

Long Sessions ~ 2:15 pm – 3:30 pm

Resources submitted by:

Rain Barrels
Jennifer McCoy

Solar Cooking
Cindy Wolfe

Hypertufa Basics: Getting “Tuf” with Container Gardens
Celia Steigerwald

Carnivorous Plant Container Gardens
Heather Fleming

Cobb County Water System: Rain Barrel Fact Sheet

A rain barrel is a rainwater harvesting system that is connected to a downspout from a house or building. By collecting rainwater, one can save energy, water, and money. Rain barrels also help reduce erosion and storm water runoff and increase water quality.

How do I set up a Rain Barrel system at my house, school or office? There are two options: purchase pre-made rain barrels or create your own.

The following instructions are for creating your own barrel.

Obtain the following materials:

- ◆ a sturdy barrel
- ◆ mesh screen
- ◆ plastic faucet
- ◆ steel washer
- ◆ o-ring
- ◆ long zip tie
- ◆ plastic elbow
- ◆ plastic drain cover
- ◆ down spout flex elbow
- ◆ #1 or #2 plug

Tools/Equipment needed:

- ◆ drill
- ◆ 7/8" paddle bit (for 1/2" faucet)
- ◆ 5/8" paddle bit (for plug)
- ◆ jig saw
- ◆ scissors
- ◆ channel lock



Athens-Clark County Rain Barrel, 2006

- Step 1.** Cut an opening in the top of the barrel the size of the drain cover.
- Step 2.** Cut a piece of mesh screen slightly larger than the drain cover. Secure the mesh screen to the drain cover with the zip tie. Insert the drain cover into the opening on top of the barrel.
- Step 3.** Drill one hole at the bottom to drain the barrel. Put the plug in the bottom hole.
- Step 4.** Drill a hole for the faucet, approximately 6 inches from the bottom.
- Step 5.** Placing a large steel washer over the faucet threads. Slide an o-ring over the faucet threads. Place the faucet into the hole in the barrel and screw a plastic elbow onto the assembly from the inside of the barrel.
- Step 6.** Cut the downspout to just above the rain barrel. Attach the downspout flex elbow to the downspout.
- Step 7.** Slide the rain barrel under the spout lining up the mesh screen opening with the spout. Spray water on the roof and check to make sure the rain barrel and mesh opening are in the right location.
- Step 8.** Optional: paint your rainbarrel using Krylon Fusion paint.
- Step 9.** Use water collected with rain barrel for gardening purposes.





Cobb County...Expect the Best!

Cobb County Water System 2008 Rain Barrel Project Materials, Costs & Sources

Item	Item Description	Supplier	Total Cost	Cost/barrel
Barrel	55 gallon food grade drum	Advance Drum	22.00	\$22.00
Mesh Screen*	Insect screening (roll)	Ace Hardware	10.00*	.25
½” Plastic Faucet	Acetal sink faucet (PVC)	Ace Hardware	2.99	2.99
Steel Washer	¾” Flat Steel Washer	Ace Hardware	.43	.43
O-Ring*	#12 O-rings 10/bag	Ace Hardware	1.27*	.13
Plastic Elbow	PVC schedule 40-90° elbow	Ace Hardware	.49	.49
Cable Tie*	24” Zip Tie 10/bag (HVAC)	Lowe’s	4.67*	.47
Plastic Drain Cover	6” round grate	Ace Hardware	2.99	2.99
Downspout Flex Elbow	Plastic extension for downspout	Ace Hardware	\$2.00 – 8.00	n/a
Plug	#1 or #2 rubber stopper	Ace hardware	.30	.30
Total	*Supplies multiple barrels		Approx \$30.00/barrel	\$30.05

Suppliers:

Advance Drum Service, Inc.
1835 Dickerson Drive
Mableton, GA 30126
404 699-7048

Vickery Ace Hardware
881 Concord Rd.
Smyrna, GA 30080
770 435-4567

Cobb’s Rain Barrel Project is funded by the Cobb County Water System

Watershed Stewardship Program
770-528-8215
water_RSVP@cobbcounty.org

Water Efficiency Program
770-528-6244
kathy.nguyen@cobbcounty.org



SOLAR COOKING

*Instructions, Classroom
Activities, Recipes, and
More!*

Outdoor Class Symposium
November 14, 2008
Cindy Wolfe
Dept. of Natural Resources

**Got more questions? Please contact Cindy Wolfe at:
cindy@greenandhealthy.org**



**We would like to extend our gratitude to Papa John's Pizza for
graciously donating several pizza boxes for this demonstration.**

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ALL ABOUT SOLAR OVENS

A solar oven or solar cooker is a device that uses sunlight as its energy source. Because they use no fuel and they cost nothing to run, humanitarian organizations are promoting their use worldwide to help slow deforestation and desertification, caused by using wood as fuel for cooking.

