



Production of Asiatic and Oriental Lilies as Cut Flowers

Fact Sheet 687

Russell Balge
Extension regional commercial horticulture specialist
Western Maryland Research and Education Center

Stanton Gill
Extension regional nursery and greenhouse specialist
Central Maryland Research and Education Center

Wanda MacLachlan
Extension area commercial horticulture agent
Montgomery County Office

Ethel Dutky
Extension plant pathologist
Department of Plant Biology
University of Maryland at College Park

Suzanne Klick
Extension commercial horticulture technician
Central Maryland Research and Education Center

Introduction

Asiatic and Oriental lilies are grown extensively outdoors for cut-flower production in the United States and Canada. All bulbs used for cut-flower production are grown in The Netherlands, New Zealand, or the Northwestern United States.

Lily bulbs have a solid basal plate that produces roots from its bottom and a concentric series of tight-to-loose, fleshy, overlapping scales of varying width from its top. Mature bulbs are 4 to 9 inches in circumference.

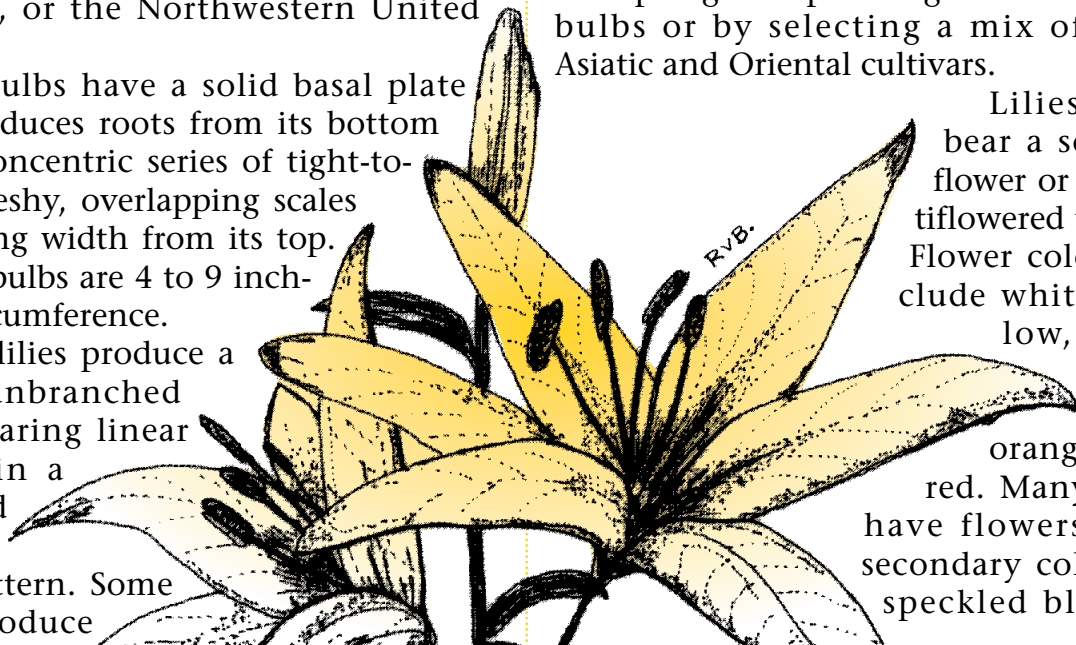
Most lilies produce a single unbranched stem bearing linear leaves in a whorled or random pattern. Some lilies produce

roots along the stem from the top of the bulb to slightly above the soil surface. These roots assist in supporting the plant and absorbing water and nutrients.

Lilies bloom naturally from May to September in zones 9 to 4. Blooming time may be manipulated by staggering the springtime planting of cold-stored bulbs or by selecting a mix of both Asiatic and Oriental cultivars.

Lilies may bear a solitary flower or a multiflowered umbel. Flower colors include white, yellow, pink,

orange, and red. Many lilies have flowers with secondary colors or speckled blooms.



The flowers may be borne erect, horizontal, or drooping, and can be funnel-shaped to bell-shaped.

