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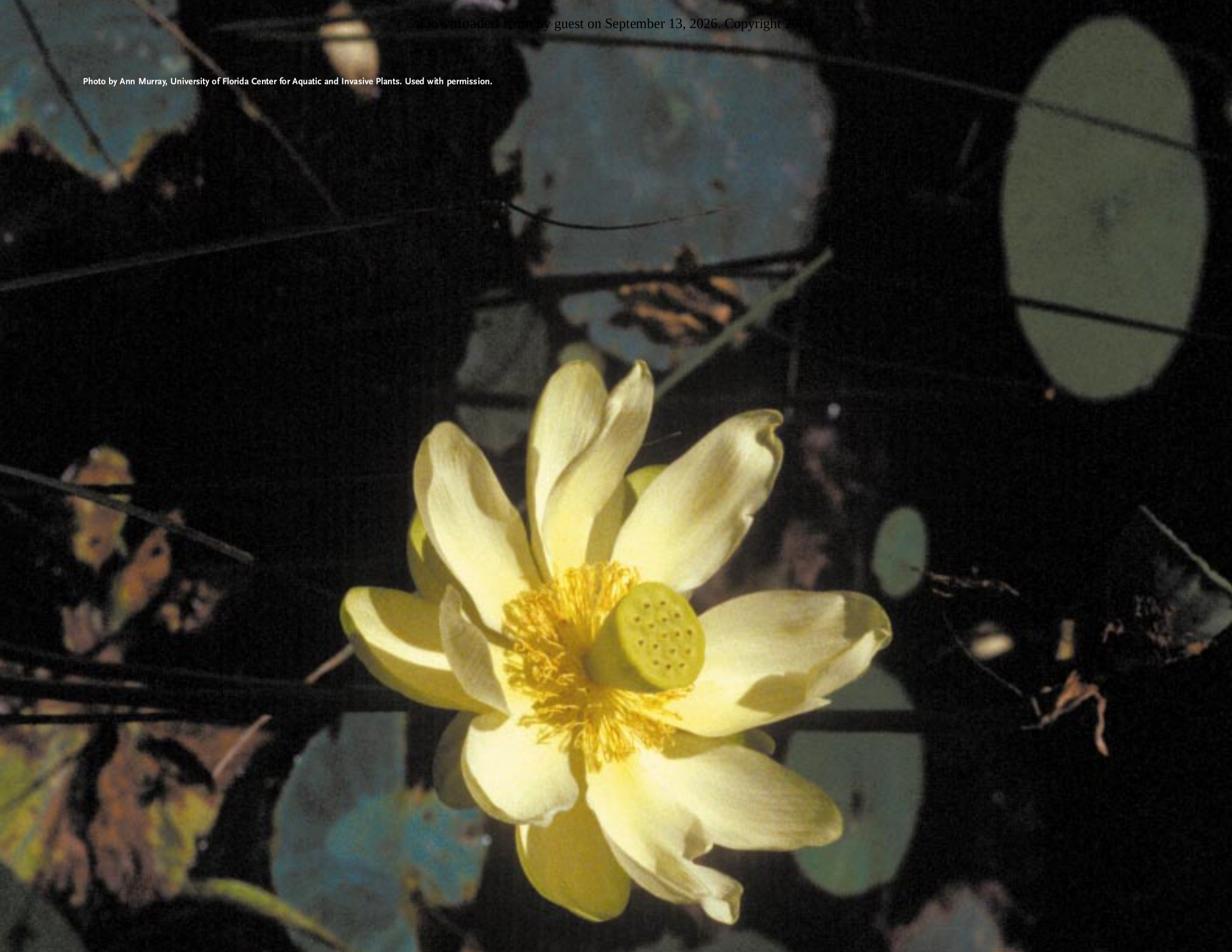

