

**Florida Federation of Garden Clubs, Inc.**

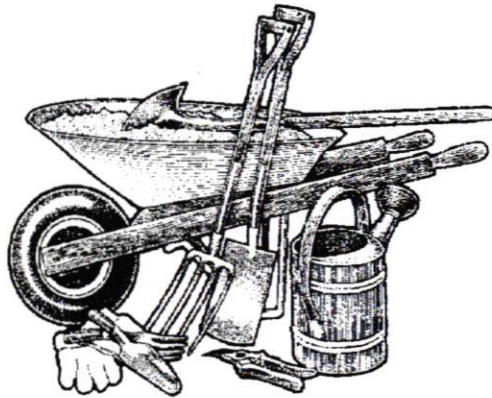


# **“Digging It”**

## **The Florida Horticulture Study Series**

(1<sup>st</sup> Revision 2010, 2<sup>nd</sup> Revision 2012, 3rd Revision 2015)

**Instructor’s Manual**



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## Introduction

Welcome! And thank you for taking the time to enhance your knowledge and skills in horticulture. This project came about as a result of requests from people like you wanting an organized series of horticulture courses, an established horticulture curriculum and a hands-on, interactive opportunity for you to refresh what you already know, hone your gardening skills and maybe even learn something new. But, basically the overall purpose of this program of study is to have fun while learning!

For some students this 10 course series will be an opportunity to learn the basics. You will learn by doing in an informal setting with structured, hands-on workshops. As you become more and more confident in your abilities with these basic skills, it is hoped that you will be encouraged and inspired to enter your horticulture specimens in support of the various sponsored flower shows in your area.

This program can also serve as an introduction and peek your interest in attending NGC sponsored flower show schools and eventually becoming an accredited Flower Show Judge (in much the same way Floral Design Study leads to becoming a designer). But this course goes beyond what you would learn in Flower Show Schools. It goes beyond what you may have learned in the NGC Gardening Study Courses or the NGC Landscape Design Courses. It even augments what you may have learned in becoming a certified Master Gardener. This series of 10 courses will take you step-by-step through the plant world, beginning with botanical nomenclature. Each course focuses on a type of plant giving the specifics of its life cycle and myriad landscape uses. It will provide you with demonstration and practice at propagation. It will help you to select and site the proper plant for the proper place. You will learn how to not only grow the plant optimally but also to show it as an award-winning specimen. You will become acquainted with what it will take to maintain your plant and inform you of the competition you are sure to face from nature's insects, diseases and weather events. This course is designed to be the 'whole package'. And if you don't like the packaged plants we are to study, you can certainly substitute other plants more suited to your area of the state or your interests.

But, maybe you don't want the 'whole package'. Maybe 10 courses is too much of a commitment for you. This program is also useful and designed such that any part of it can be developed as a single program for your garden club or organization. Or, maybe you want more and 10 courses isn't enough for you. This program is also adaptable in the creation and continuation of horticulture study groups in your area. Like-minded 'horti-maniacs' can use the information contained here as a spring board to study specific plants more in depth and establish a cadre of premier horticulturists to serve as flower show classification team members or presenters or teachers. This program is what you make it!

We sincerely hope that you will find this program meets your needs. If not, please let us know and we will strive to revise the materials as necessary to satisfy the pragmatic gardener in all of us. Happy gardening.





## Course Guidelines

### **\*Instructor certification process:**

- Be recommended by your District Director or an FFGC Executive Board officer.
- Be an accredited Flower Show Judge having completed the 4 or 5 course Flower Show Schools series, **or**
- Be a Certified Master Gardener with the University of Florida Cooperative Extension completing training and volunteer hours annually, **or**

### **Provide copies of college transcript indicating a Horticulture or Botany degree earned.**

- Attend initial instructor training.
- Attend annual refresher training (held in conjunction with FFGC board meetings, convention, Short Course) and remain in Good Standing. Training will include hands-on, in depth study, outline distribution, Q and A, etc.
- Teach from approved syllabus with approved teaching aids and provide ample samples.
- Teach at least once in a three-year time period.
- A list of approved instructors will be compiled and maintained by the Florida Horticulture Study Chairman. This list will be sent to any local chairman upon request. The local chairman will choose all instructors independently. There is no limit on the number of times an instructor can be used to teach in the 10 course series.
- Instructors will teach from the approved outlines found in this manual. Each Instructor will develop her own method of instruction, however, a unified method of hands-on practice and demonstration will provide students with a better background of knowledge and understanding.
- Develop interactive, inspiring specific plant outlines using the recommended format and reference materials. Developed outlines are meant to be shared and personalized.
- *The Handbook for Flower Shows* (current edition) glossary shall be used for definitions of Horticulture terminology.

**\*Fees:** Instructors will charge a fee of not more than \$100 for each 4-hour/ one-day unit (or \$25 per hour) plus receive mileage in the amount of 35 cents per mile. The host club shall provide horticulture specimens and materials as needed as well as any hospitality for the instructor.

If a **guest speaker/expert in the field of study** is used, he or she will be offered a stipend of \$25 per hour (that amount to be deducted from the primary instructor's fee). Consider inviting a plant society member, the county horticulture extension agent, the local college or university environmental horticulture professor or a nursery owner to instruct one or more aspects of a course.

**Field Trips:** Optional field trips may help reinforce classroom instruction or replace hands-on application. Identify possible field trip venues in advance such as a botanical



garden, a nursery propagation operation or even specialty home gardens so students can see first hand what the coursework covers.

**\*Forms:**

**Contracts** available in this manual are to be reproduced and used for each unit.

Instructors should keep records on file of each unit taught.

**Evaluations** of the unit of instruction are available in this manual and are to be reproduced and used for each unit. Evaluations will be mailed to the Florida Horticulture Study Chairman then forwarded to the instructor.

The Florida Horticulture Study Chairman is named by the current FFGC President and can be found in the BOI.



# Course Administration

## How to Establish a Horticulture Study Course

### Committee Chairman:

**Contract** instructors to teach (either by the course or for all courses in advance). Instructor Contract form letter available on page 121. Consider the use of guest speakers or experts in the field of study to augment instruction.

**Register** the course with the State Horticulture Study Chairman (name and address can be found in the BOI). Registration forms available on page 127.

**Coordinate** for an appropriate facility (negotiate rental contract).

Get the word out! **Publicity** is vital to a successful program!

**Coordinate** with other committee members for set up and clean up.

### Committee members:

**\*\*Hospitality:** Set up for morning coffee, snacks and make arrangements for homemade or catered luncheon at \$5 (estimated) per person. Keep records of expenses and income to provide treasurer.

**\*\*Horticulture helpers:** Procure examples of plants being studied and plants to be used in propagation or other demonstration techniques. Procure soil, pots, etc. as needed for propagation or demonstration.

**\*\*Registration:** Keep list of students signed up to take each course, provide nametags and folder/handouts.

**\*\*Treasurer:** Keep accounting of all funds, prepare budget, and pay all bills in a timely manner.

**\*\*Ways and Means:** Provide items for sale that relate to the course of study (books, plants/bulbs/seed, tools, gloves, etc). Keep record of expenses and income to provide treasurer.

**\*\*Instructor Hospitality:** Provide a guest room for instructor in your home or reserve hotel room for instructor.

**Time management:** Each unit is designed for 4 hours in a one-day session.

Courses may be taken in any order and at any location. It is recommended that Course 1 be taught first as it contains the requisite knowledge all students should possess for successful completion of the courses.

Courses can be scheduled as suits the participants: One course a week for 10 weeks, once a month for 10 months, every other garden club meeting, etc. However it works best for you. Just remember that all 10 courses should be completed in a 2-year timeframe.

Courses 1 through 6 must be included for certification but courses 7 to 10 may be substituted with any of the optional courses listed or approved by the state chairman.

A Certificate of Completion will be prepared and presented to students when all 10 courses are completed within a two-year period. A certificate fee of \$1 per student shall be forwarded to the state chairman. Certificates are to be presented at a suitable time and event such as at a district or annual meeting, etc.

Recommended cost per student per course is \$20 each. If courses are being used as a fundraiser, consider having a luncheon (extra charge) and ways and means table/plant

sales. Plant materials paid for by the committee for use by the instructor can be sold to recoup cost of course.

Establish a minimum and maximum number of students.

The basic Course Handbook is available through the FFGC Headquarters gift shop for a nominal fee (includes notebook binder, outlines, handouts and administrative forms). An Instructors Course Handbook is available through the FFGC Headquarters but is to be purchased by approved instructors only.

Forms included in the binder are also available online at the FFGC web site in the horticulture section.

Forms may be mailed or emailed to the State Horticulture Study Course Chairman (listed in the BOI).

### **Course Adaptations:**

With only minor adjustments, this course can be tailored to serve as a series of programs for your Youth Gardener clubs. Many of the projects found herein can be successfully used with your Garden Therapy programs. The “Digging It” program in its entirety can be used for Penal Therapy as well.

### **Awards:**

There are a number of state and national awards that can be applied for by using this program in your garden club projects. Look in your Book of Information (BOI), Section II, to see what might apply. Community service projects could be the perfect vehicle for putting the recently gained knowledge to good use. Consider the Deep South Region Award #11 Horticulture Award, the FFGC District Award #D-8: District Horticulture Award, FFGC Award #20: Year’s Horticulture Programs, FFGC Award #19: Horticulture, FFGC Award #21: Horticultural Achievement, FFGC Award # 26: Membership Increase Through Horticultural Activities, FFGC Award #32: Park Planting, FFGC Award #34: City Public Planting, FFGC Award #36: Community Service Award, FFGC Award #37: School Grounds Beautification, FFGC Award # 42: Landscaping a Balcony Award, FFGC Award # 44: Native Plant Landscaping, FFGC Award #90: Horticulture Program, and so many others. Take the time to look for an appropriate project that fits with your “Digging It” learning experiences and then apply for the award.

## Course I. Horticulture Basics

Objectives for this unit:

1. Accurately define horticulture and explain various classification systems.
2. Accurately name the various plant categories and state the life cycle of a plant.
3. Accurately name the various parts of a flower and state methods of plant propagation.

References:

*Handbook for Flower Shows*

*Botany for Gardeners* by Brian Capon

“Botany Handbook for Florida” Bulletin # 187, FDA and FFGC, 1965

*Botany*, Golden Press, 1970

*Improving Your Garden Soil*, Ortho Books, 1992

*Plants-a-Plenty*, C. Foster, 1977

*Park's Success with Seeds*, A. Reilly, 1978

*Gardener's Latin*, B. Neal, 1992

National Geographic article “A Passion for Order”, June 2007

Materials needed for this unit:

Soil samples, leaf samples, samples of spores, cones, flowers, posters and pictures representing concepts presented.

Introduction: Provide an overview of entire 10 course series to the students.

I. What is horticulture? The art (landscape design) and science (botany) of growing plants, including fruits, vegetables and ornamentals, among others.

A. Binomial System of Classification, Nomenclature: The orderly system of naming and classifying plants was originated in 1753 by the Swedish naturalist, Carl **Linnaeus**, the father of taxonomy. (National Geographic article.) The system is based on natural relationships as revealed by the study of fossils and by anatomical and structural similarities. Botanical names are Latin or latinized form.

International Code of Botanical Nomenclature (ICBN) regulates plant names. A congress of botanists meets every 5 years. (Check out their web site [www.icbn.org](http://www.icbn.org)). Some ICBN rules include: names must be in English, no tautonyms (same first and second names), not over 6 syllables, can be zoologic or botanic, etc.). Some plants have had their name changed but may be better known by their old name. The use of “syn” for synonym is acceptable. (example: *Syngonium* syn. *Nepthytis*—Associate with metric system or pharmaceuticals)

1. **Family**: A botanical grouping of like plants. Always ends with the suffix *-aceae*. Some families have only one genus, others have hundreds of genus (genera). The family name goes by the plant with the largest number of relatives in the family. (In genealogy, this would correspond to your extended family of aunts, uncles, cousins, in-laws, etc.)

2. **Genus:** Botanical grouping of a closely related group of species, recognized by distinct characteristics shared by all its species. A noun. Written with a capital letter and is underlined or in italics. You may see **spp** written behind a genus and that indicates that there is more than one species of that plant. (In genealogy this would correspond to your more immediate family of parents, brother and sisters and your kids.)
3. **Species:** The basic classification unit, a descriptive adjective (plant characteristics, habitat, usage, etc.), subdivision of a genus. A group of interbreeding plants that are morphologically similar but not necessarily identical. Written in lower case letters and is underlined or in italics. (In genealogy, this would correspond to your nuclear family of spouse and kids.)
4. **Variety:** A group forming a subdivision of a species with similar characteristics, but differing too slightly to form another species; occurs naturally, consistently. Can interbreed (self-pollinating), breeds true to parents. Written in single quotes.
5. **Cultivar:** A cultivated variety: A variety of a plant bred in cultivation, an artificial population of economically useful plants selected and maintained by man. Duplicated vegetatively. Man has intervened with nature to force pollination of plants not normally breeding. (Compare this to a cultivate pearl where man puts an artificial irritant into the oyster to make it produce a pearl.) This includes inter-generic crosses that begin with a capital X (*X Fatshadera lizii*—cross between Ivy and Fatsia, *X Cupressocyparis leylandii* (Leyland cypress)—cross between *Chamaecyparis* and *Cupressus*) and inter-specific crosses that have a small x between genus and species (*Abelia x grandiflora*, *Magnolia x soulangeana*). Some names are registered or trademarked ('Endless Summer', 'Lady in Red'). This is written in single quotes.
6. **Hybrids:** Cross-pollinating or breeding of two different species, genetically unlike, allows expression of the desirable dominant traits of both lines. Often expressed as an F1 hybrid (first generation). Many hybrids are sterile and if they produce seed, it won't come true to the parents.
7. **Common Names:** Common names, folk names, vernacular are a rich trove of imagery but they can be troublesome when it comes time to find a specific plant in the nursery. One plant can be known by many different common names depending on the region you live in (i.e. the *Chionanthus* is known as "Grancy Gray Beard", "Fringe Tree", "Smoke Tree", etc) and, by the same token, one common name can relate to many different plants (i.e. a "Bay" tree could be Magnolia Bay, Sweetbay, Laurel Bay, etc.). Common names are written in double quotes.

(Handout: "How to Write a Scientific Name" and the "Family Tree of the Plant Kingdom")

**(Activity):** Put a botanical name such as *Acer palmatum dissectum* 'Flavescens' on the board and have the students dissect it.)

**(Activity):** Have students create their own family tree and observe the same principles as we find in plant classification.)

B. Plant categories:

Primitives include the algae, bacteria, mosses, fungus, mold, etc.

1. **Spores:** Spores are produced on the undersides of fern fronds, in little spore cases called *sporangia*. These are very important in the identification of ferns. Spores will germinate and form a *prothallus* (heart shaped), which is both male and female. Sow dust-like spores on the surface of moist sterile medium but do not cover with soil.

Cover the container with a piece of glass or plastic and set in a saucer of water, maintaining a temperature between 60 and 70 degrees.

(Activity: Have students dust fern spores onto a wet brick that has moist, shredded sphagnum moss on top and grow some ferns.)

2. **Gymnosperms:** naked-seed plants (reproductive organs are borne in catkins or cones with seeds usually unprotected by a fruit) are all woody perennial includes conifers (Pines, spruce, cypress, cedar, Sequoia, Araucaria), Podocarpus (Yew), Ginkgo and the Cycads (Sago, Zamia). (Show pinecones and seeds. Have Pine nuts to eat.)

3. **Angiosperms:** Plant species that have flowers and seeds always protected by a fruit. A large, complex group of flowering plants under two main headings:

a. **Monocotyledons-** Having one cotyledon (seed-leaf) in the seed. Flower parts in threes, seeds enclosed in fruits, leaves usually with parallel veins, stems with scattered vascular bundles (in cross section), never forms true wood (corn, bulbs, grasses, lilies, aroids, iris, banana, bromeliads).

b. **Dicotyledons-** Having two cotyledons or halves in the seed. Flower parts usually in fours and fives, seeds enclosed in fruits, leaves usually net-veined, vascular bundles forming a circle (in cross section), often form wood (lima beans, Rose, Allamanda, poppy, magnolia, honeysuckle, milkweed, etc).

C. Plant types by **life cycle:**

1. **Annuals:** Plants that complete their life cycle in one growing season.

2. **Biennials:** Plants that complete their life cycle in two growing seasons (vernalization-cold- required). Lettuce, carrots, Dianthus

3. **Perennials:** Plants that flower and set fruit for many years.

Perennials can be **monocarpic** ('one life', grow for many years, die after flowering, example is Bromeliad) or **polycarpic** ('many lives', grow for many years, flower many times).

D. Anatomy (Handout: “Descriptive Botanical Terms Illustrated” from *Exotica*)

1. **Leaves:** Site of photosynthesis, respiration, transpiration. Leaves can be **evergreen** (plant retains green leaves and are never bare) or **deciduous** (plant drop all leaves with branches bare for at least a short time).

a. Two principle parts of a leaf: The expanded **blade** (a thin sheet of green tissue strengthened by the midrib and veins—parallel and net veins, which are the xylem and the phloem) and the slender stalk or **petiole**. (Activity: allow students to take leaf rubbings to show venation, forms, tips, bases, etc).

b. **Leaf shapes:** leaves vary in form or shape, bases, tips, margins, arrangement on stems and texture. (Try to show examples of each)

1) **Shapes/Forms** can be linear, lanceolate, oblong, ovate, spatulate, etc.

2) **Bases** can be cordate (heart shaped), oblique, reniform (kidney shaped), etc.

3) **Tips** can be acute, obtuse, truncate, acuminate, etc.

4) **Margins** can be entire, serrate, dentate, crenate, undulate, lobed, cleft, etc.

5) **Arrangement** on the stem can be alternate, opposite or whorled.

6) Leaf **divisions** can be simple or compound (pinnate/feather or palmate).

7) Leaf **attachments** are said to be petiolate, sessile (without a petiole), peltate (petiole attached to underside of the leaf), sheathed, winged, etc.

8) Leaf **textures** can be thick or thin, rough (scabrous) or smooth, fleshy (succulent) or leathery (coriaceous), woolly (tomentose), hairy (pubescent).

2. **Flowers:** (Handout: “Label the Flower”) Flowers are the place for sexual reproduction in plants. Single flowers are borne at the end of an elongated stalk or branch called a **peduncle**. Cluster flowers are 3 or more flowers gathered closely together on individual flower stalks called **pedicels**. An **inflorescence** is the arrangement of flowers or groups of flowers upon the plant (Forms may include: funnel form, urn shaped, polypetalous, polysepalous, etc. and flower **symmetry** can be **regular**—equally divided into quarters, or **irregular**—2 unequal parts). Two main types of inflorescences are: **Racemose** (includes raceme (Snapdragon), panicle (Crepe Myrtle), spike (Bottlebrush), spadix (partly enclosed by a spathe—Calla lily), catkin (oaks), umbel (Dill), head (composite flowers- Daisy types- are made up of ray flowers and disk flowers), etc.) and **Cymose** (cyme (Sedum), fascicle (Beautyberry Bush), terminal



(Magnolia) and axillary (Vinca), etc.). Flowers are referred to as **complete** (made up of calyx, corolla, stamens and pistil) or **incomplete** (lacking one or more of the four regular parts of a complete flower). Flowers are considered to be **perfect** (having both stamen and pistils) or **imperfect** (without one of the essential organs). Plants can be **monoecious** (bearing male and female flowers on the same plant—Begonia) or **dioecious** (bearing male flowers on one plant and female flowers on another plant—Holly).

a. Male reproductive organs: **Stamens** are composed of the **filament** (the thin stalk that attaches the anther to the rest of the flower) and the **anther** (a lobed, oblong bag-like appendage at the top of the filament, usually yellow, that produces the pollen grains that develop the male germ cells).

b. Female reproductive organs: **Carpel** or Pistil is usually flask or bottle-shaped and are made of three parts: sticky **stigma** (the tip of the style or pistil especially adapted to receive the pollen grains, the **style** (a more or less elongated stalk or neck connecting ovary with stigma) and **ovary** (enlarged basal part of the pistil bearing ovules which contain one egg or sex cell)—the fruits we eat.

c. Accessory parts:

1) **Sepals**: leaf-like parts of flowers that collectively form a **calyx**.

2) **Petals**: the inner set of leaf-like structures lying just within the calyx, collectively known as the **corolla**.

3) **Bract**: Modified leaves that simulate petals (Dogwood, Poinsettia, some gingers).

3. **Roots**: Functions of roots are to act as a mechanical anchorage and support for the stem, absorption and conduction of water and nutrient substances from the soil, and storage of food. Root systems consist of a main or primary root (arising from the embryo), rootlets or secondary roots and root hairs (specialized cell extensions which penetrate into the opening between the soil particles, absorbing water and dissolved minerals from the soil).

a. **Fibrous roots**: Have no distinguishable primary root, but a number of fine thread-like roots of the same kind and size springing from the base of the stem. Roots spread out near surface of the soil rather than penetrating straight down and deep (grasses, most annuals and some shrubs).

b. **Tap roots**: Prominent primary roots from which all other rootlets or lateral roots grow. They may become forked or fanged, fleshy and penetrate deep into the soil (carrots, dandelion, oaks, citrus).

c. **Tuberous** or Fleshy roots: Become food reservoirs that retain surplus food during the winter or adverse periods, to be used by the plant

when it is able to renew its growth (sweet potato, Dahlia, carrot, turnip, beets).

d. **Adventitious roots:** Roots developed from such aerial stems as stolons, runners and leaves and cuttings from stems or leaves are adventitious. Roots coming from bulbs, rhizomes, corms and tubers are adventitious roots.

e. **Aerial roots:** These roots form freely in a moist atmosphere and not only attach the plant to its host but also absorb water from the air.

f. **Knees:** If water cuts off the air from roots, some trees develop stem-like knees on their roots that protrude above the surface of the water to enable the plant to obtain the necessary air.

