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Carnivorous Plants

The term carnivorous plant often conjures up images from Sci-fi movies of some unsuspecting explorer deep in a remote jungle being snatched up by a monstrous, man-eating plant, never to be seen again (at least in that movie). While such depictions might be helpful in selling movie tickets, they place an unfortunate, sensationalistic stigma on what is a very interesting group of plants with some rather remarkable adaptations that aid in their survival.

To be classified as carnivorous, a plant must attract, capture, kill and digest its prey for the purpose of using its nutrients in its metabolic processes. The process of digestion suggests the secretion of enzymes (proteases, ribonucleases, phosphatases). Some plants such as the bromeliads benefit nutritionally from the decomposition of animal life in their vases or cups. However, since they do not secrete enzymes to aid in the decomposition process they are not considered to be carnivorous.

Although widespread in nature, carnivorous plants are very rare. Plant scientists estimate there are between 250,000 and 400,000 species of flowering plants on earth, yet only about 200 have been found that are carnivorous. Most inhabit areas such as bogs where the soil is thin and nutrient availability very poor. Water and sunlight are plentiful, however. Adaptations that allow these plants to derive their nutrients by means other than from the soil are obvious benefits to their survival.

Carnivorous plants employ a number of different techniques to capture their prey. These include traps that are pitfall, snap (or mechanical), flypaper, bladder, or lobster cage in nature or action. Plants with pitfall traps utilize rolled leaves whose margins are sealed to form a vessel (trap) filled with liquid to capture their prey. Slippery hairs, that point downward into the vessel, line its interior surface that is coated with wax. Insects are attracted to the leaves by nectar-secreting glands located along the rim. Upon landing, insects slip into the vessel and are unable to escape. As they attempt to climb out, their feet become coated with wax making them heavy and cumbersome. Soon the victim slips into a watery grave.



Yellow pitcher plant. www.forestryimages.com

The pitcher plant (*Heliamphora* sp.) is a good example of a carnivorous plant

with this type of trapping mechanism. The liquid in the pitfall trap contains digestive enzymes secreted by the plant to digest its prey once it is entrapped. Pitcher plants are native to areas with high amounts of rainfall, which poses an interesting problem relative to the trap overflowing. The latter would allow the prey to escape. To counter this, pitcher plants have a small gap in their rolled and zipped leaves that acts much like the overflow of a bathroom sink.

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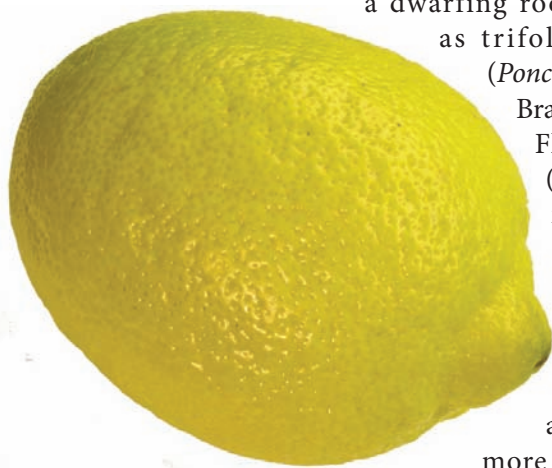
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Growing Citrus Indoors

Want to try your hand at something different? With a little effort, you can grow your own orangerie, just as Louis XIV's gardeners did so he could enjoy the fragrance of orange blossoms in his own conservatory. Not only was Louis XIV captivated by the scent of orange blossoms, but the fruit as well. The popularity of citrus continued to spread as it was introduced on all continents. Today, the sweet orange (*Citrus sinensis*) is the most commonly grown tree fruit in the world. Though most people are familiar with the sweet orange cultivars, such as 'Valencia,' 'Hamlin, and 'Navel' orange, the sour orange and many of its citrus relatives that can grow indoors are relatively unknown.