Here's how they work:

Concentrating sunlight: A type of reflective metal (foil) is used to concentrate light and heat from the sun into a small cooking area.

Trapping heat: A clear cover made of plastic or glass will allow light to enter, but once the light is absorbed and converted to heat, the cover will trap the heat inside using the Greenhouse Effect.

A solar oven can reach temperatures up to 150 degrees!

The Benefits of Solar Cooking:

- No smoke or pollution
- No fuel costs
- No need for fuel leads to preservation of natural resources

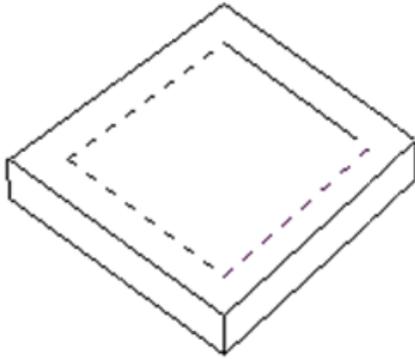
To make your solar oven, you will need:

- Pizza box
- Aluminum foil
- Clear plastic
- Non-toxic glue, tape, scissors, ruler, magic marker
- wooden dowel or straw

BUILDING INSTRUCTIONS

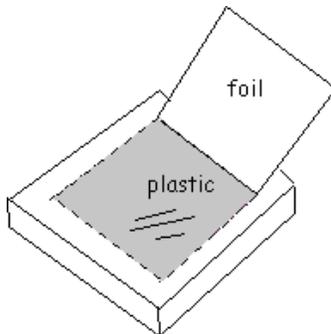
STEP ONE:

Draw a one-inch border on all four sides of the top of the pizza box. Cut along three sides leaving the line along the back of the box uncut.



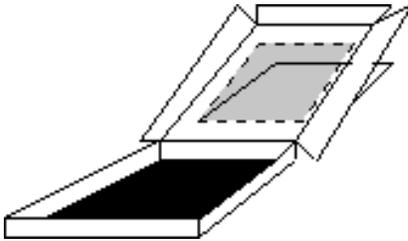
STEP TWO:

Form a flap by folding back along the uncut line to form a crease. Cut a piece of aluminum foil to fit on the inside of the flap, smooth out any wrinkles, & glue into place. Measure a piece of plastic to fit over the opening you created by forming the flap in your pizza box. The plastic should be cut larger than the opening so that it can be taped to the underside of the box top. Be sure the plastic becomes a tightly sealed window so that the air can't escape from the oven interior.



STEP 3:

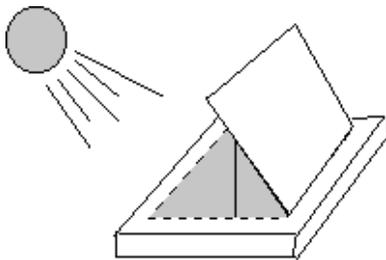
Cut another piece of aluminum foil to line the bottom of the pizza box and carefully glue into place. Cover the aluminum foil with a piece of black construction paper and tape into place.



STEP 4:

Close the pizza box top (window), and prop open the flap of the box with a wooden dowel, straw, or other device and face towards the sun. Adjust until the aluminum reflects the maximum sunlight through the window into the oven interior.

Your oven is ready!



RECIPE IDEAS

From “apples” to “ziti,” solar ovens can cook just about anything, given the time and preparation! Easy ideas include s’mores, english muffin pizzas, hot dogs, nachos, or baked apples.

For a LONG list of solar oven recipe ideas, visit:

<http://solarcooking.wikia.com/wiki/Recipes>

EXAMPLE LESSON PLANS TO USE WITH THE SOLAR OVEN

Elementary School lesson Plan Idea

<http://www.learnnc.org/lp/pages/3253>

Students will build a solar oven, and measure and record the temperature inside the oven over a period of time. They will then choose and carry out a cooking project for the solar cooker.