Lily flowers can be stored for 4 to 6 weeks after harvesting and have a vase life of 7 to 14 days if harvested at the right stage and given the proper treatment.

Classification

Cultivated lilies are classified into eight divisions based upon the number of blooms per stem and the shape and posture, or presentation, of the individual flowers. A ninth division is reserved for species lilies. Only two divisions, Division I, Asiatic cultivars, and Division VII, Oriental cultivars, are grown commercially as cut flowers.

Asiatic Cultivars

Asiatic lilies (Division I) are 12 to 60 inches tall with deep blood-red, orange, rose, peach, bright-yellow, cream, or white flowers. Individual blooms are 6 to 8 inches in diameter and are frequently streaked with purple or another color. Division I is separated into three subdivisions:

IA—Flowers borne facing upright, singly or in umbels, in June.

IB—Flowers borne facing outwards in June. Many cultivars spotted with purple.

IC—Flowers borne pendant on long pedicel in early July. Blooms often resemble Turks-cap lilies.

Oriental Cultivars

Oriental lilies (Division VII) are vigorous growers, 24 to 72 inches tall, that bloom July through August, which is later in the season than Asiatic lilies. They prefer an organically rich, slightly acid soil and do best in sunny maritime climates. The 4-to-12-inch-diameter blooms are primarily pure white, crimson, white blotched with red, and pink. Division VII consists of cultivars from a wide range of species and hybrid groups and is arranged into four subdivisions:

VIIA—Trumpet-shaped flowers.

VIIIB—Bowl-shaped flowers on 35- to 48-inch, often stem-rooting plants.

VIIIC—Recurved flowers on 35- to 48-inch stem-rooting plants.

VIIID—Floral umbel contains 12 to 30, fragrant, 8-to-12-inch-diameter flowers with recurved petals but a flat face.

Outstanding Cultivars

There are hundreds of Asiatic and Oriental lily cultivars available from bulb catalogs. Maryland growers recommend the following cultivars for field production:

Asiatic Cultivars

White Asiatic

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Alaska				
white				
few spots	G*	6+	28 inches	facing upward
Lucyda				
white	G	5+	28 inches	facing upward
Marbelle				
cream/pink center	E**	5+	34 inches	facing upward

Asiatic Cultivars (continued)

White Asiatic (continued)

Pulsar white	E	6+	28 inches	facing upward
Sancerre pure white	E	5+	28 inches	facing upward
Ventoux white/pink	E	5+	32 inches	facing upward

Red Asiatic

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Avignon red/orange	G	5+	36 inches	facing upward
Grand Paradiso red	G	5+	36 inches	facing upward
Monte Negro dark red	E	6+	34 inches	facing upward
Nerone deep red	E	6+	32 inches	facing upward

Pink Asiatic

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Azurra pink	G	5+	28 inches	facing upward
Chianti pink	E	6+	32 inches	facing upward
Cote D'Azur pink	G	6+	28 inches	facing upward
Geneve white with pink	E	5+	32 inches	facing upward
La Toya purple/ fragrant	G	6+	34 inches	facing upward
Minstreel light pink	E	6+	34 inches	facing upward
Monte Rosa pink	G	5+	34 inches	facing upward
Montreux mauve	E	5+	32 inches	facing upward
Rembrandt pink/white	E	8+	34 inches	facing upward
Renee pink	E	7+	32 inches	facing upward
Sorbet white/pink	G	6+	30 inches	facing upward
Tiarena pink	G	6+	36 inches	facing upward
Toscana pink	G	6+	32 inches	facing upward
Vivaldi pink	E	5+	32 inches	facing upward

Asiatic Cultivars (continued)

Orange Asiatic

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Apledoorn orange	G	8+	30 inches	facing upward
Bangalope salmon	E	6+	36 inches	facing upward
Elite orange	E	6+	38 inches	facing upward
Loreto orange/red	E	6+	34 inches	facing upward
Menton salmon	E	4+	32 inches	facing upward
Prato orange	E	5+	32 inches	facing upward

