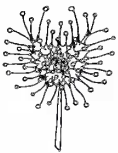


125: 245-260.

- Robinson, J.T. (1981) *Sarracenia purpurea* L. forma *heterophylla* (Eaton) Fernald: new to Connecticut, *Rhodora*, **83**: 156-157.
- Romeo, J.T., Bacon, J.D., and Mabry, T.J. (1977) Ecological considerations of amino acids and flavonoids in *Sarracenia* species, *Biochemical Systematics and Ecology*, **5**: 117-120.
- Russell, A.M. (1919) The macroscopic and microscopic structure of some hybrid *Sarracenia* compared with that of their parents, *Contr. Bot. Lab. Univ. Penn.*, **5**: 3-41.
- Schnell, D.E. (1977) Intraspecific variation in *Sarracenia rubra* Walt.: some observations, *Castanea*, **42**: 149-170.
- Schnell, D.E. (1978a) *Sarracenia flava* L.: Intraspecific variation in eastern North Carolina, *Castanea*, **43**: 1-20.
- Schnell, D.E. (1978b) Systematic flower studies of *Sarracenia*, *Castanea*, **43**: 211-220.
- Schnell, D.E. (1979a) A critical review of published variants of *Sarracenia purpurea* L., *Castanea*, **44**: 47-59.
- Schnell, D.E. (1979b) *Sarracenia rubra* Walter ssp. *gulfensis*: a new subspecies, *Castanea*, **44**: 217-223.
- Schnell, D.E. (1983) Notes on the pollination of *Sarracenia flava* L. (*Sarraceniaceae*) in the Piedmont province of North Carolina, *Rhodora*, **85**: 405-419.
- Schnell, D.E. (1993) *Sarracenia purpurea* L. ssp. *venosa* (Raf.) Wherry var *burkii* Schnell (*Sarraceniaceae*) a new variety of the gulf coastal plain, *Rhodora*, **95**: 6-10.
- Scholl, B. (1994) *private communication*.
- Sheridan, P. and Scholl, B. (1993a) *Sarracenia purpurea* ssp. *purpurea* f. *heterophylla* (Eaton) Fernald in Nova Scotia, *Carnivorous Plant Newsletter*, **22**: 106-107.
- Sheridan, P., and Scholl, B. (1993b) Noteworthy *Sarracenia* Collections, *Carnivorous Plant Newsletter*, **22**: 58-61.
- Shomin, R. (1993) Color variation of *S. purpurea* in a northern Michigan bog, *Carnivorous Plant Newsletter*, **22**: 12-13.
- Troup, R.L. and McDaniel, S.T. (1980) Current status report on *Sarracenia oreophila*, Report for U.S. Fish and Wildlife Service.
- Uphof, J.C.T. (1936) *Sarraceniaceae*. In Engler, A. and Prantl, K. (eds.), *Die natürlichen Pflanzenfamilien*, ed. 2, **17b**: 704-727.



The Savage Garden

PETER D'AMATO
Fertilizing Carnivores

Keywords: cultivation: fertilizers

There are two basic rules of green thumb concerning the application of artificial fertilizers on carnivorous plants: strongly dilute the fertilizer, and apply it as a foliar feed. That most plants can absorb minerals through their leaves is well known in horticulture. Spraying the foliage of plants with a fertilizer can be as effective as feeding them through their roots. This is also true with carnivorous plants; since most of their leaves are specially adapted to absorb minerals through

specialized digestive glands, artificial fertilizers can be as readily absorbed as insect prey. By applying fertilizers to the leaves and not the soil, you will not have to worry about hanging the mineral content of the plant's nutrient poor medium.

First, some general guidelines. If your plants are receiving a steady diet of insects, it is probably not necessary to feed them. But you may want to supplement their diets to try to grow even more vigorous plants. Or you might be growing carnivorous plants in a terrarium and may not want to hassle with feeding them insects. Perhaps you wish to display a plant at an upcoming flower show, and would prefer to present a beautiful but clean specimen, without the carcasses of digested insects distracting from the beauty of the leaves.

Some varieties of carnivorous plants benefit from a regular fertilization program. Others, however, seem to detest it. There are many fertilizers on the market developed for a wide variety of plants and purposes, and different products are available in different countries, but nowhere has a commercial fertilizer ever been developed specifically for carnivorous plants. Therefore, we must select and experiment from the general forms of fertilizers available.