G. **Stems:** The functions of stems are to support and display leaves, fruit and flowers, to carry water and nutrients from the roots up to the leaves (**xylem**), and to carry this food back down to the roots (**phloem**). Stems are structures that develop from a bud to bear leaves and buds. **Nodes** are the point on a stem where a leaf is borne or has been borne. Green stems can manufacture food. Food is stored in specialized stems (listed below). Specialized stems can be runners, tendrils (some tendrils are modified leaves) and thorns. Stems can be simple, branched, climbing (covered in depth in Course 7, Vines), creeping or inconspicuous (as in a crown where the plant is considered stemless—*Hosta* or Daylilies).

1. Specialized stems: these stems are for storage (Covered in depth in Course 5, Bulbs).

a. **Rhizomes:** Prostrate, usually thickened, subterranean or aerial stems with leaves coming from one side and roots the other. An easy means of propagation by division (ginger, Iris). (Activity: allow students to divide rhizomes.)

b. **Corms:** Growing underground, a condensed stem with one bud on top from which the new stem grows (Gladiolus).

c. **Stem Tubers:** Growing underground and having buds or 'eyes' from which spring new stems (white potato, Gloriosa lily). (Activity: Stick toothpicks in the 'eyes' of a white potato to show spiral arrangement of the nodes.)

d. **True Bulbs:** Growing underground, short and fleshy condensed stems made up of fleshy or membranous scales with roots extending from the base and forming new, mostly leafy, plants from the enclosed bud.

1) **Tunicate:** made up of tight, concentric layers of fleshy material (onion, Crinum, Amaryllis).

(Activity: Cut an onion to show concentric layers with new plant inside.)

2) **Scaly**: made of fleshy scales (Easter lily, Elephant garlic). (Activity: Show the 'toes' of a scaly bulb.)

#### H. Propagation:

1. Sexual reproduction: Fruits are the ripened and seed bearing ovaries of the flowers. Fruits are either **fleshy** (juicy with fleshy fruit and seeds—peach, tomato, squash, citrus, apples, strawberry or pineapple) or **dry (dehiscent or indehiscent—** nuts and grains) (Covered more in depth in Course 8, Fruits, Nuts and Vegetables).

**Seeds**: Seeds consist of an outer coating or wall, usually very tough, hard or woody, within which is the embryo or young plantlet. They are developed as a result of fertilization of the egg in the ovule of the ovary of the flower. Seeds are considered dormant until they are exposed to favorable environmental factors such as moisture, warm temperatures and light that encourage germination. Seeds are more or less oval or globular and range in size from dust-like seeds (orchid) to larger (Avocado). Seeds vary greatly in color, texture, longevity and methods of dispersal as being surrounded with spines, hooks, and bristles, covered with cotton, or bearing plumes or having wings and arils. (Activity; Allow students to take apart a dicot seed.) (Activity: Allow students to plant fast emerging bean seeds and track the progress from seed leaves to true leaves.) (Activity: Allow students to create a poster or seed box of different types of seeds.)

2. Asexual reproduction: Vegetative reproduction.

a. **Division**: Accomplished by digging up a plant and dividing it into 2 or more plants. Each part has some roots, stem and/or foliage in order to grow. (Activity: Demonstrate or allow students to divide a clump of bulbs.) **Separation** is pulling apart independent plants from one another (Liriope, Daylilies)

b. **Stem cuttings**: The most common method to propagate plants asexually is from cuttings. Softwood and semi-hardwood cuttings are from the current season's growth, and hardwood cuttings are from the previous season's growth. Softwood cuttings are generally taken from plants in spring or early summer during a growth flush when the tissue is relatively soft and succulent. Semi-hardwood cuttings are taken after a growth flush has matured. Stems of semi-hardwood cutting will usually 'snap' like green beans when broken. Cuttings usually require a warm, humid environment (tent or mist) to hasten root development and prevent them from drying. (Activity:

Show examples, or if the season is right, have students take stem cuttings of coleus, azalea or camellia.)

- c. **Root cuttings:** Root cuttings are usually taken from young plants in early spring or late winter, before they start growing. Healthy roots have ample food stored to support shoot development. Root cuttings are typically 2 to 7 inches long. Position smaller cuttings horizontally in the propagation medium and cover with  $\frac{1}{2}$  inch of medium. Larger cuttings can be placed vertically with the end of the cutting originally nearest the plant crown positioned upward. Root cuttings may be transplanted after shoots have emerged and sufficient new secondary roots have developed. (Activity: Show examples or have students take root cuttings.)
  - d. **Leaf cuttings:** Leaf cuttings can be made from succulent plants by allowing them to harden off before placing them in moist medium and keeping them moist until roots develop. (Activity: Show examples or allow the students to make leaf cuttings of Sansevieria, African Violets, Begonia, sedum, etc.)
  - e. **Tissue culture/cloning:** Growing very small divisions of plant material in a sterile medium containing nutrients and plant hormones. (Activity: If convenient, visit a site where tissue culture is being performed.)
  - f. **Layering:** Formation of roots along a stem while it is still attached to the parent plant. Types of layering include air, tip, trench, mound and serpentine. Layering outdoors is best performed during spring and summer months with rooted plants ready for transplanting in the fall or winter. (Layering is covered more in depth in Course 8).
  - g. **Grafting:** Accomplished by inserting a scion or stem cutting into a cut in the rootstock allowing the cambium layers to fuse. (Grafting is covered more in depth in Course 8).
- I. **Soils:** Soil is the outer portion of the earth's crust, the basic material in which most plants are rooted, the source of all food that the plant does not receive from the atmosphere. Soil is divided by size of particles: **sand** (the largest particles), **silt** (the medium sized particles), and **clay** (the smallest particles). It is best to have a mix of all these particles (explain the "soil triangle"). Soil textures or consistency (**tilth**) influence plant growth (water retention, ability of roots to penetrate soil, aeration). Components within the soil include: minerals, **humus** (decomposing organic matter—peat, leaf mold, compost, cover crops), bacteria, water and air. (Activity: Show soil sample kits and demonstrate how to take a soil sample.) (Activity: Have students put

dry garden soil in a jar and add water. Put on the lid and shake. The soil will settle out in bands of sand, silt, clay and organic material will float on top.)

**Soil pH:** pH stands for the potential for hydrogen ionization.

Hydrogen ions can interfere with nutrient absorption. The pH scale ranges from 1 (very acid) to 14 (very alkaline). At pH 7 (neutral), hydrogen ions have little effect on plant-root absorption. The ideal soil pH for many ornamental plants is within the range of pH 5.5 to 6.5, where most nutrients are available. Acid-tolerant plants (azalea, camellia, gardenia) function best at about pH 5.2. Having your soil tested every 2 years may help determine what, if any, adjustments need to be made. Garden lime is available as dolomite lime or calcitic lime which will raise your soil pH. Garden sulfur is available as ferrous sulfate or aluminum sulfate can help lower your soil pH. Lime and sulfur can be safely added to your soil at any time—mix into the root zone.

- J. **Fertilizer:** There are 3 essential major elements: **Nitrogen (N)**, **Phosphorous (P)**, and **Potassium** or Potash (K) (do the “Saturday night fever”/John Travolta dance to emphasize). (German chemist, Baron Justus von Liebig, in 1840 determined these elements to be critical to plant growth –NPK mentality). All-purpose or balanced granular fertilizers have a ratio of equal parts of N, P and K such as 8-8-8 or 10-10-10. These numbers indicate the percentage of the elements in the bag, all else is inert products to help deliver the elements. Nitrogen is needed for healthy green foliage (stimulates vegetative growth) and is water soluble, Phosphorous, which builds up in the soil and is not water soluble, serves to ripen seeds and fruits and develop roots, and Potassium, also water soluble, helps fight disease, make strong roots and assists with enzymatic reactions in the plant system. Three **macronutrients** (Carbon, Hydrogen and Oxygen) and **16 Trace elements** or **micronutrients** are needed to ensure healthy, vigorous growth and include: boron, calcium, cobalt, copper, iron, manganese, molybdenum, sulfur, zinc, chlorine, magnesium. **Slow-release** fertilizers are coated and the coating breaks down over time, releasing the fertilizer. **Liquid** fertilizer concentrates are available but use at  $\frac{1}{2}$  to  $\frac{1}{4}$  strength with each watering rather than full strength monthly.

K. **Organic Gardening:**

L. Environmental factors affecting plant growth:

1. **Light** (intensity, duration and quality) is necessary for *photosynthesis* to occur and for flower and fruit development. Photosynthesis is the process of forming starches and sugars that takes place in the leaves when plant nutrients are brought up from

the roots, carbon dioxide from the air, chlorophyll in the leaf tissues and sunlight. Too much light can cause sunburn or the paling of the foliage such that it appears seared. Too little light causes leggy, spindly growth and the plant reaching for the light (**Etoilation**). (Activity: Show examples of leggy plants lacking light.) The effect of day length (short day, long day or day neutral) on plant development, especially flowering, is called *photoperiodism*. When plants that follow the light (sunflowers), it is called *phototropism*.

2. **Water/humidity:** Rainfall variations affect growth patterns and can be modified by irrigation. Drip irrigation is better than overhead watering. The best time to water is in the morning. The ideal garden soil allows most of the water to move through it and the excess to drain away. Too much water can cause wilted foliage, rotting roots and older leaves beginning to drop. Too little water will also cause wilting but the younger leaves will drop first.
  3. **Temperature/** USDA hardiness zones for cold and for heat. Regional climates dictate plant habitats. If too hot, the plant will stop growing and the foliage will wilt. If too cold, the plant will have wilted, discolored/purple foliage and the roots will rot. Some plants require a number of “chill hours” before producing fruit (apples).
- M. **Pests and Disease:** Plant diseases can be caused by fungi, bacteria, or viral infection. There are 2 distinct classes of insect pests: **chewing insects** and **sucking insects**. Many rodents and animals such as moles, rabbits, deer can be harmful to plants as well. Root knot nematodes are microscopic, threadlike creatures that usually attack roots of plants where they drain the food supply of the plant. Weeds can harbor insects and diseases so be sure to minimize their growth. The use of beneficial insects and Integrated Pest Management (IPM) techniques are highly encouraged. Do the least first!

# How to Write a Scientific Name

*When handwritten (e.g., on an entry tag in a flower show)...*

The Genus is written with a capital letter and underlined, e.g., Salvia

The species is written with a lower case letter and underlined, e.g., farinacea in Salvia farinacea

The variety is written with a lower case letter and underlined, e.g., koreana in Buxus microphylla koreana

OR with var. placed before it and variety name underlined; e.g., Buxus microphylla var. koreana

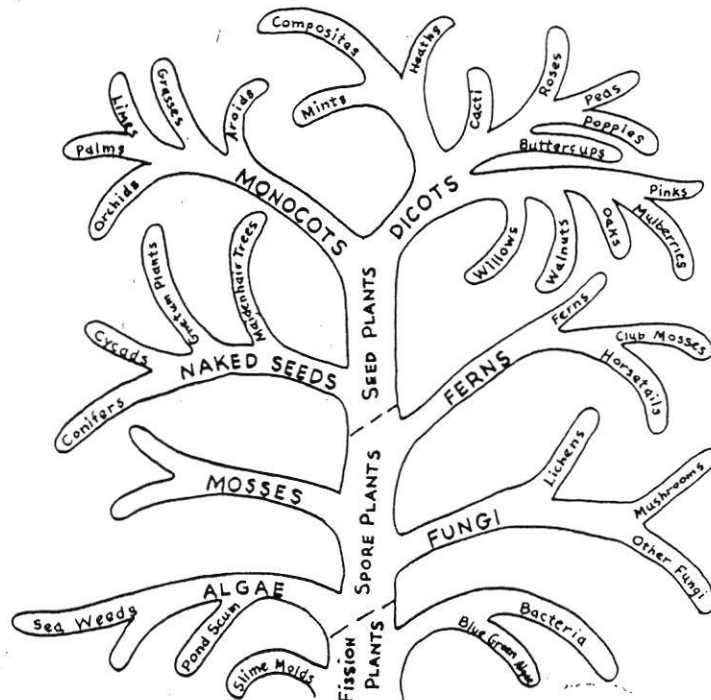
The 'Cultivar' is enclosed in single quotes and capitalized, e.g., 'Victoria' in Salvia farinacea 'Victoria'

OR with cv. placed before it and the single quotes omitted, e.g., Salvia farinacea cv. Victoria

When naming a 'Cultivar' of a variety, underline Genus and species, add var. before the underlined variety name, and then add the 'Cultivar' in single quotes, e.g., Buxus microphylla var. koreana 'Wintergreen'

*When printed (e.g., on a computer)...*

Substitute *italics* for the underlining, e.g., *Buxus microphylla var. koreana* 'Wintergreen'



Kinfolks in the garden. Family Tree of the plant kingdom illustrating plant relationships, by Mrs. Robert Rowlands, Lake Wales Garden Club.

## Label the Flower

Read the definitions then label the diagram below.

### Definitions

**anther** - the anther is the tip of a flower's stamen ( the male reproductive organs of the plant) - it contains the pollen.

**filament** - the filament is the part of the flower that holds the anther (and part of the stamen, the male reproductive organs of the plant).

**ovary** - the ovary is a female reproductive organ in plants that produces ovules. It is at the base of the pistil.

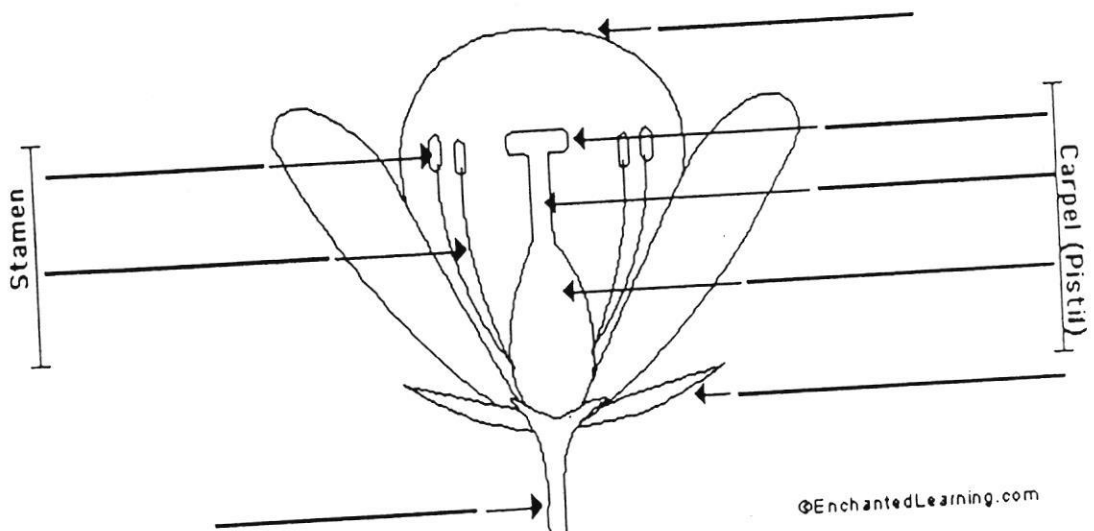
**petal** - a petal is one of the leafy structures that comprise a flower. Petals are often brightly-colored and have many different shapes.

**sepal** - the sepals are small leaves located directly under a flower - they are the outermost part of a flower.

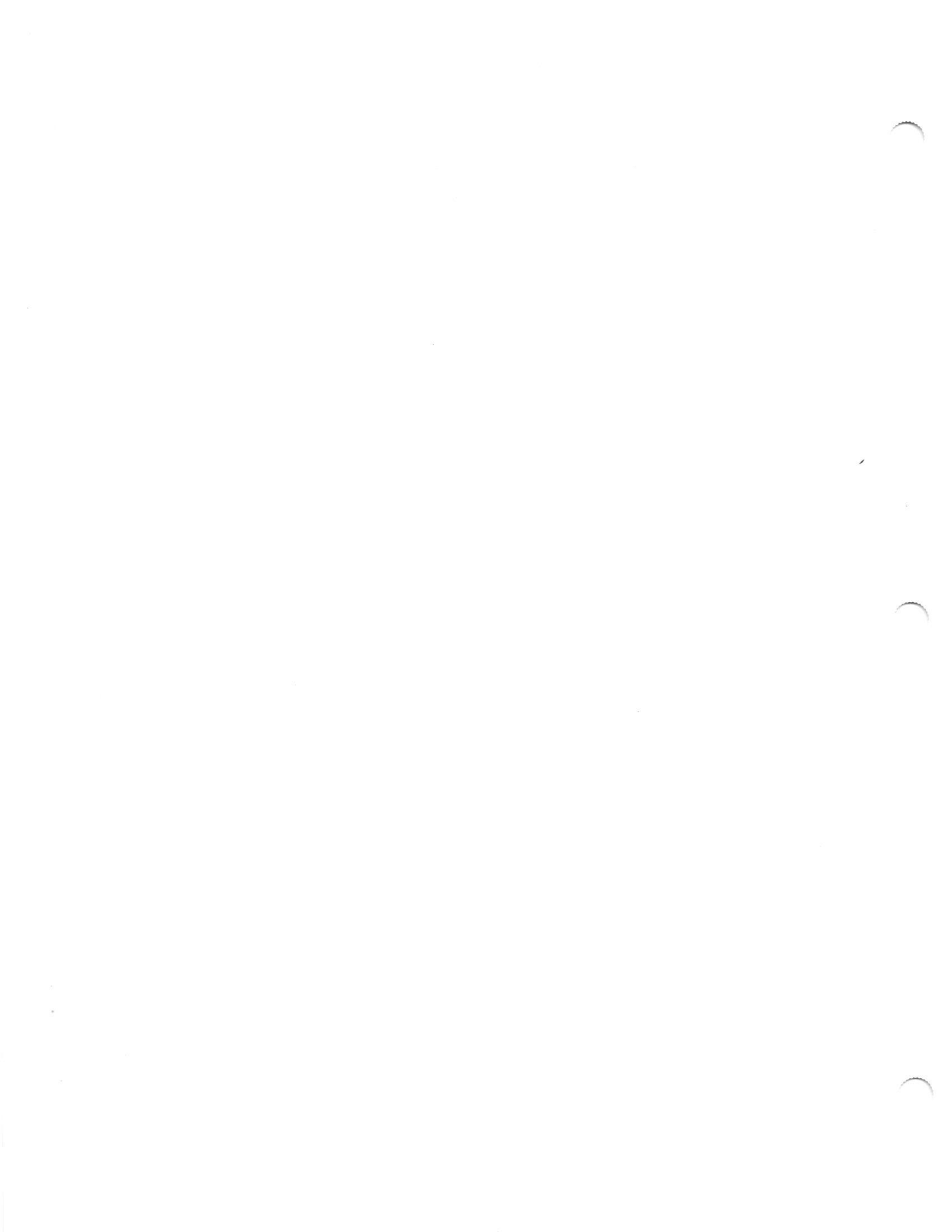
**stem (also called the peduncle)** - the stem supports the plant.

**stigma** - the stigma is uppermost part of the pistil, the female reproductive tissue of a flower. The stigma receives the male pollen grains during fertilization, when they travel through the style to the ovary.

**style** - the style is part of the pistil, the female reproductive tissue of a flower. The style is a long tube on top of the ovary, and below the stigma.







**LEAF SHAPES**  
 Needle Linear Oblong Elliptic Ovate Obovate Lanceolate Oblanceolate Spatulate Orbicular Rhomboidal Deltoid Reniform

**LEAF TIPS**  
 Acute Acuminate Cuspidate Obtuse Emarginate Attenuate Acute Obtuse Truncate Oblique Auriculate

**LEAF BASES**  
 Cordate Sagittate Hastate Transversely oblong-peltate

**LEAF ATTACHMENT**  
 Stalked Sessile Perfoliate Rosette Alternate Opposite Whorled

**LEAF MARGINS**  
 Entire Undulate Crenate Dentate Serrate Lobed Pinnatifid Pinnate-trifoliate Pinnate Bipinnate Palmately lobed Pedately lobed

**LEAF VENATION**  
 Palmately trifoliate Palmately compound Peltate-palmate Tendrils Stipulate Parallel Palmate Pinnate

**FLORAL STRUCTURES**  
 corolla perianth calyx sepal pistil stamen anther filament ovary stigma style ovary

**FLORAL PARTS**  
 dorsal A. sepal B. petals C. lip perianth

**SECTION - PETALS UNITED - OVARY SUPERIOR**  
 SECTION - PETALS UNITED - OVARY INFERIOR

**FLORAL FORMS**  
 Irregular (Orchid) Single Head Umbel Spike Raceme Panicle

**ORCHID GROWTHS**  
 central spine pseudobulbs radial spine areole rhizome

**CACTI**  
 Fibrous roots Tuber Rhizome Bulb

**ROOTS AND ROOTSTOCKS**  
 Composite Salverform Bell-shaped Bilabiate UNUSUAL INFLORESCENCE FORMS Anthurium Poinsettia Vriesia spike

**FERNS**  
 DORSAL SPORES MARGINAL SPORES

# How to plant your trees

Correct planting procedures will help each tree, shrub or other plant grow to become healthy and vigorous, able to live to the limits of its natural life.

## Where to Plant

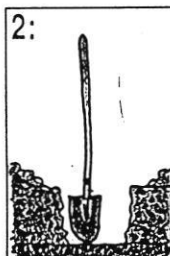
Consider how big your trees will grow. Avoid planting under or near overhead utility lines. If you're planting 6- to 12-inch trees, you may want to start them by planting them a foot apart in your garden. After they have grown for a year or two, you can transplant them to their permanent locations when they are dormant.

## Planting Bare-Root Trees

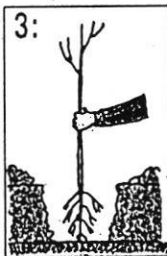
It is best to plant bare-root trees immediately, in order to keep the fragile roots from drying out. If you can't plant because of weather or soil conditions, store the trees in a cool place and keep the roots moist.



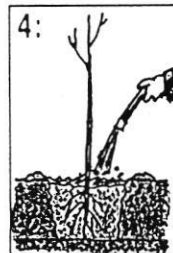
1: Unpack tree and soak in water 3 to 6 hours. Do not plant with packing material attached to roots and do not allow roots to dry out.



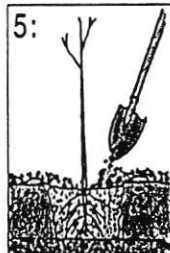
2: Dig a hole, wider than seems necessary, so the roots can spread without crowding. Remove any grass within a 3-foot circular area. To aid root growth, turn soil in an area up to 3 feet in diameter.



