

# Easter Lilies - Present and Future – Part III\*

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Having reviewed in the two previous articles (N.Y.S.-F.G. Bul. 269 and 270) some of the problems associated with present day Easter lily culture, we can now consider the information needed for the future. A basic understanding of the plant—its life cycle and responses to environment, and a record of important environmental events during the growth of the crop seem necessary for precision production. An effort to hybridize for and select new cultivars to better fit commercial requirements also seem important.

## BASIC UNDERSTANDING

One of the most important aspects of the "Easter Lily Story" is the basic question: what indeed makes the crop grow and flower? The growers' interest is in how to time for Easter, get plant quality and flower number. To relate this information to the grower, we must have an understanding of the many mechanisms that control this plant.

### "How Much" Vernalization?

A basic fact that escapes our grasp today is the knowledge of "how much" vernalization a bulb has at any particular time. We cannot look at a bulb before it is planted and answer the question "how much" vernalization? We can answer the question at flowering time, but then it is obviously too late. We know all of the necessary ingredients such as temperature, time, moisture, gases, bulb maturity, etc., but still we cannot grade bulbs according to the amount of vernalization or whether they will flower quickly or slowly. With this solution we will also find answers to why we observe the "heat effect", the "cold frame effect", etc.

### Gibberellins

We, as many other research workers in the U.S., are working on these problems. Our approach has been many pronged. One aspect has involved cooperation with other university staff members in chemical treatment and analysis of the plants. For example, we have investigated the role of gibberellic acid and some other gibberellins. Gibberellins often influence plants requiring vernalization. The results of this part of the project have not been fruitful. We suspect it is a basically a matter of our techniques.

### Starch Test

We have investigated the starch content of the growing points of Easter lilies. Work with cauliflower (a plant that also has a vernalization requirement) has shown a very dramatic change in starch content of the growing point from a great deal of starch to little starch as the plant passes from the non-vernalized to the vernalized state. If this scheme had worked with the lily the implica-

tions would have been tremendous. Perhaps with simply an eyedropper of iodine and a knife one could tell immediately whether the lily had received enough vernalization. We suspect although this did not work, a test about that simple will be devised.

### Anatomical and Biochemical

We are also making careful anatomical studies of the growing point of the lily as it grows from the non-vernalized state to the vernalized state and on to flower initiation and flowering. We are also following these stages biochemically and analyzing the growing tissue for changes in protein composition. The information from such investigations, combined with the data of storage and forcing studies, may help us better understand the Easter lily.

## ENVIRONMENTAL MONITORING

In the production of Easter lilies the most troublesome environmental factors are temperature and light (especially duration) troublesome because they have a profound effect on flowering, but are not controlled during all phases of crop growth. Daylength could be controlled if there was sufficient reason to do so, but temperature control during outdoor bulb production would be manageable only with extreme, impractical expenditures.

### Field Records

A more reasonable approach in dealing with temperature might be either to record temperature in the bulb fields and estimate its influence on the bulbs or, as mentioned above, to test the bulbs for chemical changes caused by temperature conditions (e.g. vernalization status). The appeal of environmental monitoring rests in the fact that the equipment and technique for such recording is presently available, while chemical tests are future possibilities. In any case, some overall estimate of environmental influence will have to be made if commercial bulbs are to have precise forcing characteristics.

## NEW CULTIVARS

One exciting possibility for the future of Easter lilies is the development of new cultivars. Cultivars which vary in form, flower size and shape, height, etc., but perhaps also in cold requirement. No one really knows how much variability might be found in the Easter lily if the degree of cold requirement were studied. The importance of new cultivars will be stressed later in this article.

## EASTER, 1980

Because of the long production cycle of the crop, cooperation between bulb producers, jobbers, forcers, and researchers is essential. Cooperation and more research can solve many of today's problems. To illustrate, let us consider what Easter lily forcing could be like in the 1980's.

*(continued on page 6)*

\*This concludes a three-part article

## **Easter Lilies**

*(continued from page 2)*

### **Preparation**

The preparation for Easter 1980 will start 3 or 4 years previous. At that time the bulb growers on the West coast will note whether the 1980 Easter will be early, mid-, or late season. This information will be used to determine whether to use early, mid-, or late season cultivars. The grower will then select the short, medium, and tall selections of the cultivar and bulb scales will be used for propagation under, of course, sterile conditions. As the final bulb growing season of 1979 approaches, precise weather information will be fed into computers.

### **Harvest and Storage**

The bulbs will be dug and sorted for size and soundness by machines with just a few people as inspectors. The grading and sorting will all be controlled by computers. Biochemical analyses of the bulbs will determine how much vernalization the crop had accumulated. Through analysis of the weather information and the biochemical information by the computer will determine, the exact temperature and length of additional cooling and heating necessary for the 1980 Easter. The bulbs will be vacuum cooled and then sent to the storage facilities. On completion of storage, the bulbs will be sent to the forcer's establishment with specific instructions as to the forcing temperatures, photoperiods, and other cultural details to be used for that specific season.

### **Forcing**

The forcing operation will be completely palletized. Potting machines will pot-up and move the lilies to pallets which will be conveyed to the forcing area. The grower will have already determined the percentage of short, medium and tall cultivars required. The grower will only inspect the equipment; watering, fertilizing, insect and disease control, temperature, and daylength will all be controlled automatically. In the event of a breakdown of a system, such as heating, the information would be reported to the computer which in turn would supply a new schedule to compensate for the loss. Just before Easter the crop would be sold. The pallets would be conveyed to the packing shed, the plants automatically wrapped, boxed, sorted, the bills tabulated and the plants loaded onto the trucks for the consumer market.

"Easter, 1980" may seem too futuristic and perhaps some of it is, but we do envision fewer labor requirements, more and better selections of cultivars, and a better understanding of growth and flowering control.