Fertilizers For Acid-Loving Plants

These are readily available in most general nurseries. They are used for plants that prefer an acid soil, such as pines, firs, rhododendrons, and so on. Since many carnivorous plants grow in acid soils, this form of fertilizer is useful. I have used it successfully on all *Sarracenia* species, *Darlingtonia*, most but not all *Drosera*, temperate, acid-loving *Pinguicula*, most *Utricularia*, and *Dionaea*. Avoid using it on tropical *Pinguicula* and most *Nepenthes*.

Orchid 30-10-10

This form of plant food is used to promote foliage growth, as opposed to those formulated to stimulate flowering. I have used various brands on *Nepenthes*, *Heliamphoras*, tropical *Pinguicula*, most terrestrial *Utricularia*, and I believe it can be used successfully on most of the plants enjoying acid conditions as well.

Epiphyte Fertilizers

You may have to hunt for these in your nursery, as they are specifically developed for epiphytes such as *Tillandsia* and other Bromeliads. These plants live in tree branches high above the ground, where they obtain nutrients from small amounts of leaf debris that collect on their leaves and roots. Like carnivores, they absorb much of their nutrients through their leaves. Epiphyte fertilizers were developed to enhance mineral absorption through the leaves, and therefore can be quite beneficial to carnivorous plants. I have used brands such as "Epiphytes Delight" on all carnivorous species except those few which seem to dislike any fertilization.

Fertilizers for carnivorous plants are usually best when diluted to 1/4 or 1/2 of the manufacturer's directions. It can then be sprayed on the leaves of the plant. Thoroughly wet the foliage. It is usually necessary to do this only once or twice monthly during the growing season. Do not fertilize dormant plants! You can also

apply fertilizer to the soil of some plants that are grown with good drainage and are watered frequently from overhead with purified water. Plants-grown this way, such as *Nepenthes* in a greenhouse, will have excess minerals leached out of the soil every time the plants are watered. Therefore the much feared mineral build-up is avoided.

I would not otherwise apply fertilizers to the soil, especially in undrained containers such as bog gardens. Over time the excess minerals will accumulate in the medium and possibly harm the plants. Some growers prefer to fertilize their plants more frequently using a more heavily diluted ratio. For instance, a 10% solution applied weekly *Sarracenia* can work well. Three plants that are damaged by fertilizers are all sundews: *D. schizandra*, *prolifera* and *adela*.

Be warned that if you mist or spray fertilizers onto carnivorous plants, some will fall upon the soil surface and encourage algal growth. Algae will also grow in water trays and it is wise to clean these periodically. Algal growth on soil can be scraped away with a spoon when the build-up becomes substantial. Replace it with fresh soil. Club-mosses (*Lycopodium*) and other mosses will often utilize the small amounts of fertilizers that fall upon them from mists or sprays. However, *Sphagnum* dislikes fertilizer build-up and usually only succeeds in pots that are frequently leached with pure water.

It is not wise or necessary to apply fertilizers directly into pitcher leaves. This can upset the delicate chemical balance of their digestive juices, and will often encourage the growth of algae. Simply misting the foliage will benefit the plant enough.

Vitamin B1 is a supplement for plants commonly available in nurseries, and most popular is the american brand "Superthrive." This includes other vitamins and ingredients in its solution. These are not fertilizers as commonly supposed, and their use is often controversial among carnivorous plant enthusiasts. Some growers greatly applaud their use, while others find their benefits dubious. I have found products such as Superthrive good for carnivorous plants when one follows the manufacturer's instructions. Vitamin B1 has long been used as an ingredient for promoting root growth, primarily for garden and house plants. It is most often used when transplanting bare-rooted plants, and helps them overcome shock by encouraging root growth. Bare-rooted plants are usually soaked in a solution of 10-25 drops per gallon of water for half an hour or so before they are put into soil. For general plant care, manufacturers of products such as Supertrive recommend a "one-drop-per-gallon" application with each regular watering. I have noticed that bare-root soaking of carnivorous plants in Superthrive or vitamin B1 during the process of transplanting them can reduce losses due to shock. It is particularly helpful when deflasking tissue-cultured carnivorous plants. Using it has reduced considerably my plant losses due to shock if all other conditions were good. Keep in mind that a general application of such products in high doses will increase the growth of algae even more dramatically than fertilizers. So do not apply large doses directly to the soil.