

# Propagation Protocol for North American Pitcher Plants (*Sarracenia* L.)

*Purple pitcher plant*  
(*Sarracenia purpurea* L.).

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## ABSTRACT

North American pitcher plants (*Sarracenia* L.) can be easily propagated by seeds or rhizome divisions. Flowering maturity is reached in 5 to 7 y from seeds and 1 to 2 y from divisions. Plants can be grown as containerized specimens outdoors in the southeastern US or in bog gardens. Successful propagation includes stratification of seeds and providing similar environmental conditions to their native habitat with appropriate nutrient-poor growing medium, live sphagnum moss, acidic irrigation water, high relative humidity, and light.

**KEY WORDS:** Sarraceniaceae, rhizome divisions, seed propagation, sphagnum bog

**NOMENCLATURE:** ITIS (2002)

Eight species of *Sarracenia* L. (Sarraceniaceae) are native to the east coast of the US, including pale pitcher plant (*S. alata* Wood), yellow pitcher plant (*S. flava* L.), white trumpet (*S. leucophylla* Raf.), hooded pitcher plant (*S. minor* Walt.), green pitcher plant (*S. oreophila* (Kearney) Wherry), parrot pitcher plant (*S. psittacina* Michx.), purple pitcher plant (*S. purpurea* L.), and sweet pitcher plant (*S. rubra* Walt.). All occur in the southeastern US except northern purple pitcher plant (*S. purpurea* ssp. *purpurea* L.) that ranges from the New Jersey pine barrens north to the upper Midwestern states and Canada; from

Saskatchewan to Hudson Bay, Labrador and Nova Scotia (Schnell 1976). Several botanical varieties and subspecies are recognized and many species freely hybridize, resulting in many forms and cultivated varieties.

Several species have protected status by state and federal laws. Three species are federally listed as endangered: *S. oreophila* and *S. rubra* ssp. *jonesii* (Wherry) Wherry (mountain sweet pitcher plant) only occur in the North and South Carolina mountains. The third species, *Sarracenia rubra* ssp. *alabamensis* (F.W. & R.B. Case) Schnell (Alabama canebrake) is only found in a few locations in Alabama (USFWS 1989). *Sarracenia leucophylla* is currently listed as a candidate species (Patrick and others 1995; CMU 2002). Other species have state protection in several southeastern states.

*Sarracenia* species are rhizomatous perennials that produce juvenile leaves for 1 to 2 y after seed germination. Older plants produce 2 types of adult leaves (ascidiform and phyllodia). The hollow, tube-like ascidiform leaves are the pitchers that are formed during the growing season. They usually form on plants grown from seeds during the third growing season. Phyllodia leaves are sword-shaped or ensiform in shape and grow and persist during the winter months (Pietropaolo and Pietropaolo 1986) and are known by pitcher plant enthusiasts as “winter leaves.”

The pitcher includes an extension of the leaf, known as the hood, that covers the opening of the pitchers on all but 1 species: *S. purpurea*. In preferred habitats, species can be easily identified by their pitchers, which vary from small rosette forms laying on the ground to tall, trumpet-like pitchers rising above associated forbs and grasses.

Copious nectar production in flowers, on the hoods, and upper most section of the pitchers lure insects to an untimely end. Inner surfaces of the pitcher can be described based on function and are common to all species. The undersurface of the hood contains nectar glands and stiff, downward pointing hairs that direct the movement of an unwary insect toward the next zone which contains nectar-producing glands

on a slippery, waxy surface. In many cases, insects will lose foothold on this surface and fall directly into the pitcher. The middle portion of the pitcher has digestive glands found on the smooth waxy walls. Insects are trapped by falling after reaching this slippery zone or are directed further to the bottom portion of the pitcher that has downward pointing hairs, preventing the insect from moving out of the fluid in the bot-

tom of the pitcher. Digestive enzymes and bacteria in the fluid absorb the prey and the ghostly indigestible remains can be seen at the end of the growing season as a blackened sludge.