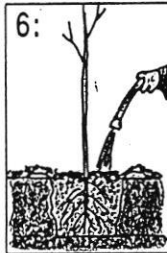
3: Plant the tree at the same depth it stood in the nursery, without crowding the roots. Partially fill the hole, firming the soil around the lower roots. Do not add soil amendments, such as peat or bark.



4: Shovel in the remaining soil. It should be firmly but not tightly packed. Construct a water-holding basin around the tree. Give the tree plenty of water.



5: After the water has soaked in, place a 2-inch deep protective mulch in an area 3 feet in diameter around the base of the tree (but not touching the trunk.)



6: During dry weather, water the tree generously every week or 10 days during the first year.

## Planting Evergreens

Evergreens are planted in the same manner as deciduous trees, and do not need pruning at planting. Partial shade is recommended for the first year except for junipers and cedars. Give them plenty of water and promote growth by cultivating the soil during the first few years. A desired shape can be kept by pinching off new growth in the spring, cutting just ahead of a point where there is a dominant bud.

## When You Plant in the Fall

After fall plantings, completely soak the ground around the tree once each week until the ground is frozen solid. Also, water during winter warm spells if the ground is dry and not frozen. Before freezing time, cover the soil around the base of the tree with an extra 4-inch layer of insulating mulch. Remove this extra mulch in the spring after the ground thaws.

## Planting a Lot of Tree Seedlings

When planting a large number of small seedlings, the same basic principles apply as in planting bare-root trees. However, use of a planting bar can help speed up the process. Remember to keep roots from drying out before planting, water the trees generously, and use mulch.



1: Insert a planting bar and work back and forth to create a hole for planting.



2: Place the tree in the hole at about the same depth it stood in the nursery.



3: Insert the bar about 2 inches from the hole and work the bar back and forth to pack soil around the roots.



4: Close new hole with your heel.

## The Value of Mulch



A young tree's best friend, mulch insulates soil, retains moisture, keeps out weeds, prevents soil compaction, reduces lawnmower damage, and adds an aesthetic touch to a yard or street. Remove any grass within a 3-foot area and pour organic mulch such as wood chips or bark pieces 2- to 4- inches deep within the circle. Keep the mulch from touching the trunk of the tree.

# How to prune young

"As the twig is bent, so is the tree inclined." This insightful saying about education also serves as the cardinal principle for pruning trees. How you prune your tree during its first few years will affect its shape, strength, and life span. Proper pruning will save you money and give you safer, healthier, more beautiful, and easier-to-maintain trees.

## Keys to Good Pruning

1. Prune early in the tree's life so pruning wounds are small, but do not start until the third year or so. A new transplant needs its leaves to produce for new growth.

2. Identify the best leader and lateral branches before you begin pruning and remove any defective parts before pruning to form. Try to find and use lateral branches that form "10 o'clock" or "2 o'clock" angles with the trunk. Branches with such angles will have greater strength than those with sharper angles.

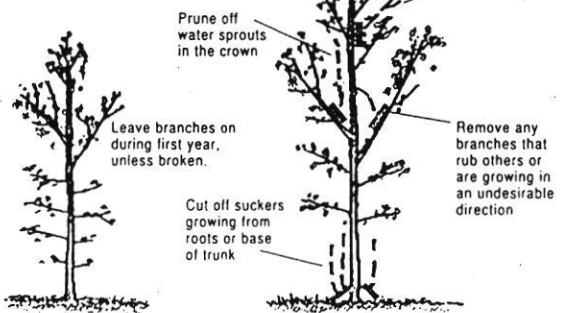


3. Keep your pruning tools sharp. One hand pruning shears with curved blades work best on young trees.



## Prune with an eye to the future

As you prune, remember that the branches do not move up the trunk as the tree grows. A branch 5 feet from the ground now will be 5 feet off the ground in 10 years—only thicker and longer than it is now. Try to visualize what a particular branch will look like later, and remove any branches that will cause an obvious problem. Never remove more than one-third of a tree's crown, and always try to maintain at least two-thirds of the tree height as live crown.



Tree as planted

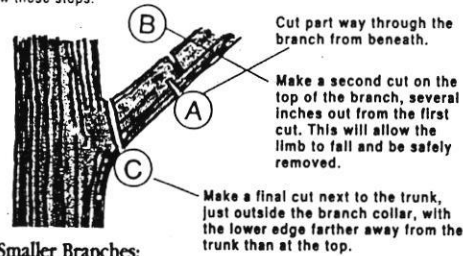
By age 3-4 years

# shade trees

## How to Make a Pruning Cut

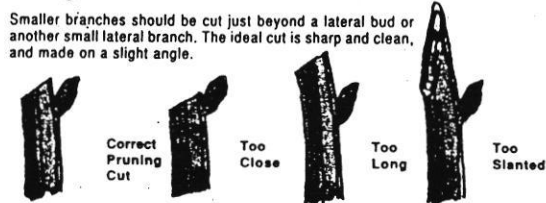
### Pruning Large Limbs:

Large, heavy limbs could tear loose during pruning, stripping bark and creating jagged edges that invite insects and disease. That won't happen if you follow these steps.

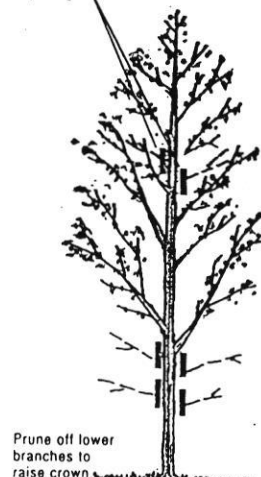


### Pruning Smaller Branches:

Smaller branches should be cut just beyond a lateral bud or another small lateral branch. The ideal cut is sharp and clean, and made on a slight angle.



Thin out branches for more even spacing



By age 5-7 years

## Double Leaders

Select a single leader and protect it from competition. Remove co-dominant leaders that have crooks or other defects.



## Waterspouts & Suckers

Suckers and waterspouts are rapidly growing, weakly attached branches that can occur at the base or in the crown. Remove them as soon as possible.



# How to prune fruit trees

Properly pruning your fruit trees will help insure high quality fruit year after year. Pruning strengthens branching structures, helps prevent limb breakage due to heavy fruit loads, insures that all fruit-bearing limbs receive sunlight, and helps fruit grow at heights for easy harvesting.

## Prune for natural growth patterns

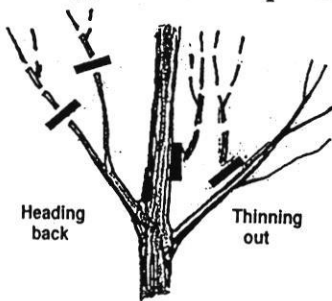


• Apples, pears and sweet cherries are generally upright growing trees, and should be pruned to encourage vertical growth and a stronger central or main leader. The top portion of the main trunk is cut out after the tree begins to bear fruit.



• Peaches, plums, apricots and sour cherries are more spreading in their growth patterns. They may be pruned into what is called "open center" form, with a short main trunk and several large branches carrying most of the leaves and fruit away from the center of the tree.

## Two types of fruit tree pruning



• **Heading Back** means cutting or shortening a branch or shoot, cutting the branch just above a bud. This encourages lateral branching.

• **Thinning Out** removes unwanted or rubbing branches, or those with weak branch angles, by cutting the entire branch or shoot back to a lateral branch or the main trunk.

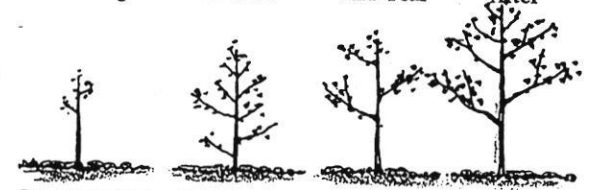
• **NOTE:** Don't prune the short branches known as fruiting spurs. The spurs are the only places where fruit will grow (except for peaches, which fruit on one-year-old wood).

At Planting

1st Year

2nd Year

After



Remove injured root tissue and branches with narrow crotch angles, that cross or rub, or that are less than 6 inches from other branches.

Pinch off unwanted sprouts in the late spring. Encourage the main trunk to grow upward, with side branches only at wide angles.

Train main side branches to grow outward. Encourage a few upright branches that can serve as "scaffold" branches.

Keep the tree leader dominant, and retain 2 or 3 new lateral branches. Aim for balance between parts of the tree.

## Course II: Annuals and Biennials

Objectives for this unit:

1. Understand the different types of Annuals, how they grow and how to care for them.
2. Determine the uses of annuals and biennials in the garden.
3. Successfully propagate annuals and biennials.

References:

*Handbook for Flower Shows* (pp. 71)

NGC Horticulture Study Course: Unit 1 Lesson Plans, p. 1.

*The New Flower Expert* by Dr. D. G. Hessayon

"Annual Flowers for Florida" by Bob Black, UF Extension Circular #569

*All About Annuals*, Ortho Books, 1981

Materials needed for this unit:

Seeds of all kinds

Seed trays or peat pots, eggshells, newspaper and toilet paper rolls

Mother plants to make cuttings from

Examples of as many blooming and foliage annuals and biennials as are available

1. Definitions: What is an **annual**? A plant that completes its life cycle in one season or one year. It grows from seed, makes all the vegetative growth (stems, leaves) that it can attain, produces flower and sets seed, then dies.

**Winter annuals:** Those annuals that grow in colder temperatures (Pansy, Petunia, Snapdragons).

**Summer annuals:** Those annuals that grow in warmer temperatures (Marigolds, Celosia, Coleus).

**Hardy annuals:** Those annuals that can withstand some frost. Many grow best under cooler weather conditions. Seeds for these are usually sown directly in the garden in the fall (Larkspur, Alyssum, Ornamental cabbage and Kale, Stock).

**Half-hardy annuals:** Annuals that can withstand periods of cold and damp but may be killed or damaged by frost (Cleome, *Lobelia*, Nasturtium, *Scabiosa*, *Dianthus*, Sunflowers, Veberna, Wax Begonias, *Zinnia*).

**Tender annuals:** Plants native to warm regions and are vulnerable to cold, cannot withstand frost (Ageratum, Celosia, Coleus, Coreopsis, Cosmos, Impatiens, Marigolds, Phlox, Petunia, annual Salvia).

**Shade annuals:** Those annuals that cannot stand the direct sunlight (*Impatiens*, Coleus).

**Sun annuals:** Those annuals that grow and thrive in direct sunlight.

**\*\*What about annual WEEDS?**

What is a **Biennial**? Any plant that completes its life cycle in two growing seasons. Generally the first year is for vegetative growth (many times a rosette form) and the second year, the plant will flower, set seeds and then die (Foxglove, Parsley).

2. Uses in the landscape:

**Bedding plants** for quick color, immediate impact: Can be used to fill in a flower bed that is just getting started or they can be the feature in the garden. Some annuals can be used as groundcovers. Many are selected for leaf color vice flowers (Coleus, *Acalypha*). Think of an English Cottage Garden!

In **containers** on the patio, terrace or balcony or in window boxes, hanging baskets or other containers. Provide interest and color for a season.

**Edges or borders** of naturally low growing annuals. Explain that some companies will spray growth retardant on their plants for ease in shipment.

Temporary **screens** can be made from annual vines (Black-eyed Susan vine, Hyacinth bean).

**Fragrance:** Some annuals such as *Nicotiana*, Petunias, and Stock have an inviting fragrance.

For **cut flowers:** Bringing fresh flowers indoors is a good reason to grow annuals in your garden (*Zinnia*).

To **dry:** Many crafts can be made by drying or pressing annual flowers. Many have interesting seedpods to craft with. Annual herbs can be dried for cooking.

As **larval and nectar foods** for butterflies.

As **edible foods** such as annual vegetables and herbs for culinary.

### 3. Growing and showing: Cultural Requirements

**Choosing a location:** Consider sun (most annuals prefer full sun) or shade orientation as well as protection from harsh winter cold or direct sunlight. Consider salt tolerance if you live by the water. Try to choose a location where the annuals will not be in competition for light, water or nutrients (away from tree roots, large shrubs, etc.). Consider color schemes and combinations that harmonize with your home and with each other.

**Preparing a location:** You may wish to use of pre-emergent for weed seeds prior to planting your flowerbed. Because of their small fibrous root system, the soil must be loose so roots can easily penetrate—dig down at least 8 inches to loosen soil. Adding humus to the soil will add moisture retention and benefit new plants. Most annuals prefer a mildly alkaline (6.5 to 6.8) soil pH.

- a. **Direct sow:** Discuss the frost dates for your area. Discuss depth of planting (depends on size of seed) or if plants need light to germinate, and how and why to water gently. Show examples of seed tape, cans of seeds, seed packets, etc. (Activity: Have students make their own seed tape with tissue paper, flour paste and seeds.)
- b. **Start indoors:** Use a specifically formulated soil mix for starting seeds or a sterile soilless mix ('Sow n Grow' or ½ sphagnum or peat and ½ a combination of Perlite and/or vermiculite—all have water retaining capabilities: Sphagnum Moss absorbs 10-20 times its weight in water but can be acidic, Peat has a high water holding capacity and would be good even for aquatic plants, Vermiculite is expanded Mica and holds water for a long time as well as aerates the soil and Perlite is volcanic ash holding water on its surface). You should not use soil dug from the garden to start your seeds unless it is baked at 80 degrees for about 30 minutes to kill weeds, insects and other pathogens. Builder's Sand is not appropriate for starting seeds and

should be used only for vegetative propagation. Some seeds will germinate on a moist paper towel, newspaper or blotter. For small seed, sow from the package or by salt shaker and for larger seeds, sow by hand. Sow evenly. Note how long it will take for the seeds to germinate. You may want to use a pencil to make depression rows in the soil mix. **'Hardening off'** means to help seedlings or young plants gradually become acclimatized/exposed to the outdoor environment before planting them out in the garden (at least one week with 2-3 days in shade, 2-3 days in half shade, then sun). The need for seed mats and heat or just a sunny windowsill, under 'grow lights' works well too. Start seeds indoors 4 to 6 weeks prior to when you desire to plant them outside, based on your area weather patterns. Don't forget to label your seed trays! If purchasing your annuals from the nursery, they should be watered well then planted in the coolest part of the day, not during the mid-day heat. Overcast and cloudy days are best for planting. Avoid planting on windy days as the wind will quickly dry out the new plants. Be sure to plant to the correct depth. Do not remove the new plants from their containers until time to plant so the roots won't dry out. **"Damping off"** is caused by soil borne fungi. Try succession plantings of seed, plant 1 to 2 weeks apart from spring to summer to increase constant bloom time.

**Maintenance:** routine cultivation, mulching, weeding and watering, with occasional fertilizing and pest management.

**Conditioning:** Cut flowers early in the day or late in the afternoon when the plant has full substance. Cut the stem at a 45-degree angle to increase surface area for absorption of water. Cut the stem a bit longer than needed and then re-cut under water just before using. Store in a cool, dark place until used.

**Entering** in a flower show: Check the Flower Show Schedule for any particulars regarding entering the flower show. Generally the Flower Show Schedule will have a Section for the cut flowers for 'Annuals' and perhaps another Section for 'Biennials'. Annuals that are not blooming can be entered under the Section for 'Cut Decorative Foliage'. Container-grown specimens of annuals can be entered in that section. You could enter your annuals as a 'Collection' or 'Display' as well (must have at least 5 exhibits that are different in some way.)

What the **judges** are looking for: Judging is based on 100 points perfection and use a Scale of Points for taking deductions. Depending on if the judge is judging a container-grown annual or biennial or a cut annual or biennial, flowering or foliage, he or she is first looking to see if it is properly named with genus and species. Next they look to see how your cultural practices have affected the color, form, substance, size, texture and maturity of the exhibit. They check the leaves and stems for diseases, malformations, bites, tears, bruises as well as the appropriateness and cleanliness of the container and the soil or water. Finally, the judges will consider the distinction/overall superiority of the exhibit.

#### 4. Propagation:

**By seed:** In order to **germinate**, seeds need moisture, air and favorable temperatures. (Explain the germination process: Once the seed absorbs water, the food (endosperm) surrounding the embryo converts from starch to sugar and the embryo

(small dormant plant) starts to grow. Soon the miniature plant is too large for the confines of the seed and breaks through the softened outer shell or seed coat and begins to take its nourishment from the outside environment.) Seeds can be purchased (The Federal Seed Act controls seeds sold in interstate commerce), or collected. Most purchased seeds are dusted with a fungicide and should be used all in the year of purchase. Discuss the different types of seeds. Discuss when to harvest and how to tell when a seed is ripe (brown, splitting). Allow seeds to air dry. Seeds can be stored safely 2-3 years if kept in cool place without moisture, unopened, in moisture resistant foil packages. Discuss how to prepare seeds for planting (scarification/scratching the outer surface, soaking to soften or leach for 24 hours, stratification/refrigerating). Understand that the rate of success is usually 50/50 so plant twice as many seeds as you want flowers. Discuss the different types of seed containers: Plastic flats, fiber flats, peat or Jiffy pots, peat pellets (expands 7 to 9 times in size), ferti-cubes, make shift foam cups, salad containers with lids—anything the right depth and with good drainage will do. Discuss the need for light, moisture and bottom heat (maintained 68 to 86 degrees for 16 to 18 hours per day) to assist in germination. Discuss how to tell what are true leaves vice the seed leaves of a dicotyledon. Discuss how to successfully transplant from seed trays to pots or to the outside soil. (Activity: Allow students to plant a variety of seeds in peat pots, eggshells, newspaper pots. (Demonstrate how to make newspaper pots by rolling newspaper around an empty toilet paper roller and tucking in at the ends, etc.) Newly transplanted plants, moved by spoon, should be pinched back to half their size. Once planted, the seeds must not be allowed to dry out—tent or mist. Seedlings may need to be **thinned** (pinching off at the soil level—do not pull out) after first true leaves are borne if spacing is not adequate for strong growth. **Reseeding** is always a bonus with annuals. Some annuals reseed freely, the seeds lie dormant during the winter and start growing as soon as the soil warms to the proper temperature in the spring. Unfortunately, some reseeding annuals revert to poor quality flowers and may become invasive if not checked. **Heirloom seeds** are becoming fashionable again—check out [www.heirloomseeds.com/catalog.html](http://www.heirloomseeds.com/catalog.html) or get a catalog from Landreth Seed Company.

**Stem cuttings:** Generally cut so that 2 to 3 nodes are below the planting medium and 2 nodes are above the planting medium. (Coleus) (Activity: Allow students to make stem cuttings on an annual of choice.)

#### 5. Maintenance:

**Pruning:** Pinching, dead heading (regularly removing fading or dying flowers in order to prevent seed formation to prolong bloom time) can improve the amount of blooms and lengthen bloom time by tricking the plant into thinking it hasn't yet completed its life cycle. Pruning helps the form of the plant to become bushy, by developing numerous side branches, and rounded. (Activity: Have students pinch by removing the tender top growth from a seedling or young plant.)

**Mulching:** To keep the soil temperature regulated and moderated, to keep weeds from growing and to hold water. Mulch to 3 inches, keeping mulch away from the stems.

**Fertilizing:** Review what the 3 numbers on the side of the bag or bottle represent. Discuss how and when to apply (after plants are established—about every 4 weeks, or in the soil when the bed is being prepared). Define **Side dressing**.



**Staking** may be necessary on some lanky annuals. Use small sticks or bamboo poles tied loosely with garden ties.

**Collars:** Some folks use collars made from old strofoam cups or containers to protect new seedlings from crawling bugs.

6. Pests and Diseases:

**Integrated Pest Management:** Natural means of controlling insects is always preferred over chemical controls. Be sure to read the label completely before using. Avoid watering from overhead late in the day to prevent mildew, fungus and other diseases. Provide good air circulation. Practice good garden cleanliness so pests don't have a place to hide. Follow a regular watering and fertilizing schedule to keep plants from becoming stressed—stressed plants are more susceptible to pests and diseases.

\*Choose 2 annuals to study in depth:

Coleus (*Solenostemon scutellarioides*)

*Impatiens*

Petunia

Vinca (*Catharanthus roseus*)

Pansy

*Cleome hasslerana*

*Torenia*

Marigold (*Tagetes erecta*, *Tagetes patula*)

Snap Dragons (*Antirrhinum majus*)

Grasses and ornamental grasses: Rye *Celosia*

Nasturtium (*Tropaeolum majus*)

*Calendula*

*Zinnia elegans*

Weeds!

**Note:** Annual Herbs can be studied during Course 9: Herbs

**Note:** Annual Vegetables can be studied during Course 8: Fruits, Vegetables and Nuts

**Note:** Annual Vines can be studied during Course 7: Vines



## Course III. Herbaceous Perennials

Objectives for this unit:

1. Define the different types of herbaceous perennials and state how they may be used in the landscape.
2. Discuss proper care of herbaceous perennials and how to successfully propagate them.

References/Resources:

*Handbook for Flower Shows*

NGC Horticulture Study Course: Unit 1 Lesson Plans, p. 8.

*The New Flower Expert* by Dr. D.G. Hessayon

*All About Perennials*, Ortho Books, 1981

*Perennials*, Southern Living "Garden Guide", 1996

*Perennials and Their Uses*, Brooklyn Botanic Garden Record, Vol. 34, No. 3.

"Flowering Perennials for Florida" by Sydney Brown, UF fact sheet ENH-68, 1996

Materials needed for this unit:

Peat pots for plantings

'Mother plants' to take stem and root cuttings and for division

A variety of seeds

As many examples of flowering and foliage herbaceous perennials as possible

1. Definitions: What is an **herbaceous perennial**? Herbaceous perennials are non-woody plants that live for more than two years, typically producing flowers and seeds each year after reaching maturity. Most herbaceous perennials will survive some cold weather because the roots are stronger and more vigorous than those of annuals or biennials. With the frost, the tops of herbaceous perennials may die back to the ground where they stay dormant until the weather reaches the temperatures they prefer to begin growing again. Herbaceous perennials typically have stems that are soft and fleshy. (Note: Many herbaceous perennials grown in the south may be grown as annuals in northern sections of the state.) Discuss the perennial WEEDS found in you garden!

