

Minnesota Commercial Flower Growers Bulletin

<u>Cultivar</u>	<u>Color</u>	<u>Forcing Time</u>	<u>Height (cm)</u>	<u>Planting Time</u>
Acapulco	Plum Pink	85	100-130	All Year
Alexander	Red	100	90	All Year
Alliance	Red to Crimson	130-140	80-110	All Year
Angelo	Dark Pink	120	90	All Year
Atlantis	Red to Pink	110	130	All Year
Barbaresco	Purple Pink	100	120	Spring, Summer
Barracuda	Dark Red	120	120	All Year
Belcanto	Rose Red	100	110	All Year
Belle Epoque	Pink and White	110	100	All Year
Bergamo	Pink and Pink Rib	100-105	125	All Year
Berlin	Dark Pink	90-95	110-130	All Year
Carmen	Light Pink	75-85	80	Spring
Cascade	Pink with White	110	130	All Year
Con Amor	Bright Pink	90-100	100-110	All Year
Concerto	Red and Pink	110-115	85-90	Spring, Fall
Creation	Dark Red	120	120	All Year
Dizzy	White with Red Spots			All Year
Dolce Vita	Soft Pink	100	80	Spring, Fall
Early Rose	Soft, Light Pink	70	70	Spring
Egypt	Light Pink	85	90	Spring
Eldorado	Red with White	130	100	All Year
Elysee	Light Pink with Spots	90-100	85-100	All Year
Esperanto	Pink/Yellow/White	95-130	80-90	All Year
Fellowship	Light Pink	90-95	70-100	All Year
Friendship	Red with White	115	80-100	All Year
Galilei	Light Pink	105	115	All Year
George Marshall	Light Pink			Spring, Fall
Gerosa	Pink with Yellow Center	95	115	Spring
Hit Parade	Pink and Cream	90-100	80	Spring, Fall
Hollandia	Crimson to Red	130	80-90	All Year
Hot Lips	White with Red	100	100	Spring, Summer
Idole	Light Pink and White	130	100	Spring, Summer
Journeys End	Crimson	120	90-120	All Year

Cultivar	Color	Forcing Time	Height (cm)	Planting Time
Kissproff	Plum Red	100	100	Spring, Summer
La Mancha	Brightest Red	110	100	All Year
Laura Lee	Raspberry Pink	115-120	90-120	All Year
Le Reve	Light Clear Pink	75-80	70-90	Spring, Fall
Lourve	Light Clear Pink	90-95	115	All Year
Lush Life	Bright Light Pink	110	120	All Year
Marco Polo	Pink and White	100	90-100	All Year
Mary "M"	Light Pink	90	60	Spring
Mediterranee	Bright Dark Pink	100	110-120	All Year
Mero Star	Crimson Red	100	105	All Year
Nobelesse	Light Pink/Yellow	90	80	Spring, Fall
Olympic Star	Red with White	95	90-110	All Year
Paula da Costa	Light Pink with Spots	110	100	All Year
Passage	Clear Pink	100	100	Spring, Fall
Pesaro	Light Clear Pink	90-100	90	All Year
Picadilly	Dark Clear Pink	115	110	All Year
Reputation	Light Pink and White	110	90	All Year
Romanesso	Raspberry Pink			All Year
Royal Class	Soft Pink	125	90	All Year
Royal Queen	Soft Pink			
Sangria	Red/Purple	120	110	Spring, Summer
Saturnus	Bright Red with White	110	100	All Year
Second Paradise	Red/White	105	120	All Year
Spinoza	Light Pink	100	115	All Year
Star Drift	Crimson Red	120	90-100	All Year
Star Gazer	Red to Crimson	115	70-90	All Year
Tempo	Bright Red/White	115	85-95	Spring, Fall
Vino	Red to Crimson	100-120	80-100	All Year
Woodriffs Memory	Bright Pink	90-100	100-110	Spring, Summer

"Flower induction of Oriental hybrid lilies usually occurs prior to shoot emergence."

strongly fragrant, are large (3-6" in diameter) and are oriented horizontally. In addition, flowers can be spotted or unspotted. In general, Oriental lily flowers are longer lasting, are larger and are more fragrant than Asiatic hybrid lilies.

