

percent perlite and 10 percent peat. Response seems good with rooting apparent as well as good callus throughout. One comment: with *Magnolia grandiflora*, good callus does not necessarily mean that rooting will occur. In any event, cutting production of *Magnolia grandiflora* is far superior to seedling propagation. Overall growth will far exceed in both rate and habit if good selections are propagated.

In conclusion, I stress the importance of timing, heavy mist, moderate hormonal levels, wounding, and excellent medium drainage to compensate for increased mist and tender wood.

## **IDENTIFICATION AND PROPAGATION OF VARIOUS LIRIOPEs AND OPHIOPOGONS**

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### **IDENTIFICATION**

The justification for this discussion is that liriopes and ophiopogons are used in huge numbers, that they are so easy to grow, that few people know the fine points of production, that there are cultivars of great merit which are virtually unknown. Evergreen Nursery has specialized in groundcover production, mainly ivy and liriopes, since the 1960s. At present we produce 24 cultivars of liriopes and ophiopogons.

What are the differences between liriopes and ophiopogons? The most useful point of identification is that the ophiopogon flowers hang down on their scape, while liriopel flowers are held erect. Ophiopogons are slightly less hardy, are usually strongly rhizomatous, always bear the flowers down in the foliage and have a flower with a subinferior ovary. Liriopel flowers bear a superior ovary. Cultural practices discussed apply equally to liriopes and ophiopogons unless otherwise indicated.

Differentiation between species and cultivars begins at the root system. There are caespitose, or clump-forming types, and rhizomatous types.

The rhizomatous species are the most common and include *Liriope muscari*, *Liriope spicata*, and *Ophiopogon japonicus*. Of these *Liriope muscari* is the slowest spreader and the prettiest in flower. Leaves are up to 1/2-in. wide and 12 to 15 in. long on established plants. The flowers are held about the same height as the foliage and are a lavender-blue.

I know of two *L. muscari* cultivars that are rhizomatous. 'Tidwell's Big Blue,' compared to the species, is a larger plant, usually darker in color with larger fruit, which are usually abundant. This is a vigorous grower that originated at Tidwell's Nursery in Greenville, Georgia. 'Samantha' originated at Doug Young Nursery in Forest Hill, Louisiana. It's a vigorous grower with dark green foliage and a nearly-pink flower color. It is our earliest-flowering cultivar.

The species *Liriope spicata* has leaves usually under 1/2-in. wide and 6 to 18 in. long. Compared to *L. muscari*, the leaves are more slender and pointed. Flower display is poor. The color is very pale, and the scapes are no taller than the foliage. *L. spicata* is a vigorous spreader and in time will make a thick, even turf. It is a poor choice for a border but it's a great groundcover and soil-retainer.

I believe 'Silver Dragon' to be a *L. spicata* cultivar. Its flowers are held erect like other liriope. It is slightly smaller and slower-growing than the species; it tends to revert to a solid green leaf sometimes and it has fruit variegated like the foliage.

What is sold for *L. muscari* and *L. spicata* is actually a conglomeration of species, hybrids, mutants, and variants. This is especially true for *L. muscari*. *Liriope muscari*, *L. exiliflora*, *L. graminifolia*, *L. intermedius*, *L. spicata*, *Ophiopogon jaburan*, and *O. japonicus* and others that have grown in the southeast U.S. for at least 150 years. Liriope and ophiopogons are very fertile and hybridize and mutate freely. Therefore, it is not surprising to find variability within what is acceptable as a species.

A third rhizomatous species, *Ophiopogon japonicus*, is known by its Japanese name, mondo. This is a vigorous spreader and makes a thick, even mat. The flowers and jewel-like blue fruit are, unfortunately, hidden down in the foliage. The leaves are about 1/4-in. wide or less and 4 to 10 in. in length. Here again, we have a good groundcover and a high-maintenance border.

There is a dwarf form that grows to about 2 in. It is slow to spread, so it is most effective in confined spaces. Dwarf mondo could be used as a grass substitute where there is little foot traffic.

We have a variegated cultivar, 'Kigimafukibuma,' which is slightly smaller and slower than the species.

Another ophiopogon species, *O. planiscapens*, is known by its cultivar, 'Nigrescens.' Black mondo is truly unique in appearance but grows with slug-like speed.

"Aztec grass" is a representative of another ophiopogon species. It is very popular in Florida but it isn't cold-hardy in northern Georgia.

