EVEN HIGHER FLOWER BUD NUMBERS ARE NOW POSSIBLE IN EASTER LILIES BY DIPPING YOUR GREENHOUSE TEMPERATURES

H. F. Wilkins and S. M. Roh[1]

Easter lilies are usually priced and sold at the wholesale and retail levels according to flower bud numbers. True, there are other factors such as leaf quality at the base of the plant, unsightly residues on the foliage, plant height, and damaged leaves and flowers. A few lily forcers sell their crop bench run.

Over the years there has been an increase in the number of flower buds produced from any given bulb size. Historically, a typical 8 - 9-inch (21.4 to 24 cm) 'Nellie White' or 'Ace' bulb cooled in the case produced from 5 - 6 flowers. In the late 1960's and in the early 1970's many forcers started using the Control Temperature Forcing (CTF) technique to program their bulbs to flower. Flower number produced from an 8-9 inch (21.4 to 24 cm) bulb dramatically increased from the typical 5 or 6 to 7 or 8. By using the following described technique, it is now possible to produce up to 9 or 10 flower buds.

For many years various researchers have reported that the Easter lily plant begins forming flower buds when it is between 2.5 - 9.5 inches (7.5 - 25 cm) tall. This event takes place during the last week of January and the first week of February. This period of time has proven to be amazingly uniform from year to year and throughout the country. This transition period from the vegetative to the reproductive stage of development is critical. Determining when this takes place is the key to success and the clue to when to dip your temperature. The theory behind this new technique to increase flower bud number is not to rush through the flower bud formation period and allows more buds to develop. The technique is simply to lower the forcing temperatures during the transition period, prolong the process, and increase the number of primary (P), secondary (S), and tertiary (T) flower buds initiated (table 1, figure 1).

How to Know When to Dip Temperatures

Date: We have repeatedly observed that the CTF programmed Easter lily goes through this transition period during the last 2 weeks in January and the first few days of February. Case-cooled bulbs go through this transition period 1 week earlier. There appears to be little difference between 'Ace' and 'Nellie White'. However, this can vary from year to year, source of bulb to source, and development stage within any one greenhouse lily plant population. Only by inspection of the meristematic growing point can one truly know when it occurs for any particular year.

Meristem Inspection: This technique is most useful and is recommended. However, you, the forcer and greenhouse operator, may be its most reluctant customer. Nevertheless, meristem inspection is the most accurate technique and not that difficult. To determine the stage of development, cut off at soil level several "average" looking plants selected at random from each source and cultivar and take them into a well-lighted room. Using a corsage pin, a razor blade and a good, strong reading glass or hand lens (or even a binocular scope), slowly remove the leaves until you expose the growing point or apical meristem (figure 2). A drop of India ink will help differentiate similarly colored tissues. If the surface or top of the growing point (dome) is smooth and curved upward (convexed), your lily plants are still making leaves. If the dome is beginning to get ridges on the edges and marking off "bumps," your plants are now making future flower buds (figure 3) and it is time to dip the greenhouse forcing temperature.

Height: When your plants are 4 - 5 inches (11.3 - 13.8 cm) tall it should be in or past the reproductive stages and temperature should be dipped. Height is the least reliable of these methods to aid in determining when to dip the greenhouse forcing temperatures because internode length will vary from cooling technique to cooling technique, greenhouse to greenhouse and cultivar to cultivar. As stated earlier, various researchers have reported that plants were reproductive at 2.5 inches (3 cm), some at 9.5 inches (24 cm).

Leaf Number: We have data for 2 years from one greenhouse and for one cultivar to support this method if it is to be used for dipping the greenhouse temperature. However, when your 'Nellie White' lilies have from 25 - 30 leaves unfolded to a 45° angle, plants should be in the transition zone and the temperature dropped.

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[1]Professor and Research Assistant of Horticultural Science, respectively.

How to Dip Your Temperatures

We feel you should be running a soil temperature of 62° to 65°F (16.7 to 18.3°C) from the time you bring your pots into the greenhouse until shoot emergence. After shoot emergence, run an air temperature of 63° to 68°F (17.2 to 20°C). When your lily plants are in the transition period lower air temperatures to 45° to 50°F (7.2 to 10°C). You can drop temperature in one step or do so in a 2-day interval. Hold these temperatures for 7, 10, or 14 days, depending on whether Easter is early, medium, or late. Some forcers in Minnesota allow their day temps to float up to 60°F (15.5°C) on sunny days, but go down to 45 to 50°F (7.2 to 10°C) each night. After the 7 - 14 day temperature dip, return the temperature to 63° - 68°F (17.2°C - 20°C) and force as normal. We urge you to follow the leaf counting technique as timing and temperature adjustments are essential. This technique is described in past issues of the Florists' Review and the Minnesota State Florists' Bulletin.