Flowering

Flower induction of Oriental hybrid lilies differs from the Easter lily in that flower initiation is believed to occur prior to emergence. However, whether this occurs on all Oriental hybrids is not likely as when buds naturally initiate varies greatly among different Asiatic and Oriental hybrid lilies. Although there appears to be great variation in when Oriental lilies initiate flowers, the effect of different environmental treatments is consistent across species/hybrids. The responses of flower induction/initiation to the environment are outlined next.

Temperature: Exposure of lily bulbs to cool temperatures increases stem elongation and hastens flowering. In general, flower induction and initiation in Asiatic and Oriental hybrid lilies occurs during the cooling process. Bulb respiration (oxygen release) increases and then decreases during cooling suggesting that there is

significant activity within the bulb during cooling. The decline in respiration marks the end of flower initiation. Therefore, respiration rate may be used as an indicator of the stage of flower initiation.

Oriental lily bulbs are cooled at 36-39°F for 8-12 weeks to initiate/induce flowering. Part of that cooling process is conducted while bulbs are shipped from Europe. The broker generally conducts the remainder of the cooling treatment. Bulbs intended for later forcing (after January-February) are frozen until they are needed; bulbs can be held in moist peat for months at 30°F. If you freeze bulbs, do not allow the freezer temperature to drop below 28°F! If bulbs are frozen, defrost bulbs slowly at 45-55°F



(1-3 days). If you re-freeze already thawed bulbs, flower bud number

can be reduced and/or flower bud development may be distorted. Bulbs must be kept moist during the cooling process, as moisture is required for the physiological processes associated with vernalization (flower induction due to cold) to occur.

As with Easter lily, days to flower, flower bud number and plant height decrease as the length of the cooling/freezing treatment increases. This is a generalization and may not be true for all Oriental hybrids. For instance, flower bud number of the hybrid 'San Souci' increased from 7 to 11 flowers per plant as the length of the cooling treatment increased from 6 to 9 weeks.

Photoperiod: All species in the genus *Lilium* appear to be facultative long-day plants, i.e. long-day conditions hasten flower initiation but are not essential for flowering to occur. However, it appears as though long-day conditions can not completely replace a cooling treatment in the flower induction process. However, exposure of plants to long-day conditions can partially substitute for cold treatment but plant quality is sacrificed as bud count per plant is decreased and plant height at anthesis

increases. Therefore, there is an apparent cold requirement for flowering of many Oriental hybrid lilies, i.e. they have an obligate cold requirement for maximum flowering to occur.

Irradiance: After flower initiation, irradiance, or light intensity, has little effect on Oriental lily rate of development. Rate of development is temperature dependent as with the Easter lily. However, Oriental hybrid lilies do benefit from supplemental lighting by decreasing bud abortion that can occur under low light conditions. The reduced bud abortion is probably associated with the synthesis of additional carbohydrates, i.e. flower bud development may be carbohydrate limited under lower light conditions. Therefore, if flower bud abortion may occur in your greenhouses due to low light conditions, consider adding supplemental lighting (high pressure sodium). In addition, although unconfirmed, supplemental lighting likely increases total plant dry weight, i.e. quality

Interestingly, lighting during the night (night interruption) with incandescent/fluorescent lights was shown to hasten flowering by 25 days in cultivars of *Lilium speci-*

osum (Oriental type). This response is associated more with a photo-



periodic response than a response to increased carbohydrate as above with addition of supplemental lighting.

Media:

Grow Oriental hybrid lilies in a sterile soilless mix. Do not use media with superphosphate or perlite added as these materials contain fluoride that can cause 'leaf scorch' (see later section). I suspect that chlorides can have the same effect, therefore, groundwater high in sodium chloride may also cause leaf scorch. Alternative media such as rice hulls and coir are in some ways superior to traditional peat blends.

Planting:

After vernalized bulbs arrive or after frozen

bulbs are thawed inspect bulbs for any apparent damage and/or mite infestation. Brown, soft, rotting scales may suggest a mite infestation. Confirmation of this is possible using a stereoscope or by sending potentially infested bulbs to a plant disease clinic. Plant bulbs 1-2" from the base of a 6" standard pot in soilless media. If bulbs must be stored, hold bulbs at 32-35oF; do not store bulbs for longer than 10 days. At no point should bulbs be dry. The suggested number of

Table 2. Recommended bulb number per size per pot.