2. Uses:

In **flowerbeds**: Perennials are continuous, reliable performers in the garden. These plants return each year to provide color and structure in the garden saving the gardener time, money and energy. Create a layered effect by placing taller plants in the back and shorter growing plants toward the front. Some herbaceous perennials can be used as a groundcover. Plant for emphasis and repeat in odd numbers.

In **Containers** on the patio, terrace, or balcony they provide mobile color. Group several containers together for an eye-catching display. Ensure good drainage and plant compatibility. (Containers will be discussed in Unit 6.)

To attract birds, butterflies and other **wildlife**: Plant herbaceous perennials that produce seed, berries or flowers to attract animals to your yard. Many of the best for this purpose are native perennials!

In **wet areas** or in **dry areas**: There are a number of herbaceous perennials that you can select to fill in these difficult areas. Many native plants will work well.

As a temporary **screen**, herbaceous vines can provide shade for you in the summer and die back to allow in the warming sunshine in the winter.

### 3. Growing and showing: Cultural requirements

**Location** of the site: Sun perennials are actually divided into full sun or partial sun or half-day sun plants. In Florida, full sun generally indicates 6 hours or less. Morning sun is less intense than afternoon sun. Shade perennials may easily grow in heavy shade but may not bloom unless provided with some dappled sunlight (*Hosta*, *Pulmonaria*, Toadlily).

**Preparing the site:** Because herbaceous perennials are semi-permanent in the garden, soil preparation takes on added importance: These plants need a fertile, loam soil with good drainage but is moisture retentive. Be sure to remove any grass or weeds from the site and till the soil to at least 12 inches. You may wish to treat the area with a pre-emergent. You may wish to have your soil tested to see what amendments might need to be added (fertilizer, compost, peat, manure, etc). Adding any of these organic components will help create a loose soil, easily penetrable by roots. Preparation of a new bed should be started about 2 months before planting allowing amendments to take effect. Most perennials prefer soil with a pH that is neutral (7.0) to slightly acidic (6.5). When all else fails and you can't achieve a perfect soil, consider building raised beds.

**When to plant:** Plant when dormant or if purchased in a container, plant anytime. A general rule is to plant spring blooming plants in the fall and to plant fall bloomers in the spring. Avoid planting in the heat of the summer unless you can provide enough water and protection from the sun until the plant becomes established. Always buy your plants from a reputable nursery. Plant only as deep as the plant was in the container. If the plant was rootbound, gently tease out the roots. Space plants according to mature growth.

**Conditioning:** Cut your specimens early in the morning or late in the afternoon when the plant substance is at it's fullest. Cut the stem longer than you need and cut it at a 45-degree angle to increase surface area absorption. Re-cut under water when time to use the plant.

**Entering** in a flower show: Herbaceous perennials can be entered in the Flower Show in Sections designated "Flowers from Cut Perennials" or in the Section for "Cut Decorative Foliage". Herbaceous perennials can be entered as flowering or foliage specimens in the "Container-grown" Section as hanging baskets or traditional containers. Some folks will choose to enter their herbaceous perennials as a "Collection" or "Display". Herbaceous perennials are usually eligible for an Award of Merit or the Grower's Choice Award.

What the **judges** are looking for: Flower Show Judges will first check the entry tag to ensure your exhibit is properly named with genus and species. They will then consider the cultural perfection of the specimen by examining the stem, foliage and flower for color, size, texture and form. The judges will ensure you have properly groomed your entry and removed any dead, diseased, broken or damaged parts. They will look to see if the container and soil are clean or the bottle and water are clear and clean. Lastly, they will consider the distinction of the exhibit.

#### 4. Propagation

**By seed:** You can collect seeds or purchase them. Keep them in a cool, dark place until ready to plant. Sow in the garden about ¼-inch apart and gently water. Keep moist to germinate. The size of the seeds determines how deep to plant them. A rule of thumb is to cover it 2 times the width of the seed. (Activity: Allow students to plant seeds of herbaceous perennials in peat pots.)

**Division and separation:** Asexual vegetative reproduction. Divide herbaceous perennials to control the size, rejuvenate and to propagate. Often the ‘mother’ plant will send up new shoots that develop roots and can be easily cut off. Division is usually done in the fall and spring. Other plants create clumps or colonies that are easily separated. Water plants well before dividing. If left undivided, the plants begin to compete with themselves, often choking off inner plants and leaving a dead center. Divide about every 3 to 5 years (Daylilies, *Hosta*, *Rudbeckia*, Yarrow). (Activity: Allow students to divide a clump of daylilies or other herbaceous perennial and then replant them—in a civic planting.)

**Stem cutting:** 6- inch cuttings taken in the late spring or early summer from new growth should be inserted in rooting medium or good, loose soil so that at least 3 nodes are under the soil and at least 2 nodes are above the soil (*Chrysanthemum*). (Activity: Have students take stem cuttings and plant them—in a civic planting.)

**Root cutting:** Roots about the size and diameter of a pencil are cut off the ‘mother’ plant, close to the crown. These are then placed nearly horizontally in good potting soil so that down is down and up is up. (Activity: Demonstrate or have students take root cuttings and plant them.)

#### 5. Maintenance: Herbaceous perennials require only the minimum of maintenance.

**Fertilizing:** Although fertilizer was added during the soil preparation, apply fertilizer at the beginning of the growth season and again about half-way through the season. Choose a fertilizer with higher phosphorus and potassium to encourage blooming or simply apply a balanced fertilizer. Organics can also be added to improve the physical condition of the soil.

**Mulch:** It is best to use an organic mulch such as leaves, pine straw or grass clippings since they will decompose and add nutrients to the soil. Mulch to a depth of 3 inches being careful not to have the mulch actually touch the plant stems. Mulch well at the onset of winter to protect the resting plants.

**Pruning, pinching, dead heading:** Prune when dormant or directly after blooming. Prune to shape, to remove any dead, diseased or dying branches, prune to remove any crossing branches and increase air circulation. Remove dead blooms to improve reblooming. Prune to keep the plant in shape and in bounds. If you purchased a new plant that was tall and lanky, cut it about in half before planting.

**Staking:** Some taller growing plants may need assistance to stand up, especially if they produce large, heavy flower heads. There are a variety of things to use for this purpose including wire, sticks, poles or purchased stakes.

#### 6. Pests and diseases:

**Insects:** First try the environmentally friendly ways of controls like insecticidal soap, washing off with a spray of water and using and protecting beneficial insects before

turning to chemical controls (Integrated Pest Management). Read labels carefully and follow the directions. Check for chewing or holes, look for caterpillars (future butterflies), grasshoppers/Lubbers. Treat thrips, aphids, slugs, whiteflies or spider mites as recommended by your County Agent.

**Fungus** such as black spot, mold and mildew can be somewhat prevented by good garden practices. These are often spread by wind and splashing water and debris. Fungicides are available for treating infected plants.

**Bacteria** such as rots and blights may result in the loss of the plant.

**Viruses** are evidenced by yellow streaking or splotching and can be spread by Aphids. The best prevention may be to dispose of the affected plant.

\*Choose 2 herbaceous perennials to study in depth (one hour each):

<i>Chrysanthemum</i>	<i>Echinacea purpurea</i> , "Coneflower"
<i>Hemeracallis</i>	<i>Heuchera</i>
Columbine ( <i>Aquilegia</i> spp.)	<i>Lobelia</i>
<i>Artemisia</i>	<i>Monarda</i> "Bee Balm"
<i>Hosta</i>	<i>Phlox paniculata</i>
<i>Amsonia tabernaemontana</i>	<i>Penstemon hartwegii</i>
<i>Stokesia</i>	<i>Salvia</i>
<i>Rudbeckia</i>	<i>Pulmonaria saccharata</i>
Yarrow ( <i>Achillea filipendulina</i> )	<i>Sedum</i>
Any other herbaceous perennial	<i>Pentas lanceolata</i>

Check out the Perennial Plant Association web site and plants of the year  
[www.perennialplant.org](http://www.perennialplant.org).

**Note:** Many herbaceous perennials are Bulbs and can be discussed during Course 5.  
Woody Perennials will be discussed in Course 4.

## Course IV. Woody Perennials / Arboreal Trees and Shrubs

Objectives for this unit:

1. Define the differences between trees and shrubs and the uses and care of each.
2. Demonstrate the methods for propagating trees and shrubs.

References/Resources:

*Handbook for Flower Shows*

NGC Horticulture Study Course: Unit 1 Lesson Plans, p. 18.

*The Tree & Shrub Expert* by Dr. D. G. Hessayon

*Botanica's Trees & Shrubs*, Laurel Glenn Pub., 1999

*Shrubs*, Southern Living "Garden Guide", 1996

*Flowering Shrubs*, Time-Life Books, 1972

*Trees and Shrubs*, Sunset Books, 1999

*Woody Ornamentals for Deep South Gardens* by D. & C. Rogers, 1991

*Trees, Shrubs and Plants for Florida Landscaping* by J. Morton

"Selecting and Planting Trees and Shrubs" by Bob Black, UF Extension Circular #858

"Native Trees for North Florida" by Jeff Norcini, UF Extension Circular #833

"Enviroscaping to Conserve Energy: Trees for North Florida" by Bob Black, UF Extension Circular EES-40

"Ornamental Trees for North Florida" by Bob Black, UF Extension Circular ENH-29

Materials needed for this unit:

Grafting tools and scion

Example of air layering, sphagnum moss, plastic wrap, aluminum foil

Cross section of wood showing cambium, rings

Examples of as many hardwood trees and shrubs as needed

Examples of flowering branches, cones, berried branches, foliage branches

Paper and pencils for bark rubbings, leaf rubbings.

1. Definitions: What does **arboreal** mean? In garden club, arboreal means "cut specimens from trees or shrubs". Trees and shrubs that are **arborescent** have secondary growth (bark).  
**Tree:** Generally with a single leader and standing over 15 feet tall. Large trees such as oaks, maples, generally have a strong central trunk and may reach considerable heights. Small trees may be single-trunked, such as Dogwood or have several major stems but will seldom exceed 35 feet in height. A tree usually has a canopy of foliage above head height.  
**Shrub:** Generally with multiple trunks or branches and growing under 15 feet tall. Shrubs vary in size from low spreading ground plants to those 25 feet in height but invariably have multiple branches emerging directly from the ground or from a very short trunk. Dwarf plants are the exception to the sizes. Shrubs usually have foliage to ground level.

**Sub-shrub:** Those low growing, woody perennials with multiple trunks that grow less than 30 inches or 3 feet tall. Some junipers (Parson's Juniper, Blue Rug, etc).

**Understory trees and shrubs:** There are some trees that prefer to be in the dappled shade of others and not placed in direct sunlight (Dogwood).

**Cambium layer:** This is the only part of a woody stem that is actually still growing, producing new bark and new wood. **Sapwood** is new wood that contains the active xylem and phloem cells, protected by the bark and forming the 'rings' (lighter rings indicate fast spring growth while darker rings indicate slower growth periods—count the darker rings to determine the tree's age). The interior of the stem is **heartwood** that is actually dead cells.

**Deciduous vs. evergreen:** Many trees and shrubs are deciduous, losing all their leaves for a period of dormancy, usually in the winter. Trees and shrubs that retain their leaves or lose them throughout the year but not all at once, are considered evergreen. Most conifers are evergreen.

Discuss **WEED trees:** Invasive trees such as Popcorn Trees, Cherry Laurel, Brazilian Pepper, etc.

2. Uses: Planting trees in your yard may increase your property value.

**Foundation plantings:** Arboreal trees and shrubs become a permanent part of the landscape. They form a backbone (and ceiling of a garden room) from which other flowerbeds and plants are sited. Trees and shrubs can frame a vista or hide an ugly view (use as a **screen**). They can establish perspective or direct circulation in the garden.

**Specimen or Accent trees:** Many trees possess a beauty that shows through all the seasons and grow to great heights. They can be placed alone to provide a dominant focal point in the garden. (Activity: Visit a local arboretum to see specimen trees or locate famous or historic trees in your community.)

In **containers:** Small trees or shrubs can make a big statement when strategically placed at the entry, on the patio, terrace, balcony or in the home. Choose dwarf or miniature varieties.

**Windbreaks:** Trees planted closely together can block the cold north wind or deflect saltwater spray.

**Noise breaks:** Trees reduce, disperse and absorb the noise from highways, neighbors, industry and other annoyances.

**Hedges** for privacy (full or partial) or as a **barrier** provide delineation between your yard and the neighbors without fencing. They can also hide private areas of the yard as well as unsightly areas. Allow 3 to 5 years for the hedge to fill in completely.

**Shade:** Many large trees cast a cooling shade over the yard and the home, reducing temperatures 10 degrees or more and reducing cooling bills in the summer.

**Food:** A great many trees provide food for our table or food that will attract wildlife to your yard. Recently the idea of **dooryard fruits** has come into favor. Berries provide color in fall and winter and attract birds and other wildlife. (Fruit trees and shrubs are covered more deeply in Course 8.)

3. Growing and showing:

**When to plant:** Deciduous trees and shrubs are most easily planted before winter or in the early spring before leafing out (leafless plants are most easily handled and less



likely to be damaged than plants in leaf) so they can establish themselves for the growing season ahead. Evergreen trees are best planted in early fall since they do not shed and will retain their leaves in a dormant state while roots are established in the soil. Container-grown plants can be planted at almost anytime. Be sure about the plant's location as they resent being moved once established.

**Site selection:** Analyze the planting location for the following: Sunny, shady or dappled? Where will shade be cast? What type of soil is there? Moist and humusy or dry and sandy, heavy clay or other? Will the mature size of the tree interfere with roof overhangs, utility lines overhead or will roots invade drain lines? Will the leaves or fruits make a mess on your walkway or driveway? There are potential liabilities involved. A rule of thumb for spacing between trees and shrubs is keep minimum distance about 2/3 the height of the mature plant. Generally the branch spread is equal to its height. Be aware of the microclimates on your property, particularly where temperature is a factor.

**Site preparation:** Dig the hole about twice as wide but not much deeper than the original planting or container depth. Remove plants from the container and gently tease out the roots. Do not add amendments to the planting hole. Mix soil from hole with a bit of soil from the roots to ease transition. Water generously and regularly for the first year. Some plants prefer acid soils (Azalea, Gardenia, Camellia, Blueberries) so work in peat moss or acidifying substances. (Handout on 'How to Plant a Tree'.)

**Plant selection:** When deciding what tree or shrub to plant, consider your climate, the mature height and sculptural form. Mature size and rate of growth depends on variety of plant, location, soil, climate and companion plants. Trees and shrubs have predictable shapes or silhouette: Trees may be pyramidal, round, columnar, weeping (fountain) or vase shaped (**excurrent** and **decurrent**). Shrubs can be oval, spreading (flat top) or matting (useful as a groundcover), globe-shaped or rounded-upright. Fast growing trees are considered weaker than slower growing trees (*Stormscaping* book by Pam Crawford lists trees that survive hurricanes). Trees and shrubs also provide a variety of textures (fine, medium or coarse) for the garden. Foliage color (other than green) and variegation can provide as much interest and excitement in the garden as can flower color. We identify many trees by their foliage leaves. (Activity: Have students collect leaves to identify, dividing them by leaf type—needle-like or scaly, simple leaves, compound leaves.) Do not forget the trees and shrubs with interesting bark or fragrance. (Activity: Allow students to take bark rubbings.)

**Purchasing the plant:** **Bare rooted** trees and shrubs come with no soil on the roots (often from a mail order company—it saves on shipping costs). Some trees have taproots while others have spreading root systems. **Ball and burlap** plants are dug with a ball of soil around the roots that is held in place with a covering of burlap tied around it. The burlap need not be removed (but should be loosened), as it will naturally decay in time. **Container-grown** trees and shrubs allow for planting almost any time during the growing season. Simply remove the plant from the container with little disturbance and place in the planting hole. The roots of container-grown plants may be overgrown and circling and will need to be loosened or cut back. Purchase your trees and shrubs from a reputable dealer and inspect them well before purchase. Choose those with a bushy crown and a well developed root system.

**Conditioning:** Cut your arboreal specimens early in the morning or late in the afternoon when the plant has the most substance. Cut longer than the anticipated need of

30 inches and make the cut at a 45-degree angle to increase surface area for absorption. Cut again, this time underwater, when time to use. Conditioning new growth is harder than conditioning older growth. Some specimens prefer to be completely submerged in tepid water for a period of time before use. It may be beneficial to clip the stem crosswise to increase absorption. Do not crush the stems.

**Entering** in a flower show: The arboreal branches from trees and shrubs can be entered in a Flower Show in the 'Arboreal' Section eligible for the Arboreal Award (Woody Vines are not eligible for this award). They may be entered as flowering, foliage, coned, fruited or berried. The maximum length of the specimen is 30 inches (except for dwarf, miniature or naturally small species) and it must be cut to show 2 or more nodes and habit of growth. Be careful to choose a substantial container of water as these top-heavy branches can tip a container easily.

What the **judges** are looking for: The judges will first look to see if the botanical name is correctly written, with genus and species and cultivar if known. They will consider the amount, arrangement and quality of flowers or fruits on the branch. Leaf arrangement and color (appropriate for the time of year) as well as the form (habit of growth) of the branch are taken into consideration. The size, substance and symmetry are important. Grooming and removal of spent or dead flowers or fruits or any dead leaves will determine points awarded. Physical condition of the exhibit should be free from mechanical damage, breaks, tears, splits, missing parts. Lastly, the overall distinction of the exhibit is reviewed.

#### 4. Propagation:

**Seed:** Conifers are Gymnosperms and produce naked seeds in cones. Other trees produce seeds in fruit. Collect the fruit in early fall before the birds and squirrels have a chance to eat it. Peel the fleshy pulp from each berry to reveal the seed. Place seeds in a small glass jar or zip-top bag and refrigerate them for 3 months. Sow the seeds in a seed flat filled with moist, seed-starting soil mix. Provide bottom heat to 70 degrees. Seeds should germinate in several weeks. Give seedlings bright light and feed every 2 weeks with half strength liquid fertilizer. When seedlings are about 2 inches high, transplant to individual 4-inch pots. (Activity: Allow students to prepare and plant seeds.) Some seeds will benefit by **stratification** (period of cold) and/or **scarification** (to nick or scratch the seed coating).

Softwood and Hardwood **cuttings** are taken in June just as the new wood hardens (was green, now becomes brown). Take cuttings about 4 to 6 inches long. The ideal shoot is one that has only become woody within the preceding 6 months. Moisten the stem, dip it into rooting powder, tap off the excess then place the cutting into a pot packed with moistened potting medium (one part peat moss and one part Perlite—a soil-less mix). Bottom heat may be necessary—70-75 degrees. Keep cuttings moist. Roots should develop in 2 to 3 months. To check for roots, pull gently on the stem to see if it offers any resistance. Pot cuttings into 5-inch pots and gradually harden them to plant in the fall. (Activity: Allow students to prepare and plant cuttings.)

**Layering:** Simple or ground layering is accomplished by bending the stem of a flexible shrub so it touches the ground a foot from the tip. Dig a dish-shaped hole 6 inches deep. At the bend, cut partway through the stem and wedge with a matchstick insert. Dust the cut with rooting powder and bury it 3 inches deep, anchored with crossed

sticks or a brick, in soil mixed with equal parts of damp peat moss and coarse sand. Water thoroughly. About 6 inches of the stem should show. By the following spring the buried stem will have produced roots. Cut it from the parent stem just below the soil ball and set the ball to its original depth in a prepared hole and water well. (Activity: Allow students to perform simple layering on a nearby shrub.) **Air layering** involves formation of roots on upright portions of the plant. About 12 to 18 inches back from the terminal end of a shoot, and in partially matured wood a ring of bark  $\frac{1}{2}$  to 1 inch in width is removed. (Branches  $\frac{1}{4}$  to  $\frac{3}{4}$  inch in diameter work best.) Conductive tissue adhering to the wood should be scraped away with a knife. A rooting hormone can be dusted on the upper end and just above the cut to hasten rooting. The entire area is then enclosed with a handful of moist sphagnum moss, covered with a small piece of clear plastic and tied around the stem at both ends with twist ties or sting. Reduce excessive heat buildup in the moss due to direct exposure to the sun by wrapping the layer in aluminum foil. After several roots are observed growing inside the plastic wrap, the layer can be removed by cutting below the rooting area. Place the layer in a container and keep moist for about 4 weeks. (Activity: Allow students to air layer a tree or shrub.)

**Grafting:** Grafting refers to the process of joining parts of two separate plants in such a way that they will unite and grow on as a single plant. The regenerative tissue of root stock and scion is brought together, in close proximity or touching, so healing occurs. The **scion** is that part of the combination that produces the top of the new plant and, ultimately, the fruit. The **rootstock** is the part that forms the root system and often the lower part of the trunk. Grafting, which can be done any time of the year but is best during dormancy, involves the use of a scion with 2 or more dormant axillary buds while **budding** uses a scion with only one bud and is usually done in late spring or early fall. There are many types of grafts that can be done on trees or shrubs (cleft grafts, whip graft, veneer graft, bark graft) and many types of budding too (Shield bud, patch bud, chip bud). Spray the graft with a fungicide then wrap the graft in 'Perifilm' to protect and seal it. (Demonstrate grafting techniques.)

**Root cuttings:** Root cuttings should be taken in early spring or late fall when the plant is dormant and leafless. Use a sharp spade to cut off a section of the spreading root (about  $\frac{1}{3}$  of the way in from the outermost spread of branches). Put the cutting atop a 1-inch layer of damp peat moss in a 3-inch hole and cover with soil. The root cutting will send out new roots along its length and in a few months a young plant will appear, growing from the end of the cutting that was nearest the mother plant. Allow the cutting to grow about a year before planting it in the garden. (Activity: Allow students to prepare and plant root cuttings.)