Applicable GPS Standards:

Math

M(3,4,5)P4

M(3,4,5)D1

M4M2;M5D2

Science:

S2E2;S2P2; S3P1

Middle School Lesson Plan Idea:

**<http://www.proteacher.com/110015.shtml>
under “reflective solar cooker”**

Applicable GPS Standards:

S6E2, S6E6, S8P4, S8P2, CS2, CS3, CS4, CS5, CS8

High School Lesson Plan Idea

<http://www.re-energy.ca/pdf/solar-heat-lp.pdf>

Students will build a solar oven, and test the efficiency of the oven using two baking pans, each of a different color, over a series of five-minute intervals. They will record the temperature changes on their worksheet. Students will also identify aspects of the solar oven construction, record steps of the construction and identify building plan modifications.

HYPERTUFA POTS AND TROUGHES

Hypertufa is a man made substitute for tufa rock. Tufa is a spongy cellular rock found in limestone country and especially where water has been involved in the wearing and leaching out of the original materials to effect a porous spongy consistency. In many countries throughout the world this natural stone has for centuries been hollowed out and carved for tubs and planters.



Materials

- Peat moss
- Portland cement
- Sand, vermiculite or perlite
- Chicken wire for large pots or concrete reinforcement fibers for reinforcement
- Cement dye, optional

Hypertufa Recipe

- Portland cement - 1 part
- Peat moss- 1 1/2 parts, Sift through finger to remove all lumps
- Sand, vermiculite, or perlite – 1 1/2 part

Procedures

1. Mix the above recipe ingredients dry wearing rubber gloves on your hands until completely homogenous.
2. Add one-part water and mix well. Add additional water if needed to make a mixture that is just moist enough to stay together in a ball. (If worked in your hand the water should just be visible between the fingers when a handful is firmly squeezed—a moist cottage cheese consistency.)
3. Next, take a 10-minute break from the whole mixing process. Let the water "soak in" a bit. This is an invaluable suggestion ... so try to do it, as it will pay off in the long run with a better pot.
4. Use chosen mold. (i.e. a 2 gallon black plastic pot.) Line with plastic (i.e. a grocery store bag) or spray with cooking spray or WD40 for easy removal from mold.
5. Place enough concrete mixture in bottom of mold to cover about 1" to 1½" deep for small pots.
6. For drainage hole cut a one-half inch dowel to a selected length of 1 to 1½ and insert into center of pot to make the holes. Do not remove at this time.
7. Continue to add mixture and work up the sides of the mold, one hand on the outside of mold, one on the inside, pressing and working until most of the air is expressed and sides are smooth. At this point check for uniformity of thickness in the sides (about 1" in thickness). Recheck smoothness of bottom. Work to compact and smooth. Build to the desired height.
8. Using fingers round the edges of the pot, as sharp edges can easily be chipped or broken so by rounding edges you have a more durable pot.

Tools

- Rubber gloves - heavy
- Face mask to protect from dust
- Plastic bags or sheet up to 4 mils thick
- Pot or tub for form
- Mixing tub or wheelbarrow
- Screwdriver
- Wire Brush
- Wooden dowel 1/2"-3/4"
- Water spray bottle

9. When the pot is at the desired height and thickness carefully place it inside a plastic bag and tightly seal it inside.
10. Now for the slow cure. After approximately 24 hours you will want to carefully open the bag and see if your fingernail can scratch off any tufa. If you can, seal it back up and wait another 12-36 hours. When you can't easily scratch any off tufa, you're ready to unmold your object. Remember your object is still a bit fragile! Remove from the mold carefully. If you want to add texture to the object's surface, you need to do that now before you move on to the next step.
11. Remove dowel from drainage hole.
12. Gingerly place your object back into the plastic bag and seal tightly. You can now keep your object at room temperature. Continue to keep it moist, misting occasionally if needed. Allow it to cure for at least another week but the longer it can slowly cure in a moist environment, the better. At this point, most tufa makers will keep the object bagged up for a month or more. (I've seen it written that a one-month cure time can result in 25% stronger tufa). Patience is a virtue. The longer and more slowly it can cure in a moist environment, the stronger your hypertufa will be. Curing will also take longer at cooler temperatures.
13. Due to the Portland cement, the 'tufa ends up being very alkaline. Soak the 'tufa planter in a larger container of fresh water, changing the water every day for 3 days. It is plant safe by then. Other recommendations are to leave the planter outside for 1 or up to 2 months, allowing it to weather naturally by being rained upon.
14. Happy Planting! These pots are very porous. Great for rock garden plants, succulents, grasses, and bonsai. Note: This pot will continue to cure and get stronger as it's used. In the presence of water the concrete will cure for many years.

