Methods of Propagation for Aquatic Plants

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People not familiar with aquatic plants are sometimes intimidated by the prospect of cultivating and propagating them. Aquatic plants, unfamiliarity notwithstanding, are very easy—often annoyingly easy—to grow and propagate.

Basically, plants require light and nutrients (including water) to grow. Aquatics have an advantage over many plants in that by growing in water they have unlimited access to water, which is also a very efficient transporter of other nutrients. The primary limiting factor in the growth of aquatics then becomes growing space with sunlight. The best way for an aquatic species to survive is to secure as much available growing space with sunlight as possible. The aquatics best adapted to survive under these conditions are those that can grow and multiply quickly—very quickly, because many species of aquatics are using the same survival strategy. For example, if grown in optimum conditions, a single water hyacinth (*Eichhornia crassipes*) can multiply to over 1 million plants through division in a single growing season of only 5 months. While that is an extreme example, *Azolla* (a small floating plant) is capable of doubling every day.

Many aquatics go through drastic seasonal fluctuations and climactic cycles, and as a result are very adaptable to various water levels and water chemistries. Of course, there are little growing tricks and some species can be difficult to work with out of their natural environment. In general, though, aquatics are very easy to propagate, and with many species the real trick is to not be engulfed by them.

For convenience, I will classify aquatic plants into four groups according to their growth habit:

- Water lilies (genus *Nymphaea)* and lily-like aquatics
- Marginal aquatics, also referred to as "uprights"
- Floating aquatics
- Submerged oxygenating aquatics

Water Lilies and Lilylike Aquatics. These include both hardy and tropical water lilies, lotus (Nelumbo), Nymphoides (which look like small water lilies), water poppy (*Hydrocleys nymphoides*), and water hawthorne (*Aponogeton distachyus*). These plants are characterized by having roots that anchor the plant in an earth bottom, leaf stems extending from the soil through water anywhere from several inches to several feet deep, and leaves floating on the water surface. Lotus are placed in this group in spite of the fact that in shallow water their mature leaves do grow in an emersed state (up out of the water). Water lilies are the best known of the aquatics and usually form the foundation of pond plantings. By the way, water lilies are not actually a lily according to taxonomy.

Hardy water lilies in cultivation are hybrids of several species from temperate climates and will generally overwinter outdoors unprotected. Named cultivars are propagated by division. The rhizomes grow horizontally in the soil and new growing points develop along the rhizome. This is the same way a typical *Iris* multiplies. These divisions are separated and repotted with sufficient rhizome to support the new growing point. Division is best done while the plant is in active growth from

April through July. A typical plant may yield 3 to 7 divisions per growing season. Water lilies may also be propagated by seed, but this is not normally done, as desirable named cultivars cannot be produced true from seed.

Tropical water lilies in cultivation are hybrids of several dozen species from tropical climates, and will generally not overwinter outdoors unprotected in the United States except in the southern Zones 9 and 10. They are generally more spectacular than hardies, blooming more and later in the season. Their blooms stand up well out of the water and color choices include blues and purples, which are unavailable in the hardy water lilies.

Tropical lilies are divided into either day or night bloomers. Both day- and night-blooming tropicals are propagated by division from the dormant tuber. In the spring the tuber sprouts, sending up a slender growing point that becomes a small water lily. When this new lily has several small floating leaves, gently sever it from the tuber and plant. The tuber will send up another growing point and by repeating the process of separation you can typically generate 4 to 7 plants before the tuber is exhausted. Night bloomers may generate 10 or more.

Some day-blooming tropical lilies have another ability called viviparity. Viviparous varieties grow a new plant, which we call pups, out of the sinus node in the leaf. In some varieties these pups will form not only leaves and roots, but may bloom as well while still on the leaf. Viviparous varieties vary in their degree of viviparity. The most viviparous lilies can produce dozens of pups in a single season.

Lotus (*Nelumbo*) are magnificent plants which can overwinter outside down to Zone 4 so long as the tubers are in water deep enough to not freeze solid. They produce large numbers of banana-like tubers that should be divided in spring just before active growth begins. A single, established lotus plant can send out a runner extending 30 ft or more in a single season and this runner will form many overwintering tubers.

The *Nymphoides* and the water poppy are closely related to water lilies, but are smaller and have slightly different growth habits. Most send out runners like a strawberry plant, which root new plants. One, the water snowflake (*Nymphoides cristata),* is viviparous, growing a new plant out of every leaf.

Water hawthorne is a beautiful lilylike aquatic with long narrow leaves and small, white, vanilla-scented blooms. It grows freely from seed and may become a pest in an earth-bottom pond. Native to Africa, it grows and blooms in the spring and fall, coming up very early and lasting into winter. In the summer, it goes dormant, mimicking Africa where the shallow ponds dry up completely and bake in the hot summer sun. This adaptation to its harsh native environment gives us a delightful little plant up and blooming both earlier and later than most other aquatics.

Marginal Aquatics. These are plants that root into soil and grow with their leaves up out of the shallow water around the edge of water features. They may grow in damp soil or in up to about a foot of water. Taller marginals can adapt to deeper water than shorter marginals. Some are best suited for the bog garden, while others may survive in as much as 2 ft of water.