Size (cm)	Size (inches)	Suggested Number of Bulbs per Pot
12/14	5/6	3 per 6 inch pot 4 per 8 inch pot
14/16	6/7	1-2 per 6 inch pot 2-3 per 8 inch pot
16/18	7/8	1 per 6 inch pot 2 per 8 inch pot

bulbs per pot for different sized bulbs is shown in Table 2.

Fertilization

Fertilize Oriental lilies with a complete fertilizer

“Oriental Lily growth and development less uniform than that of the Easter Lily. Be prepared to market this crop over a longer period of time and/or move plants to different temperature environments to hasten or slow plants to have a consistent flowering time.”

mix that is high in calcium and potassium nitrate and low in ammonium. We recommend 15-0-15 Dark Weather Feed or Plantex High Nitrate Fertilizer. Apply phosphorus through periodic applications of 20-10-20 Peat-Lite fertilizer, through phosphoric acid injection, and/or by applying a single ‘starter’ fertilizer mix very high in phosphorus. Apply 600 ppm nitrogen with irrigation water the first two waterings to bring nutrient levels up to the desired range as quickly as possible to promote larger leaves and flowers. Thereafter, fertilize with approx. 200 ppm nitrogen with each irrigation. Recommended media nutrient levels and suggested tissue levels of different nutrients are shown in Table 3.

Growing On Temperature

Oriental lily shoot emergence is more erratic than Easter lily shoot emergence. If possible, maintain air temperature at 59°F for the first 4 weeks. Following this four-week period, grow plants at constant 68°F air temperatures except for the morning drop in temperature. Drop temperatures

help control stem elongation (see later section). Under no circumstances should day temperatures exceed 85°F as flower bud abortion can occur and leaf scorch is also promoted by large fluctuation in day/night temperature. The length of time required to flower a crop after cooling can vary greatly depending on cultivar and the length of the cooling/freezing

Table 3. Media nutrient standards based on a Spurway extraction method.

Nutrient	Optimal	Excessive
pH	5.8—6.8	>7.0
Electrical Conductivity	120-180	>200
Nitrate (NO3)	150-250	>400
Ammonium	5-10	>15
Phosphorus	5-10	>20
Potassium	50-85	>140
Calcium	150-200	>300
Magnesium	40-50	>70
Iron	0.25-0.50	>3.0
Manganese	0.25-0.50	>3.0
Zinc	0.25-0.50	>3.0
Boron	0.25-0.50	>1.0

period. General crop times for different Oriental lily cultivars are shown in Table 1.

Height Control:

Control height as much as possible using temperature control. Lily stem elongation decreases as the difference (DIF = Day temperature – night temperature) decreases. In addition, dropping temperatures during the first 4 hours of the day can eliminate approximately 1/3 of

the total elongation that can occur during a day.

during the first 2-4 hours of the morning to approximately 60-65°F to

Dipping bulbs in a growth retardant is very effective for height control. If you historically need additional height

control, dip bulbs in either Bonzi (100-200 ppm) or Sumagic (5-10 ppm) for 1 to 5 minutes. Let bulbs 'drip dry' prior to potting. A-Rest works as well. Spraying is preferred to drenching or dipping in that root stunting is lessened, lower leaf yellowing is lessened, it

requires less time, media pH does not affect growth retardant effectiveness, and the grower has less opportunity to over apply. Spray with Sumagic (2-5 ppm) when shoots are 1" tall. Growth retardant rates per gallon are shown in Table 4.

Diseases

Oriental lilies are susceptible to the 'root rot' fungi *Pythium* and *Rhizoctonia*. These fungi attack the root system and can reduce the size of the root system or eliminate it entirely. Both fungi are 'water molds', i.e. they proliferate in a wet environment. Therefore, culturally manage these dis-

eases by not overwatering Oriental hybrid lilies.

Often chemical control is

when the flower or the anther at the end of the stigma can become infested.