ENHANCING HYPERTUFA WITH MOSS & ALGAE

Paint with one of the following solutions to enhance moss and algae growth.

- 2 sugar cubes/1 can beer mixed with pulverized moss or
- Buttermilk and pulverized moss



HYPERTUFA BIRDBATHS

To make a birdbath the hypertufa should be about 3" thick. It is porous, so to make it hold water have one person pour hot liquid paraffin around the basin. The 2nd person smears the wax around wearing heavy rubber gloves.

LARGE HYPERTUFA CONTAINERS

To make very large pots or tubs use chicken wire reinforcement in-between two layers of the hypertufa mixture.

Helpful hints:

To give you an idea of "how much hypertufa does it take to make a ...?" A loose rule-of-thumb:

30 lbs. of Portland cement, 1 cubic foot compressed peat moss,

and 1.5 cubic feet of perlite should yield enough mixture to make an 8 x 12 x 12 trough.

Tufa Advantages

- Offers the ability to provide exact soil mixes and conditions for particular plants.
- The containers can be shifted from sun to shade and moved to protect from frost and wind.
- Alternative to those gardeners restricted by lack of garden space in small suburban sections and apartment.
- Tubs are also excellent for general use in gardens offering special areas of interest and tasteful features. It looks old and attracts lichens and mosses and has a natural look entirely compatible with plants and shrubs in the garden.
- Hypertufa tubs are very plant friendly. The bulky and porous wall thickness acts as a reservoir for water from which the plants can drink between showers and waterings. Being porous it allows for easy passage of air to the root systems - a feature often disregarded when using terracotta and plastic pots.
- Trough gardens are excellent for elderly gardeners who can no longer manage the terrain and conditions of more conventional gardens. Pots and tubs can be elevated to allow easier gardening.
- They can also serve useful temporary homes for cherished plants for those in transit or living in rented or mobile homes.
- In cool shady areas pots and tubs can provide great little special effects particularly bright glowing perennials or annuals potted up and tucked into shady green areas as a vivid contrast.



Type of Pots and Their Release Agents

- *Wooden or Metal molds*—Hypertufa adheres to wooden or metal mold, so line these with plastic. If you don't, you more than likely won't be able to get the 'tufa to release from the mold.
- *Plastic molds*—Depending on the size and/or shape of a plastic mold, you've got a few choices you can use to allow the release of the hypertufa from the plastic. Besides wrapping your hypertufa mold in plastic wrap, or large trash or garbage bags, you can use:
 - Vaseline
 - Motor oil (new or used)
 - Cooking spray (i.e. PAM is one brand)
 - Vegetable oil
 - Mineral oil
 - WD-40



Spread a thin layer of any of these onto the mold. Don't worry -- the oils will not harm the 'tufa and will not be noticeable after a few weeks out in the elements.

- *Terra cotta pots and planters* —There is a larger degree of difficulty when trying to remove the new hypertufa pot from terra cotta.. Without the right release agent, the tufa will literally bond itself to the terra cotta. You MUST FIRST soak the terra cotta item OVERNIGHT in water. Then apply a generous coating of the equal parts mineral

oil/corn oil blend. Then pat on your hypertufa mixture.

Container Garden Planting Tips

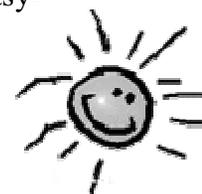
Containers eliminate much of the guesswork in gardening. They are an excellent way to learn about gardening because they're easy to plant and give great results quickly. There is no need to tolerate difficult soil or make do with marginal sites. You can start with any potting mix, picking the perfect blend for the plants you want to grow. You can set the pot where it will have the ideal amount of sun or shade. You provide water when nature comes up short, and you schedule the fertilization. There is nothing left to chance, assuming of course that you take the time to tend the potted plant. In return, containers become living flower arrangements that are easily enjoyed.