Thus, in Missouri, sweet citrus trees tend to be difficult to grow and overwinter indoors, but can be moved outdoors during the warm summer months. In contrast, acid citrus species are easy to grow in containers inside and many will bear several crops of fruit per year if given optimum growing conditions. Citrus trees grown indoors require a nursery container at least 14 inches in diameter with a loose, well-drained potting mix maintained at a 5.5 to 6.5 pH. A half whiskey barrel also makes a good container, as long as it has drainage holes drilled in the bottom. Because citrus favor a sunny climate, the trees should be placed in a room kept at 55 to 68 degrees Fahrenheit with a southern exposure with at least 8 hours of bright light per day. Trees also require high humidity (30-60 percent). Because most homes have an average humidity of only 15 to 20 percent, a cool mist vaporizer or humidifier may be used to raise the humidity. Alternatively, placing the container on a pebble tray that is partially filled with water and misting of the foliage frequently helps raise the humidity. A soluble citrus fertilizer that is formulated to maintain the medium at a slightly acidic pH may be applied about once a month, or a slow-release fertilizer can be pre-mixed into the potting medium. Trees require water when the top 2 or 3 inches of the potting medium feels dry. Over-watering is a common cause of fruit drop.

Most citrus trees grown indoors are grafted onto a dwarfing rootstock such as trifoliolate orange (*Poncirus trifoliata*), Brazilian Sour, or Flying Dragon (*Hiryu*). While many citrus plants can be grown from seed, they tend to be large trees and may take more than 7 years



to bear fruit. Because citrus trees are self-fertile, multiple trees are not required for pollination. However, if kept inside year-round, shaking the tree gently when flowers are open will facilitate pollination. Alternatively, pollen can be transferred from one flower to another using a cotton swab or small paintbrush.

There are many different types of citrus trees that can be grown indoors. For example, Calomondin sour orange is frequently grown as an ornamental with its fragrant white flowers and bright orange fruit (resemble small tangerines) even though its fruit is edible. 'Blanco' mandarin "orange" (*Citrus reticulata*) is not a true sweet orange because the peel easily separates from the very sweet fruit segments. 'Meyer' lemon trees are small, with few thorns, very fruitful and long-lived. 'Meyer' lemons have a slightly sweeter flavor than the commercial cultivars sold at grocery stores. 'Ponderosa' lemon trees produce a few fruit at a time, but they are juicy and very large, often as big as a sweet orange. 'Ponderosa' lemons also have a thick rind that extends their storage life.

Key (or Mexican) lime trees produce abundant, faintly fragrant flowers and that develop relatively small fruit. These limes are prized for their distinctive aroma and uniquely acidic juice. Originally used in the famous Key Lime Pie of the Florida Keys southern Florida, it is often replaced by the juice of the Tahiti lime today. The Tahiti or Persian lime produces slightly purple-tinged flowers throughout the year, but most are produced in January. Tahiti limes are vivid green, but lack the bouquet of the Key lime. Kaffir "lime" (*Citrus hystrix*) is a misnomer for true limes. Trees produce thorns and the fruit has a bumpy rind. The leaves are used as a spice in cooking Southeast Asian dishes.

Kumquat trees produce abundant fruit that are generally eaten whole, including the rind. Meiwa kumquats are rarely found at the grocery store but are small, round, pale orange fruit with a sweet flavor unlike that of the more common Nagami kumquat that is tart. The other "quats" are interesting hybrids of other citrus species and kumquats. They are prolific fruit producers that are most often used for ornamental purposes. The limequat is a cross between a Key lime and a kumquat that was originally made in 1909. These trees produce bright yellow fruit about the size of an egg. The orangequat is a cross between the Meiwa kumquat and the Satsuma mandarin. The citrangequat is a cross of kumquat and citrange (orange x trifoliolate orange). The acidic fruit is like an oval kumquat and has been used to make marmalades.

If you enjoy a beautiful plant, like an enticing floral scent, love to eat fruit, or enjoy using an unusual spice, there is a citrus tree for you that can be grown indoors with ease!