The following caespitose or clumping forms of liriope are all assumed to be *muscari* cultivars. They are distinguished by their root systems and their superior flowering and foliage characteristics. *Liriope spicata* is often called "creeping liriope" because it

is so rhizomatous. *Liriope muscari*, to distinguish it from *L. spicata*, is often called "big blue liriope" because its flowers are bigger and bluer. This terminology creates endless confusion with muscari and its cultivar 'Big Blue', an improved type.

I say "improved type" because I know that what is offered in the trade as 'Big Blue' is not clonal stock. Non-rhizomatous seedlings of muscari with superior foliage and flower characteristics are not at all uncommon, and this seedling stock has thoroughly permeated the trade.

To deserve a higher price tag, what is sold for 'Big Blue' should be a caespitose green liriope with foliage larger and darker green than the species. The inflorescence should be displayed well above the foliage and should have flowers bluer and more numerous than muscari. Usually the inflorescence tapers to the apex. 'Majestic', 'Royal Purple', 'Lilac Beauty', 'Monroe's White' and 'Christmas Tree' have vegetative characteristics similar to 'Big Blue.' The main difference between these cultivars is in their inflorescences.

An inflorescence that seems abnormally flattened and seems to be several units fused together is said to be fasciated. Fasciation creates a cockscomb effect, as contrasted with forking, where the scape actually branches. Any muscari liriope can exhibit forked and/or fasciated inflorescences.

'Majestic' is an old cultivar that has a strong tendency to fasciate. Its scape and flowers are violet and the inflorescence is blunt or fasciated.

'Lilac Beauty' is a standout because of its lilac-purple flowers held high on scapes coming straight up from the center of the plant like a bouquet. 'Purple Bouquet' is reputedly very similar. Riegel Plant Company, Griffin, Georgia, claimed both these originations. For us 'Lilac Beauty' is the latest to flower.

'Royal Purple' comes from South Carolina. It has richly-colored flowers and a superior appearance even when not in flower.

Two good cultivars originated at Monroe Landscape Company in the 1930s and were introduced in the 1950s. 'Monroe's No. 1' or 'Monroe's White' bleaches easily in the sun. Its white flowers make a beautiful show in the shade. 'Monroe's No. 2', or 'Christmas Tree', is distinctive for its light violet, almost pink flowers in a conical shape.

Four cultivars not notable for their flowers but for their distinctive foliage and habit are 'Webster's Wideleaf', 'Densiflora', 'Evergreen Giant' and 'Green Midget'. 'Webster's Wideleaf' has the largest leaves of any liriope. It is not fast to increase. 'Densiflora' has long, slender leaves held more upright than in other cultivars. It makes a great tall, tight border or foliage accent. 'Green Midget', another Riegel introduction, is the smallest liriope. It makes a good low border or facer plant. 'Evergreen Giant' is at the other extreme in size. It grows 2 ft or more in height and has thick leathery, dark-

green leaves. 'Evergreen Giant' has been extremely popular in warmer parts of the country, but in Athens, Georgia, it isn't reliably cold-hardy.

*Liriope muscari* 'Variegata' grows to about the same proportions as the species but is slower. The flower display is better and the color is a bright purplish-lavender.

White-flowering variegated liriope originated at Southern States Nursery in Florida. For us, it is slower than common variegated and not as floriferous. The flower display is not as good because of the background foliage.

There is much confusion about 'Silvery Sunproof'. Buyers frequently receive 'Variegata' when they order 'Sunproof.' The two distinguishing characteristics of 'Silvery Sunproof' are its striated leaves and ascending habit. When mass planted, it does have silvery appearance. It is less floriferous than most cultivars.

Mr. Riegel originated three good variegated cultivars. 'John Burch' has the largest inflorescence of any liriope and broad leaves of dark green with golden-yellow variegation. The variegation is usually marginal.

Marginal variegation and an arching growth habit are hallmarks of 'Gold-Banded'. It has lavender flower spikes. The variegation may nearly disappear in sun or heavy shade.

The most distinctive features of 'Silvery Midget' are its small size and random golden variegation. The gold color whitens in dormancy like other variegated liriope. The lavender flowers are held nicely above the compact plant. It's a slower grower.