- When planting a container garden, avoid real soil. Instead, choose a soil-less mix, a mixture of peat moss, vermiculite and perlite sold as patio or container mix or potting mix. The potting mix should be fluffy and just moist for planting. Put a piece of broken pottery or small stone over drainage hole to prevent the mix from leaking out.
- Use containers between 15 and 120 quarts capacity. Small pots restrict the root area and dry out very quickly. The size and number of plants to be grown will determine the size of the container used. Deep rooted vegetables require deep pots.

Steps for Success:

1. When you add your soil to your container, leave a 2 inch space between the top of the soil and the top of the container. You will be able to add 1/2 inch or so of mulch later. Remove plants from pots, gently teasing roots apart if necessary, and place inside container.
2. If you are worried about potted plants drying out, try adding moisture retaining crystals to your potting mix. These non-toxic polymers absorb up to 200 times their weight in water, then release it gradually as plants need it.
3. Container plants are asked to produce masses of flowers in a tight space, so be sure to fertilize. The easy way is to mix slow-release fertilizer pellets into the top couple of inches of potting soil. (Follow package directions for amount.) The fertilizer beads are covered with a coating that gradually releases nutrients all season long.
4. Fill gaps between container plants with potting mix, firming down gently. Avoid packing pots right up to the rim – leave about an inch free as a reservoir for easier watering.
5. To finish, water thoroughly. Throughout the season, check your pots daily and water until water comes out through the drainage hole. Consistent moisture is a must during the hot months of summer, so consider installing an easy-maintenance automatic drip patio irrigation system.



6. Your container garden will need at least five hours of direct sunlight each day, and many plants will benefit from even more. As a general rule, leafy vegetables such as cabbage and lettuce can tolerate the most shade, while root crops such as beets and carrots will need more sun. Fruiting vegetables such as tomatoes and cucumbers need the most sun. The amount of sunlight needed by flowers varies depending on the varieties grown.
7. Since potting mixes drain water rapidly, fertilizer will be washed out of the container as you water. Lighter mixes will require more frequent fertilizing than heavier mixes. It's a good idea to use a dilute liquid fertilizer with every other watering. Liquid fish emulsion or liquid seaweed are great plant boosters, but remember that you need to provide your plants with a variety of nutrients. Check the labels on the products in your garden center to be sure that they contain a complete, balanced solution that includes trace elements.
8. In an exposed location, container plants lose moisture quickly. Some plants will need to be watered daily, especially during hot, dry weather.



Pots, Pots and More Pots....

Choose good sized container so your plantings can be more interesting, and for easier maintenance. You are only limited by your imagination! Bigger containers don't dry out so quickly. Cheap plastic pots may deteriorate in UV sunlight and terracotta pots dry out rapidly.



- **Terra cotta:** A time-honored classic material that's porous and allows oxygen to get to roots. However terra cotta is heavy and easily chipped or broken and generally not frost-proof, so store indoors in winter. The best terra cotta comes from Italy.
- **Glazed ceramic:** This material has the same advantages and disadvantages as terra cotta. Available in many attractive colors. Not frost-proof, needs indoor storage for winter.
- **Plastic and molded polyethylene (fake terra cotta or stone):** Light, easy to move, polyethylene looks like real thing. It doesn't chip or break and is frost-proof. Not porous like terra cotta, so good drainage is essential. Raise pot on blocks so drain holes not obstructed. Go for quality as cheap plastic pots degrade quickly in UV rays.
- **Wooden barrels, window boxes:** Attractive, readily available; can be built to sizes and shapes that suit the location. Large-sized containers heavy to move. Deteriorates quickly unless protected from moisture, so line interior with plastic sheeting.

**For more information contact Karen Garland,
Georgia Conservancy, kgarland@gaconservancy or
beenature@aol.com.**

Carnivorous Plant Container Gardens



Carnivorous plants are adapted to low-nutrient environments. These plants obtain some nutrients by trapping and digesting various invertebrates, and occasionally even small frogs and mammals. Because insects are one of the most common prey items for most carnivorous plants, they are sometimes called insectivorous plants. It is not surprising that the most common habitat for these plants is in bogs and fens, where nutrient concentrations are low but water and sunshine seasonally abundant. Carnivorous plants absorb nitrogen from their animal prey through their leaves specially modified as traps.

Traps work in a variety of ways.

Pitfall traps of pitcher plants are leaves folded into deep, slippery pools filled with digestive enzymes.