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Pest Corner

Insects on Indoor Plants

During the winter months, it is important to keep ahead of insects on your indoor plants. Many insects live happily in the warm conditions of a living room or greenhouse. They may enter the house from plants either recently purchased or brought in after the summer outdoors. Some insects may enter through windows or screens and many insects hitch a ride on our clothing. The other day I was watering my plants, and noticed more leaves than normal had dropped off my Schefflera plant. When checking the leaves, they were sticky with insect honeydew. I have a massive scale infestation, and only just noticed it. It is important to watch plants carefully for development of insect problems as they can be easily corrected if detected early. If ignored or unnoticed, insect problems can become quite difficult to control and can devastate indoor plants. Insect infestations can reach large populations in a short time indoors because there are no natural controls such as weather or predatory insects.

Only a small group of insects harm indoor plants. The most common are mealy bugs, scales, whiteflies and spider mites. Mealy bugs are soft-bodied insects and are usually covered with a white-powdery material. They feed on the plant with a piercing-sucking mouthpart that extracts plant juices. Mealy bugs are usually found clustered along leaf veins, on the underside of leaves and in hidden areas at leaf or stem joints. Their excess waste is excreted from



Diagram of spider mite on leaf. www.forestryimages.com

the body in a form that is referred to as honeydew as it contains a high amount of sugars and is very sticky. Many times this sticky substance is discovered on the leaves before the insect has been detected. Some methods to control mealy bug include attempting to remove them using a cotton swab dipped in

rubbing alcohol or by dislodging them with a strong stream of water.

Scales are another insect that excretes honeydew. Scales can be found on both sides of the leaves as well as on the twigs and branches. Scales are small, soft-bodied insects that are covered and protected by an outer waxy coating. Scales have piercing-sucking mouthparts and damage the plant by sucking plant juices. Scales are many times located along the veins of plants, or hidden in the crevices of stems or leaf axils. Many times you will discover a scale infestation by the sticky substance on the leaves of the plant, or you may notice yellowing or wilting leaves. Scales can many times be rubbed off the plant by hand, or with a toothbrush or cotton swab soaking in alcohol. Heavily infested plant parts can be pruned out and disposed of.

Whitefly can be one of the most difficult insect pests of indoor plants to control. They fly off the plant when disturbed, and the white appearance is very obvious. Whitefly have piercing-sucking mouthparts and are more closely related to scales and mealy bugs than flies. Their damage is similar as they remove plant juices and can cause the plant leaves to be mottled and yellow. If indoor plants are infested with whitefly, you might consider disposing of the plants. If outdoor temperatures allow, whitefly populations can be adversely affected by outdoor weather conditions and predatory insects that feed on the whitefly, thus placing plants outdoors will be beneficial in controlling the insect. A vacuum cleaner can also be used to vacuum up the adults as they fly, but you need to continue this as more adults will emerge over time from eggs laid in the soil.

Spider mites are a very common plant pest. They reduce plant vigor by sucking plant juices and many times leaves turn yellow and drop. Spider mites are not insects, but rather belong to a class that contains ticks and spiders. They are very small and difficult to see with the naked eye. Spider mites have eight legs instead of insects which have six. Many times spider mites produce a fine Webbing that may be spotted on the plant, and plants infested with spider mites generally look unhealthy. When a leaf or branch is tapped over white paper, small specks that appear as pepper or dust may be seen to move.

Information for this article was obtained from the Missouri Botanical Garden Hortline Guidesheet series.

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2007 Plant Diagnostic Clinic Report

The samples sent to the plant diagnostic clinic each year help us to obtain data on plant problems occurring in Missouri, as well as to illustrate the services the diagnostic clinic provides to citizens of Missouri. The Plant Diagnostic Clinic is part of the Soil Testing and Plant Diagnostic Service Laboratories at the University of Missouri and handles samples submitted for disease, insect, and weed identifications, as well as management recommendations. A majority of clinic samples, approximately 75 percent of samples received, came directly from various agencies, businesses, and private citizens throughout the state. The clinic also supports regional extension specialists, who submitted 25 percent of the samples received. Most clinic operations are handled by clinic staff, however other Division of Plant Science Agronomy, Entomology, Horticulture, and Plant Microbiology and Pathology extension faculty handle insect and weed identification and assist when needed.