*Sarracenia minor*, *S. leucophylla*, and *S. psittacina* also have visual lures known as fenestrations which are translucent “windows” on the upper section of the pitcher or hood. Fenestrations allow light to enter the pitcher. An insect may sense the fenestrations are openings and will fly into it and thus fall into the bottom of the pitcher. Otherwise, insects feeding on nectar may follow a path to one of these windows, and continue down into the pitcher because it would have to walk against the troublesome downward pointing hairs. Common prey include ants, wasps, flies, beetles, crickets, spiders, and occasionally small frogs. Some insects do not succumb to the pitcher plant and live in the fluid bath or use the pitchers to capture their own insect prey (Pietropaolo and Pietropaolo 1986).

Flowers of pitcher plants are another lure and are among the most beautiful in nature (Figure 1). Flowering begins



Photo by Thomas G Barnes

Figure 1 • The unusual flower of the purple pitcher plant (*Sarracenia purpurea* L.).

in March in the southern portions of the range of these species and continues until August in the northern regions. Flowers are borne singly on long scapes and each flower has numerous stamens and a 5-carpellate, compound ovary terminated by a 5-parted umbrella-like stigma. There are 5 sepals and 5 petals. Depending on species, flower color can be yellow, pink, or burgundy. The fruit is a dry capsule containing laterally winged seeds. *Sarracenia* species will self-pollinate but produce more seeds if out-crossed with other individuals.

*Sarracenia* species inhabit acidic nutrient-poor environments including sphagnum bogs, swamps, wetlands, pine barrens, savannas, and flat woods. Usually, the very wettest parts of habitats are favored; stands form dense, floating mats on the water at the edges of bog ponds and lakes and across acidic streams. These acidic habitats have a pH below 4.5 and are poor in base cations, and have no alkalinity. *Sarracenia* species are found growing with oligotrophic species of sphagnum mosses (*Sphagnum* spp. L.



Photo by Doyle Darwin Thomas

Figure 2 • Pitcher plants growing in the greenhouse at Darwin's Backyard Nursery.

[Sphagnaceae)]. Successful propagation and growth of pitcher plants require creating these environmental conditions in the propagation environment.

### SEED PROPAGATION

North American pitcher plants are some of the easiest for American gardeners to propagate. They will grow in a backyard bog or in containers provided with adequate sunlight, water, and relative humidity. Seeds are an excellent way to obtain large numbers of plants. Seed propagation requires patience since it normally takes 5 to 7 y to reach flowering maturity.

In North Carolina, I collect seeds in September and October. Seeds are shaken out of the dry capsules by hand and do not require further cleaning. Fully mature seeds are stored immediately in sealed containers under refrigeration and will remain viable for at least 3 to 4 y. Seeds are reddish brown at maturity and are approximately 0.5 mm long. Each capsule contains hundreds of seeds.

I use 2 methods of stratification to successfully overcome seed dormancy. With both methods, seeds are coated with a fungicide such as Captan 50% WP for the prevention of damping-off disease (*Fusarium* spp., *Rhizoctonia* spp., *Pythium* spp.). The first stratification method involves direct sowing of seeds

onto moistened 1:1 (v:v) milled sphagnum peat moss and coarse sand growing medium in 420 ml (7.5 X 7.5 cm [3 in X 3 in]) containers. I water the growing medium thoroughly, seal the container in a plastic bag, and stratify seeds in the refrigerator for at least 2 mo. The second method involves placing seeds treated with fungicide on a fine cloth or paper towel. I roll the cloth or paper towel, then secure, moistened, and place it in a plastic bag or jar. After adding a small amount of water, the container is sealed and placed in the refrigerator for at least 2 mo. After the stratification period has ended, the paper towel or cloth is removed and allowed to dry. Seeds are brushed off of the towel and sown into containers filled with the same medium described above. I place sown containers in a greenhouse or indoors under grow lights set at 18 h per day for the first 3 to 4 mo. Germination will begin and continue over several weeks. I transplant extra seedlings into individual containers at the true leaf stage. Seedlings will only produce juvenile leaves the first 1 or 2 y. Only