Flypaper (or sticky or adhesive traps) of sundews and butterworts are leaves covered in stalked glands that exude sticky mucilage.

Snap traps (or steel traps) of the Venus flytrap and waterwheel plant are hinged leaves that snap shut when trigger hairs are touched.

Suction traps, unique to bladderworts, are highly modified leaves in the shape of a bladder with a hinged door lined with trigger hairs.

Lobster-pot traps of corkscrew plants are twisted tubular channels lined with hairs and glands.

Plant Species Information

Pitcher Plants



Pitcher plants are carnivorous plants whose prey-trapping mechanism features a deep cavity filled with liquid known as a **pitfall trap**. Foraging, flying or crawling insects such as flies are attracted to the cavity formed by the cupped leaf, often by visual lures such as anthocyanin pigments, and nectar bribes. The sides of the pitcher are slippery and may be grooved in such a way so as to ensure that the insects cannot climb out. The small bodies of liquid

contained within the pitcher traps are called phytotelmata. They drown the insect, and the body of it is gradually dissolved. The prey items are converted into a solution of amino acids, peptides, phosphates, ammonium and urea, from which the plant obtains its mineral nutrition (particularly nitrogen and phosphorus). Like all carnivorous plants, they occur in locations where the soil is too poor in minerals and/or too acidic for most plants to be able to grow.

Sarracenia Oreophila (Green Pitcherplant)



S. oreophila is the most endangered of all *Sarracenia* species, its range limited to a handful of sites in northern Alabama, North Carolina, and Georgia. The pitcher tube of this species is similar to that of *Sarracenia flava*, but has a wider pitcher mouth and neck and is usually somewhat shorter, reaching only 60 cm. (24 in). The uppermost part of the leaf is flared into a lid (the operculum), which prevents excess rain from entering the pitcher and diluting the digestive secretions within. They will grow tall green pitchers with light veining that may intensify with stronger light. These are very deadly to the smaller sized insects such as bees and flies.

These will do best as container plants outdoors in areas with humidity over 50%. They will appreciate full sun all day, and should be set in a tray of water at all times during the growing season. They will require a dormancy period of 3-5 months each year, with temps cold but not freezing. They will not require as much light during dormancy, and should be kept dryer as well.

Sarracenia flava (Yellow Pitcher Plant)



Sarracenia flava is native to marshy and boggy areas in the southeastern USA. This is a vigorous growing plant, and very showy in the spring, growing very large bright yellow blooms to lure in the victims. These plants can get very tall, even in small pots. Mid summer their pitchers can contain many insects alive and dead. They will slow down growth after mid summer, and require 3-5 months dormancy each year. They can tolerate freezing temps, but not for extended periods. As container plants, they like full bright sun, and at least 1" of water in their tray all summer. These will do best outdoors in areas with humidity over 50% and moderate temps.

Sarracenia leucophylla (White-topped Pitcher Plant)



These are sometimes called the "white topped pitcher plant". *Sarracenia leucophylla* is native to boggy and marshy areas in the south eastern USA. They are the tallest of the *Sarracenia* family, easily reaching heights of 4ft in nature. Large plants in cultivation will also grow quite tall. *Leucophylla* will put up pitchers with their blooms each spring, but the fall is when these plants really start to show off. As most of the other *Sarracenia* will be slowing down for the season, *Leucophylla* will rapidly start pushing up its largest pitchers yet. Pitchers are green with red highlighting, up to a red veined white fenestration covered top. Having such notable characteristics makes it an excellent choice for hybridization.

Like all *Sarracenia*, these will prefer full sun and being in a tray of water during summer months. Keep them dryer during their required winter dormancy of 3-5 months, with temps about 35-45 degrees. These are also more prone to rotting if too wet in the spring so be careful not to let them get too wet.

Sarracenia minor (Hooded Pitcher Plant)



This is an odd form of *Sarracenia* that has a style all its own. Known as the "Hooded Pitcher Plant", *Sarracenia minor* pitchers form a slightly overhanging hood, which is coppery in color with white fenestrations on the upper back side. These are native to swampier areas of the far southeastern USA. In nature these plants can easily reach over 3 ft in height, but in captivity they will usually reach up to 12-18" in larger pot sizes. They can take on a comical appearance; the hoods resembling mouths, clusters of pitchers can look almost sociable. These will form woody rhizomes with a smooth texture, new leaves can form anywhere on the rhizome. Keep these in full sun, and nice and wet during the growing season, and dryer during dormancy.