The 2007 growing season represented an increase in sample submissions over the past few years. Most samples were submitted through the mail while some were personally delivered to the clinic. A few digital photos were also submitted by email. Samples were submitted from 81 Missouri counties with 22 percent of those submissions from Boone County. Nearly 90 percent of the samples were received between May and September. Most of the sample submissions were for plant problem diagnosis, although 7 percent and 4 percent of submissions were for insect or plant identification respectively.

In 2007, woody ornamental and field crop samples represented a majority of samples submitted to the clinic. We also received fruit, turf, vegetable, herbaceous ornamental, and forage samples (Figure 1). The top five plants submitted to the clinic were soybean, oak spp., corn, pine spp. and tomato respectively. Environmental factors, especially the hot, droughty summer weather the previous few growing seasons and the late spring freeze this year played important roles in the damage observed associated

with many submitted samples, especially woody ornamental samples. Approximately 33 percent of the plant disease samples submitted to the diagnostic clinic were affected by abiotic (non-living) problems, although many samples with biotic disease issues may also have been predisposed to infection by abiotic problems. An additional 8 percent of plant disease submissions had insect/arthropod problems. Many of these samples had spider mite injury (Figure 2). While sample submissions from many plant species were so variable we often received just a single sample with a specific disease, significant numbers of certain horticultural samples were received and are described below:

Many of the tree problems were related to plant stress this year, especially samples from pine, yew, and other evergreens, which displayed severe dieback in central and southern Missouri after the spring freeze. Often these samples were from plants that continued to grow normally for several weeks after the freeze until more stressful weather conditions developed. More information on this issue can be found at <http://ppp.missouri.edu/newsletters/meg/archives/v13n7/meg5.htm>.

Some additional white pine samples appeared to have general white pine decline issues and displayed general wilting, chlorosis and death resulting from root problems and environmental stress. Information is available on white pine decline at <http://www.ppd.l.purdue.edu/ppdl/weekpics/8-16-04.html>. A few Austrian pine samples had Diplodia tip blight, while Dothistroma needle blight was also observed on a few samples. Scotch pine was less frequently submitted this year, however we did diagnose Diplodia tip blight and Cyclaneusma needle cast. A majority of the spruce samples were Colorado blue spruce with needle cast diseases caused by Rhizosphaera and Stigmina. Other spruce samples had spider mite infestations or had a needle drop caused by environmental stress. Sudden needle drop (SNEED) was responsible in a few cases. Information on

Figure 1: Plant sample submissions in 2007

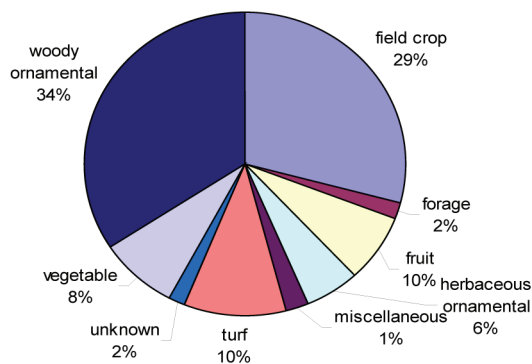
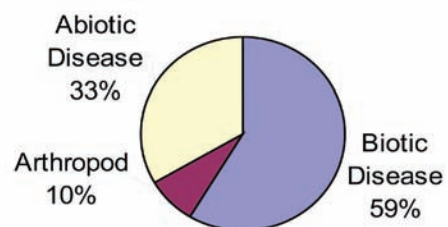


Figure 2. Primary diagnosis for samples submitted for plant problem analysis in 2007.



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The Importance of Pesticide Applicator Training

The safe and responsible use of pesticides is of up-most importance to Missouri's agricultural sector and its citizens. All pesticides used in the U.S. must be registered (licensed) by the Environmental Protection Agency (EPA). Registration of pesticides assures they will be properly labeled and if used in accordance with specifications, will not cause unreasonable harm to the environment.

During the 1960s, there arose a new awareness of ecology and the environmental resulting in an outcry of public concern over all types of environmental contamination from smoking, belching chimneys and smog; foul water, rivers and streams, as well as pollution from pesticides. Up until that time the old adage of "if a little works, a lot will work better!" was the major premise for applying chemicals to address pest problems on the farm and around the home.