##### 5. Maintenance:

**Pruning** (why, when and where): There are many specialized pruning tools on the market to make this task simpler—hedge shears, lopping shears, pruning knife, pruning saw, hand pruning shears and others. Plants should not be pruned back upon initial planting except to remove damage and do necessary shaping. Prune out crossing or damaged branches anytime. Prune spring-blooming shrubs shortly after they finish blooming and before they form next year's buds (*Forsythia*, *Azalea*, Quince). Prune summer or fall blooming shrubs in spring before flower buds form later in the season (Rose of Sharon, *Weigela*). If in doubt, prune after bloom. Don't prune maple, birch or

walnut trees before mid-summer, as they will exude (bleed) excessive sap. Prune plants so they remain attractive and suitable for their space and site. Formal hedges will require clipping to keep them neat and in bounds. Prune a hedge so that light can reach the lower branches. Some pruning terms: **Heading back** (removing tips or ends of branches to stimulate new growth and thicken and shape plants), **Thinning out** (removing a branch at its source, either at the ground level or at a juncture with another branch), **Rejuvenation** or renewal pruning (Promotes fresh new growth from the shrub's crown and heavier flowering in years to come. Cut as many as 1/3 of the stems all the way to the ground, starting with the oldest branches). **Proper cuts:** To remove large tree branches, use the 3-step method (Handout: "Proper Pruning Techniques") to avoid tearing into the trunk. Do not cut into the "collar" on the trunk where the branch joins it (Branch Bark Ridge). Do not use pruning or wound paint on cut surfaces. Allow cuts to heal naturally. Single-trunked conifers (pines, cedar) generally need little or no pruning—many are self-pruning. Topping of trees is to be avoided at all costs. If the job is too big for you, call a certified arborist.

**Fertilizing:** It is not recommended to fertilize new plants for the first year or two as fertilizer will stimulate too much leaf growth and it is more important to establish new roots. Fertilize well-established plants in spring or fall, if needed. Apply around the drip line (the spread margin of the overhead branches).

**Stake** trees only if necessary (to protect, support or anchor) and for only the first year, then remove the stake and any guy wires so the plant can bend and become flexible to wind. Wires used in staking should not bind or cut into the bark.

**Mulch:** Mulch with organic bark, straw, pine needles (that will return some nutrient value to the soil) or inorganic gravel, rubber to retain moisture, discourage weeds and prevent erosion. Mulch should be 2 to 3 inches deep but not touching the trunk.

**6. Pests and Diseases:** Be alert to any problems that may be caused by insects or disease. Contact your Extension Agent for advice and remedies. Some problems may cause temporary disfigurement but the mature tree or shrub usually gets over such troubles. Consider using **native** trees and shrubs in the landscape that may be naturally resistant to some pests and diseases.

Some common problems found on trees and shrubs may include: Scale, Borers Beetles, Blight, Bag and tent worms, and Root rot. **Leaf Spot** Fungus and blackspot on roses may be cured using Captan. **Animals:** Damage from deer, rabbits, rodents can kill young plants. Wrap the trunk with protective material or use a cylinder of netting or wire around the trunk.

\*Choose 2 woody perennials to study in depth:

Dogwood (*Cornus florida*)

*Spirea*

*Forsythia*

Azalea

Maple

Juniper

*Callicarpa americana*

Holly (*Ilex*)

Crabapple

Conifers

*Gardenia*

Ginkgo

Willow

Camellia (see optional topics)

Vitex

Viburnum

Roses (see optional topics)

*Ligustrum*

*Aucuba japonica*

*Pittosporum*

*Chionanthus*

River Birch (*Betula nigra*)

Eleagnus

*Ternstroemia gymnanthera*

*Hydrangea*

Magnolia

Redbud (*Cercis canadensis*)

Oaks

Note: Fruit trees will be covered in Course 8.

\*Check out the National Arbor Day Foundation's web site at [www.arborday.org](http://www.arborday.org).

(Activity: Have the students plant a tree to celebrate Florida's Arbor Day in January—then apply for an award.)

Florida Department of Agriculture and Consumer Services, Division of Forestry offers booklets on caring for your trees and shrubs.

To plant a Presidential Tree visit [www.americanforests.org](http://www.americanforests.org).



## Course V. Bulbs

Objectives for this unit:

1. Accurately describe the most common bulb types, giving examples of each.
2. Demonstrate and describe the methods of bulb propagation.
3. Discuss the process of bulb selection, site selection and preparation, and tell how to successfully maintain planted bulbs in the garden.

References/Resources:

*Handbook for Flower Shows*, NGC

NGC Horticulture Study Course: Unit 1 Lesson Plans

*Bulbs*, Sunset Books, Inc., Menlo Park, CA

*Daffodils in Florida: A Field Guide to the Coastal South*, Linda and Sara Van Beck, 2004

*Garden Bulbs for the South*, Scott Ogden

"Bulbs for Florida", Bob Black, University of Florida, Circular 552

*120 Bulbs You Can Grow*, Rob Herwig, 1975, Collier Books, NY

Materials used in this unit:

Examples of as many bulbs as possible

Examples of as many flowers and the foliage from bulbs as possible

Knife for cutting 2 onions

Catalogues from Bulb companies

Propagation materials: soil, peat pots, etc.

1. Definitions: What are **bulbs**? Bulbs are 'storage tanks' that nourish the plant during the growing and flowering season. Most are monocots. "Geophytes" is a new term for bulbs.

A. **True bulbs**: are compressed modified stems bearing a growing point/apical tip or embryonic flower bud enclosed in thick, fleshy scales called bulb scales. An underground stem sheathed in a papery skin called a *tunic*, which protect against both injury and dehydration. (Activity: Slice an onion horizontally to show the moist concentric rings and the outer paper-thin skin or tunic. Then cut another onion vertically to show a small fully formed tiny flower, stem and leaves. Show the roots attached to the basal plate that holds the bulb together.)

**Tunicate**: Protected by a tunic (dry and membranous outer scales) from drying and mechanical injury. With a sheath and only one growth point (Narcissus, tulip, Amaryllis, onion, Allium, Hyacinths).

**Scaly** or non-tunicate: "toes": Outer scales are succulent and separate, giving a scaly look (Garlic, Easter Lily).

B. **Stem Tubers**: Thickened, terminal storage structures on underground stems. Marked by buds ('eyes') and a tough skin without a tunic of any kind nor a basal plate (*Anemone*, Irish potato, Gloriosa Lily, *Caladium*, some *Begonias*). (Activity: To show that stem tubers are actually stems, have students place toothpicks at each eye and see how the nodes appear in a spiral pattern.)

C. **Tuberous root:** A large fleshy taproot acting as a storage organ. Buds and stems are attached at the proximal end or the crown. There are no buds or 'eyes' on the surface of root tubers as there are on stem tubers. Tuberous roots grow in a cluster, with the swollen tuberous portion radiating out from a central point (*Dahlia*, *Ranunculus*, Elephant Ears, sweet potato, *Ipomoea* vine).

D. **Rhizomes:** Thickened, horizontal underground stem growing along or below the surface of the ground, with nodes and internodes and roots. Can be branched. *Canna*, Calla, Ginger, Iris, some Ferns, grasses,

E. **Corms:** compressed underground stem with only one growth point: Each year new corms are produced on top of the old one, which then shrivels and dies. *Gladiolous*, *Crocospia*, *Crocus*.

F. **Basal plate:** Hardened, compressed stem tissue to which roots are attached.

G. **Scape:** leafless stem with flower at top.

## 2. Uses in the Landscape:

In Seasonal borders and as cut flowers.

In perennial beds or in rock gardens.

In Containers: Plant in terra-cotta pots, wooden tubs or in window boxes; just ensure it has good drainage and quality humus soil. **Forcing bulbs:** Inducing bloom indoors: Trick the bulbs into breaking dormancy by refrigerating them and then planting them directly into prepared container (gravel or small pebbles, potting soil or in a hyacinth vase) and placing them in a warm sunny place.

**Naturalized:** Some bulbs are marked "for naturalizing" which means they do not need to be dug up and stored each year. 'Drifts' give an informal garden effect. The traditional naturalizing method is to broadcast a handful of bulbs over the desired planting area and then plant them where they fall.

## 3. Growing and showing: Cultural Requirements

**Site selection:** Well-drained soil, full to partial sun (*Caladium* tubers prefer partial shade and Yellow Flag Iris rhizomes prefer boggy conditions). If the soil does not drain properly, raised beds should be built and filled with soil that has good drainage properties.

**Soil preparation:** Prepare soil to a depth of 18 inches. Add organic matter to the hole. Spacing depends on the type of bulb you are planting.

**Bulb selection:** Choose bulbs proven to thrive in your area and soil that are firm and plump, not dry, not damaged, molded or with visible black spots. Feel each one to ensure its firmness and heft. The embryonic flower is already inside the bulb for next year. Avoid those bulbs already showing the first signs of green shoots. Bulbs are sold when they are in a dormant state. If ordering from a mail-order nursery, try to choose one closest to your area, not from Holland necessarily.

**Depth:** Depends on type of bulb you are planting. Generally, for true tunicate bulbs, plant 3 times the bulb height. For *Amaryllis* or *Crinum* species, plant with about 1/3 of the neck exposed.



**When to plant:** For spring flowering bulbs, plant by November (before the first frost), for fall flowering bulbs, plant in the summer. A period of dormancy can be replicated by storing bulbs in the refrigerator for a period of time. Plant bulbs with the pointy side up. Water generously. Remember: next year's performance is determined by this year's care.

**Conditioning:** Condition by cutting bloom scapes early in the morning or late in the evening when the sugars are high (full substance). Use a sharp knife and cut the stems at a 45-degree angle to increase surface area for water absorption. Submerge ends in warm water immediately after cutting and transfer to cold water and trim another inch from the stems while they are underwater. Some have success searing the stem ends. Some stems are hollow. Some stems will ooze a substance that can be harmful to other plants in an arrangement.

**Entering** in a flower show: The schedule for a Flower Show may include a Section for 'Flowers from Bulbs, Tubers, Corms and Rhizomes' that may be eligible for an Award of Merit. Entries will be sub-classed by color, type, size and named cultivars. Bulbs would also make an interesting Collection or Display. Bulbs may be entered as cut specimen or as container-grown exhibits. A scape of *Amaryllis* doesn't have to have 4 trumpets open—doubles rarely have 4 trumpets, but the *Handbook* says "four is optimum". Naming can include 'Seedling'.

What the **judges** are looking for: After checking to see that the plant is correctly identified with genus and species name, the judge will look at the color of the flower and color of foliage, physical condition, form, substance, placement or pose of the flowers on the stem (most poses are at 45-degrees to the stem), buds and their arrangement. Age and size of the bulbs will determine the size of plant and number of flowers it bears: this will determine overall form. Foliage on stem should get smaller as it progresses upward. Judges check the pollen to see if it is old and starting to discolor or fall on the petals. The dry papery husk/sheath should be retained on the bloom for show. The container will be checked for cleanliness and suitability. Lastly, the judge will consider distinction of the specimen.

#### 4. Propagation:

**Bulbils:** Tiny, dark, adventitious buds often forming in the axils of the leaves (at nodes) on the stem of some lilies. (Activity: Have students remove bulbils from stems and plant in peat pot.)

**Cormels:** Corms produce a small pellet-like form of offset called a cormel found around the base of each new corm. They may be removed and sown the following spring to grow into new corms, although it will take two growing seasons before they bloom. (Activity: Have students take cormels from *Gladiolus* bulbs and plant in peat pots.)

**Division:** For **bulb cuttings**, cut lengthwise or vertically through the bulb being sure to include a part of the basal plate with each cut. Dust each section with sulfur to prevent disease. Plant in a mixture of equal volumes of sand and peat. Bulblets will develop from the basal plate between the bulb scales. These can then be transplanted into beds to continue development. Likewise, overcrowded **rhizomes** can restrict the growth of newer segments. To revitalize, lift the rhizome out of the soil soon after blooming, break or cut the youngest rhizome segments apart from the older sections. Discard the old rhizome. The young rhizome should contain at least one node from which new growth

can be initiated. Plant the rhizomes just beneath the soil surface, positioning them horizontally so they can grow forward without being obstructed. (Activity: Have students cut rhizomes of Ginger apart and then plant in a 4 inch pot.) **Stem tubers** have a number of incipient buds ('eyes'), each of which may give rise to a shoot. The tuber should be sectioned so that each piece has at least one 'eye'. Plant the sections about an inch deep in loose, well-drained soil and the 'eyes' will soon grow into a new plant. (Activity: Have students cut a white potato apart and plant each section in a 4-inch pot.) To separate **root tubers**, in the spring, look for adventitious buds around the base of the old stem. To separate a tuber from the cluster, make clean cuts at the base of the old stem and between the buds so that the tuber will contain at least one stem bud. Plant each tuber on its side with the bud end upward in a hole deep enough to cover the tuber.

**Separation of the offsets:** Dig up the bulbs in late spring or early summer after foliage has died down. Pull small **bulblets** (small branch buds) off the base of the bulb and then replant. This should result in better blooming (overcrowding can cause lack of bloom). Separate bulbs every 3 to 5 years. (Activity: Have students pull bulblets off Crinum and plant in a 4-inch pot.)

**Seed:** Many bulbous plants produce seed that will germinate and grow but this method of propagation is not very popular because many varieties today are hybrids. Some seeds look like stones!

**Toes:** Individual scale leaves of large mature scaly bulbs may be used for propagation by gently pulling them off at the base. They should then be set, base down, into a shallow flat of well-drained sandy soil (moist peat and sand). Young bulbs will form about the edges of the scales. About a dozen scales can be removed from a scaly bulb without interfering with its blooming potential. (Activity: Have students pull 'toes' off Garlic or Easter lily and plant in peat pots.)

## 5. Maintenance:

**Storage:** If you dig up or lift your tender bulbs for storage, gently remove them from the garden soil and spread on newspapers to dry out a bit. When the tops die off, after about a week, cut them off close to their bases; do not pull as you might tear into their lower portions. Store in a cool (about 50 degrees), dry, dark place, in paper bags. Storage before planting must include chill time in the refrigerator (for 8 to 10 weeks prior to planting). To reduce the chance of insect or disease, a combination of fungicide and insecticide dust may be applied.

**Pruning:** Braiding of foliage? The foliage of a bulb needs to ripen and die naturally for the bulb to be fed and come back the next year, so do not cut off the foliage too soon. **Deadhead** to the bottom of the scape to prevent seed production, saving energy to increase bulb size and form bulblets.

**Fertilizing:** Apply "Bulb Booster" when planting or high phosphorus (middle) number just as the bulbs emerge. Apply Bonemeal as the flowers fade. (Show samples of Bonemeal and a Bulb Booster product.)

**Mulching:** Ensure any mulch used is light-weight and finely chopped and no more than 2 inches deep so as not to distort the emerging bulb foliage and bloom scape.

6. Pests and Diseases:

**Animals:** Bulbs are often eaten by moles and gophers and other rodents or dug up by squirrels, especially when newly planted. Prevent damage by covering the planting with a screen or chicken wire.

**Virus:** Useful viruses cause the attractive variegation in Darwin Tulips foliage and petals. Symptoms of viral infections (some caused by aphid infestation) include stunted growth, mottled or striped leaves and malformed flowers and foliage. The only treatment for virus is to destroy infected plants.

Too much water can cause rotting and cause soil-borne bacteria and fungi. Red Blotch is actually a form of rust (a fungus) that turns bulbs to mush.

\*Choose 2 bulbs to study in depth:

*Dahlia*

*Gladiolus*

Tuberous Begonia

Tulips

Iris

*Zephyranthes*

*Ixia*

Crocus

Gloriosa Lily

Daffodils, *Narcissus*

*Amaryllis*

*Lycoris*

*Leucojum*

Scilla

*Liatris spicata*

*Ranunculus*

Crinum



## Course VI. Container-Grown Plants

Objectives for this unit:

1. Describe and discuss the many different types of containers, their use and care.
2. Discuss the issue of compatibility in the selection of plants for containers.
3. Create a container-grown combination planting.

References/Resources:

*Handbook for Flower Shows*, NGC

NGC Horticulture Study Course: Unit 1 Lesson Plans, p. 24

*The Houseplant Expert* by Dr. D. G. Hessayon

*The Container Expert* by Dr. D. G. Hessayon

*Plants and Gardens*, Brooklyn Botanic Garden Record, Vol. 34, No. 1

*Propagating House Plants*, Arno and Irene Nehrling, 1976

Materials needed for this unit:

Examples of many types of containers

Plants and containers for projects (dish garden, terrarium or planter)

Soils (sterile) and examples of soil amendments

Tools for planting

Hypertufa ingredients: Portland cement, peat, Perlite or Vermiculite

What are the **advantages** to growing plants in a container? Portable, moveable, décor (color, texture, beauty), no yard (Condo, patio), controlled soil, fertility controlled (specific soil mixes for containers), weather control (move in and out of sun/shade, cold protection), plant sales or sharing, edibles close at hand, verticality (trellis in pot, eye level flowers).

What are some **disadvantages** to growing plants in a container? Water more often, weight, outgrow and have to repot, pot breaks or freezes and splits (integrity), theft (no anchor), exposure (heat build up in plastic pots).

Plants can be grown in a container singly or in combination: **Single plant** is one crown, no self multiplication. **Self-multiple** is a clump originating from a single plant, an original root system. **Multiple plantings** are several plants of the same genus, species, cultivar planted in one container. **Combination plantings** are several plants, at least 3 (same or different) combined for immediate effect.

1. Definitions: What is a container? Any receptacle for plant material—can be anything that holds growing medium. Will the container be subordinate to the plant material or will it be featured? Is the container in good taste?

**Containers:** Containers traditionally are made from terra cotta or clay, plastic, metal, wire, wood, fiber, tufa, etc. Show examples of as many as you can find discussing the pros and cons, sizes and types for each. Discuss the need for a drain hole and rot. Decorative glazed pottery is not recommended for use as a container except for decorative **double potting** (the inner pot should not be visible). Do not ever plant directly into a container made of copper as copper is toxic to roots. Discuss use of styrofoam pellets or pine cones in the bottom of a

container if the pot is very large for weight reduction. Discuss the need for a reservoir of self-watering and/or for a drainage hole. Provide examples of troughs, tubs, urns, bowls, tower containers, growing bags, wall mounted containers, and open and closed hanging baskets (remember the Hanging Gardens of Babylon, 600BC and the Egyptians 4000BC) with liners (coconut fiber, plastic sheeting, plastic foam, bitumen paper, recycled wool, sphagnum moss) to show how extended the definition of 'container' really is. What about toilets, tires or shells? Can you see using a wheelbarrow, shoe, BBQ pit or drilled out bowling ball?

**Dish Garden:** A miniature landscape (not a scene) in an open, shallow container. May include accessories that should be in proper scale. Plants must be compatible (requiring the same soil, light, moisture, humidity, and fertilizer). Consider immediate effect and ultimate size when choosing plants. Use a variety of leaf shapes, foliage color and plant forms for interest, remembering that too many colors and patterns will destroy unity. How will you keep the plants from outgrowing the container?

**Terrarium:** A miniature landscape (not a scene) in a covered or uncovered, transparent container. Plants must be completely confined within the container. No cut plant material is permitted. Accessories may be used if in scale with the container, plant materials and each other; they should be suited to the type of planting. Plants must be compatible. Traditionally the container is shallow, but that is not a requirement. Discuss the evaporation cycle created in a closed terrarium. Discuss the need for charcoal and gravel in the terrarium.

**Planter:** A term used to describe a group of plants grown in a container, either indoors or out. Not planted as a landscape or scene. Plants should be compatible (similar cultural requirements for soil, water, light, fertilizer, humidity)—like a marriage of plants. Choose plants with interesting forms, unusual foliage and/or attractive flowers (thrillers, spillers and fillers). Use herbs, bedding annuals, small shrubs, vegetables, cacti and succulents, foliage or flowering plants. No restrictions on size, shape, type of container—may be baskets, pottery, half barrels, flue tiles, a pillow of planting mix, decorative wood as well as any traditional container. A standard pot is as wide as it is high. And azalea or bulb pot is  $\frac{3}{4}$  as high as it is wide. A pan is  $\frac{1}{2}$  as high as it is wide and a tub is very large. Accessories are generally not used.

**Trained Plants:** Do you consider topiary or espalier or bonsai when you think of containers? Topiary is a container grown plant clipped or trained to grow in an intricate geometric, representational or free form—think of all the trained topiary plants at Disney World! Espalier is a tree or shrub that is trained to grow in flat plane against a trellis or other framework, often in a symmetrical pattern, often in a container. We often see fruit trees espaliered. Bonsai is the ancient art of dwarfing plants in a container and is quite a horticultural accomplishment.

## 2. Uses: Indoor and Outdoor

**Houseplants:** To grow a houseplant successfully indoors, you must approximate its natural state of growing conditions in your home: light, temperature, humidity, etc. Most houseplants are tropical or subtropical foliage plants (*Dracaena*, Pothos, *Ficus*, *Dieffenbachia*, *Philodendron*, Chinese Evergreen). Houseplant history: Indoor gardening

is recorded in ancient Egypt, (carvings indicate frankincense trees in containers about 3500 years ago/in 110BC), India, and China prior to the 1500's. International exploration, collection and cultivation in the 1800s brought many unusual plants into Victorian homes, conservatories and greenhouses. NASA experiments prove that indoor plants remove noxious chemicals from the air, especially formaldehyde and benzene. To achieve a humidity environment that plants love, consider placing them in the kitchen or bathroom. Consider grouping container grown plants, elevating them, hanging some or even mounting them for display.

**Greenhouses**, small and large, are being used to protect many outdoor plants from the cold weather and to provide a laboratory for specialist gardeners.

**Patio**, courtyard or poolside decoration, creating a lush, tropical atmosphere. Containers on a small balcony are the gardens of choice for those living in condominiums, mobile homes or retirement apartments. The elderly and handicapped also find happiness gardening in containers. Just be sure your containers are located no farther than the length of a hose for convenient watering. A great use for plants on a patio is as crop containers—planters with vegetables, fruits and herbs.

Convenient **veggie and herb gardens**: If author Felder Rushing can grow vegetables in a bag of potting soil in the back end of his truck, you can certainly grow a tomato on your back porch! Many new cultivars of compact, heavy fruiting vegetables are being developed for containers—they don't call them 'Patio' tomatoes for nothing! You may want to raise these containers off the ground to deter worms.

**Accent plants**: Welcoming friends to your front door, small shrubs planted in containers are certain ambassadors. We now see many containers lining the streets of our communities. Containers are used as art objects, architectural features or focal points. Some containers are beautiful even without plants growing in them!