a minimal amount of fertilizer is used on seedlings during the first few months of growth. I use one-fourth the recommended rate of water soluble MiracleGro Miracid fertilizer (30N:10P<sub>2</sub>O<sub>5</sub>:10K<sub>2</sub>O; The Scott's Company, Marysville, Ohio) once every few weeks. Seedlings require evenly moist medium. Irrigation water should be neutral to slightly acidic, and I prefer using collected rainwater. Irrigation frequency and duration is increased as plants attain greater root and shoot development. Live sphagnum moss is added to individual containers. I reduce day length to 12 h about 5 mo after germination. Seedlings are left in the greenhouse for 1 full year under growing temperatures averaging 16 to 30 °C (60 to 85 °F) with relative humidity levels averaging 60% to 65% (Figure 2). Plants are moved in the spring of the second year to the outdoor nursery and are placed in cold frames for the winter.

### VEGETATIVE PROPAGATION

Rhizome divisions can be done easily for all species. The optimum time for divisions is during winter and early spring before bud break. Generally, seed-propagated nursery stock can be divided after 3 y, but more divisions are obtained from 5- to 6-y-old plants. After removing mature plants from containers or outdoor bog beds, I gently wash rhizomes with water and remove as much growing medium as possible so that identifying rhizome grow-



Photo by Doyle Darwin Thomas

Figure 3 • Pitcher plant rhizome ready for division.

ing points and branches is easier (Figure 3). Rhizome branches are cut away from the main rhizome and any dead or dying portions are removed. Healthy sections will be white and firm in cross section and should contain at least 1 lateral, elongate vegetative bud and roots per rhizome section. I remove any round, marble-sized flowering buds to encourage additional leaf and root growth. Exposed surfaces of the rhizome are treated with powdered sulfur to prevent fungal infection. I cut longer rhizomes in 5 to 7.5 cm (2 or 3 in) sections. I use the same medium described for seed propagation and containers large enough to accommodate the rhizome section. Small rhizome cuttings are planted in 420 ml (7.5 X 7.5 cm [3 in X 3 in]) square plastic containers while larger containers (3.8 l [1 gal]) are used for rhizome sections ranging 1.3 to 1.9 cm (0.5 to 0.75 in) in diameter. When potting divisions, I carefully place them horizontally with the roots down. Growing points should be slightly above the surface of the growing medium to prevent rot. Finally, I add live sphagnum moss to the top layer of growing medium in the containers.

After sections have been potted, I irrigate with a solution of B-1 such as Superthrive at a rate of 2 ml/l (1 to 2 drops/gal) of irrigation water. Because carnivorous plants are adapted to nutrient-poor environments, very little, if any, additional fertilization is required. Additional fertilizer will also kill the sphagnum moss in containers or bog gardens. Growing medium should be kept evenly moist and plants will require frequent irrigation during summer months. Irrigation water should be neutral to slightly acidic. Newly potted divisions are left in the greenhouse under a range of growing temperatures from 16 to 30 °C (60 to 86 °F) with an estimated average of 60% to 65% relative humidity until September or October. In October, I move plants from the greenhouse to cold frames to harden off and overwinter or directly plant them in beds containing 1:1 (v:v) mix of milled sphagnum peat moss and coarse sand. Flowering maturity is reached in 1 to 2 y from divisions (Figure 2). Many species produce several growing points along the rhizome each year and growers can continually propagate additional plants each year.

## SUMMARY

North American pitcher plants are among the most fascinating species in our country's flora. The distinctive and sophisticated pitchers are unique among species, and growers are also rewarded with regal flowers and radically different winter leaves. Successful propagation and growth require replication of the environmental conditions of *Sarracenia* habitats.

Using seeds, *Sarracenia* species can be grown as containerized plants in greenhouse conditions in the southeastern US. Seedlings exhibit juvenile leaves the first 1 to 2 y, form ascidiform leaves (pitchers) by the third year, and reach flowering maturity in 5 to 7 y. Rhizome divisions can be easily made from 3-y-old plants and will often flower 1 to 2 y from initial division. Using the propagation methods I described will reward you with many new and exciting additions to your native plant garden. This protocol has been successful for 8 species.

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