Yellow Asiatic

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Adelina yellow	G	5+	34 inches	facing upward
Grand Cru yellow/brown	G	5+	34 inches	facing upward
London yellow	E	5+	34 inches	facing upward
Mona yellow	E	6+	34 inches	facing upward
Nove Cento yellow	E	5+	32 inches	facing upward
Parma lemon yellow	G	5+	38 inches	facing upward
Polyanna yellow	G	5+	38 inches	facing upward

Oriental Cultivars

Red Orientals

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Stargazer red/white	G	6-8+	28 inches	facing upward

Pink Orientals

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Acapulco mauve	E	4-6+	40 inches	facing upward
Alena pink	G	5+	38 inches	facing outward
Berlin pink/red	E	4-6+	40 inches	facing upward
Le Reve soft pink	G	6+	32 inches	facing upward

Oriental Cultivars (continued)

Pink Orientals (continued)

Marco Polo				
soft pink	E	4+	38 inches	facing upward
Nigata				
dark pink	E	6+	42 inches	facing upward
Pesaro				
pink	E	4-6+	36 inches	facing upward

White Orientals

Cultivar	Rating	Bud Count Per Stem	Height	Flower Position
Casa Blanca				
pure white	G	6+	44 inches	facing outward
Montreal				
white/yellow band	E	5+	40 inches	facing upward

*Good

**Excellent



Propagation

Lilies are propagated by a variety of vegetative means and by seed. Most growers buy fully mature bulbs from suppliers. A few growers may propagate lilies by vegetative means, while hybridizers necessarily propagate lilies from seed.

Vegetative Propagation

Vegetative propagation usually produces mature bulbs more rapidly than seed propagation, but it is a slow means of multiplying lilies. It maintains the genetic integrity of the parent, but allows viral diseases to be easily carried over to the offspring. Vegetative propagation includes simple division, or bulb splitting, usually done in the fall; stem bulblets, small bulbs borne on the underground portion of the stem; bulbils, small bulbs borne in the leaf axils; stem cuttings; and bulb scales.

Seed Propagation

Seed propagation takes longer than vegetative propagation to produce a mature bulb. It is a way of obtaining large numbers of lilies from one plant, and it reflects upon but does not duplicate the parent, unless the cultivar comes true from seed. Seed propagation does not transmit viral diseases to the offspring.

Culture

Site Selection

Select a site that receives a minimum of 6 to 8 hours of sun daily. Morning sun is best because it allows the flowers and foliage to dry off by evening, which decreases the chance of *Botrytis*.

Soil

Choose an organically rich sandy soil that is at least 16 to 18 inches deep.

Work in large amounts of well-rotted organic matter. A pH of 6.5 to 7.0 is desirable, especially with Oriental lilies. Grow lilies on a foot-wide raised bed to guarantee good drainage.

Bulb Handling and Care

Lily bulbs are usually dug from August to September. American-grown bulbs for outdoor culture are available in the fall; Dutch-grown bulbs are available in the spring. Cryogenically stored bulbs are available throughout the year for greenhouse forcing.

Lily bulbs have no protective covering and must be handled carefully at all times to avoid injury or drying out. Order the bulbs as soon as they are available, and plant them no later than 10 days after receipt, unless they are to be cryogenically stored.

The shelf life of unplanted lily bulbs at ambient air temperatures is 2 months in the fall, but only 2 weeks in the spring once the bulbs are unpacked. Lily bulbs may be stored up to 18 months at 32 to 35 °F if they are not allowed to dry out. If the shoots of unplanted lilies have grown beyond 2 inches, the bulbs are worthless.

The growing strategy for lilies planted for cut flowers is quite different from that for lilies grown as garden ornamentals or potted plants.

Growing Strategy

Year one. Plant lily bulbs in the fall, upon receipt, for bloom at the normal time. Produce a series of Asiatic lilies by including June-blooming IA and IB with the July-blooming IC-division lilies. Add Oriental lilies for fall bloom.

As an alternative, purchase lily bulbs in the fall and cold store them over winter for planting at 2-week intervals in the spring, until four crops have been planted. Precool fall-purchased Asiatic lilies for at least 6 weeks and Oriental lilies for at

least 8 weeks at 40 °F before planting the first crop, or purchase professionally precooled bulbs in spring for planting at that time and every 2 weeks until four crops have been planted.