Sarracenia Purpurea ssp. Purpurea (Purple Pitcher Plant)



Sarracenia purpurea is native to boggy and marshy areas east of the Mississippi River. They form a rosette of ground hugging, bulbous hooded pitchers. *Purpurea* pitchers are capable of catching many crawling insects, and even snails and slugs. The pitchers fill with water during rainy spells, and many captured insects will drown before being digested. These plants can take lower temperatures than most *Sarracenia*, and as a result they hold their form nicely through the winter. Pitchers can vary from yellow with red veins, pure green, green with red veins, and some will turn deep shades of red.

Sundews



The Sundews (*Drosera*) comprise one of the largest genera of carnivorous plants, with over 170 species. These members of the family Droseraceae lure, capture, and digest insects using stalked mucilaginous glands covering their leaf surface. The insects are used to supplement the poor mineral nutrition that sundews are able to obtain from the soil they grow in. Various species, which vary greatly in size and form, can be found growing natively on every continent except Antarctica.

Drosera spathulata (Spoon-leaved sundew)



These Sundews are known for growing clusters of plants that will flower like mad. The mature plants will take on a more earthy tone of green, with orange hues showing through their sticky dew drops. They grow small spoon shaped leaves, and can grow white or pink flowers depending on their geographic background. They are quite widespread in nature, growing throughout tropical zones. They require summer temps of 70-95 degrees, and can be kept at these temperatures year round. They appreciate bright light, and can live as windowsill plants in areas with higher humidity, but avoid direct sunlight that might burn them. Keep them wet throughout the growing season. These plants require no dormancy, making them excellent terrarium plants.

Drosera capensis (Cape sundew)



One of the easier sundews to grow, *Drosera capensis* is also a very beautiful plant. Long bright green leaves end in a sticky pad, with red tentacles covered in digestive dew. They are a tropical type of sundew native to Cape Province South Africa. Bright pink flowers will form on many tall flower scapes. These will self pollinate, and after the flower stems fully dry out, you can shake hundreds of tiny black seeds from them. These plants require no dormancy, but will die back during colder months,

resuming growth in the spring. Prolonged temps under 40 degrees can potentially be harmful to them.

This type of sundew can trap and digest larger insects than you might expect. Their long sticky leaves will envelope their prey, rolling downward to fully incapacitate and digest struggling victims.

Drosera rotundifolia (Common sundew)



Drosera rotundifolia (the common sundew or round-leaved sundew) is often found in bogs, marshes and fens. One of the most widespread sundew species, it is generally circumboreal, being found in all of northern Europe, much of Siberia, large parts of northern North America, Korea, Japan and is also found on New Guinea.

The leaves of the common sundew are arranged in a basal rosette. The upper surface of the lamina is densely covered with red glandular hairs that secrete a sticky. The flowers grow on one side of a single slender, hairless stalk that originates from the center of the leaf rosette. White or pink in color, the five-petaled flowers produce 1-1.5 mm light brown seeds that are slender and tapered.[1]

In the winter, *D. rotundifolia* produces a hibernaculum in order to survive the cold conditions. This consists of a bud of tightly curled leaves at ground level.

Butterworts

The butterworts are a group of carnivorous plants comprising the genus *Pinguicula*. Members of this genus use sticky, glandular leaves to lure, trap, and digest insects in order to supplement the poor mineral nutrition they obtain from the environments. Of the roughly 80 currently known species, 12 are native to Europe, 9 to North America, and the rest are found in northern Asia, South and Central America and southern Mexico.



Pinguicula primuliflora:

These carnivorous plants are native to the southern United States. They grow long sticky leaves up to 3.5 inches, and will commonly create 'baby plants' at each leaf tip. During the spring and summer they will grow beautiful violet flowers on a very sticky bloom stalk. They prefer indirect or filtered light, and can do quite nicely in shaded terrarium corners.

These plants will require a dormancy period each winter with temperatures between 35 and 50 degrees. During this time, the plant will remain green, but will slow down growth substantially. Small winter buds may form that will grow into many small plants in the spring.

General Care of Carnivorous Plants

(<http://www.carnivorousplantnursery.com/info/growing.htm>)

Carnivorous plants are easy to grow if you follow a few, rather strict rules

- 1. Wet all of the time.**
- 2. Mineral-free water.**
- 3. Mineral-free soil.**
- 4. Lots of light.**

Wet all of the time.

