Easter Lilies - Present and Future

Part I*

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There have been many research reports about the Easter Lily in the past 5 years. We have digested this material and would like to give you our thoughts on where we have been and what to look for in the future. There have been some great strides made and, in fact, we feel these were more numerous than the lily grower, jobber, and forcer have been able to absorb. It, therefore, is our hope this series of articles will be comprehendible and will put this work in its proper perspective.

There are presently about 1000 acres devoted to the production of lily bulbs in the United States; the greatest production in Oregon, California, and Florida (2). A large percentage of this acreage is devoted to Easter lilies (*Lilium longiflorum*). Ten million Easter lily bulbs are produced each year (3) and an additional 5 million bulbs are imported from Japan (4).

This large number of bulbs could lead one to believe the culture of Easter lilies is easy and uncomplicated; however, those who reflect back to the 1963-1964 season, for example, will verify the falsity of that assumption. In 1963-1964 many thousands of the 'Ace' bulbs did not flower in time for the early Easter. Slow forcing has been a problem encountered with many early Easters.

Another indication Easter lilies are a "difficult" crop is the percentage of crop loss each year. Recently, we had the opportunity of hearing Easter lily forcers discuss this problem and they concluded a yearly loss of 10 per cent from various causes was not uncommon. While they still find the crop profitable, a 10 percent loss is nevertheless a large one and also unnecessary if the crop requirements were better understood.

The recently published "Easter Lily" manual contains most of the pertinent information about this crop and is recommended reading for any lily grower. The manual also contains many of the details of the research work discussed in this series and can be used as additional reference. The major problems in Easter lily production and forcing will be discussed in the first two articles and the third will speculate on future trends and practices in Easter lily production.

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*Parts 2 and 3 of this article will be presented in future bulletins.

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Bulbs reach commercial size in the Pacific northwest after 2 years of field growth from the bulblet stage. The forcing characteristics of any Easter lily are the sum of the innumerable factors in field growth, handling, bulb storage, and greenhouse forcing. For ease of discussion let us divide the factors affecting the Easter lily crop into 5 parts: 1) field culture, 2) bulb maturation—field vernalization—bulb harvest, 3) shed storage—bulb transport, 4) cool storage, and 5) forcing.

FIELD CULTURE

We do not generally appreciate the influence of field culture on the Easter lily crop, but soil type, fertility, watering practices, and disease-virus-insect control are essential to the production of quality bulbs. Researchers and bulb producers have ably determined the field cultural requirements.

Summer Sprouting

One of the difficult problems remaining to be solved in the Pacific northwest is "summer sprouting". In some years the sprouts which would normally begin growth during greenhouse forcing start to grow in the field before the bulbs are dug. This problem is influenced by field temperatures (1) but no commercial means of control is presently available.

Under greenhouse growing conditions in Ithaca, we have found all "mature" bulbs (bulbs having flowered 6 to 8 weeks previously) sprout if given sufficient moisture. They do not need cool temperatures to "break dormancy" before sprouting. However, "summer sprouting" involves sprouting at or immediately after the flowering of the mother plant, that is, sprouting while the bulbs are "immature". Sprouting from these "immature" bulbs has occurred in fluctuating or low temperature conditions (1). An understanding of this problem will hopefully come in the near future.

BULB MATURATION

Field Vernalization—Bulb Harvest

We have already alluded to bulb maturation which occurs before the bulbs are dug, but Easter lily bulbs may also be partially vernalized while in the West coast fields. These phenomena depend on the bulb harvesting date.

Bulbs are not highly receptive to a vernalization (cooling) treatment until 6 to 8 weeks after the stem of the mother (old) bulb has flowered (5). Immediately after flowering, the daughter (old plus new) bulbs are said to be "immature" or "juvenile". Pacific northwest bulbs which flower July 1 to 15 are, therefore, most receptive to cooling sometime after September 1.

Vernalization Temperatures

We have recently determined at least in 'Ace' (8), temperatures below 70° are vernalizing temperatures. Sixty degrees is more effective than 65° and temperatures of 35° to 50° are the most effective vernalizing temperatures. In August and September, Pacific northwest field air temperatures are frequently 55° to 60° (6, 7).

Field Vernalization

A popular topic of discussion about Easter lilies involves "field vernalization" or the cooling of the bulbs in the field before harvesting in September. This "field vernalization" could replace part of the cool storage requirement. However, it is obvious from the above discussion if the bulbs are not highly receptive to cooling until September and the bulbs are dug in September, field cooling may not have a significant effect on the vernalization status of Easter lily bulbs. Harvesting the bulbs before maturity is reached, or late so field vernalization is significant could be, and perhaps has been, problematic.

Stem Pulling

Another problem associated with bulb harvesting arises when the old stems are pulled from the bulbs before digging. In a normal season there is no problem, but if the abscission layer between the stem and basal plate has not completely formed, stem-pulling damages the base of the bulb. Disease organisms may enter the wounded tissue and these damaged bulbs often root poorly and the new shoot may not grow satisfactorily. Last year (1966-1967), a season with an early Easter, many of the stems were not pulled, but rather the stem was cut near the top of the bulb. This practice may circumvent the stem-pulling problem.

SHED STORAGE

Transportation

The bulbs are dug and accumulated in sheds out of the sun where they are packed, graded, and held before transportation to refrigeration centers in the Midwest and on the East coast. The average temperature prevailing on the West coast at that time of the year is between 50° and 60°F. The cases of liles are packed on refrigerated transports and trucked east in about a week's time.

Refrigerated Trucks

The refrigerated trucks maintain an air temperature in the truck of 35 or so degrees, but the case and especially the bulb temperatures are far from this temperature. The bulb temperature would be around 60° when packed and it would be unrealistic to think a small refrigeration unit would be able to reduce the temperature of that mass of plant material. Refrigerated trucking is not a wasted effort; at least it prevents the load from heating up. The important point is the bulbs arrive in the east at a temperature of about 60°, not a most efficient vernalizing temperature.

Vacuum Cooling

We know it is possible to vacuum cool the Easter lily and in a relatively few minutes reduce the temperature of the bulb to 35°. There are certain years, especially for early Easters when there would be a possible important gain of at least 2 weeks. Equipment is available on the West coast and we will see this type of treatment being used by the West coast bulb producers in the future. The real value and implications of this will be discussed in the next section on bulb storage.

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