Year two. Plant new bulbs in the fall and a new series of precooled bulbs in the spring. Let year-old bulbs rest, and remove any flowers that form.

Year three. Let 2-year-old bulbs bloom at their normal time. Plant a new series of precooled bulbs in the spring. Let bulbs purchased the second year rest and remove any blooms that form. Dig the bulbs that are in their third season as soon as they are done blooming. Save the largest bulbs, and replant them immediately for bloom at the normal time, or precool them for a staggered planting in the spring to complement newly purchased precooled bulbs. Discard small bulbs or grow them on in a nursery.

Subsequent years. Repeat the third-year process. Note that the following will occur during years following the third: Some bulbs will be resting during their second year of growth; some bulbs will be repeating bloom during their third season of growth; some bulbs will be purchased and planted in the fall for a normal bloom time, while some bulbs will be purchased precooled by the grower or supplier and planted in the spring over a staggered time to space out the blooming.

The oldest bulbs should be lifted and replanted or discarded annually, while the smallest bulbs should be discarded or grown on in a nursery. It is sometimes easier, albeit more expensive, to plant new bulbs each year.

Depth and Spacing

Plant bulbs so that the top of the soil is 6 inches above the top of the bulb nose. Space the bulbs 2 to 3 inches apart within rows. Plant two rows, 6 inches apart, on a foot-wide raised bed. This will pro-

vide a density of 6 to 8 bulbs per foot of row. Space the rows 24 to 48 inches apart, depending upon the limitations of the equipment used for cultivation, spraying, and other maintenance and harvesting practices.

Fertilization

Fertilize newly planted lily bulbs with 2 to 3 pounds of 10-20-10 fertilizer per 100 feet of row, as a side dressing, as the shoots emerge. Fertilize established bulbs at the same rate in the spring as shoots emerge. Sometimes lilies are fertilized a second time, at the same rate, right after flowering.

Staking

Lilies grow to a height of 24 to 72 inches. Stake or net lilies when they become 24 inches tall. Use a figure-8 tie to decrease stem breakage. Tie or net lilies at 24-inch intervals.

Watering

Water lilies frequently enough to keep the soil moist but not wet. Use ooze, soaker, or trickle irrigation to avoid wetting the foliage, thereby reducing the chance of disease.

Harvesting

Whether they are to be used fresh or stored (wet or dry) for in-house use or wholesale or retail distribution, harvest lilies when the first, lowermost bud shows full color but has not yet opened. If lilies are harvested at an earlier stage, buds may take longer to open, may not open completely, or may be misshapen. Remove the anthers on open blooms to prevent pollen from soiling the flower or any surfaces on which it might fall. Handle lily blooms carefully at all times; the flowers bruise easily.

Handling and Storage

Fresh Use

Store freshly harvested lilies in water for as short a time as possible at 35 to 41 °F. Freshly harvested lilies have a vase life of 5 to 9 days, depending upon the cultivar and the environment.

The vase life of freshly harvested lilies can be extended to 7 to 14 days if they are pulsed and then placed in a solution containing a floral preservative. Pulsing consists of placing the lower stem ends of cut flowers in a concentrated solution of sucrose and germicides. Silver thiosulphate (STS) inhibits the activity of ethylene in flowers, retarding the rate at which they senesce. It should be added to the pulsing solution of Asiatic lilies. Oriental lilies do not respond to STS, and it does not need to be added to their pulsing solution.