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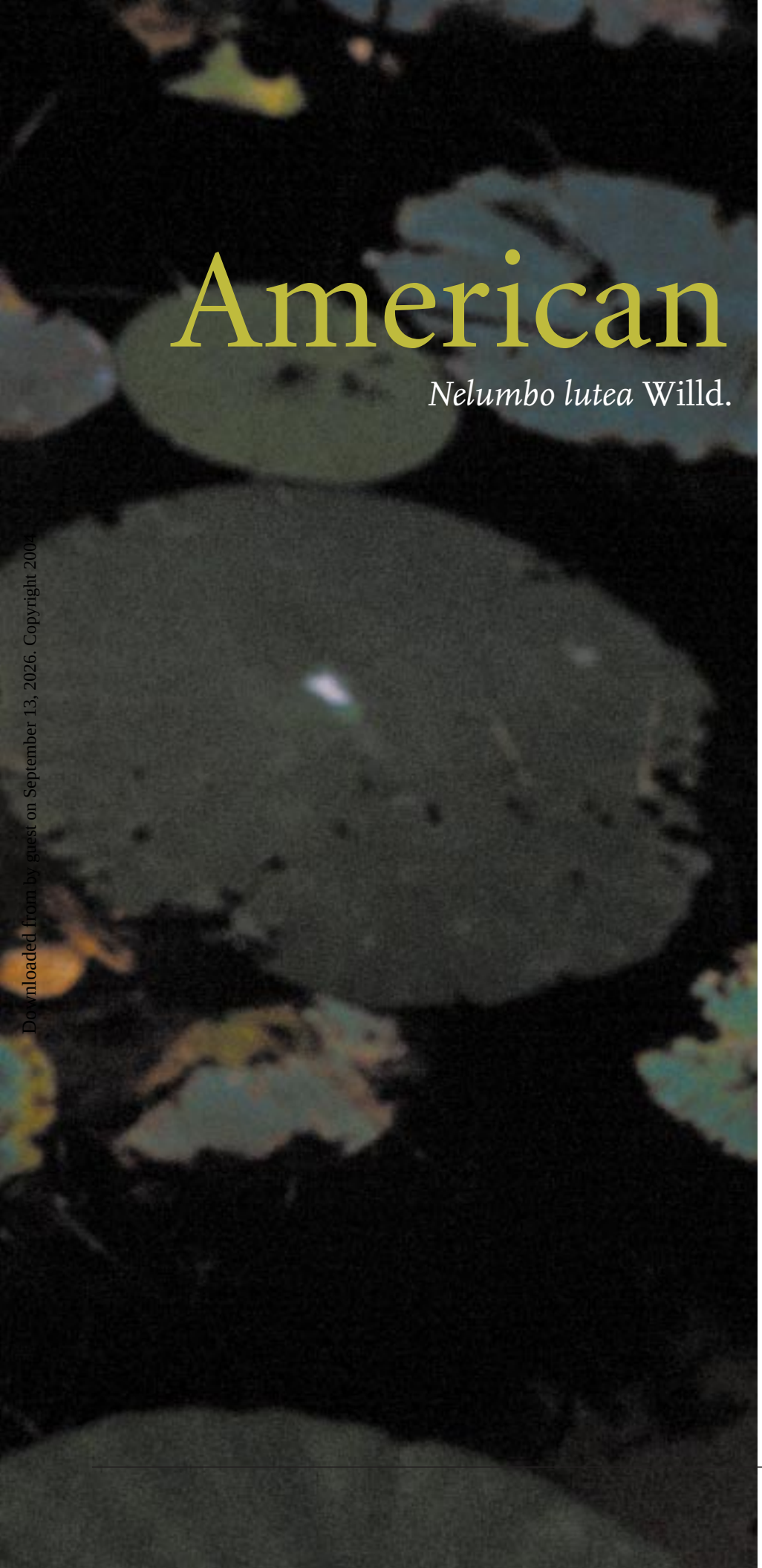

Propagation protocol for American Lotus

Nelumbo lutea Willd.

Jeff Sayre |

KEY WORDS
Nelumbonaceae, seed, bareroot production

NOMENCLATURE
USDA NRCS (2002)

American lotus (*Nelumbo lutea* Willd. [Nelumbonaceae]) is native to the eastern and central portions of the US ranging from Maine to Wisconsin and southward from Florida to Texas. *Nelumbo lutea* also occurs in native stands throughout Central America and into northern South America. Small native populations can still be found in the West Indian Archipelago and the extreme Southeastern portion of Ontario, Canada.

