in 2011 growers had no choice but to pack in their spring bedding plant crop. Shade from overhead baskets can increase lily stretch and uneven shadows can produce uneven growth on the crop below.



Figure 4. Fungus gnat populations can explode if not detected early or if left untreated. If you are using bio-control methods early detection and a fast response is a must. Also remember to follow up and make sure the treatment was effective.



Figure 5. Stress from drought or excessive heat, or disease associated with condensation dripping from the glazing can all result in bud blast. These asiatic lilies show a high incidence of bud blast and leaf scorch. Cultural conditions during the final stages of bud development are extremely important since the plants are most prone to damage at this stage. These plants suffered a severe water stress when a portion of the irrigation system failed.



2012 EASTER LILY SCHEDULE

| Weeks Prior to Easter | Date | Forcing method | |
|-----------------------------|---------|---|---|
| | | Case-Cooled | Pot-Cooled (CTF) |
| 24 | Oct. 23 | <i>This schedule designed to produce 16" lilies that bloom 1-week before Easter. Notes on next page & accompanying article for details. Programming starts immediately. Prep for lily arrival. Test soil & inspect bulbs.</i> | |
| 23 | Oct. 30 | Start bulb programming as soon as bulbs arrive but no later than 23 weeks before Easter. | |
| 20 | Nov. 20 | Cool at 40-45F for 6 weeks | Pot and allow roots to grow at 60-62F for 3 weeks |
| 17 | Dec. 11 | --- | Cool at 40-45F for 6 weeks |
| 14 | Jan. 1 | Pot no later than 17 weeks before Easter | |
| | | Force in greenhouse at 60-62F in pot. | --- |
| 13 | Jan. 8 | Shoots emerging ~ 0.5" tall & buds beginning to set. Start fertilizing & keep moist. | |
| | | --- | Force in greenhouse at 60-62F in pot. |
| 12 | Jan. 15 | 1.25-1.5" tall. Keep lilies moist & use fungicide drench as needed. Bud initiation coincides with stem root development. | |
| 11 | Jan. 22 | 2.25-2.5" tall. Run 60-62F day/ night during bud initiation. Begin leaf counting as soon as bud set is complete. | |
| 10 | Jan. 29 | 3-3.5" tall. Apply growth regulator when 3-5" tall. Repeat leaf count on late batches of lilies. Maintain temperature below 65F until bud initiation is done. | |
| 9 | Feb. 5 | 4-4.5" tall. Check for bud set & begin leaf counting and graphical tracking. Use temperature to control the rate of lily development & DIF to control height. ADT 65-70F. Check for aphids & root problems. Apply Marathon sometime during weeks 10, 9, or 8. | |
| 8 | Feb. 12 | 4.75-5.5" tall. Space lilies to avoid yellow leaves & stretching. Soil test & if leaf scorch is evident, use calcium nitrate for balance of schedule. | |
| 7 | Feb. 19 | 5.5-6.5" tall. Adjust temperatures as needed. | |
| 6 | Feb. 26 | 6.5-7.5" tall. 42 days to sale. Buds can be felt. If buds are visible on early planting run 60F until finish. | |
| 5 | Mar. 4 | 7.25-8.5" tall. Buds ~0.75". Lilies are about half final height. Buds should be visible no later than 30 days prior to sale. Grade for uniformity as buds become visible. Apply Fascination or Fresco if leaf yellowing is evident, or if cooling is anticipated. | |
| 4 | Mar. 11 | Lilies 9-10.25" tall. Buds 1.25" long. | |
| 3 | Mar. 18 | Lilies 10.5-12" tall. Buds 1.75-2" some bending down. | |
| 2 | Mar. 25 | Lilies 12-13.5" tall. Buds 2.75". If aphids present, use a total release smoke or aerosol. | |
| 1 | Apr. 1 | Lilies 13.5-15.25" tall. Buds 4-4.25" long. some turning whitish. Stop fertilizing & apply clear water once before sale. Cool lilies at 35-45F to hold. Apply Fascination or Fresco prior to cold storage. | |
| 0 | Apr. 8 | Final lily height 15-17" tall. Buds 6-6.25" long & at or near bloom. Shade lilies immediately after they are removed from storage. | |
| | | Easter Sunday 2012 | |

NOTES & COMMENTS ON THE 2012 EASTER LILY SCHEDULE

Easter 2012 outlook: Easter falls on a mid-date in 2012 (April 8). Mid-date Easter schedules are the easiest to manage. You will have plenty of time to follow the full schedule and force at normal temperatures. If you have problems contact your Extension Educator.

Pot-cooled bulbs are normally potted & held for three weeks at 60-62F before the six weeks of bulb cooling (at 40-45F) begins (see the 2012 Easter Lily schedule for details). The bulbs then require 14 weeks of greenhouse forcing. This entire process requires 23 weeks from initial potting to Easter. This same process is used for both naturally cooled or CTF bulbs.

Case-cooled bulbs require six weeks of cooling followed by 17 weeks of greenhouse forcing to flower in time for Easter. Be sure that commercially case-cooled bulb arrive & are planted by Dec 11, 2011. If you cool your own bulbs, start as soon as bulbs arrive but no later than Oct 30, 2011 (23 wks before Easter).