We should note that in our research we found that 45°F (7.2°C) was the optimal temperature for secondary flowers and 60°F (15.5°C) for tertiary 'Nellie White' flower buds. DeHertogh was recently reported that 55.5°F (13°C) is best for secondary and 69.8°F (21°C) is best for tertiary buds for 'Ace.' We have only worked with 'Nellie White.'

Why It Works

We have observed that when we dip the temperatures we increase the numbers of secondary and tertiary flower buds (table 1). At lower temperatures, the formation of these additional flower buds should take place because of slower rate of development, conservation of metabolic energy, and the production of a larger dome and more total flower buds. In chronological order, these are the primary flowers formed in all cooling techniques. Then there is the elongation or development of an elevated flower "stalk" (peduncle) to support a secondary group of flowers, and the ultimate formation of tertiary flowers in the axils of bract leaves on the primary and secondary flower "stems" (pedicels) (figure 1).

Any Problems

We have consistently questioned Minnesota Easter lily forcers who have tried this technique to determine whether any potential problems or undesirable side effects arose when temperatures were dipped. No one has stated so over a 2-year period. We have not observed any root rot problems, adverse delay of crop or inability to "start" the crop forcing again once temperatures are increased. At this early stage of development, some 55 - 70 forcing days are left (depending on the date of Easter). We estimate that some 60,000 bulbs have been commercially forced in Minnesota over the past 2 years when this technique was used. Feel free to contact me (612-373-1665) or the following lily forcers in Minnesota with any additional questions:

1. Lloyd Bachman - 612-469-2102
2. Fred Busch - 612-545-8821
3. Bob Cashman - 507-451-4820
4. Jim Dey - 612-489-1397
5. John Hertog - 612-789-4371
6. Bob Pletscher - 612-633-6666
7. Don Rosacker - 612-789-3577
8. John Vigel - 507-433-2316

Advantages

1. More buds on any given bulb size will mean extra income from your crop.

2. You may be able to use a smaller size bulb in the future, save money on production cost, and yet maintain equal grade in flower bud numbers.

3. Lastly, no doubt these few days of lowered temperatures will save a few dollars in fuel.

Table 1. The number of primary (P), secondary (S) and tertiary (T) flower buds developed from 8 - 9 inches (21.4 to 24 cm) 'Nellie White' lily bulbs forced in commercial greenhouses in 1975-76. These data are the averages of 10 plants selected at random in 6 forcers' greenhouses.

	Bud Type			
	P	S	T	Total
CTF + Dip				
Forcer A	5.1	3.0	0	8.1
Forcer B	4.7	3.5	.6	8.8
Forcer C	4.9	4.1	.3	9.3
CTF + No Dip				
Forcer D	5.1	2.7	0	7.8
Forcer E	4.7	1.8	0	6.5
Forcer F	4.4	3.0	0	7.0
Case Cooled + No Dip				
Forcer G	3.6	.9	0	4.5