As a result of this public outcry, the EPA and Congress enacted a "new" pesticide law, the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) in the early 1970s that provided the impetus to establish a national program of federal/state certification of pesticide applicators. The primary focus of this new law was to provide federal control of pesticide distribution, sales, and use. Under FIFRA, the EPA was given authority not only to study the consequences of pesticide usage but also to require users to register when purchasing restricted use pesticides. One of the goals of this program would be to provide the quantity and quality of information needed for various levels of persons using pesticides, ranging from structural pest control specialist to farm laborers.

Because of continuing public concerns over potential effects of pesticides on human health and the environment, new laws and regulations that govern pesticides and their use make an intensive training program essential. For example, there were several changes in the recently implemented Worker Protection Standard. Additional new legislation which provides training opportunities for this program includes the Endangered Species Program and the Federal Recordkeeping Requirement.

The University of Missouri along with the Missouri Department of Agriculture provides certification and recertification for this diverse sector of individuals involved in the pesticide industry.

Since the inception of Missouri's pesticide training program, over 6,000 commercial pesticide applicators have received at least initial training. Every three years, these applicators must be recertified by training programs conducted

by University Extension as mandated by the Missouri Department of Agriculture's Bureau of Pesticide Control.

The University of Missouri Extension Pesticide Program provides educational outreach for individuals aspiring to become licensed commercial pesticide applicators as well as private applicators. If you engage in the application of a restricted-use pesticide for hire you are considered a commercial applicator. If you engage in pesticide application for the purposes of producing an agricultural commodity on property you or your employer owns, or rent without compensation other than trading of personal services between producers of agricultural commodities you are considered a private applicator. Private pesticide applicator training is available at the local level through your regional extension offices. It requires no exam to be certified or recertified.

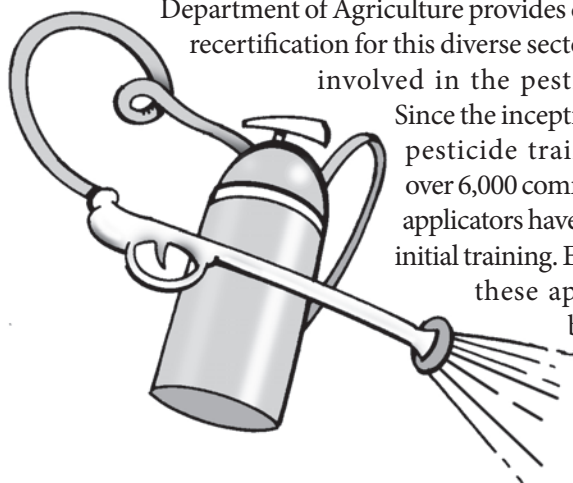
The commercial applicator program involves two areas of instruction: a core training session in which all trainees attend and the specialty category section in which the attendees conduct their business activities. The core training session provides basic pesticide knowledge which impacts all pesticide applicators. The instruction is provided by persons representing several agencies including the Missouri Department of Agriculture, Missouri Department of Natural Resources and University Extension.

Missourians wishing to become licensed commercial applicators must pass a core exam, as well as a category exam tailored to the specific area in which they wish to become certified. There are 11 different specialty categories within the commercial PAT program (category 1 has two sections: 1A: Agricultural Plant, and 1B: Ag. Animal Pest Control and category 7 has three sections: 7A: General Structural Pest; 7B: Termite; and 7B: Fumigation Pest Control). Applicators can be certified in one or more of the following categories depending on which area of expertise you are qualifying for. For a complete list of applicator categories, visit us at <http://ppp.missouri.edu/pat/>.

Training programs are conducted every January in Springfield, Kansas City, Cape Girardeau, St. Louis and Columbia. For dates and locations check out the Plant Protection Programs Web site at: <http://ppp.missouri.edu/pat/>.