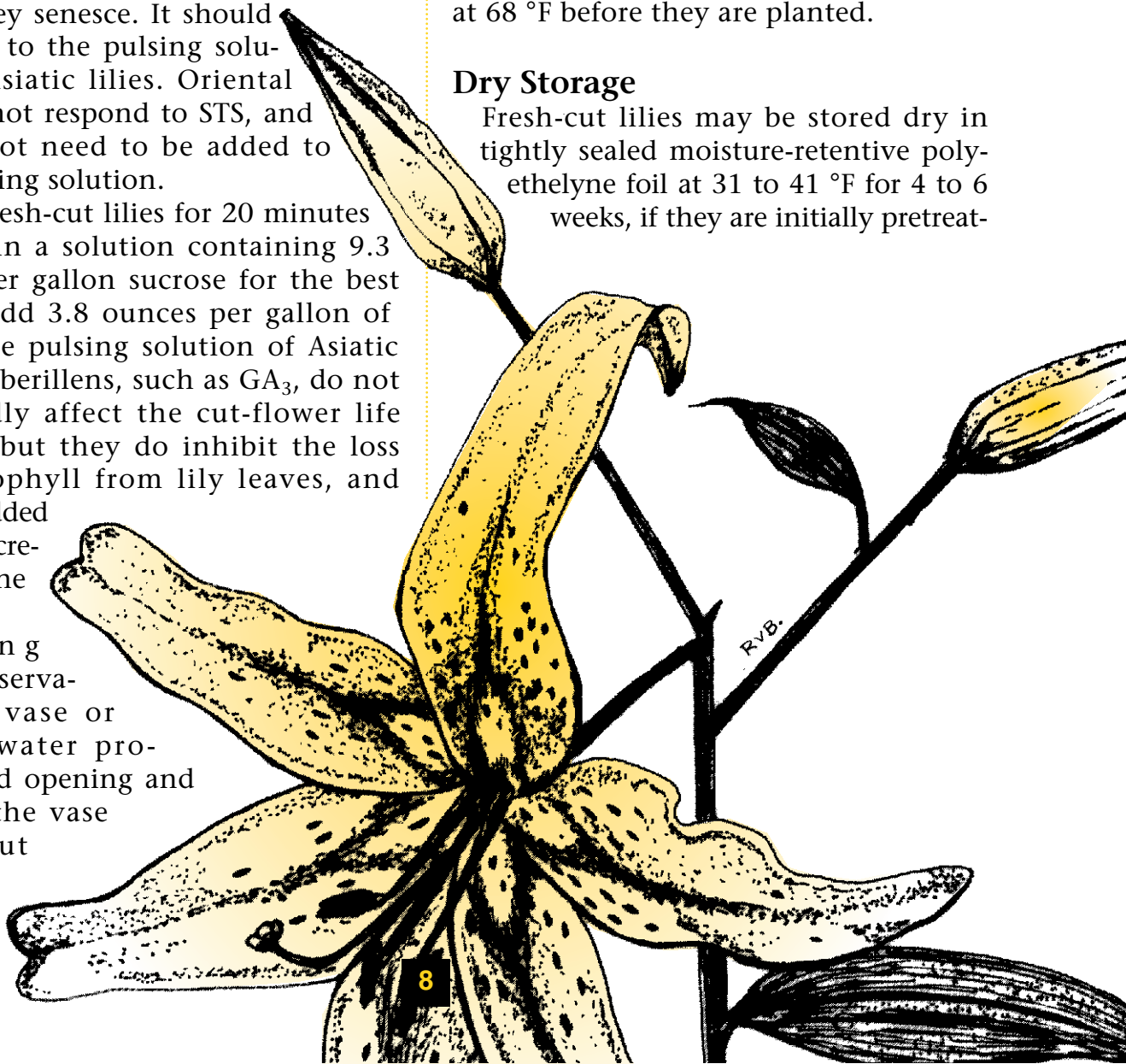
Pulse fresh-cut lilies for 20 minutes at 68 °F in a solution containing 9.3 ounces per gallon sucrose for the best results. Add 3.8 ounces per gallon of STS to the pulsing solution of Asiatic lilies. Gibberellins, such as GA₃, do not profoundly affect the cut-flower life of lilies, but they do inhibit the loss of chlorophyll from lily leaves, and may be added at the discretion of the grower.