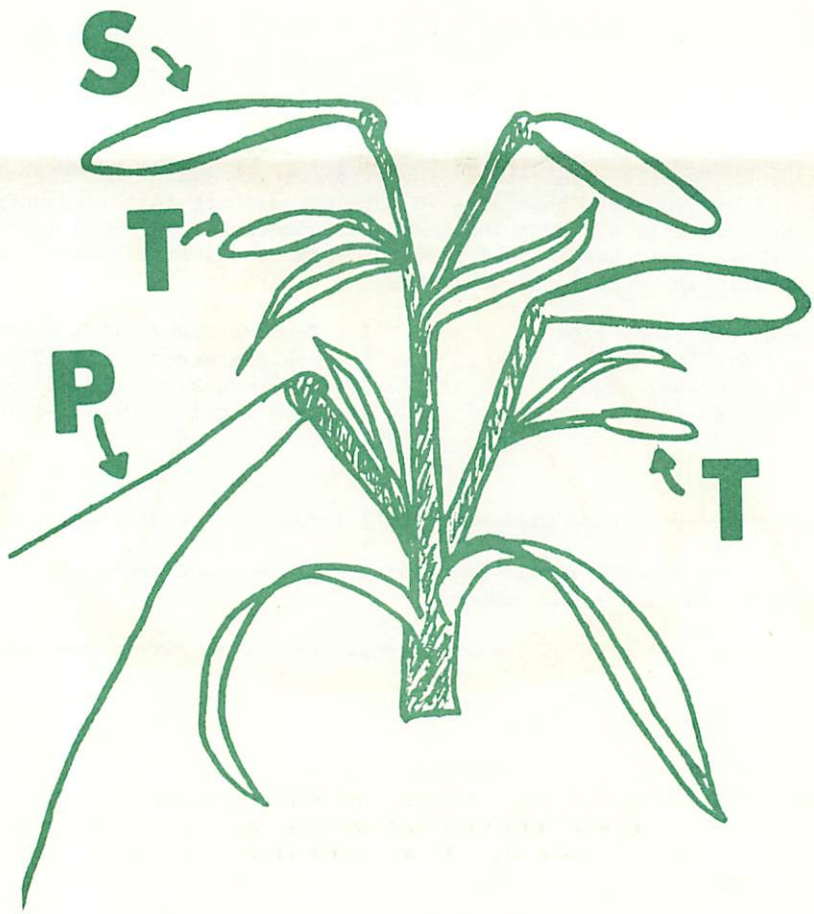

Figure 1. An inflorescence of an Easter lily illustrating primary (P), secondary (S) and tertiary (T) flowers

Figure 2. The growing point of an Easter lily in the vegetative (V) stage of growth. Note the older leaves have been trimmed away and the very young leaves are clasping the vegetative growing point.

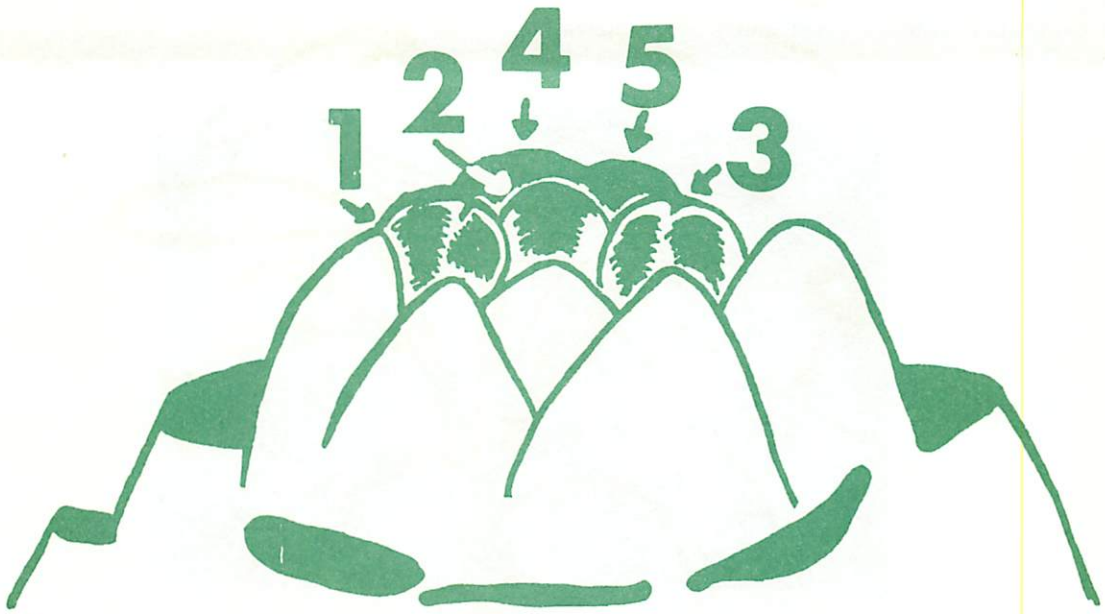

Figure 3. A reproductive growing point showing five primary flower buds (P). When temperatures are dipped, the central growing point will elongate through them and form a floral stalk (pedicel) supporting secondary flower buds (figure 1). Tertiary buds will form in the axils of bract leaves on the stems (peduncles) supporting the primary and secondary flowers.

References

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