Table 4. Recommended growth regulator applications and suggested rates.

Growth Regulator	Dip	Drench	Spray
A-Rest	-	0.25 mg/pot (3-4 oz/pot)	50 ppm (24.2 oz A-Rest/gallon)
Sumagic	* 2-5 ppm (1 minute)	-	* 2-5 ppm
Bonzi	100-200 ppm (5 minutes)	-	-

* recommended

also required to eliminate root rot. Therefore, we recommend that bulbs are dipped in a Banrot dip (8-oz Banrot/100 gallons) immediately prior to planting for 10-20 seconds. Potted bulbs should then be drenched with fungicides for control of both root rot organisms every 4 weeks.

Grey mold, *Botrytis cinerea*, can occur on flowers and/or foliage if tissue remains moist for extended periods of time and/or if air circulation through the crop is poor. In general, Oriental lilies do not have problems with *Botrytis* except during the shipping period

Leaf Tip Burn/Leaf Scorch

Oriental lily hybrids can develop leaf tip burn. Leaf tip burn is associated with a collapse in the palisade parenchyma cells approximately 1" from the tip of the leaf. The problem is generally is progressively more pronounced from the top to the bottom of the plant. Leaf tip burn is most problematic from the visible bud stage until flowering when the nutritional demand of the plant is probably greatly elevated.

Leaf tip burn is associated with calcium deficiency or excessive fluoride. In-

"Most Oriental hybrid lilies require a growth retardant application to limit stem elongation."

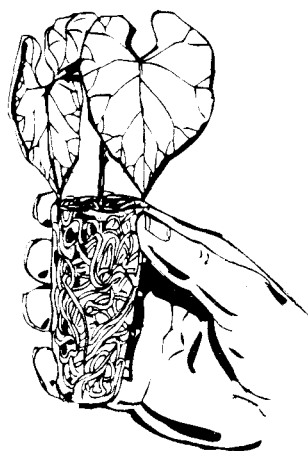
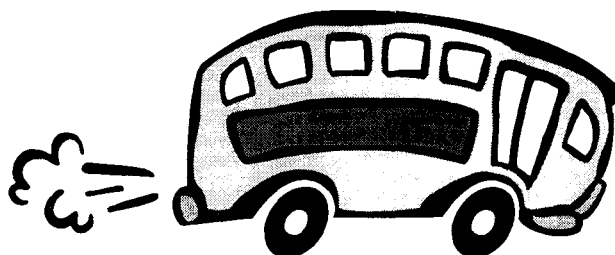
" Remember that lilies should be drenched with a fungicide for Pythium and Rhizoctonia 2-4 weeks prior to shipping/sale."

crease calcium uptake by during development by 1) reducing humidity, 2) using fertilizers that contain calcium and little ammonium, 3) encouraging stem root development, i.e. make sure you plant bulbs deep enough, and 4) allow for air circulation to increase transpiration. Alternatively spray calcium nitrate on plants (400 ppm solution) as with poinsettias (3.5 grams/5 gallons water). Also, do not use materials/water that contain fluoride.

plants in the cooler can result in lower leaf loss after plants are removed. To alleviate this problem, light plants in the cooler with fluorescent lighting (approx. 10 footcandles) and/or spray plants to runoff with Promalin (100 ppm) 4-6 hours before moving plants into the cooler. Cooler temperatures should range from 38-40°F.

Postharvest

Oriental lilies to not store as well in a cooler as Easter lilies. Placing



DATES TO REMEMBER!

April 13, 1999 - Minnesota Commercial Flower Growers Meeting at Lynde Greenhouses, Maple Grove, Minnesota. The speaker will be the new Floriculture Teacher and Breeder/Geneticist —Dr. Neil Anderson who will speak on “Future Directions in Flower Breeding in North America.”

August 10, 1999 - University of Minnesota Floriculture Day. A series of classes on commercial floriculture production, experiment updates, new plants. See plans for the new greenhouses. Visit laboratories, trial gardens and have a picnic!

September 22-25, 1999 - Bedding Plants Inc. Convention, Minnesota Commercial flower Growers Association Short Course and Pesticide Recertification.