Information used in this article came in part from MU Extension publications and Purdue Extension

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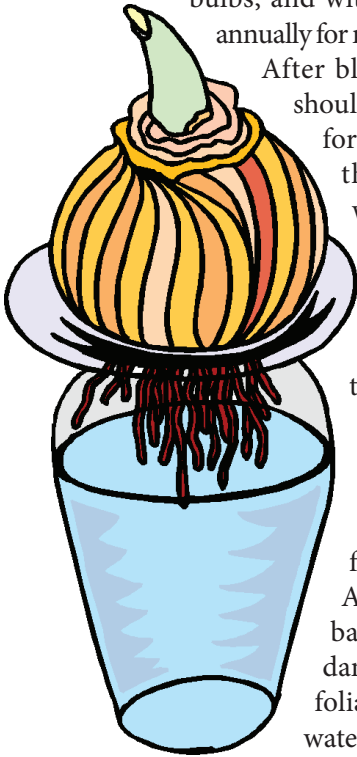


After Bloom Care for Indoor Bulbs

It is a very common practice to “force” bulbs to bloom indoors during the winter months. The most common are daffodils, hyacinths, tulips, and amaryllis. Many of you may purchase bulbs that are almost ready to bloom from the grocery stores or nursery/Florist retail shops, or you may have purchased and forced your own bulbs. But what do you do with the bulbs once they are done blooming?

Amaryllis are perhaps the most showy of the indoor bulbs, and with minimal care, will repeat annually for many years of lovely blossoms.

After blooming, amaryllis flowers should be cut off to prevent seed formation. The foliage should then be placed in a sunny, warm location and treated as a houseplant. Once the danger of frost has passed, place the plant outdoors in a location in the garden that receives minimal sunlight. Keep the plant fertilized at regular intervals throughout the summer months to allow the nutrients needed for blooming to build up. Amaryllis should be brought back indoors before the first danger of frost occurs. Let the foliage dry out by withholding water and storing in a cool, dark location. Once the foliage has dried



down completely, the bulb usually will need to be kept dormant for eight weeks before it will re-bloom. If the bulb gets too large for the pot, simply repot into a slightly larger container. If you don't repot, it is good to top dress with fresh potting soil. If plantlets develop alongside the original bulb, you can gently separate these and repot the plantlets. They can also be left to bloom alongside the original bulb, resulting in several amaryllis blooming at one time.

Other bulbs such as daffodils, tulips, hyacinths, and crocus are typically planted outdoors once the indoor blooms have faded. Outdoor planting of forced after they have faded is never a sure thing. Forced bulbs that have bloomed indoors have been through an exhausting process and may or may not re-bloom in the garden. Once they have finished flowering, plant them out into the garden and provide with water and a slow release bulb food. Wait until the leaves brown and die back before removing the foliage. Daffodils and crocus typically do well naturalizing into the garden after blooming indoors. Tulips do not readily come back even when originally planted in the garden, and thus generally not worth the trouble to re-plant outdoors. These should be enjoyed indoors during bloom and then tossed out or composted. Hyacinths may come back in the garden, usually not as robust in subsequent years.

Reference for Amaryllis: University of Minnesota Extension Service. For more information, visit their Web site at <http://www.extension.umn.edu/distribution/horticulture/DG1116.html>.

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SNEED can be found at <http://www.na.fs.fed.us/fhp/fhw/csfnw/nov03/sneeddetail.pdf>.

Many of the oak sample submissions were requests for oak wilt testing from oaks displaying decline and dieback symptoms. While we did have some positives, many of these were negative suggesting other factors and perhaps general plant stress being an underlying factor. <http://extension.missouri.edu/explore/agguides/forestry/g05200.htm>. Other oak samples had bacterial wetwood, lacebug feeding injuries, and Tubakia leaf spot.

We also received a large number of tomato samples this year. A majority of these were from backyard gardens. Many of the tomato samples from central Missouri were affected by leaf mold (*Fulvia fulva*). Also common were herbicide injuries, Fusarium wilt, Fusarium stem rot, and rain wilt, an abiotic problem that occurred after extremely heavy rains left soils temporarily saturated in some areas of the state. We also received some tomato samples from high tunnel

growers that were affected by pith necrosis (*Pseudomonas corrugata*).

Turf submissions were divided between warm and cool season grasses. Many of the turf submissions were affected by environmental stress, however, brown patch was common on fescue (especially in areas with high rainfall), and summer patch was common on bluegrass samples.