### 3. Growing and showing: Techniques for success; nothing in excess!

Discuss **plant selection** and seasonal care for seasonal plants, flowering, fruiting or foliage: Before purchasing a container grown plant, check the top and bottom of the leaves as well as the soil for anything that shouldn't be there (insects, fungus, infection). Check the coloring of the leaves. Choose a sizeable plant that fits the decor (texture, shape, color) of your home (Boston fern fits a Victorian decor while a Cactus fits a southwestern theme). Check for healthy roots and good foliar tone. It is best to buy from a reputable nursery. Remember to always keep the ultimate size and scale of the plants in mind. You may want to consider a variety in shapes as well.

**Potting soil mixtures**: A loose, well-drained soil is suitable for many types of plants. The soil should have some water holding ability but also provide adequate pore space for root aeration. Discuss the pros and cons to buying commercial vs. making your own soil—quantity, ease, (Brown Earth, Miracle-Gro, Sunshine Mix, Jungle Growth), adding **Perlite** (a volcanic material created by heat treatment to form lightweight white granules, used to lighten soils and improve drainage), **Vermiculite** (a lightweight mineral product made from mica that is expanded by heat treatment and used to lighten soil and improve drainage), soil conditioners, peat moss, sphagnum moss (mined from bogs—acidic, moisture retentive). Consider that you may just get what you pay for—So, when purchasing, always get the best! Do not use soil from the yard to pot houseplants unless it

has been treated to eliminate weed seeds, pests and pathogens (Bake at 180 degrees for 30 minutes). (Have examples of soil amendments labeled in plastic bags for all to see.)

**Recipe** for home mixed potting soil: 1/3 all-purpose commercial mix, 1/3 peat moss and 1/3 Perlite or vermiculite. Or, 1 part peat moss, 1 part well composted bark mulch or bark mold (for drainage—somewhat acidic) and 1 part Perlite. Commercial mixes are available for specified plants (African Violets, Orchids, Cacti, etc.). Sand can be added to the mix for improved drainage and stability. Charcoal can be added to the mix as a deodorizer. (Activity: Compare different types of potting soil for tilth.)

Discuss soil-less mixes and hydroponics as optional growing medium.

**Light** needs for photosynthesis: Artificial lights (Use fluorescent lights rather than incandescent light to reduce heat, for 12 to 16 hours each day. Plants respond best to artificial light from the blue spectrum.), bright light (indirect light from an east or west window that receives a few hours of sun in the early morning or late afternoon, well lit the rest of the day), full sun (more than 4 or 5 hours of direct sun per day in an unshaded window—Plants with highly colored leaves, flowering plants and succulents grow best when placed in an area where they receive full sunlight.), direct light (between 2 and 5 hours of light in the morning or afternoon but not the full strength midday sun), low light (placed well away from the nearest window), medium or moderate light (average indoor light from a north facing window or away from an east or west window). Note that light intensity and angle change with the seasons. Be sure to rotate or turn pots regularly to avoid lop-sided growth (etiolation).

**Water and humidity** needs: Use room temperature water and water in the morning. Amount of water needed depends on the type of plant, stage of growth, type of soil, type of container, amount of light, temperature, air movement and humidity. Over-watering can cause rotting—Demonstrate the ‘finger test’ for soil wetness. Water less often but more thoroughly—a deep watering will help leach out salts. Water less often during periods of dormancy. Generally your home has less than 20% humidity (moisture content in the air). Create humidity by grouping plants, placing plants in a pan of pebbles covered in water, using a humidifier, misting, etc. Humidity of 40 to 60 % is ideal. Do not let plants sit in a saucer full of water. Plant roots need oxygen and air exchange. Discuss use of polymer crystals in the soil mix (hold up to 400 times their weight of water--Hydrogel).

**Temperature:** Most tender plants are brought inside if temperatures drop below 50 degrees. Plants will adapt to normal indoor temperatures (55 to 75 degrees). Even your home has microclimates and temperatures will vary from room to room—avoid placing plants near heat sources. If you keep your plants outside for most of the year, be sure to allow them time to acclimate and adjust to the weather and sunlight.

**Top Dressing** or not: Mulch the container with moss, rocks, actual tiny pieces of mulch or lava rocks, etc. This will not only be more attractive but will help reduce moisture loss. Top dressing should be culturally compatible with the chosen plants as it can be heat reflecting or acidic, depending on the type chosen.

**Double potting** or not: Placing one pot inside another, usually decorative, to ‘dress up’ a plant.

**Entering** in a flower show: The Flower Show Schedule may have one or more Sections devoted to container-grown plants, hanging baskets and combination plantings. Generally these will be eligible for an Award of Merit. Carefully read the schedule to see



what, if any, size or weight limitations there may be. Check to see if **reservations** are required. Be sure to provide the complete botanical name of the plant when it is entered. If entering a combination planting, draw a **schematic** of the plants named by location in the container. Container-grown plants can be entered as Collections or Displays as well, eligible for the Collector's Showcase. The rule for combination plantings is that they must have been in your possession and growing together for at least 6 weeks. All other container-grown plants must have been in your possession for 90 days. Look to see what terminology is used in the schedule: self-multiple (a plant that sends up offshoots from a main stem) or multiple planting (a single container with multiple plants of the same cultivar).

What the **judges** are looking for: First the judges will see if the plant or plants have been correctly and completely identified by genus and species. Cultivar names and common names are not required but are good to include. They will look to find a schematic of the plant arrangement if more than one plant is present. Judges will consider the cultural perfection of the plant, determining if it is of prime maturity, peak of perfection and healthy. They will look at the foliage and stems to see if they are growing true to the type of plant and if there are any dead ends, malformations, broken parts or voids. Judges will give points for large size, a firm substance and true form. They will look to see if the color of the leaves and the flowers, if present, are clear and bright, fresh and attractive and if the texture is typical. Judges will look to see if there are any blemishes, bug bites, residue or cuts, tears, bruises or holes in the leaves and if the plant has been groomed for best appearance. Attention is given to the container and how clean and appropriate it is. Lastly, the judges will consider the overall plant for any distinctive qualities. For combination plantings, the unity or overall harmony is important.

#### 4. Maintenance:

**Repotting:** 'Bump up' the plant to a larger pot when the plant has obviously overgrown the container, has become root bound or with roots growing out the drain holes or is no longer blooming—Rule of thumb: To be in proper proportion, up-pot to another container that is one inch larger on each side (a total of 2 inches) of the size of the plant. Some sources suggest repotting every other year. (Activity: Demonstrate how to repot a plant or have students up-pot a plant—Moisten the plant to be repotted, hold the container sideways and tap it against a hard surface, hold the stem of the plant between your fingers and gently ease it out of the pot. Remove damaged or dead roots. Now is the time to remove any offsets or pups or divide the rhizome. Partly fill the new container with soil. Place the plant at the height it grew in its old pot. Continue to fill the new pot with soil, tamping the planting mix with your fingers until soil is within  $\frac{1}{2}$  to  $\frac{3}{4}$  inch from the rim, water thoroughly.) Try not to over-pot or under-pot.

**Fertilization:** Discuss and review the numbers on the granular fertilizer bag and what they stand for (Nitrogen for foliage and stem growth, Phosphorous for bloom and root growth and Potassium for plant vigor and disease resistance) and what they mean (percentage of each nutrient in the bag). Fertilize during active growth periods and stop during the winter resting months (Thanksgiving to Valentines Day). 'Nutricote' or 'Osmocote' prills are pelletized slow/time-release fertilizers with minor elements. Liquid or soluble fertilizer cut to half or quarter strength works to keep the plants at optimum

health, not maximum growth. (Activity: In advance of the class, gather samples of each type fertilizer. Many companies will gladly send you samples if you just ask)

**Grooming:** Disbudding and deadheading, pruning to shape and to increase bushiness. Clean plant foliage by washing with warm water. Be sure to remove any weeds growing in the container.

5. Pests and Diseases: It is important to identify the problem and then treat it accordingly. First, isolate the plant. Determine if the problem is cultural or physiological.

**Insects:** Aphids (1/8 inch tiny, soft-bodied, wingless insects), mealybugs (up to 1/4 inch insects cluster on stems and leaves in cottony masses), scale (create brown crusty bumps that can be scraped off easily), spider mites (minute in size, look for webbing), whitefly (tiny, winged insects 1/12 inch long feeding on the undersides of leaves. Excrete honeydew).

**Virus, Fungus and Bacteria:** Lack of air circulation is the number one cause of fungal diseases in houseplants. When treating with chemicals, read the label and follow directions carefully. Keep tools and your work area clean.

\*Construct at least **two** of the following:

A single plant in a single decorative container: Use a strawberry pot, a seashell, a hanging basket, or even a stump or something as unusual to plant one spectacular plant or several smaller plants from the same species.

**Dish garden:** See definition above. Depending on the type plants to be used, choose the appropriate soil mix. Best choices are slow-growing, small plants that won't crowd and outgrow their space and ruin the landscape plan. Place plants to see if you are getting the desired effect. Arrange and rearrange to create a miniature landscape. Remember the principles and elements of design! Ensure the container has adequate drainage or place pebbles, shards or crocks in the bottom. Add a layer of soil. Remove the plants from their containers and knock off most of the old soil. Place them in the design and add soil to firm in the plants. Water. Do not fertilize until the plants are well established and growing. Top-dress with pebbles, if desired. Accessorize with appropriate, in scale material such as rocks, pieces of wood, etc. (Check out [www.thegardenhelper.com/dish~gardens.html](http://www.thegardenhelper.com/dish~gardens.html) for step by step instructions.)

**Terrarium:** See definition above. Container can be any type clear glass or plastic but must have a lid or cover (bottle gardens, pretzel containers, brandy snifter, aquarium, Wardian type case, etc.). There must be a layer of drainage material (pebbles, rocks, shards, crocks, etc.) in the bottom of the container (generally no more than 2-3 inches). Place some horticulture grade charcoal in with the drainage material to help absorb gasses and to sweeten the soil. Place a layer of net over the drainage material to keep soil from washing down into the drainage. Add slightly moistened soil in an amount at least equal to the drainage material. Place chosen plants (those slow growing, shallow rooted, small plants liking high humidity and low light) into a landscape, remembering the principles and elements of design. Scoop out areas to place plants, place them and fill in with soil as needed. Place accessories. The complete terrarium should fill no more than half the area of the container. Using a funnel or mister, wash down any soil that stuck to the sides of the container. Cover the terrarium. Watch for mist or moisture droplets to accumulate then run down the sides of the terrarium, creating a continuous watering

cycle. If the mist does not clear, remove the top and let some moisture evaporate, then replace the lid. If no mist appears, add water until it does. (Check out [www.thegardenhelper.com/terrarium~plants.html](http://www.thegardenhelper.com/terrarium~plants.html) for a list of plants suitable for growing in terrariums and dish gardens. Also [www.robsviolet.com/terrariums.htm](http://www.robsviolet.com/terrariums.htm) for other ideas.)

**Planter:** See definition above. Make sure the drainage hole is open—put a few shards in bottom of the container. Put 3/4 of the soil mix in the planter. Place selected plants, adding additional soil to cover roots. Water well. Placement of plants will depend on the container, the effect you wish to achieve and the height, spread and habit. Tallest in center (thriller—attention grabber, architectural backbone), graduating heights down (filler—add mass to the planting as well as variety), with any trailing or vining at the bottom (spiller—plants tumbling over the lip of the container) is one design (be sure to avoid a layering effect). Window boxes are another type of planter. Planters will need watering and feeding more often than most containers since there are several plants in competition for the food and water. Prune plants to shape and to keep in bounds. Groom the plants often, removing spent blooms, yellowed or dried foliage, etc. Inspect often for disease or insect problems. If an indoor planter, place where the chosen plants get the light required for proper growth. Outdoors, place the planter in light shade or dappled sun or on the patio, deck or porch. If making a mixed planting using a small shrub, choose under-plantings that are permanent (perennials) or annuals that can be removed and replaced each season.

Make and plant a **Hypertufa trough:** One recipe calls for 2 parts Portland Cement (this is not concrete!), 3 parts peat and 3 parts Perlite or vermiculite. Another recipe calls for 1 part Portland Cement, 1 part sand, 1 part peat and 1 part Perlite or vermiculite. Choose a mold so that you can create your trough inside or outside the form. Desired thickness of a hypertufa trough is 1 ½ inches, so choose the size of your mold accordingly. Mix the ingredients in a large container or wheelbarrow slowly adding water to moisten. Apply the mixture to your mold patting it into place. When done, stick dowel rods through the bottom to act as drain holes. Let cure for several days before planting.

Make and plant a **mosaic planter:** Select an appropriate clay container. Draw the clay (terra cotta) container's dimensions on paper, then sketch your design. Cut tile, glass, pottery and mirror pieces, polished rocks or seashells to fit designed pattern and place on paper. Spread tile adhesive on one section of the container using a trowel. Transfer the cut pieces to the pot and press in place. Let adhesive dry. With a damp sponge, press gray grout between the shards. Wipe excess grout from surface with a damp sponge. Let grout dry, then polish away haze with a soft cloth. Plant as you would any other container.

**Sand-casting:** from [www.GardenGateMagazine.com](http://www.GardenGateMagazine.com)

Materials and Tools needed:

- 1 large leaf (harvest when ready to use or condition it fully—not wilted)
- 1 40-pound bag of sand
- 1 40-pound bag of premixed concrete
- 1 roll of plastic wrap
- 1 gallon of concrete sealer (such as Thompson's Water Seal or Drylock)
- Paint or concrete dye (optional)
- Water
- Bucket or mixing tray for concrete, trowel, scrub brush, paint brush

1. Start by making a dome-shaped pile of sand that's big enough for the entire leaf to rest on plus a couple of extra inches to spare. The sand pile will support the concrete-covered leaf and create the shallow depression that holds water. Cover the completed sand dome with plastic wrap to keep the sand from sticking to any concrete that might leak through or run over the edge of the leaf.
2. Cut the stem off close to the base of the leaf. Lay the leaf **face down** on top of the sand. Adjust the sand pile to make sure the leaf is fully supported. Make sure the plastic wrap extends a couple of inches beyond the leaf's edge.
3. Pour dry concrete into a mixing tray and add water until it is the consistency of a brownie mix. Scoop some concrete onto the center of the leaf and begin working it toward the outer edges. Make it about  $\frac{3}{4}$  inch thick in the middle and taper it to  $\frac{1}{4}$  inch at the edge. Cover the concrete with plastic wrap. Give it at least 48 hours to dry.
4. Remove the top layer of plastic and turn your concrete leaf over carefully. Peel off the second sheet of plastic wrap and start pulling out the leaf. You may have to scrub it a bit. Let cure for a week or so to paint it.
5. To use the leaf as is, add a coat of concrete sealer. To paint it, use several coats of a thin wash of acrylic paint. The wash is about 3 drops of paint to 2 cups of water. It dries quickly and you can begin a second coat almost as soon as you finish the first. You can also use concrete dye, water color, oil or spray paint.

**Pot-et-fleur:** from 2007 *Handbook for Flower Shows*, page 207.

1. A Creative Design consisting of a combination of 2 or more rotted plants, growing in soil or other medium, with cut plant materials and other components, artistically arranged together in one basket or other suitable container. (Not organized as a landscape or combination planting.)
2. Growing plants may be of same or different varieties, but latter must have compatible growth requirements, as this is a semi-permanent arrangement. They should be chosen for pleasing variations in color, texture, and leaf-form.
3. May be all foliage plants, all flowering, or a combination.
4. Fresh and/or dried flowers, leaves, and/or branches are added; Fresh ones needing to be in water may be inserted in small bottles, floral foam or orchid tubes and hidden among the plants.
5. Branches, with or without attached foliage, and/or decorative wood, may be used or height.
6. Outside container must be sturdy, large enough to hold all materials, and deep enough for roots to be below container rim for watering.
7. Plants may be kept in their pots, plants and soil put into baggies, or planted in a light, porous medium.
8. Moss, pebbles, and other suitable materials (marbles, wood chips) may be used to cover planting medium.
9. All Principles and Elements of design apply, as this is an arrangement or design style.

## Course VII. Vines

Objectives for this unit:

1. Accurately describe the methods vines use to attach themselves to a support structure.
2. Describe how vines can be sited and used effectively in the landscape.
3. Propagate vines and discuss planting and care of mature vines.

References/Resources:

*Handbook for Flower Shows*

*Vines and How to Use Them in your Garden*: 1983, Golden Press, NY

“Vines for Florida” by Bob Black, University of Florida Extension Circular 860

Materials needed for this unit:

Examples of vines showing various methods of attachment

Examples of as many vines, their flowers and fruits as possible for hands-on identification.

Propagation materials: soil, peat pots, etc.

Optional activity materials: grape vine or wisteria wreaths

1. Definitions: What is a **vine**? Plant that trails or climbs by twining, or by attaching appendages to a support. Methods of attachment are part of a plant’s evolution toward survival. Includes all plants the stems of which are too frail to support themselves in a more or less upright position or have horizontal stems not stiff enough to support themselves without trailing on the ground. It is said of vines that the first year it sleeps, the second year it creeps and the third year it leaps!

A. **Clinging Vines**: Suckers, “Holdfast”: clinging with disc -like suction or adhesive cups (Boston Ivy) or adhering with tiny rootlets that grow from the stem (Ivy, creeping fig, winter creeper, climbing hydrangea, trumpet vine). Prefer a rough surface.

B. **Non-Clinging Vines**: Hooks: ends of leaf form a hook to grasp the support (Gloriosa lily).

**Tendrils**: Grasping and tightly curling and coiling, slender stalks (grapes, pole beans). Supports should be no more than 1 inch in diameter and closely set. Contact by the tendril causes a reaction resulting in a growth response called *thigmotropism*, a fancy word meaning “a touch-caused turning response”. When a tiny tendril makes a contact, under the influence of the plant hormone *auxin*, the cells in touch lose water and shorten while those opposite quickly increase in turgidity and elongate so that the tendril is bent around the support.

**Twining**: Twisting, encircling and weaving in and out of fencing or around a support (wisteria, jasmine). Vines will twine clockwise or counter-clockwise.

**Rambling or Clambering**: Leaning on support but not actually attaching (rambling rose). Should be tied to their supporting structure.

2. Uses: **Vertical Gardening** in narrow spaces

In the **landscape** for privacy, shade, color, fragrance or to soften hard architectural areas. As an accent or focal point on a lamppost or mailbox, porch railing,

bird and butterfly gardening (larval and nectar foods for the caterpillars: passion vine, Dutchman's Pipe-- or berries for the birds), fruiting (kiwi, grapes, gourds, passion vine— have some available to eat!), as groundcover (Asiatic jasmine, Vinca, Potato vine) trailing over bare ground to form neat carpets or stabilize steep slopes. Unfortunately, many invasive vines such as Kudzu and Chinese Wisteria are abundant in the landscape and should be destroyed.

**Ornamental** uses: On a pergola, lattice, fence made with pressure treated wood or redwood or cedar, rust-proof wire cables. Support should be sturdy enough to hold the weight of a mature vine.

On a **trellis** as a screen placed 6 inches away from wood or shingled walls (attached with hinges at the bottom and hooks at the top for easy access to painted walls).

On an **arbor** providing shade or dappled light for an outdoor ceiling, or a regal entryway into the garden.

In **containers** and as houseplants used in hanging baskets or window boxes, vines can drape and cascade over the edge. Frost-tender vines grown in containers can be brought under cover when low temperatures threaten.

On brick, masonry, stone or mortar **walls**, rootlets and suction cups can do damage if mortar is weak or too much sand is used in proportion to cement.

### 3. Growing and Showing:

**Site selection:** USDA Hardiness zones for heat and cold help you select site and plants. Create microclimates to protect vines from cold injury or harsh winds. Consider salt-tolerance if you lie by the water. Plan to space vines about 5 feet apart. Most vines flower and grow best in full sunlight to partial shade.

**Site preparation:** Heavy, clay soils may retain moisture while sandy soils have limited water and nutrient reserves. Adding plenty of organic matter is the best way to improve either clay or sandy soils. Check for drainage before planting (dig a hole, fill it with water and let water drain out, then refill the hole with water and time how long it takes to drain—about 1/4 inch per hour). Most vines prefer a slightly acid soil pH, measuring between 5.5 to 6 and 6.5 to 7 (Review use of a soil test and discuss how rainfall effects pH). Caution against planting vines near newly constructed home foundations or walls (the soil is usually too alkaline here).

**Plant selection** for sun or shade, annual or perennial with seasonal interest (colorful autumn foliage), evergreen (ivy, *Fatsyhedera*, Carolina Jessamine, Bank's Rose, Star Jasmine, Coral Vine) or deciduous (*Clematis*, Passion vine, Grape, Wisteria), bloom time and color, mature size and rate of growth (six feet of growth in a year is not uncommon and many grow twice as much), texture, and variegation. Drought-tolerance consideration. Avoid use of invasive and non-native vines (Chinese Honeysuckle, Kudzu, climbing fern, cypress vine), replacing them with native vines (Woodbine or Red Honeysuckle). Plants ordered from mail-order nurseries may come bare-rooted: Ensure lateral roots radiate from the main root in several directions on several levels and buds are plump and firm, not dried up. Bare-rooted vines should be planted in late winter or early spring or anytime when they are dormant. Plants purchased in containers should have a good root-to-top ratio. They can be planted at any time but ensure they receive ample water in the first year. Loosen roots that circled the container and plant to the original container depth.

**Conditioning:** Cut your specimens early in the morning or late in the afternoon when the plant is full of substance. Cut the specimens longer than desired and make the cut at a 45-degree angle to increase surface area for absorption. When ready to use, re-cut underwater to the exact length. Some vines prefer to be completely submerged for a period of time (Ivy).

**Entering in a flower show:** Certain Flower Shows will have a separate Section for Vines while others will enter Vines according to habit or life cycle. Can be entered as flowering cut annual or perennial, as ‘Cut decorative foliage’, as fruiting or as a Collection or Display. Ensure your container-grown vines are within size and weight limits. Cut specimens within size limits (usually no longer than 30 inches and no shorter than 12 inches, unless usually small growth). Woody vines are not eligible for the Arboreal Award.