Liriope identification can be next to impossible when the plants are not in flower. The size, appearance, and "feel" of the plant varies with age and growing conditions. This situation is further complicated by the extreme likelihood of encountering seedlings or misnamed plants along the way. But even with these difficulties, I feel it is worthwhile to learn these plants because their use can only refine our landscape designs.

## PRODUCTION

Liriope and ophiopogon propagation and culture are nearly fool-proof, but there are some ways to improve production. Water management is critical for optimum growth. This surprises some people, given the plants' extreme drought tolerance. But the best growth is obtained when plants are never allowed to dry out or to become soggy.

Growth on liriope in pots and in raised beds is superior, so it is easy to be convinced of the importance of good aeration. It is important not to set the crown too deep.

In the landscape liriope may live indefinitely without supplemental fertilization, but they do respond well to feeding. At Evergreen Nursery we apply liquid 16-4-8 through the sprinklers.

Ground beds get monthly application March through September at a rate of 120 lbs. per acre. Container plants get weekly applications March into October at a rate of about 150 lbs. per acre. I am satisfied that these rates could be increased substantially, at least in the spring season, with a corresponding increase in growth.

*Liriope spicata* and the ophiopogons appear to grow continuously. However, *Liriope muscari* makes most of its growth in the spring, and the *L. muscari* cultivars tend to grow only in the spring. But abundant moisture and high fertility can dramatically improve the summer growth of all these.

Liriope and ophiopogons have one disease problem, which can be cosmetically serious. An anthracnose fungus causes reddish or necrotic streaks in the leaves, beginning at the tips. This occurs on the older foliage only, beginning in midsummer and worsening as the old foliage declines in the dormant season. The problem is usually less severe where there is less overhead watering. Spray applications of Manzate fungicide are very helpful if begun in July before the fungus gets started.

The only insect problem of liriope is a scale that hides underneath the leaf and causes yellow spots. This pest shows up in midsummer. Malathion, among other insecticides, will kill the crawler stage; dormant oil is helpful later on.

The incidence of both disease and insect problems is reduced by mowing or pruning off the old foliage in late winter, especially if the cut leaves can be removed. Here is the major difference between liriope and ophiopogons in culture. Mondo grass does not respond well to mowing or clipping. A close mowing at certain times seems to cause stunting.

Warm weather planting seems to be more important for mondo grass than with liriope. In warm weather the recovery time is very quick and losses to rot are minimized.

Established liriope in the ground are apparently quite tolerant of a variety of preemergent herbicides. Sprinkler-applied herbicides I have used include Kerb, Devrinol, Princep, Surflan, and Ronstar. Granular products we have used include Ronstar, Pennant, Treflan, Southern Weedgrass Control, and simazine. A few plants should be tested before treating a large number of plants. It is important before applying any kind of preemergent spray to water the plant sufficiently to settle the soil.

For those with cold storage, plants of *L. muscari* and its cultivars store very well at 45 F, provided they are not packed wet. *Liriope spicata* and ophiopogon plants store well for days, but not for weeks, as with *L. muscari*.

Propagation may be done in three ways: by division, by seedage, and by tissue culture. I strongly prefer division for one reason—there is less variability of the product. The cause of seedling variability is obvious, but I do not understand the

variability arising in tissue culture.

Seedlings from variegated muscari can be up to 50 percent variegated. There will be differences in variegation, size, growth rate and flowering. 'Monroe's White' will produce a majority of white-flowering seedlings but there again variation will show.

The concept of propagation by division is simple—cut it up in pieces and plant it. The part that is divided is the crown, from which the leaves and roots both grow. Rhizomatous plants can be reproduced by pieces of rhizome. We cut the clump of liriopse with a hatchet or knife, then pull apart the individual bubs.

In old plants the crown grows downward and eventually looks like a corn cob. These "cobs" may be cut off and planted. Chips of crown tissue smaller than a pencil eraser may be used successfully. The new growth will be slow to start, but this is a very efficient propagation method. Usually three growing seasons produce a profitable-sized plant.

We occasionally break the set of leaves off a division in the process of digging and dividing clumps. If these leaves are bound together by a ring or layer of crown tissue, they may be planted and will grow on nicely.

People are interested to know if mowing liriopes and ophiopogons speeds up the multiplication process. I think I have seen a favorable effect on rhizomatous types. I am sure that mowing during dormancy is not detrimental to the growth rate, provided that mondo grass is not "scalped." However, good soil preparation and an abundance of water and fertilizer are the keys to maximum growth.