Worldwide there are only 2 native species of *Nelumbo*. The genus is represented by *Nelumbo lutea* (synonyms: *Nelumbo pentapetala* or *Nelumbium luteum*) and *Nelumbo nucifera* Gaertn. (synonyms: *Nelumbo speciosa* or *Nelumbium speciosum*). *Nelumbo nucifera*, which has pinkish white flowers, is native to northern Australia, the Philippines, the Orient, Egypt, and the Volga River delta. All other lotus species are cultivated varieties of these 2 species.

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Nelumbo nucifera has been introduced into North and South America as an ornamental plant. Escapees have become naturalized in lakes, ponds, and waterways. In some places, this introduced species has become invasive.

Common names for *Nelumbo lutea* include American lotus, water-chinquapin, and yellow lotus. Common names for *Nelumbo nucifera* include sacred lotus, Oriental lotus, and East Indian lotus. This article will deal exclusively with our native North American species, *Nelumbo lutea.*

NATURAL HISTORY

Nelumbo lutea is an emergent, obligate species locally occurring in lake and pond margins. Some populations are found in headwater lakes of riparian corridors. American lotus prefers water depths from 60 cm to 2.1 m (2 to 7 ft). Most plants establish in shallower water and grow out to deeper water.

American lotus is a long-lived perennial with cylindrical, spongy rhizomes that produce thick tubers in the fall. It is listed as endangered in New Jersey and Pennsylvania, threatened in Michigan, and extirpated in Delaware.

Nelumbo lutea blooms from June to September depending on geographic location. The flowers open on a single stalk and are cream to yellow in color, ranging from 7.6 to 20 cm (3 to 8 in) in diameter when fully open. The flowers usually open up in early to mid morning and close by early to mid afternoon. A single bloom lasts from 3 to 4 d. Once the petals fall off, a seedpod covered with small holes is revealed. In a flower that was successfully pollinated, most holes contain a single round, developing seed. The seeds are actually located in the woody receptacle—the distinctive inverted cone (obconic) that looks like a showerhead. The hard, brown seeds, about 1 cm (0.4 in) in diameter, are renowned for surviving for decades, waiting for the proper conditions to germinate. I have stored scarified lotus seeds in a cup on my desk for several years—they germinated 6 d after being submerged in warm water.

The leaves are orbicular in shape with crenulate margins. They range from 30 to 61 cm (1 to 2 ft) in diameter with the petiole attached to the leaf at the center. The peltate, palmate leaves are slightly concave, giving the impression of a shallow bowl. Unlike the leaves of American white water lily (*Nymphaea odorata* Ait. ssp. *tuberosa* (Paine) Wiersma & Hellquist [Nymphaeaceae]), the leaves of *N. lutea* do not have a radial cut. Leaves arise directly from the rhizome and can either be floating on the water or raised 30 to 46 cm (1 to 1.5 ft) above the water.

A number of American Indian tribes, including the Comanche, Dakota, Huron, Meskwaki, Ojibwa, Omaha, and Potawatomi used various parts of the lotus plant as a source of supplemental food. All parts of the plant were eaten. The hard seeds were gathered and added to soups or roasted like chestnuts and the tubers and shoots were cooked and eaten like a vegetable. Several American Indian tribes treated lotus as a sacred plant with mystical powers.

Today, *N. lutea* is considered to have little economic importance. The flowers and dried seed heads are used in ornamental floral displays. In areas where American lotus colonies have grown large, they sometimes are considered an economically-detrimental species that restrict small boat navigation and hinder fishing.

SEED PROPAGATION

Propagating *N. lutea* by seeds or rhizome is a rather straightforward task, as long as a few important steps are followed. American lotus can easily be propagated from seeds. First, it is crucial to use viable seeds. The easiest way to determine the viability of lotus seeds is to throw them in a cup of water. Retain the seeds that sink and discard the seeds that float; floating seeds have poorly developed or rotten embryos.