Finally, we had several submissions of samples with cucurbit downy mildew (*Pseudoperonospora cubensis*). Most of our cucurbit downy mildew submissions were from western Missouri, however we also had some samples from the east central portion of the state.

More information on the University of Missouri Plant Diagnostic Clinic, fees and services are available at: <http://soilplantlab.missouri.edu/plant/index.htm>.

You can also contact the lab at plantclinic@missouri.edu or 573-882-3019

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Carnivorous Plants continued from page 1

Plants with snap mechanisms use rapid leaf movement to snare their prey. The Venus flytrap (*Dionaea muscipula*) is an excellent example of a plant with such a mechanism. This unusual plant catches insects by means of two wing-like projections at the ends of its leaves.

These trap-like leaf parts are brightly colored on the inside to attract unsuspecting insects and have teeth-like projections along their edges, which helps to hold the prey as it closes. As the insect lands on these traps and moves into them, small hairs trigger them to snap together within a fraction of a second. Interestingly, traps contains only six trigger hairs each, two of which must be contacted simultaneously by the prey in order for the trap to close. Plant scientists still are uncertain what causes them to close so quickly.

One might wonder how the plant knows whether or not it has captured anything worth consuming when the trap snaps shut. The answer once again involves the six trigger hairs. Trapped prey will continue to thrash about inside the trap further stimulating the trigger hairs. This prompts the plant to close the trap even tighter and to begin the digestion process. If an inanimate object falls into the trap and triggers it to close, the trigger hairs will not be further stimulated and the trap will reopen within about 12 hours.

Some plants such as the sundews (*Drosera* sp.) secrete sticky, glue-like substances that act like flypaper to trap their prey. Leaves of this genus range from slender and elongate to broad and spatulate in shape. Each leaf is covered with numerous tubular hairs that contain glands on their ends, which secrete a sticky, glue-like substance that has the appearance of dew as it sparkles in the sun and attracts insects. Once entrapped by the sticky dew, the prey is pulled close to the surface of the leaf where digestive enzymes aid in absorbing nutrients from it.

Bladders are trapping mechanisms found exclusively on plants belonging to the genus *Utricularia*, which contains the bladderworts. Many of the latter are aquatic in nature although there are terrestrial species. The bladders on bladderworts have small openings equipped with a hinged door. They physically suck in prey by creating a vacuum within the bladder whenever prey (usually aquatic organisms since the bladders are submerged) activate a trigger mechanism.

Some plants, such as the corkscrew plants (*Genlisea*), possess chambers that are easy for prey to enter, but hard to leave. Such plants are classified as having lobster cage trapping mechanisms and are most often aquatic in nature. Corkscrew plants contain a Y-shaped modified leaf with inward-pointing hair. Prey (aquatic protozoa) enter the leaf through a spiral structure that wraps around the two arms of the Y. Eventually, the prey is forced to move toward the bottom (leg) of the Y, which posses a stomach-like appendage that digests the prey.

Growing carnivorous plants is an interesting but rewarding challenge for the plant enthusiast. Venus flytrap, pitcher plant and sundew are some of the more common types grown indoors. Since these are bog plants in nature, they need constant moisture and high humidity. A closed terrarium provides the best growing environment for them in the average home. They also need an acid, organic growing medium such as sphagnum peat or sphagnum moss. A mixture of two parts sphagnum peat, two parts sphagnum moss and one part clean sand is a suitable growing medium for many of the carnivorous plants.

The need these plants have for acid conditions precludes the use of hard, alkaline water. Collected rain water, de-ionized or distilled water should be used exclusively. Fortunately, in a closed terrarium carnivorous plants will require little additional water once established. Fertilization also should be kept to a minimum. Feeding them an occasional insect is helpful; a few small insects per month should suffice. Avoid the temptation of using meat (e.g., hamburger) instead of insects. If catching insects is not to your liking, then fertilize them with a nutrient solution one-fourth the recommended concentration about every two months during the spring and summer only.

Carnivorous plants need bright light for optimum growth and color development. Setting a closed terrarium in a sunny window is likely to cause overheating in which case the terrarium must be opened to prevent temperatures from building up. A more practical solution to the need for bright light might include using fluorescent artificial light positioned as close to the terrarium as possible without touching it. Fluorescent lights do not emit significant amounts of heat, but will provide the plants with adequate amounts of radiant energy for growth and development.