**What the judges are looking for:** Plant identification should be complete (genus and species, cultivar name if known), clearly and legibly written and visible. Judges must consider the **prime maturity** of the specimen. The foliage should be evenly spaced according to the species, uniform in size, shape and color, none missing in placement. Spaces between nodes should not be unduly long. **Stems** should be graceful and long enough to display growth habit, flexible whether herbaceous or woody. If vines have a branching pattern or habit, the specimen should exhibit that. The **color** qualities should be clear, fresh, with no fading, streaking. If variegation is present, it should appear to be smooth, not smeared, defined in appearance. The **form** of the cut specimen should be closely related to the growth pattern. If a container-grown specimen, the form is expected to be rounded with branches coming from the center of the plant, evenly extending over the pot and cascading. If the vine is trained to a wire frame or support, it should twine or cling or twist evenly about the support. The **substance** of the vine should be firm and strong, particularly in mature leaves. Often very young leaves will not be as strong-appearing as the more mature leaves with the color and texture not fully developed. The **size** of the cut specimen should not be unduly stressed if it is sufficiently long enough to indicate what mature growth from a plant would be. **Texture** will vary according to the specimen but can be accurately described by the appearance. The vining “attachments” such as the aerial roots or tendrils may or may not be present. If they are present on the selected piece of vine, they should never be removed. If **flowers** are present they should be of excellent quality—fresh, with clear, defined coloration, in quantities according to the specific vine. If numerous, more of the blooms should be open than there are buds with proper form exhibited. If blooms normally are along the stem, from leaf axils, hopefully there will be flowers all along the stem. If blooms appear either singly or in clusters at the end of the branches, there should be no dead or past prime or tangled flowers present, having been carefully removed. Exhibits should be clean, **well groomed**, staged to advantage. If cut, in a clear container of appropriate size, if container-grown, in a pot or basket of proportionate size, appropriate color. Lastly, the judges will consider the overall distinction of the specimen.

4. Propagation: (Activity: Allow students to take cuttings and plant them in peat pots. Allow students to prepare and plant seeds for annual or perennial vines.)

**Seed:** Annual vines produce an abundance of seeds (sexual reproduction). Discuss seed collection from ripe pods, drying them in open air on paper towels, storing seeds in a

cool, dark place, and necessary soaking, scarification, stratification as needed. Planting seeds to appropriate depth at the appropriate time and keeping them moist and warm are vital to germination. It is recommended that you purchase seeds from a reputable dealer.

**Cuttings:** One of the easiest vegetative ways to propagate vines is by cuttings. Many will root in water or sterile rooting mixes.

**Simple layering:** Allow vines to come in contact with soil and often roots will develop at the node. Stolons can be cut off of the mother plant and planted independently.

5. Maintenance: Once attached, very hard to remove!

**Pruning:** It is the nature of vines to grow vigorously! Prune vines to keep them in bounds and to promote or enhance flowering. Most vines require some regular pruning. Vines can be trained into a tree or shrub or espalier. Prune newly planted vines to compensate for loss of roots during transplanting. Make cuts just above buds that point in the direction you want subsequent growth to take. Remove any dead or broken branches. Severe renewal pruning (cut off at ground level) is the only recourse if a vine is seriously overgrown. To promote branching and dense growth, pinch back tips after flowering. Use longer pruned branches to make wreaths (Optional activity to make wreaths using wisteria or grapevines).

**Fertilizing:** Most vines need very little fertilizer. Time-release pellets can provide nutrients for 1 to 5 years. Granular fertilizer (general purpose 10-10-10) applied on the soil surface can promote good growth (about 4 tablespoons per vine depending on age and size of plant) in February and again in September. Foliar fertilizer gets fast results.

**Mulching:** It is recommended that you apply a 2 to 3 inch layer of organic mulch (pine needles, compost, bark, sawdust) around the base of vines to conserve moisture, regulate soil temperature and control weeds. Do not let mulch touch the stem. Some vines (Clematis, in particular) want cool feet and a sunny top and mulching can help achieve this.

6. **Pests and Diseases:** Control chemically, physically (hosing or picking pests off) or biologically (encouraging useful insects such as ladybugs and lacewings). Some vines are subject to attack by fungus or bacterial diseases (including powdery mildew) or by insect pests such as aphids, caterpillars (future butterflies), mealybugs, scale and spider mites (Activity: If possible, show examples of chlorosis, butterfly larvae, etc.) Blister Beetles will completely denude the Autumn Clematis. Control effectiveness will vary, depending on the season, region and type of weather when treatment is administered. Recommend Dipel or Sevin.

\*Choose 2 vines to study in depth:

Kiwi (*Actinidia chinensis*)  
Coral Vine (*Antigonon leptopus*)  
Trumpet Creeper (*Campsis*)  
Climbing Rose (*Rosa*)  
Cape Honeysuckle (*Tecomaria capensis*)  
Star Jasmine (*Trachelospermum*)  
Jasmine (*Jasminum*)

Passionflower (*Passiflora*)  
Honeysuckle (*Lonicera*)  
Bougainvillea  
Grapes (*Vitis*)  
Ivy (*Hedera*)  
Wisteria (American)  
Creeping fig (*Ficus pumila*)



Virginia Creeper (*Parthenocissus*)  
Winter creeper (*Euonymus fortunei*)  
Fatshedera (*X fatshedera lizei*)  
Silver Lace Vine (*Polygonum aubertii*)  
Carolina Yellow Jessamine (*Gelsemium sempervirens*)  
Snail Vine (*Phaseolus caracalla*)  
Black-eyed Susan vine (*Thunbergia alata*)

Clematis  
Chocolate vine (*Akebia*)  
Potato vine (*Ipomoea*)  
Cross Vine (*Bignonia*)  
Mandevilla  
Any other suitable vine



## Course VIII. Fruits, Nuts, and Vegetables

Objectives for this unit:

1. Understand the differences and similarities between fruits and vegetables.
2. Describe the care and maintenance needed to successfully produce large crop volume.
3. Demonstrate methods of fruit and vegetable propagation.

References/Resources:

*Handbook for Flower Shows*

*Exhibiting and Judging Fruits, Vegetables, Nuts and Gardens: A Manual for Judges and Exhibitor*

*Growing Your Own Vegetables*, U.S. Department of Agriculture, Agriculture Information Bulletin #409, 1977

*Down to Earth Vegetable Gardening, Down South*, L. Bullard, 1974

*All About Growing Fruits & Berries*, Ortho Books, 1976

*Vegetable Growing for Southern Gardens*, W. Adams, 1976

“Manual of Minor Vegetables”, J. Stephens, UF Extension Bulletin SP-40

“Propagation of Fruit Crops”, Young and Sauls, UF Extension Circular #456

“Florida Vegetable Gardening Guide”, Stephens, Dunn, UF Extension SP-103

“Organic Vegetable Gardening”, J. Stephens, UF Extension Circular #375

“Mini-gardening (Growing Vegetables in Containers)”, J. Stephens, UF Fact Sheet HS-708

Materials needed for this unit:

As many examples of fruits, vegetables and nuts as possible

Plants, soil and containers for propagation

Definitions:

- A. **Fruits**: What is a **fruit**? Fruits are seed-bearing organs or mature ovaries from angiosperms. Their structure shows that they have the outer skin, **exocarp**, the fleshy part surrounding the seed or **pericarp** (we eat this) and the seed or pit that is called the **endocarp**. Fruits are either dry or fleshy: **Dry fruits** can be **indehiscent** or **dehiscent** depending on how the seeds are dispersed. Indehiscent fruits include grains (with caryopsis type seeds), acorns (with calybiium type seeds), and nuts while dehiscent fruits include peanuts (with loment type seeds), legumes. Dehiscent fruits pop, explode, break open or otherwise distribute or spill out the seeds. Indehiscent fruits do not disperse seeds but disperse the entire fruit intact. **Fleshy fruits** can be simple or compound. The fleshy simple fruits include **berry** (tomato, peppers), **drupe**—with a single pit or seed (peach, plum, nectarine), **pepo**—a berry with a hard rind (Cucumbers, watermelon, squash), **hesperidium** (citrus with segments), **pyrene** (holly with a bony endocarp), **pome** (apple, pear, quince). The compound fruits include **accessory** (strawberry), **aggregate** (raspberry, magnolia with carpels fused together), **hip** (roses, gardenia), **multiple** (mulberry, sweetgum) and **syconium** (fig with flowers on the inside). Ask the

question: Is a tomato a fruit or a vegetable? Read the “Great Fruit Debate”. (Activity: Have students collect or bring in different kinds of fruit and arrange them by type—it may be lunch!) *Question for a prize:* What is the only vegetable or fruit never sold frozen, canned, processed, cooked or in any form other than fresh? Lettuce.

#### Growing and Showing: Cultural Requirements

**Uses:** In the **landscape:** Fruit can be used in the landscape as trees, shrubs (genetic dwarf species, blueberries) and groundcovers (strawberries). Grape vines can provide shade cover for your summer patio. Many fruit trees offer a spectacular display of spring blossoms.

In **containers:** Many dwarf fruit trees are now on the market for patio, terrace or balcony. Container plants can be planted out in the landscape at any time provided water can be supplied.

**Orchards:** If space permits, and you really want to produce fruit, contact your local county extension agent for the “Fruit Crop Fact Sheet” to get your orchard off to a good start.

**Plant selection:** Choose fruit trees that are recommended for your area. Many are bred for certain areas, cold tolerance, number of **chill hours** (hours below 45 degrees) required, etc. Decide if you want your fruit trees to be edible, dooryard fruits, ornamental/decorative. Pollinators are a consideration as well: Some fruit trees require another variety nearby to pollinate. Some need bees, some are dioecious, others self pollinating or pollinated by wind.

**Site selection:** Look for an open, sunny location, well-drained and with good air circulation. Avoid ‘pockets’ where dead air collects and where the circulation is poor. The soil should be a sandy loam with organic material mixed in. Citrus fruits prefer a lime sub-soil. Ensure proper spacing for a mature tree. If space is limited, choose a site on which a fruit tree can be espaliered.

**Site preparation:** Work in large amounts of organic material to increase tilth, drainage and moisture retention. Prepare to plant by digging a hole larger than needed. Place the plant in the hole with roots spread, add half of the prepared soil, water in, add remainder of soil and water in. Tamp lightly to make sure there are no air pockets. Do not cover graft union or plant deeper than the plant was originally grown. Fruit trees should be planted when they are dormant—usually when they appear in stores.

**Entering the Flower Show:** The Flower Show Schedule may list fruits specifically or generally and then sub-classify them by variety or type. The schedule must state with or without stem, the number required (1 large, 3 to 5 medium size and 12-15 small) and the staging for the exhibit (on a plate, tray, napkin, etc). The schedule may further state how the fruits are to be shown. If you grow many types of fruits, you may wish to enter them as a Collection or a Display. A potted fruit tree, with fruit on it would be entered under Container-grown plants. Fruits are never to be cut open.

What the **judges** are looking for: Ensure the botanical name is listed on the entry tag. All fruit should be uniform size (size average or above), shape,

color and texture. It should be clean and free from insect damage. Fruit is shown ripe, table ready (except apples and pears, which are picked before they are ripe) and should never be waxed or polished but shown with natural **bloom** (waxy substance that covers fruits). Distinction is the last quality considered.

Propagation:

**Seed:** (Sexual reproduction) Seeds should be removed from ripe fruit, washed thoroughly, treated with a fungicide and surface dried. Some will require cold stratification. Seeds may be planted in late winter in pots or flats. In general, cover the seed with soil to a depth 3 to 4 times larger than the seed diameter. As they begin to grow, seedlings can be transplanted individually to pots or directly into the ground. Growing seedlings requires frequent watering and occasional light fertilization with liquid fertilizer. (Activity: Allow students to harvest seeds for later planting.) Discuss nature's way of dispersing fruit seeds and how rotting fruits can provide needed organic matter for seeds to grow.

**Grafting:** (Asexual or vegetative reproduction) Grafting refers to the process of joining parts of two separate plants in such a way that they will unite and grow on as a single plant. The regenerative tissue of stock and scion is brought together, in close proximity or touching, so healing occurs. The **scion** is that part of the combination that produces the top of the new plant and, ultimately, the fruit. The **rootstock** is the part that forms the root system and often the lower part of the trunk. Grafting, which can be done any time of the year but is best during dormancy, involves the use of a scion with 2 or more dormant axillary buds while **budding** uses a scion with only one bud and is usually done in late spring or early fall. There are many types of grafts that can be done on fruit trees (cleft grafts, whip graft, veneer graft, bark graft) and many types of budding too (Shield bud, patch bud, chip bud). (Demonstrate one method of grafting and/or budding.)

**Cuttings:** Softwood cuttings are taken generally in May or June when the new spring growth is soft and succulent. Cuttings are cut into 3 to 6 inch lengths and placed in a sterile, moist medium. Hardwood cuttings are taken during the dormant season, late fall to early spring. Cuttings should be about pencil size in diameter and 6 to 12 inches long and placed in a moist sterile medium, such as sand, peat moss or sawdust. Rooting hormones are quite often beneficial in stimulating rooting, especially for hard-to-root plants. Intermittent misting prevents the leaves of the cutting from water loss. Bottom heat helps maintain temperature during the rooting process. To avoid transplant shock after hardening off, acclimatize plants over a 2-week period before planting them out. (Demonstrate taking a cutting.)

**Layering:** Layering involves the formation of roots on the sub-terminal portion of a stem, while it is still attached to the mother plant. **Simple layering** involves placing the sub-terminal portion of a flexible or trailing branch in a shallow hole near the mother plant. This part of the branch is covered with soil, leaving the tip exposed. Rooting can be further promoted by either removing a ½-inch ring of bark, or making a small cut on the underside.

Strawberries send out stolon runners and produce new plants. **Air layering** involves formation of roots on upright portions of the plant. About 12 to 18 inches back from the terminal end of a shoot, and in partially matured wood, a ring of bark  $\frac{1}{2}$  to 1 inch in width is removed (branches  $\frac{1}{4}$  to  $\frac{3}{4}$  inch in diameter work best). Conductive tissue adhering to the wood should be scraped away with a knife. A rooting hormone can be dusted on the upper end and just above the cut to hasten rooting. The entire area is then enclosed with a handful of moist sphagnum moss, covered with a small piece of clear plastic and tied around the stem at both ends with twist ties or sting. You can reduce excessive heat buildup in the moss due to direct exposure to the sun by wrapping the layer in aluminum foil. After several roots are observed growing inside the plastic wrap, the layer can be removed by cutting below the rooting area. Place the layer in a container and keep moist for about 4 weeks. (Activity: Allow students to air layer a fruit tree.)

Maintenance:

**Pruning:** Pruning will depend on the type of fruit tree grown and the age of the tree. Prune to maintain shape, regulate size and quality of fruit. Prune yearly the first 3 or 4 years to keep a dominant, central branch and open framework. Prune when dormant to remove crossing, broken or damaged limbs and to improve air circulation (prune to urn shape). Remove 'water sprouts' off at any time. If the tree is grafted, remove any growth from the rootstock as it appears. Prune grape vines when dormant.

**Fertilizing:** Particular fruits have particular requirements. Try to choose a fertilizer with the trace elements included. Amount to apply will depend on the age and size of the tree. Do not fertilize until plant is established and new growth is evident.

**Mulching:** Mulching helps control weeds, keep soil cool or warm and helps retain moisture. Do not put mulch right against the trunk. Clean cultivation practices increase yield.

**Pests and Diseases:** Fruit trees have a great number of pests and diseases that can plague them: Squirrels, birds, worms, scale, fireblight, cankers, leaf miners. Spraying for disease and insect control should be on a regular schedule and as advised by your County Extension Agent. Use bird netting to protect the fruits.

## B. Nuts:

Growing and Showing:

**Plant selection:** Nut trees have only one main taproot that cannot be trimmed or bent, with few or no side roots. (Note: Peanuts are not really nuts but rather legumes and should be planted and cared for more as a vegetable than a nut.)

**Site Preparation:** The soil should be well conditioned with abundant peat or composted mulch. It is recommended that a hole 2 feet wide and 3 feet deep be dug for each seedling tree. Do not force the taproot to fit in the hole.

Plant the tree 2 inches deeper than they were in the container. Never let pecan or nut trees dry out during the first two growing seasons.

**Entering** the Flower show: The Flower Show Schedule may list nuts specifically or generally and then sub-classify them by variety or type. The schedule must state the number required (for small nuts, at least a dozen are required) and the staging for the exhibit (on a plate, in a basket, etc). The schedule may further state how the nuts are to be shown. Nuts must have been grown by the exhibitor and should be from the last season's crop or the current season's crop.

What the **judges** are looking for: Judges will first check the botanical name and cultivar. Judges will look to see that you have chosen nuts that are characteristic in size for the variety. The nuts should be well-cleaned, attractive, dried, free from external molds or stains, and with no cracks. Green material is not acceptable as it indicates a lack of maturity. Shells should be clear in color, uniform in size and shape.

Propagation:

**Seeds:** The nut itself is the seed and the kernel inside the nut is the embryo. Many nuts require scarification of the seed coating and stratification for germination. Seedlings can be transplanted out when of sufficient size and maturity to ensure survival.

**Grafting** on rootstock is a vegetative method of propagating nuts. (See methods of grafting above.)

Maintenance:

**Mulching:** Mulch with about 6 inches of dry mulch. Do not allow mulch to touch the trunk during the growing season, however during the harsh winter, mulch should be heaped up around the whole truck.

**Pruning:** Pecan and other nut trees have only one leggy trunk with few or no side shoots. Pruning at planting can be a bit difficult because the main stem must be cut back 1/3 to 1/2 its height. This is essential to the plant getting a good start and developing a correctly formed main trunk.

**Pests and Diseases:** Squirrels, birds, worms can plague the production of nuts. Consult your local county extension agent for information on pest control. A regular schedule of spraying should be followed to prevent diseases such as blight, rust, etc.

- C. **Vegetables:** What is a **vegetable**? Any herbaceous plant that is eaten whole or in part, raw or cooked. The edible part of such a plant as the root (carrot), tuber (potato), seed (pea), fruit (tomato), stem (celery), leaf (lettuce), etc. **Cool season** vegetables include broccoli, turnips, collard greens, lettuce. **Warm season** vegetables include tomatoes, squash, peppers, corn, okra, eggplant. Warm season vegetables may stop producing when the weather gets too hot. Some warm season vegetables have now been hybridized to produce during

even the hottest summers. Most vegetables are annuals but some are actually perennials treated as annuals.

#### Growing and showing: Cultural Requirements

Uses: In the 'victory' **garden**: Many families take great joy in planning and putting in a vegetable garden each year. Gardening offers exercise, fresh air, therapy and food! Try a community garden for increased fun!

In the **landscape**: Families who may not have room for a full garden in their yard are incorporating vegetable plantings in with their flowerbeds.

On the **farm**: A few folks have enough land to grow vegetables on a large scale for themselves or in a co-op or to sell. Additionally, the idea of having a **community garden** affords space to those families who wish to plant a garden but live in close quarters.

**Raised beds**: Intensive gardening can be done in small locations. Raised beds can compensate for sandy, bad, rocky soils. Construct using 2" x 12" pressure-treated pine, redwood, cypress or cedar boards. Raised or tiered beds can be very practical if you live on a slope and your soil keeps washing away. And, it saves bending over!

In **containers**: Mini-gardening or the growing of vegetables in containers has become popular. Vegetables have been specifically hybridized to serve as 'patio' varieties. These mobile gardens can be moved to provide the best sun or to bring inside for protection from cold. Vegetables can be grown in hanging baskets, tubs, half-barrels—just be sure they have drainage. With containers, even boaters can have a garden.

**Site Selection**: Vegetables generally need a minimum of 6 hours of sun daily. Morning sun is best as plants can become sunburned in too much direct sunlight. All vegetables need plenty of water at planting time, during drought and when making fruits. Soaker hoses are a great aid. Ensure proper drainage. Rotate crops to ensure soil can replace depleted nutrients and to avoid the spread of diseases. It is advisable to draw your **planting plan** on paper showing the location of each crop. Plan to plant tall-growing crops on the north side of the garden so they will not shade other plants. Place long-season crops to one side of the garden so they will not interfere with soil preparation for short-term crops. Group crops with similar maturation dates so that the space may be prepared easily for later plantings and allow ample space between rows for convenient cultivation. **Raised bed** gardening usually requires a large amount of topsoil and organic matter. Many vegetables grow reasonable well with **hydroponics** (no soil, just water treated with nutrients). Enclosing a garden plot with a fence is usually profitable.

**Site Preparation**: Vegetables need a neutral to slightly alkaline soil pH (6.5-7.0). Adding dolomite limestone can help raise pH. The soil should be enriched with compost (composted cow manure, cured sawdust, leaf mold, peat moss, cotton seed hulls) to hold water and add **nutrients**. Add some fertilizer to the soil at preparation time but allow the selected site to rest at least 3 weeks before planting. Be sure to clear the site of weeds and grass by



hand pulling or hoeing. Certain vine crops—cucumbers, squash—are often planted in “hills” or mounds.

**Plant selection:** Buy and plant only those vegetables your family will eat or try something new and different! Discuss vines (vertical vegetables) vs. bush types, determinate (all vegetables mature at about the same time) versus indeterminate (vegetables are produced throughout the growing season). Choose disease resistant varieties that look healthy, turgid and stocky. Do not choose plants that are already in bloom or have buds set. Night temperatures can affect bloom set. Look for and avoid purplish color on leaves that may indicate frost or cold damage. Consider pollination factors, some plants are dioecious and male and female flowers are present on different plants. Finally, consider how many plants you will need based on the number of people in your family and how much you are willing to can, freeze, store or sell. Tomatoes should be planted deeper than they grew in the container.

**Entering the Flower Show:** The Flower Show Schedule may list vegetables specifically or generally and then sub-classify them by variety or type. The schedule must state with or without stem, the number required (1 large, 3 to 5 medium size and at least 12 to 15 small) and the staging for the exhibit (on a plate, in a basket, on a tray, etc). The schedule may further state how the vegetables are to be shown. If you grow a variety of vegetables, you may wish to enter them as a Collection or a Display. To enter vegetables grown in pots with or without vegetables on them, they would need to be entered as Container-grown specimens. Vegetables are never to be cut open.