Adding floral preservatives to vase or storage water promotes bud opening and extends the vase life of cut lilies. Use

floral preservatives for fresh arrangements, storage in water prior to shipping, or upon receipt and pulsing at the retail level. Possible floral preservatives include Chrysal Select™, Chrysal Universal™, Crystal Clear™, Floralife™, Floralife Special Blend Pure™ (for high-quality water), Floralife Special Blend Hard™ (for hard water), Oasis® Floral Preservative, Prolong™, and Rogard RST™. Silflor® and Silgard RST™ are ethylene inhibitors that may be used for Asiatic lilies. Silgard™ is designed specifically for mixing with Rogard™. Chrysal LVB™ is a STS product designed for use with lilies. The vase life of lilies is extended if the bulbs are soaked in a 2-millimolar STS solution for 24 hours at 68 °F before they are planted.

Dry Storage

Fresh-cut lilies may be stored dry in tightly sealed moisture-retentive polyethylene foil at 31 to 41 °F for 4 to 6 weeks, if they are initially pretreat-



ed with a pulsing solution. Pulse the lilies for 24 hours at 68 °F in a solution containing 4 ounces per gallon STS plus 9.3 ounces per gallon sucrose and .04 ounces per gallon GA₃.

Remove the bottom one-third of the foliage, grade the stems by size, and bunch the lilies into the desired quantities before wrapping them in foil bags for dry storage. Cool the pulsed, foil-wrapped lilies to 31 to 41 °F as rapidly as possible. Prolonged dry storage may cause yellow or brown foliage and curled, brown, petal tips that appear when the flower opens.

Wet Storage

Pulse the lilies as previously described under Dry Storage, and store them loose in deionized, pH-3.5 water, at 32 to 34 °F. Lilies may be stored for up to 4 weeks in this manner. *Botrytis* may become a problem during wet or dry storage.

Shipping

Remove the bottom one-third of the foliage; grade the stems by size; bunch the lilies into desired quantities; sleeve them for shipping; and let them partially wilt. Partially wilted lilies will experience less mechanical damage to flowers and can be packed more densely than unwilted ones. Asiatic lilies are sensitive to ethylene; keep them away from ripening fruit, maturing foliage and flowers, or any other ethylene source.

Retail Treatment

Strip the lower one-third of the foliage from lily stems if it has not already been done. Recut the stem ends and rehydrate the lilies in warm water adjusted to a pH of 3.5 as soon as they are received. Remove the anthers from any open blooms.

Pulse the lilies during rehydration for 20 minutes with a 4-millimolar STS solution or for 2 hours with a 1-millimolar STS

solution at 68 °F. As an alternative, pulse the lilies overnight for 18 hours in a 1-millimolar STS solution at 35 to 40 °F. Add sugar to the STS solution to extend vase life.

Transfer the lilies to a solution containing a commercial floral preservative, or use 200 parts per million 8-hydroxyquinoline citrate plus 3 percent sucrose solution as a holding solution. Follow pulsing with STS and sucrose with a 24-hour pulse of 2,000 parts per million GA₃, or use 50 parts per million GA₃ in the vase water. Pulse fresh lilies with a 1.6 millimolar STS and 10 percent sucrose solution for 24 hours before wrapping them in tightly sealed moisture-retentive polyethylene film to reduce water loss. Lilies may be stored up to 4 weeks in this manner.

Pests

Aphids

Aphids can rapidly become a major pest on lilies if left unchecked. Because aphids feed on the plant fluids within the phloem of leaves and green stems, they represent a competing nutrient sink. Heavy populations may measurably reduce plant vigor. Aphids spread many plant viruses. They excrete large quantities of sugar-rich honey dew on which sooty mold fungus may grow.

Before any attempt is made to control aphids, it is necessary to identify the species. Submit samples of aphids to the local Cooperative Extension Service (CES) office for identification. After the species is identified, familiarize yourself with its biology on a particular lily crop. Note whether it prefers particular species or cultivars of lilies, if it feeds selectively on certain parts of the plant, and how rapidly it reproduces.

If you grow lilies in greenhouses, check plants before moving them indoors to make sure they are free of aphid populations. Control weeds under the greenhouse bench and outdoors, adjacent to

the greenhouse, to prevent aphid populations from developing. Aphids can be prevented from migrating into the greenhouse by covering screen vents and doors with a 300-holes-per-inch mesh screening.