Marginal aquatics may also be classified as temperate or tropical. Marginals include water iris, cattail, pickerel, papyrus (*Cyperus papyrus*), and variegated giant reed (see *Schoenoplectus lacustris* ssp. *tabernaemontani* cvs.). Most of these multiply by division, just like terrestrial plants. Some may be efficiently propagated by seed, such as papyrus and marsh marigold (*Caltha palustris)*, but most multiply so

quickly by division that it is the preferred method of propagation. Some, like the iris and pickerel (*Potederia cordata*), have a horizontal rhizome that develop new growing points. Many, such as cattail and pennywort (*Hydrocotyle*), send out a complex of runners which quickly produce a stand of plants. Some, like marsh marigold, form clumps which may be divided. Marble queen sword plant forms plantlets on flower stalks.

Floating Aquatics. These plants may be either temperate or tropical, but are most often tropical, as this growth habit does not provide as much protection from cold temperatures. They grow on the surface of the water, with leaves floating or raised slightly above the surface, and roots hanging down suspended in the water or occasionally rooted if in shallow water. Many have flotation devices built into the leaf or stem structure. Floaters are the fastest growing of aquatics, and include water hyacinths, *Azolla*, duckweed, frogbit (*Hydrocharis*), and water lettuce (*Pistia*). Typical reproduction is by division and most will send out runners like a strawberry plant. Smaller floaters, such as *Azolla*, form a carpet on the water and a plant 1/2 in. across can be broken apart to form 25 or more tiny plants. These small floaters quickly cover the surface and can be among the worst of aquatic weeds. On the other hand, they provide shade and food for fish and compete with algae for light and nutrients.

Submerged Oxygenating Aquatics. This group of plants grow completely under the water. Some, like the genus *Vallisneria* and dwarf sagittaria (*Sagittaria subulata*), root strongly into the soil bottom and multiply by sending out runners. Others, such as *Elodea* (syn. *Anacharis*) and *Cabomba*, root weakly if at all and quickly fill up the area between the bottom and surface of the pond. They are limited only by available light and nutrients and are easily propagated by stem cuttings.

Submerged plants are often referred to as oxygenators even though all aquatics, and all photosynthesizing plants for that matter, produce a surplus of oxygen. The term oxygenator is used because submerged plants release all their surplus oxygen under water and, therefore, raise the oxygen content of the water during daylight hours. This benefits many organisms in the ecosystem which require oxygen. The other benefits of submerged aquatics include competing with algae for light and nutrients and food for fish.

This has been a brief and basic overview of propagation of aquatic plants. Anyone who has experience with the propagation of a variety of terrestrial plants can quickly and easily adapt to the growing of aquatics. The main differences are in dealing with utilizing various water levels to assist in propagation and in recognizing and coping with the lower oxygen content of soil when saturated with water. The lower oxygen content of the soil encourages anaerobic conditions potentially harmful to the plant when it is most vulnerable, such as during dormancy or when newly divided and planted. The use of fresh soil, oxygenated water, and warm temperatures to encourage fast growth are some of the means used to cope with this potential problem. Organic fertilizers are best avoided (a time honored mistake in water gardening, where traditional literature still heavily endorses organics) for the most part because they require oxygen to decompose and steal oxygen from a system already deficient in it. Organics can most successfully be used in limited situations by growers who understand the biochemical process and can successfully manipulate it.

The culture of aquatic plants naturally requires the construction of special growing beds and special attention to their cultural requirements. Large-scale commercial growers have found it does not fit in easily with their overall program and it remains a specialty market. In order to address that market properly, it is important to provide a wide variety of aquatics for the consumer and to facilitate the availability and proper use of other pond products, such as liners, pumps, filters, etc. Extra attention is required to provide sufficient customer support.

However, you do not have to be a commercial grower of aquatic plants to appreciate them. I became interested in aquatics because they were fun. If you enjoy plants, you will enjoy aquatics. If you have been in terrestrial horticulture for some years, the differences are just great enough to pique your interest.

Terra Plug® Production

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Terra Plugs® (U.S. Patent 5331908) are field-grown perennial plugs produced by a patented process developed several years ago by Carl Loeb and Bruce Gibson, the owner and general manager of Summersun Greenhouse Company. The nursery had been a large producer of bedding plants, baskets, and poinsettias and was interested in expanding into the perennial market. The search for an efficient and labor-saving way to produce field-grown perennials led to the concept of planting perennials directly into the field in 3-in. bottomless pots. The initial production crop was 500,000 plants and this year there are 2.7 million plants in the field. Currently we are growing 176 taxa, 40% of which are vegetatively propagated.

Propagation begins in the greenhouses at Mount Vernon, Washington in early April. Cutting material is taken from both container and field stock beds at the perennial farm. The first crops are those items requiring superior drainage or on which losses are fairly high, such as *Phlox subulata* or *Dianthus*. These are stuck in 200 cells in 100% perlite. By early May we are cutting and sticking an average of 40,000 cuttings daily, most directly to the 3-in. bottomless pot. Cuttings are placed on heated floors and mist or fungicides are applied by robots. We use the same 18-in. × 18-in. flat used throughout the nursery. Our spacer insert holds 30 plants and allows ample room for growth without overcrowding. We set the same spacer into a cardboard insert for storage and shipping.

Seeds are sown into 288-cell plug trays on one of three seed-sowing machines. They are moved into a sweat chamber for 2 to 5 days and then either to the greenhouse or to the freezer for stratification. Once established, the plugs are transplanted into the 3-in. pots and grown in the greenhouse for 4 to 6 weeks. When roots are visible at the bottom of the pot the plants are sufficiently established to withstand field conditions. At this point they are graded, racked, and trucked to the perennial farm.

Three to four weeks prior to planting, the fields are treated with Vapam for weed and disease control. Planting begins mid June and continues until early August, with an average of 100,000 pots planted daily. Terra Plugs® are planted in raised beds that are made with a Struik rotovator and hiller that has been customized to