Keep the soil wet or at least damp all of the time. The easiest way to do this is use the tray method. Set the pots in a tray or saucer, and keep water in it at all times. Pitcher plants can grow in soggy soil with the water level in the saucer as deep as 1/2 the pot, but most carnivorous plants prefer damp to wet soil, so keep the water at about 1/4 inch and refill as soon as it is nearly gone. Add water to the tray, rather than watering the plant. This will avoid washing away the sticky mucilage of the sundews and butterworts and keep from closing the flytraps with a false alarm.

Mineral-free water.

Always use mineral-free water with your carnivorous plants, such as rainwater or distilled water. Try keeping a bucket near the downspout to collect rainwater. Distilled water can be purchased at the grocery store, but avoid bottled drinking water. There are simply too many minerals in it. The condensation line from an air conditioner or heat pump is another source of mineral-free water. Reverse-osmosis water is fine to use. Carnivorous plants grow in nutrient poor soils. The minerals from tap water can "over-fertilize" and "burn out" the plants.

Mineral-free soil.

The nutrient poor soils to which the carnivorous plants have adapted are often rich in peat and sand. You can duplicate this with a soil mixture of sphagnum peat moss and horticultural sand. Be sure to check the peat label for sphagnum moss. Other types will not work well. The sand should be clean and washed. Play box sand is great or you can buy horticultural sand. Avoid "contractor's sand" which will contain fine dust, silt, clay and other minerals. Never use beach sand. The salt content will harm the plants. The ratio of the mix is not critical, 70% peat with 30% sand works well for most carnivorous plants.

Lots of light.

Carnivorous plants, as a general rule, grow best in sunny conditions. The nutrient-poor and soggy bogs provide bad conditions for most plants. Those that do grow in the bog are usually stunted or short in height. As a consequence, the carnivorous plant habitat tends to be open and sunny. Many carnivorous plants grow quite well out-of-doors or indoors in a bright, sunny spot. Any windowsill, but north, will work fine. The plants also do well under artificial light with a timer set at 12-14 hours. Fluorescent tubes designed for plant growth work better than plain bulbs. Sundews and Butterworts prefer partial sun (plant in shade of Pitcher Plant)

Other Helpful Growing Tips

Dormancy

Many carnivorous plants are native to temperate climates and require a dormancy period. This is a natural protective mechanism that allows plants to survive the harshness of winter. Some carnivorous plants, like the sundews, form winter buds. Others, like the Venus Flytrap and pitcher plants, form winter leaves. Some simply drop their leaves. Carnivorous plants will enter dormancy when winter conditions begin. If you do not allow them to rest, you will exhaust your plants and they will die. When your plants begin to show signs of dormancy, water them less. Leave the soil only slightly damp (1/4" water in tray). Reduce the amount and the length of daylight. Keep them cool for 3 to 6 months, depending on its native area. This can be done by placing them in the basement or on a frost-free porch. *If brought into a classroom, keep in a sunny window or under a fluorescent lamp to over-winter.*

Humidity

Carnivorous plants grow naturally in humid bogs and swamps; therefore your growing environment should duplicate these conditions. This can easily be accomplished by simply keeping your plants wet at all times. You cannot water carnivorous plants too much. You may choose to use a humidifier placed near the plants to increase humidity. Perhaps the easiest way to provide humidity is to grow your plants in an open terrarium. Do not seal your plants in a tightly closed container. This will invite fungus and mildew which could kill your plants. Leave the terrarium slightly open so that a draft of air can enter. Experiment with the size of the opening so that the plants do not either dry out, bake or become infected with fungus.

Feeding and Fertilizing

As a general rule, do not feed or fertilize your carnivorous plants. Grown under the conditions outlined in this flyer, your plants will be able to collect enough insects on their own to do well. Most carnivorous plants only need an insect or two a month in order to flourish. Of course, it is fine to demonstrate the unique trapping capabilities of these plants by using a fly carefully placed with tweezers. Never use raw meat, as large pieces will kill the traps. Freeze-dried insects from a pet shop, or a culture of wingless fruit flies provide an excellent source of nutrition. Carnivorous plants grown with no insect supplemental feedings will not flourish. Be careful and do not overdo it. Grow the plants in such a way that they have natural access to insect prey.

Resources and Bibliography:

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