Thrips

Thrips scar lily foliage and flowers as they feed on the underlying cells by piercing them with their mouthparts and sucking out the contents. This feeding can cause deformation of flowers, leaves, and shoots. As leaves that have been fed on expand, they often exhibit silvery streaking and flecking. Thrips often deposit tiny greenish-black fecal specks on leaves as they feed.

Early detection of a thrips infestation is critical to controlling it. Thrips can be detected by placing white or yellow pieces of paper beneath flowering plants and gently tapping the contents of open blooms onto them. Use a X 10 magnifier to examine the insects that fall out. Thrips will appear as small, slender-bodied insects with feathery wings.

Yellow or blue sticky cards are the easiest way to detect the onset of a thrips infestation in a greenhouse. Place cards just above the crop canopy, approximately one card per 500 square feet of bench space, as well as near doors, vents, and thrips-sensitive cultivars, to monitor the movement of the pest.

Thrips are resistant to some insecticides that were once used for control. Resistance to certain organophosphate, carbamate, and synthetic pyrethroid insecticides has been documented in populations of western flower thrips. Several insecticide applications should be made at 5-day intervals to significantly reduce thrips infestations. Check with the CES for current recommendations.

Slugs and Snails

Slugs and snails disfigure lily foliage

and flowers but can be controlled with poison bait.

Diseases

The major diseases of lilies in the mid-Atlantic region are *Botrytis*, viruses, nematodes, root rots, and southern blight.

Botrytis

Three species of *Botrytis*, *B. elliptica*, *B. cinerea*, and *B. liliorum*, attack lilies; the symptoms of infection are similar. The first symptoms are pale tan spots on leaves, stems, or petals. The spots enlarge rapidly, producing general browning and collapse of tissues. In very humid weather or the early morning, a gray velvety or fuzzy mold may be seen on blighted plant parts. Because *Botrytis* is resistant to most of the fungicides that formerly controlled it, the grower must use cultural methods to reduce the risk of infection. Keep lily foliage as dry as possible: Avoid overhead watering, and plant in a site with good air circulation so foliage dries rapidly after dew or rain. The copper fungicide Phyton 27® may be applied as a foliar spray to help prevent *Botrytis* during periods of misty or rainy weather. Blighted plant parts should be promptly removed from the field or greenhouse.

Viruses

Several aphid-transmitted viruses can damage lilies. Many lily cultivars have been selected with resistance to some of these viruses. Symptoms of viral infection include foliar mosaic (bright- to faint-yellow mottling and streaking), rings (dark or yellow), abnormal flower size, color-breaking, stunting of random plants, and distorted leaves. Cucumber mosaic virus is common in the mid-Atlantic region and can be brought into lily plantings by several aphid species. Rogue out symptomatic lilies promptly. Cucumber mosaic

remains from year to year in perennial weeds, so good weed control will help reduce virus transmission.

Nematodes

Lilies are susceptible to several different nematodes. Nematode damage to the roots may cause plants to be off-color and stunted. Root-knot nematodes, *Meloidogyne* spp., can invade lily roots and produce root galls (swellings). Lesion nematodes, *Pratylenchus* spp., also attack lilies, resulting in stunted, browned roots. Once plants are infected with plant-parasitic nematodes, there is no effective therapy; it is essential to test soil and, if necessary, treat it prior to planting. Late summer is the best time to test soil for nematodes because nematode populations are usually at their highest levels toward the end of the growing season. Solarization, chemical nematicides (vapam, oxamyl granules, methyl bromide), or crop rotations can be used to bring soil nematode populations below damaging levels.

The foliar nematode, *Aphelenchoides fragariae*, feeds on lily growing points early in the season, which causes symptoms of bunchy top and other distortions. After feeding on growing points, the nematodes move inside the leaves to feed on mesophyll cells. They remain there for most of the growing season. This internal feeding causes leaf discoloration and blight; damaged areas appear as distinct stripes, delineated by the major (parallel) leaf veins. Foliar nematodes remain in the plant throughout their life cycle, so symptomatic plant parts must be examined by a diagnostic laboratory to identify an infestation. Foliar nematodes may not show up on soil tests. Infected bulbs cannot be cured and should be destroyed. If lilies are to be grown for several seasons, they should

not be planted near plants known to be infected with foliar nematodes.