Insurance lighting: Insurance lighting should not be needed this year. However you can substitute 1-week of insurance light for 1-week of bulb chilling if the full 6 weeks of cooling is not achieved on schedule.

Fertigation: Start fertilizing using a 15-0-15 or comparable formulation when lilies emerge. If phosphorus was not added to the medium, 20-10-20 can be used on an alternating basis with a 15-0-15. Fertilizer rates should range from 200-400 ppm. Do not allow medium EC to exceed 3-3.5 mmho/cm based on a Saturated Media Extract. Stop fertilizing 1-week prior to sale. Provide one clear watering before shipping lilies - this will reduce salt levels in the potting medium and maximize keeping quality. Do not withhold water or fertilizer to slow development. Do not over water (i.e. water too frequently) or root rot problems may occur.

Decrease Leaf Yellowing & Delay Flower Senescence: To prevent early-season leaf yellowing (7 to 10 days before visible bud) & mid-season leaf yellowing (7 to 10 days after visible bud) spray Fascination at 10/10 ppm. (Note: Fascination contains two active ingredients and recommendations include the concentration of each). Apply only to lower leaves & cover thoroughly. To prevent late-season leaf yellowing and post-harvest flower senescence, spray 100/100 ppm to thoroughly cover all foliage & buds. Apply when buds are 3 to 3 ½" long BUT NOT MORE than 14 days before shipping or cooling. Protects leaves from yellowing for up to 14 days. Note: Avoid direct contact of spray to immature leaves during early- & mid-season applications or increased stem stretch will result.

Disease and pest control: Before planting, clean bulbs of debris removing any damaged scales, especially scales that show evidence of infection. Once potted, root rots associated with *Rhizoctonia*, *Fusarium*, and *Pythium* are a concern. Drench immediately with Banrot or Insignia, broad-spectrum fungicides, or you can treat to control these diseases separately by selecting from the fungicides specifically registered for *Rhizoctonia*, *Fusarium* and *Pythium* control on lily. Materials registered for *Rhizoctonia* and/or *Fusarium* include 26GT, 26/36, Contrast (*Rhizoctonia*),, and Terraclor WP (*Rhizoctonia*). Materials registered for controlling *Pythium* include Alude, Banol, Subdue Maxx, and Truban. Check with manufacturers regarding compatibility when tank mixing fungicides. Fungicides may also need to be re-applied later in the crop, check labels for guidance. Preventative biological fungicides (RootShield, CEASE, Actinovate, Mycostop or Companion) may also be applied for disease suppression and to enhance root growth. Check with company or product labels information on time intervals between application of biological fungicides and traditional fungicides.

Aphids, fungus gnats and bulb mites are a major concern. Use only aerosols once in bud. Many chemicals are listed for aphid control, including, Safari,, Flagship, Tristar, Marathon, DuraGuard, Distance, Enstar AQ, Preclude TR, Tame, UltraPure Oil, Insecticidal Soap, Talstar and Endeavor. Fungus gnats can be controlled with many of these same chemicals as well as Citation, Adept, insect parasitic nematodes (Nemasys, NemaShield, Scanmask) and Gnatrol. Bulb mites, *Rhizoglyphus robini*, represent one of the more troublesome insect pests on lilies and effective management requires an integrated approach. Bulb mites are considered a secondary pest and are commonly associated with decay caused by fungus gnat damage and soil-borne fungal pathogens. To best manage this problem, sort out diseased and damaged bulbs before planting, handle bulbs gently and monitor and control fungus gnats. Duraguard is labeled as a drench for soil borne organisms that may include bulb mites.

Note: Registration of pesticides varies by state so consult and follow labels for registered uses. To avoid any potential phytotoxicity or residue problems, spot test first before widespread use. No discrimination is intended for any products not listed.

Controlling Lily Height: Use A-Rest, Chlormequat E-Pro, Concise, Cycocel, Topflor or Sumagic as needed when shoots are 3-5" tall. Split applications provide the best results. You can apply any of the PGRs at ¼ to ½ normal rate as needed, to control height. Reduce the concentrations of Sumagic used when combined with DIF. Use DIF, or cool morning DIP, to control lily height. Equal day/night temperatures, high night/low day temperatures or a cool morning temperature dip will keep lilies short.

Lily storage: Lilies can be stored for up to 14 days in the dark at 35-45F when buds turn white but before they open. Spray for Botrytis control prior to moving lilies to cold storage. Materials registered for botrytis control on lilies include 26GT, 26/36, Daconil, Exotherm Termil, Sextant, and Protect DF. Follow label directions. Water Easter lilies thoroughly before starting cold storage. After removing from the cooler, place lilies in a shady location to avoid excessive wilting.

Graphical Tracking of Lily Height: Monitor lily height regularly during forcing. If height exceeds the target size, run negative DIF to slow stem elongation. If height is less than the target size, run positive DIF to increase stem elongation.

If you have problems contact your Extension Educators.

All agrichemical/pesticides listed are registered for suggested uses in accordance with federal and Connecticut state laws and regulations as of the date of printing. If the information does not agree with current labeling, follow the label instructions. The label is the law. Contact the Connecticut DEP for current regulations. Where trade names are used for identification, no product endorsement is implied nor is discrimination intended.

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