The hard seed coats must be scarified to allow the seeds to imbibe water (Figure 1). The simplest approach is to scratch off a small area of seed coat using medium-grade sandpaper. Most articles indicate that if you scratch seeds too deeply and reveal the creamy-white inner embryos, the seeds are killed. At our nursery, we regularly nick seed coats with a grinding wheel and this technique always results in the creamy-colored inside portion of the seed being exposed. Although we do not always have 100% germination, exposure of the embryo does not appear damaging. It is important to change the water daily as you wait for seeds to germinate.

Nursery Production

Once seeds have germinated and the root begins to emerge (but before the leaves are up), transplant them to a 10-cm (4-in) pot filled with a loamy-clay. We place pots in 2.5 to 5 cm (1 to 2 in) of warm water in holding ponds. A seedling is not likely to bloom the first year.

As the seedlings develop, gradually increase the water depth but not so much that the emergent true leaves are submerged below the water surface. Generally, the fertility in the soil we use to fill pots is sufficient for growth. At the end of the growing season when leaves have died back, we remove tubers from the containers and store them surrounded by moistened sphagnum peat in a cool (not freezing), dark storage room. Seedlings can be held in their containers in storage ponds as long as the water is more than 1 m (3 ft) deep and the tops of the containers do not freeze.

If seedlings are held, however, for longer than 1 y in their pots, we incorporate a controlled release fertilizer after new leaves emerge in spring. Our preference is Osmocote Exact tablets with 3% water soluble magnesium oxide (15N:9P_2O_5:9K_2O; 8 to 9 mo release rate; The Scott's Company, Marysville, Ohio) at the approximate rate of 5 g per l (0.2 oz/qt) volume of medium.

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Direct Seeding

If you are installing American lotus seeds in a restoration site, the seeds should be prepared for germination as detailed above. Plant the seeds in water no deeper than 30 cm (12 in) taking extra care to make sure seeds are fully covered with substrate. As the plant matures, it will spread into deeper waters.

VEGETATIVE PROPAGATION

Propagating *N. lutea* from rhizomes requires several steps. For best results start with dormant tubers (before new runners form). Cut the tubers into pieces, ensuring each section contains at least 1 bud. It is from these buds, or eyes, that leaves will emerge.

Plant the rhizome pieces in wide, round pots that lack drainage holes. Avoid square pots because the growing tip of the rhizome is tender and can break off if it grows into a corner. Pot size depends on the size of the rhizome pieces. In general, expect to use a pot with a diameter ranging from 20 to 36 cm (8 to 14 in). Since *N. lutea* grows vigorously, no more than 1 piece should be planted in each pot. Use extra care so that the growing tip is not damaged during planting because at this sensitive stage, a damaged tip can result in rhizome death. The pot should be filled with a rich, loamy-clay soil and then topped with a thin layer of pea gravel. Correctly planted rhizome pieces have about 1.3 cm (0.5 in) of the growing tip visible above the pea gravel.

Place pots in a warm, sunny location so that the growing tip is submerged 5 to 7.5 cm (2 to 3 in) below the water surface. Water temperatures between 10 and 16 °C (50 to 60 °F) are ideal. If all goes well the first set of leaves will emerge in about 3 wk. As with nursery raised seedlings, we do not use supplemental fertilizer unless the tubers are held at the nursery for more than 1 y. In fall, when leaves die back, we harvest and store tubers like the seedlings described above (Figure 1).

OUTPLANTING

Usually, seedlings are outplanted in fall of the same year they were sown or the following spring. Plants derived from cuttings, because they grow and fill containers quickly, can be outplanted during the summer or fall of the year they were started.

For ornamental ponds, container stock can be outplanted in spring or fall if the pond has a natural mud bottom. More often, container plants remain in containers and are used in fiberglass or concrete fabricated ponds, divided or repotted as needed.

Bareroot tubers, either from seeds or cuttings, should be outplanted in the same manner as described for potting cuttings: ensure that the growing tip of the shoot is 1.3 to 2.5 cm (0.5 in to 1 in) above the soil line.

REFERENCE

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Photos by JF New Nursery

Figure 1. Scarified seeds ready for planting (left) and a 3-y-old tuber grown from a seed.

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