Root and Bulb Rots

Several fungi (*Pythium*, *Phytophthora*, *Fusarium*, *Rhizoctonia*, and *Sclerotium rolfsii*) cause root and bulb rots in lilies. *Pythium* and *Phytophthora* are favored by wet, poorly draining soil. Hot weather and warm, moist soil promote *Fusarium*, *Rhizoctonia*, and *S. rolfsii* (southern blight). Prevention of these diseases relies on starting with healthy bulbs, planting them in a very well drained soil, and using mulch to help keep soil from heating up in hot weather. Composted bark soil amendments improve soil drainage and water-holding capacity, and provide some natural control of root rots due to the beneficial bacteria and fungi that are part of the bark decomposition process.

The southern blight fungus, *S. rolfsii*, produces white mycelium and small, tan, mustard-seed-sized sclerotia on blighted plant parts and adjacent soil. If you see these sclerotia on rotting bulbs (only during very hot weather), promptly remove infected bulbs and adjacent mulch. The bed should be solarized before replanting with lilies. During hot summer weather, soak the infested bed with water, then cover it with clear plastic. Leave the plastic on for 3 to 4 weeks. Check with a thermometer to be sure temperatures of 120 to 140 °F are maintained.

Weeds

Weeds may be controlled by a combination of shallow cultivation, mulching, preemergent herbicides, and the use of glyphosphate (Roundup®) after the lily foliage has died back. For the most recent weed-control recommendations, contact your local CES agent.

References

Armitage, A. M. 1993. *Specialty Cut Flowers: The Production of Annuals, Perennials, Bulbs, and Woody Plants for Fresh and Dried Cut Flowers*. Portland, OR: Variety Press, Inc./Timber Press.

Armitage, A. M. 1989. *Herbaceous Perennial Plants: A Treatise on Their Identification, Culture, and Garden Attributes*. Athens, GA: Varsity Press, Inc.

Balge, R. J. 1994. *Cut Flower Production From Bulbs: Cut Flower Management Short Course Handbook*. Edited by S. Gill. Central Maryland Research and Education Center. Ellicott City, MD: Maryland Cooperative Extension Service.

Bryan, J. E. 1989. *Bulbs*. Portland, OR: Timber Press.

De Hertogh, A. 1989. *Holland Bulb Forcer's Guide*. Hillegom, The Netherlands: The International Flower-Bulb Center.

Everett, T. H. 1981. *The New York Botanical Garden Encyclopedia of Horticulture*. New York: Garland Publishing Co.

Genders, R. 1973. *Bulbs, A Complete Book*. London: Robert Hale & Co.

Hartman, H. T., D. E. Kester, and F. T. Davies, Jr. 1990. *Plant Propagation: Principles and Practices*. Englewood Cliffs, NJ: Prentice Hall.

Halvey, A., ed. *The Handbook of Flowering*. Boca Raton, FL. CRC Press.

Jelitto L. and W. Schacht. 1985. *Hardy Herbaceous Perennials*. Portland, OR: Timber Press.

Nowak, J. and R. M. Rudnicki. 1990. *Postharvest Handling and Storage of Cut Flowers, Florist Greens, and Potted Plants*. Portland, OR: Timber Press.

Ress, A. R. 1992. *Ornamental Bulbs, Corms, and Tubers*. Wallingford, England: C.A.B. International.

Scallis, J. N. 1993. *Cut Flowers: Prolonging Freshness*. Batavia, IL: Ball Publishing.

Vaughn, M. J. 1988. *The Complete Book of Cut Flower Care*. Portland, OR: Timber Press.

*Disclaimer

Use of brand names in this fact sheet does not express or imply an endorsement by the University of Maryland at College Park College of Agriculture and Natural Resources or the Maryland Cooperative Extension Service.

Artwork by:

Ray Bosmans, Regional Specialist
CES Home & Garden Information Center

Reviewed by:

Dr. Doug Bailey, North Carolina State University
Dr. John Dole, Oklahoma State University
Dr. Will Healy, Ball Seed Company