In spite of the fact carnivorous plants consume insects, certain species of the latter can be problematic. Watch for scale, mealybug, aphid, thrips and spider mite. If present, hand removal or isopropyl alcohol applied with a cotton swab are advised since carnivorous plants are quite sensitive to most pesticides.

In closing, perhaps we should address the scenario described in the opening paragraph of this article and question whether or not there are carnivorous plants that pose a danger to humans. A relative of the pitcher plant belonging to the genus *Nepenthes* has the distinction of being the largest known carnivorous plant. It possesses vessel-like traps 12 inches in length on vines that might be 50 feet long. Although its traps have been known to devour frogs and an occasional small rodent, the greatest danger they pose to humans is from tripping over them as one hikes through the rainforests of Southeast Asia, their native habitat.

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February Gardening Calendar

Ornamentals

- Winter aconite (*Eranthis sp.*) and snowdrops (*Galanthus sp.*) are hardy bulbs for shady gardens that frequently push up through snow to bloom now.
- Water evergreens if the soil is dry and unfrozen.
- Inspect summer bulbs in storage to be sure none are drying out. Discard any that show signs of rot.
- Enjoy the fragrant blooms of the Ozark Witch Hazel flowering in shrub borders or wooded areas on warm sunny days.
- Take geranium cuttings now. Keep the foliage dry to avoid leaf and stem diseases.
- **Weeks 2-4:** Sow seeds of larkspur, sweet peas, Shirley poppies and snapdragons where they are to grow outdoors now. To bloom best, these plants must sprout and begin growth well before warm weather arrives.
- **Weeks 2-3:** Seeds of slow-growing annuals like ageratum, verbena, petunias, geraniums, coleus, impatiens and salvia may be started indoors now.
- **Week 4:** Dormant sprays can be applied to ornamental trees and shrubs now. Do this on a mild day while temperatures are above freezing.
- **Week 4:** Start tuberous begonias indoors now. "Non-stop" varieties perform well in this climate.

Vegetables

- Season extending devices such as cold frames, hot beds, cloches and floating row covers will allow for an early start to the growing season.
- Start onion seeds indoors now.
- Run a germination test on seeds stored from previous years to see if they will still sprout.
- Don't work garden soils if they are wet. Squeeze a handful of soil. It should form a ball that will crumble easily. If it is sticky, allow the soil to dry further before tilling or spading.
- **Weeks 2-4:** Sow celery and celeriac seeds indoors now.
- **Weeks 3-4:** Sow seeds of broccoli, cauliflower, Brussels sprouts and cabbage indoors now for transplanting into the garden later this spring.
- **Weeks 3-4:** If soil conditions allow, take a chance sowing peas, lettuce, spinach and radish. If the weather obliges, you will be rewarded with extra early harvests.

Miscellaneous

- To avoid injury to lawns, keep foot traffic to a minimum when soils are wet or frozen.
- When sowing seeds indoors, be sure to use sterile soil mediums to prevent diseases. As soon as seeds sprout, provide ample light to encourage stocky growth.
- Repot any root-bound house plants now before vigorous growth occurs. Choose a new container that is only 1 or 2 inches larger in diameter than the old pot.
- **Weeks 1-2:** Now is a good time to learn to identify trees by their winter twigs and buds.
- **Weeks 1-2:** Branches of pussy willow, quince, crabapple, forsythia, pear and flowering cherry may be forced indoors. Place cut stems in a vase of water and change the water every 4 days.
- **Weeks 2-4:** Watch for squirrels feeding on the tender, swollen buds of Elms, Hickories, Oaks and other trees as spring approaches.
- **Weeks 2-4:** Maple sugaring time is here! Freezing nights and mild days make the sap flow.
- **Weeks 2-4:** Begin to fertilize house plants as they show signs of new growth. Plants that are still resting should receive no fertilizers yet.
- **Weeks 3-4:** Now is a good time to apply appropriate sprays for the control of lawn weeds such as chickweed and dandelion.