

Sarracenia pitcher plants as a conservation focus for botanical gardens

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Sarracenia are perennial carnivorous plants having striking tubular leaves that attract, catch, digest, and absorb invertebrate prey (see figures at end of this paper). They are widely grown as curiosities and educational species, often along with other famous carnivorous plants like the Venus'-flytrap (*Dionaea muscipula*) and sundews (*Drosera* species). These plants are famous in that they turn the tables on normally herbivorous insects, and are viewed with delight and curiosity by children and adults alike. Many people are reminded of the man-eating plants of Hollywood movies, but there really are no such monsters. The largest of these carnivores is a pitcher plant 1 meter tall, while the trap-portion of the Venus'-flytrap leaf is barely 3 cm. Nevertheless, they are interesting plants and they attract attention. Botanical gardens have benefited from this trait and have developed displays of carnivorous plants to satisfy the curiosity of their visitors, and to demonstrate the marvelous diversity of the world's flora.

There are 10 *Sarracenia* species (Sarraceniaceae) endemic to North America. All but one species (*Sarracenia purpurea*) occur only in the southeastern states ranging from southeastern Virginia along the coastal Plain to east Texas. There are also several inland locations in Alabama, Georgia, and North Carolina. They grow in open, sunny, moist meadows or long-leaf pine flat woods where the soil is a poorly drained peat-sand mixture. Sometimes these habitats are called bogs because they can be very wet. In northern North America *S. purpurea* can grow in real peat bogs, which are formed of mats of live and partly decayed sphagnum moss floating around the edge of an open lake. These habitats are nutrient poor – due to leaching and high acidity – and thus there is less competition from dense vegetation. The carnivorous plants probably benefit from their ability to obtain extra nutrients, and grow here along with orchids, grasses, and many other species in some of the most diverse communities outside the tropical rain forest. In the South, these habitats are frequently burned (by lightning and man-made fires), helping to release nutrients and keep dense woody vegetation from dominating.

Sarracenia are easy to grow in a sunny bog garden or dish garden. The soil should be 60% Canadian peat and 40% white sand, but some leaf mold or decomposed bark is allowable. The soil should be acidic and moist, but not totally sterile of nutrients. Pitcher plants do not make good house plants as they need full sun. They are winter hardy as long as they do not dry out, and may live for many years as herbaceous perennials. The leaves die down in winter on most species, but some are evergreen (*S. minor*, *S. psittacina*, *S. purpurea*, and *S. rubra*). They are clump-forming, often enlarging several cm a year. They may be divided, or grown from seeds. The flowers are large and showy, being red or yellow in the wild species.

*Sarracenia*s demonstrate several biological principals that make them worthy of display as education and conservation subjects. That is, it may be argued, that they are more highly desirable for conservation and preservation because they display more interesting adaptations and behaviors than most plants.

First, they are showy, well-known representatives of the coastal wetland and savannah flora which has been widely depleted during the past 10 years due to drainage, timber farming, and development. Therefore, much like the Panda and Condor, they may help attract attention to the plight of threatened wetlands and the interesting species that grow there. By saving pitcher plants, you also save many other species that grow in the same coastal

habitats. In one area in southeastern North Carolina, over 40 species of vascular plants per square meter have been identified.

Pitcher plants demonstrate the unusual genetic trait of being able to form hybrids between species, and the hybrids often exhibit hybrid vigor. Furthermore, the hybrids are fertile and may backcross to the parent, or cross among themselves. This can result in striking hybrid swarms in disturbed habitats throughout the South whether two or more species grow together. Many of these hybrids have been brought into cultivation and make striking horticultural specimens. The author has worked since 1980 with the late Rob Gardener of the North Carolina Botanical Garden to produce man-made hybrids that have become popular in horticulture. These have been given cultivar names and been tissue-cultured. Some better known representatives of this effort are 'Dixie Lace,' 'Mardi Gras,' 'Love Bug,' 'Doodle Bug,' 'Lady Bug,' and 'Red Bug.' The latter was the world's first patented pitcher plant hybrid. By growing these showy plants in botanical gardens, and making people aware of them, they help call attention to the beauty of pitcher plants and may help make them more recognizable and appreciated when it comes to saving native flora and their habitats.

Pitcher plants also demonstrate adaptations that make them good subjects to use in teaching. Their unusually leaf structures (it is the leaves of carnivorous plants that are modified for catching prey) show how evolution can select for modification that have particular uses. Since the pitcher plants can catch insects and get nutrients from them, they are able to live in nutrient-poor habitats. This gives them an advantage. The different species have different types of pitchers for catching different insects. For example, *S. minor* and *S. psittacina* catch only ants; and *S. leucophylla* only moths. *Sarracenia flava* can catch very large prey with an orifice opening of 10 cm, while *S. rubra* rarely has an opening larger than 2 cm. Pitchers can have different markings and color patterns. The flowers can smell sweet or fetid. So you see, there is an array of traits that can mix and match to produce different functional packages for catching insects and avoiding competition with one in the bogs where they grow.

Historically, pitcher plants have been known since the late 16th century in collections from North America. They have been known as curiosities and frequent illustrated in botanical art. They have been widely grown as ornamental plants since about 1800 in European gardens, and during the Victorian era of the late 1800's were celebrated in cultivation both as species and hybrids. Botanists have studied their distributions and species patterns. The first species were formally named by Linnaeus in 1753 (*Sarracenia purpurea*); and as recently as 2002, a new species has been recognized (*S. rosea*, the Gulf Coast form of *S. purpurea*). They demonstrate species formation by the fact that several closely related populations have been recognized, with botanists uncertain as to their relationships, degree of distinctness, and species history. This makes for lively discussion, even if it keeps the nomenclature from being simple. In this case, I am talking about the *S. rubra* complex, where 5 similar taxa from distinct geographical regions may be recognized as distinct species, or merely as subspecies or forms.

So, you see, there are many facets to *Sarracenia* pitcher plants as they provide something for everyone – the casual looker and the scientist, the hobbyist, and the conservationist. They are a challenge to understand, but easy to grow. They are attractive to look at, but the forms and colors of the leaves and flowers tell us something about their biological behavior. They live in hot and unpleasant habitats, but represent some of the most beautiful wildflowers and diverse meadow communities in the world. They are strange plants to see in botanical gardens, but they are more interesting than simple plants that just grow and never change. They demonstrate plant-animal interactions, and thus allow us to talk about the interconnections of the intricate web of life. If we don't understand that, we miss the very meaning of life on earth.

References

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Pine flat wood with Sarracenia flava ca. 1950



Sarracenia flowers in bog garden



Display bog garden with Sarracenia, Univ. of N.C. at Charlotte 2000



Sarracenia leucophylla, showing hood, mouth, veins and colors



Sarracenia habitat destruction, southeastern North Carolina, 1977.



Array of hybrid *Sarracenias* at UNC Charlotte Botanical Gardens. <http://gardens.uncc.edu>



Insects being digested in *Sarracenia* leaf tube.



Members of the *Sarracenia rubra* complex.