What the **judges** are looking for: Ensure your exhibit has the complete botanical name and cultivar, if known. Vegetables should be presented in the proper stage of development for kitchen use: crisp, tender and fresh. The vegetables should be uniform in shape, color, texture, and size (average or a little above). They should be free from blemishes, cracks, insect damage, dust or spray residue.

Propagation:

**Seed:** Buy fresh, healthy seeds from a reputable dealer and start them indoors. These seeds should be treated with a fungicide. Plant at appropriate time of year (time depends on season and crop) and to the depth indicated on the package. Harden off and up-pot so the plant is at least 6 to 8 inches tall before moving them outdoors in the spring after danger of frost has passed. Direct sow in prepared ground. Thin as necessary to improve air circulation. Look for Heirloom seeds and historical facts about seed production in catalogues, online. (Activity: Allow students to plant vegetable seeds in peat pots.) Some vegetables, such as tomato, will produce roots along the stem. These can be rooted and then cut from the mother plant, increasing your stock.

Maintenance:

**Fertilizing:** Vegetables need a balanced fertilizer at least monthly during production that can be applied as **side dressing** (a light application of fertilizer applied in a band near the plant but not so near the plant as to cause root

injury). You can use a foliar fertilizer as well. **Organic** gardeners prefer to use natural and organic materials and methods, without commercial, synthetic chemicals. **Green manure** is any crop grown for the specific purpose of soil improvement (a **cover crop**). Remember that phosphorous increases flowering and fruiting.

**Mulching:** Mulch around vegetables to keep soil cool in summer and warm in winter, control weeds and retain moisture. Place at least 3 inches thick.

**Pruning:** When we harvest the vegetables we are actually pruning and this will encourage more fruit production.

**Staking:** Some lanky and climbing vegetables will need staking or some sort of support. Use tomato cages, beanpoles, trellis or teepees.

**Shading:** Some new plants are tender and not acclimatized to the outdoors. You may wish to cut small branches and stick them in the ground near the new plant to provide some temporary shade.

**Pests and Diseases:** Practice **Integrated Pest Management** (IPM) whenever possible. Use ecologically safe products and follow package directions. Good air circulation will help reduce fungal and insect problems. Try not to plant related plants in the same location as the previous season (crop rotation) as they are prone to the same diseases that reside in the soil. Any number of problems arise when planting vegetables in the garden: Squirrels, birds, worms, caterpillars, tomato hornworms, fungus, wilt, cucumber beetle, stink bugs, nematodes. Consult your County Extension Agent to see what is recommended. Practice the 3-Rs when using pesticides: the right material, the right way, at the right time. And, yes, beer can be used to drown slugs and snails. Blossom end rot on tomatoes is a calcium deficiency brought about by lack of water or uneven watering. A regular schedule of **spraying** can help to control disease and insect infestation. If cutworms are a problem try making a collar of styrofoam around the base of the plant. Companion Planting, although not fully researched, suggests planting certain plants together to keep certain pests away: marigolds and tomatoes. Weeds steal moisture and nutrients and serve as cover for insects and disease. Cultivate the garden often to prevent their rapid growth.

\*Choose 2 fruits, vegetables or nuts to study in depth:

<u>Fruits</u>	<u>Nuts</u>	<u>Vegetables (by family)</u>
Apples	Pecans	Cucurbitaceae (squash, etc)
Oranges	Walnuts	Brassicaceae (greens, etc)
Pears	Pistache	Fabaceae (beans, peas)
Blueberries	Filbert	Solanaceae (tomato, etc)
Grapes	Others	Apiaceae (carrot, celery)
Loquat		Liliaceae (leeks, garlic)
Strawberries		Asteraceae (lettuce, etc)
Persimmons		Others
Citrus		

# THE GREAT FRUIT DEBATE

Every day at the lunch table, students in Mrs. Bishop's class talked about what they had brought to eat that day. One day Melinda told the rest of the group that she had brought only vegetables. She said, "I have carrots, broccoli, cauliflower and tomatoes."

"Tomatoes aren't a vegetable," John said. "They're a fruit."

All through lunch, John and Melinda debated whether a tomato was a fruit or vegetable. They decided to ask their teacher when they returned to the classroom to see who was right.

"Well, both of you are right," answered Mrs. Bishop. She explained that there are different ways to determine whether a food is a fruit or vegetable. You can use a botanical definition or social customs. "Why don't the two of you prepare a report for the class so we can all learn from your debate?" she said.

John and Melinda went to the library together that afternoon after school. John looked up the botanical definitions of a fruit and vegetable. He found that a fruit is the part of the plant that grows from a flower and usually has seeds inside. Vegetables are other parts of the plants, including the roots, stems and leaves.

"See, I was right!" John said. "Tomatoes come from flowers and have seeds inside them just like apples and oranges and grapes—they are all fruits."

"Not so fast, John," said Melinda. "Look what I found." She showed him the book she found on social customs that told about fruits and vegetables. The book said you can tell the difference between a fruit and vegetable depending on how it's grown. Vegetables are

grown in 1 year and are planted in rows in fields. Fruits are grown for more than 1 year and usually grow on trees or bushes.

"So this definition says that tomatoes are a vegetable," Melinda said. "They are grown for 1 year in rows in a field."

Melinda also found that even the U.S. government had had to decide if a tomato was a fruit or a vegetable. In the late 1800s, people had to pay more taxes on fruits than on vegetables. At the time tomatoes were considered a fruit. People didn't want to be taxed more for tomatoes, so they argued that tomatoes were a vegetable because they are grown in 1 year in the field. So, in 1893 the Supreme Court decided that tomatoes would be considered a vegetable, and they weren't taxed as much.

"Mrs. Bishop was right—tomatoes can be defined as a fruit or a vegetable," John said. "So can cucumbers, squash and pumpkins. We were both right!"

The next day John and Melinda told the rest of their class what they had learned about fruits and vegetables at the library. They also found out that one person doesn't always have to be right and the other wrong. They were both right. A tomato is called a fruit and a vegetable, depending on where you find your information.

## Course IX. Herbs

Objectives for this unit:

1. Describe the many uses of herbs.
2. Propagate herbs by a variety of methods and relate proper care and growing conditions.
3. Outline how herbs can be written into a Flower Show Schedule and how to enter blue ribbon quality exhibits.

References/Resources:

*Handbook for Flower Shows*, p. 94

*The Houseplant Expert*, D. G. Hessayon, 2001, p. 147.

*Park's Success With Herbs*, G. Foster & R. Louden, 1980

*The Herb Book*, A Boxer & P. Back, 1987

*How to Grow Herbs*, Sunset Books, 1974

*Herbs: How to Select, Grow and Enjoy*, Norma Lathrop, 1981

"Herbs in the Florida Garden" by James Stephens, UF Extension Circular #570

Materials needed for this unit:

Examples of each type of herb

Examples of herb vinegar, oils, herb bread, etc. to taste and smell

Herbs to propagate and dry

1. Definitions: What is an **Herb**? Any plant whose leaves, seeds or even roots give flavor to foods. One of a savory, aromatic group of plants used for medicine, food, flavor, fragrance/scent or dyestuffs. Can include beneficial weeds and flowers. How should it be pronounced? "Urb" prevails in the USA while "hurb" prevails in England.

2. Uses:

In the **landscape**, herbs are especially versatile. They can become a specialty culinary **herb or knot garden**, formally laid out, or as **groundcover**, rock garden, border, or in your **butterfly garden** as host plants for larva. Some herbs are trees, bulbs. Many gardeners prefer to build raised beds or planter boxes (especially out of cinder blocks) to grow their herbs. (Activity: Allow students to visit a nearby herb garden or herb specialty nursery.)

**Medicinal:** Many herbs are used in the preparation of salves and ointments and medicines in pill or powder form. Tinctures, poultice, plasters and tonics made with herbs have all been used in the past. Herbs, herbal teas and remedies are now an important economical industry. Ginkgo, Ginseng, Saw Palmetto, Aloe Vera.

**Culinary:** Used in oils and vinegars as well as flavoring for any number of foods. The top 4 herbs considered essential in the kitchen are basil, thyme, savory and oregano. Fifth is either sage or dill. "**Bouquet garni**" is a combination of parsley, a bay leaf, thyme, basil and savory with rosemary, celery or lovage added often. (Activity: Allow students to sample herbed toast, oils and vinegars or other delicacies or feature herbed foods for lunch.)

**Aromatic:** Tussie-mussie, potpourri and sachets are common uses for herbs. (Activity: Allow students to make potpourri or sachet from dried herbs.)

**Ornamental/decorative:** Many crafters have learned that drying, preserving, pressing herbs are easy and profitable. (Activity: Allow students to harvest and dry herbs in the microwave—on low for 1 minute between paper towels, in the oven—100degrees for 3 hours, or tying in bunches to hang upside down in a warm, dry, dark, well-ventilated space.)

**Containers:** Mini-gardening: Place containers on the terrace, patio or in the courtyard. Indoors containers will be found on a sunny windowsill. Some container grown herbs can be trained and pruned to form topiaries (Rosemary). Growing herbs in containers may require moving the container as weather dictates (to keep in the sun). Growing herbs in containers may require specialized soils especially mixed for their culture. Containers can control the rampant growth of mints.

### 3. Propagation:

**Seed:** Annual herbs are easily grown from seed (Basil, Dill). Some freely reseed themselves. Buy fresh, healthy seeds from a reputable dealer and start indoors. Store seeds in air-tight or glass containers. Plant at the appropriate depth and time of year as indicated on the package. Seeds of annuals sprout in 7 to 14 days while seeds of perennials sprout in 4 to 6 weeks. Harden off and up-pot (transplant when they have 4 true leaves) before moving outdoors in spring after danger of frost has passed. Direct sow in prepared ground successively. Parsley seeds require soaking in hot water before planting. (Activity: Allow students to plant herb seeds in peat pots.)

**Cuttings:** Easy to root stem cuttings include mint, oregano. In the spring take 4 to 6 inch cuttings with a set of leaves or leaf buds and place in Perlite, sand, peat. Mist or tent to keep moist. May take 3 to 6 weeks to root. Many herbs will root in water during periods of active growth. (Activity: Allow students to take and plant cuttings of herbs.)

**Simple layering:** Some herbs will put out roots at the nodes when they come into contact with the soil and can be cut free from the mother plant when established. Mint, Oregano, Thyme, Marjoram.

**Division:** Some bulbous herbs grow in clumps (chives, garlic, tarragon) that are easy to separate and divide. Lemon grass has a crown that can be divided. Stolon runners from the mints, thyme can be separated and propagated. (Activity: Allow students to divide and plant a clump of herbs or to separate herb bulbs.)

### 4. Growing and Showing: Cultural Requirements

**Site selection:** Most herbs prefer sunny, dry locations to develop the essential oils that give the plant flavor (Exception: mints, parsley like moist soil). Many herbs need up to 6-8 hours of sun daily (Exception: there are a few herbs that prefer shade: lemon balm, parsley, woodruff). They will need well-drained, loose soil but need to be watered during time of drought or when first planted. If given enough light, the herbs will bloom all season. Many originate from the Mediterranean area and like that climate. A general rule of thumb is the smaller the leaf, the more sunlight a plant can handle.

**Site preparation:** Most herbs prefer **high pH** or alkaline soils (6 to 7.5). If soil is sandy, add organic materials. Many are shallow rooted so the soil needs to be kept weed free to eliminate competition for water and nutrients. Soil **recipe** for herbs: 2 parts good rich garden loam or packaged sterile houseplant soil, 1 part coarse Perlite (not vermiculite), 1 part fine pine bark mulch or composted oak leaves, 1 part dried cow or

horse manure and ½ part coarse sharp sand (sandblasting sand, not play sand or beach sand). For every quart of mixture, add 1 teaspoon of bonemeal or ground eggshells, 1 ½ teaspoon Dolomite lime. Another **simpler recipe** is 2 or 3 parts store-bought potting soil and 1 part extra Perlite.

**Plant selection:** If it is more practical to buy starter plants than to plant seeds, buy from a reputable dealer. Choose small, healthy, sturdy plants, actively growing. Plant out in the garden on a warm, damp day. Carefully remove the plant from the container and avoid disturbing the roots.

**Conditioning:** Cut specimens early in the morning or late in the afternoon when the plant is turgid. Cut the stem longer than needed and at a 45-degree angle to increase water absorption. When ready to use, re-cut the stem under water.

**Entering** a flower show: Herbs may have a separate Section in your Flower Show, by genus or by use (some have more than one use), for cut specimens or they may be interspersed among the Sections for blooming Annuals, Biennials, Perennials, or Cut Decorative Foliage. Obviously, herbs can be entered as Container-grown plants and many who raise herbs will enter them as a Collection or Display or a combination planting. Some herbs are woody and will be entered as Arboreal specimen (Bay, Rosemary). Herbs may be sub-classed by color, type, form. The inclusion of “Any other” class permits exhibitor to bring and show worthy specimens not specifically listed in the schedule. The schedule may state a number of stems required other than just one. It is always exciting to enter herbs as part of an Educational Exhibit or in a Section of Crafts.

What the **judges** are looking for: Once the judges have seen that the herb is correctly named with genus and species, they will look to see the cultural perfection of the plant: this includes the plant vigor, health, maturity, turgidity, color and form according to the variety. They will see that the specimen is free from blemishes. If entered as a combination planting, compatibility will be an important factor. If flowering, the judges look for quality and quantity of the blooms. Judges ensure there is no foliage below the waterline and that containers are appropriately sized.

#### 5. Maintenance:

**Pruning and pinching:** Pinch off the flowers of those in the mint family to prevent the flavor from going bitter and to prevent the plants going to seed. Pinch ends or continually harvest to use in cooking to make the plant bushy.

**Fertilizing:** Commercial dry granular fertilizer can be applied as a side dressing in the spring and again in the late summer, or the gardener can use a foliar fertilizer once herbs are established. Do not fertilize newly planted herbs. Too much fertilizer results in fast leggy growth, large leaves and less essential oil development. **Organic gardeners** prefer to use natural or organic materials and methods without commercial, synthetic chemicals.

**Mulching:** Mulch herbs to keep soil cool in summer and warm in winter, to control weeds and to retain moisture in the soil. Place at least 2 to 3 inches thick but keep away from the stems.

#### 6. Pests and Diseases:

Remember that **caterpillars** may be the larva of butterflies feasting particularly on the dill, fennel or parsley. Very few pesticides are labeled for use on edible herbs. Use

ecologically safe products by package instructions. Choose disease resistant varieties. Herbs have minimal pest or disease problems but all herbs are susceptible to a variety of not only caterpillars, but also grasshoppers, beetles, mites, grubs, borers, nematodes and aphids, as well as infection from fungus, wilt, mildew, rust or rot. Good air circulation reduces fungal and insect problems, especially if grown indoors. Deer, rabbits, squirrels, mice, and birds can plague a garden. **Companion planting** is undocumented to actually work, but some gardeners interplant their herbs among vegetables to repel certain insects and other pests.

\*Choose 2 herbs to study in depth:

Mint, all flavors (*Mentha* spp.)  
Thyme (*Thymus vulgaris*)  
Dill (*Anethum graveolens*)  
Parsley (*Petroselinum crispum*)  
Oregano (*Origanum vulgare*)  
Fennel (*Foeniculum vulgare*)  
Rosemary (*Rosmarinus officinalis*)  
Anise (*Pimpinella anisum*)  
Cardamom (*Elettaria cardamomum*)  
Lavendar cotton (*Santolino*)  
Winter/Summer Savory (*Satjuraea*)  
Greek Myrtle (*Myrtis communis*)  
Mexican Tarragon (*Tagetes lucida*)  
Beach Rosemary (*Conradina*)

Bay (*Laurus nobilis*)  
Sweet Basil (*Ocimum* spp.)  
Lavender (*Lavendula angustifolia*)  
Chives, garlic (*Allium* spp.)  
Marjoram (*Origanum majorana*)  
Caraway (*Carum carvi*)  
Tarragon (*Artemisia dracunculus*)  
Borage (*Borago officinalis*)  
Society Garlic (*Tulbarghia*)  
Scented Geranium (*Pelargonium*)  
Lemon Verbena (*Aloysia triphylla*)  
Cuban Oregano (*Plectranthus*)  
Soapwort (*Saponaria officinalis*)  
*Pachouli*

\*Check out The Herb Society of America's web site [www.herbsocam.org](http://www.herbsocam.org).

## Course X. Cacti and Succulents

Objectives for this unit:

1. Describe similarities and differences between Cacti and Succulents
2. Propagate cacti and succulents by a variety of methods and relate proper care.
3. Outline the way cacti and succulents can be used in the landscape and how they might be entered in a Flower Show.

References/Resources:

*Handbook for Flower Shows*, pp. 81-82

*Cacti: The New Compact Study Guide and Identifier* by Glass, Innes and Schneck, 1996

*Cactus and Succulents*, Sunset Books, 1978

*Succulents*, Terry Hewitt, 1998

*Succulents: The Illustrated Dictionary*, Sajeve & Costanzo, 1994

*Cacti & Succulents: North & South, Indoors & Out*, W. Mulligan, 1975

*Cacti & Succulents from Mother Nature*, J. Gick, 1977

Materials needed for this unit:

Examples of as many tribes and sub-tribes of cacti as possible

Examples of as many succulents as possible

Materials for repotting and propagation

1. Definitions: "All cacti are succulents but not all succulents are cacti."

**Adaptations** for survival: spines instead of leaves (can be fine spines, straight, short, prominent or missing), ribbed to expand as water is available, slow growing to conserve energy.

Tribes of Cactus: All cacti belong to the family **Cactaceae**

- A. Pereskia:** (leafy cacti) Most primitive, original cactus, least succulent, woody, spiny stems, bushy or vine with pinkish leaves such as the "Lemon vine". Flowers appear on stalks and in clusters, fruit producing. This tribe has spines but no **glochids** (sharp, easily detached bundles of barbed bristles in the areoles).
- B. Opuntia:** Often heavily spined by without ribs, flowers are not stalked, usually wheel-shaped, flat ("Bunny Ears"), pad-like ("Prickly Pear" Cactus) or cylindrical, stems or branches, fleshy and jointed. Leaves appear briefly on immature growth. Have glochids and **cladodes** (a stem that functions as a leaf). Several are native to Florida.
- C. Cereus:** Ribbed (expanding), fleshy stems of continuous growth in columns or globes. No glochids or leaves (except in *Rhipsalis* sub-tribe). Showy funnel-shaped flowers attached directly to plants, no stems. Largest and most complex, evolved group. Tiny or huge (1 inch to 60 feet tall), from desert to high mountains or epiphytes or tropical forests. **Eight sub-tribes** include:
  1. Cereanae (column or Torch cactus)
  2. Hyloceranae (night-blooming cactus—climbing cacti)
  3. Echinocereanae (Hedgehogs)



4. Echinocactaneae (Barrel, Ball or star cactus)
5. Cactanae (Melon cactus or Turk's cap)
6. Coryphantanae (Pinchusion cactus and *Mammillaria*)
7. Epiphyllanae (Christmas (*Zygocactus* formerly *Schlumbergera*) and Orchid Cactus)
8. Rhipsalidanae (Chain cactus), tree dwelling

**Caudex:** Swollen roots and /or stems making large lumps. **Caudiciform:** such as a Desert Rose.

**Succulents:** A plant that stores water in its stems, leaves, or both. The Latin word 'succos' means juicy. Succulents can be mostly stem, mostly bushy leaf succulents, rosette-leaf succulents or root succulents.

Succulent are in many families: Lily, *Amaryllis*, *Crassula*, Daisy, Milkweed and others. Include such genus as *Aeonium*, *Agave*, *Aloe*, *Cotyledon*, *Crassula*, *Dudleya*, *Echeveria*, *Euphorbia*, *Faucariaea*, *Gasteria*, *Haworthia*, *Hoya*, *Kalanchoe*, *Lithops* ("Living Stones" or *Mesembryanthemum*), *Sansevieria*, *Sedum* and *Sempervivum* ("Hen and Chicks").

**Cacti** are plants that have **areoles** from which the spines, branches and /or flowers arise (corresponding to internodes on other plants). The presence of areoles distinguishes a cactus from a succulent.

## 2. Uses:

**Containers:** Show off your unusual succulents in hanging baskets (pendant types), dish gardens or other interesting containers made of clay, plastic or wood. Group containers for instant eye appeal. Succulents in containers do well in the home because of low humidity. Place where spines won't stick people! Be sure the plants are well-established and not wobbly or insecure in their containers.

In the **landscape**, in a **rock garden** or specialty garden. Some folks use cacti or yucca as a **security** fence! Other low growing succulents can be used as **groundcovers**. (Activity: Allow students to visit a cacti garden or trial planting.)

As **accent** or specimen: Succulents come in a dazzling array of colors and can grow to be quite large.

## 3. Growing and Showing: Cultural Requirements

**Site selection:** Sunny (direct full sun for part of the day—watch for sunburns) and dry (low humidity) for desert types (referred to as arid) and moist, humid and shady for the jungle types. The soil must be loose, porous and with good drainage. When plants are actively growing in spring and summer give them plenty of water, allowing them to dry out between waterings.

**Site preparation:** Commercial potting mixes are specifically formulated for cacti and succulents. The soil must be gritty with ample amounts of sand for fast draining. Use equal parts of garden loam, sand and leaf mold, plus small amounts of agricultural lime or old mortar or gypsum board for hairy types. Epiphytic cacti do not need potting soil and have no real roots but take their moisture from the air.

**Plant selection:** Buy healthy, well-grown plants from a reputable dealer who cares for them properly.

**Entering** a flower show: The Flower Show Schedule may have a separate Section for Cacti or Succulents or a combination of the two. These plants can be entered as cut specimens or container-grown plants. They may be in hanging baskets, combination plantings or attached to wood. Specimens may be blooming or foliage. They may be subclassed by genus, plant form (erect, pendent), container size, or type of growth (trailing, rosettes, clustering, solitary, monstrose—really big). The schedule may have limits as to the size or weight of the containers or the length (minimum and maximum) of the cut specimen. Some gardeners who specialize in succulents will enter them as a Collection or a Display (see if reservations are required). A few succulents may be entered as Arboreal specimens.

What the **judges** are looking for: Judging considerations include looking at cultural perfection that includes the condition, vigor, growth pattern and color (clear, bright, fresh, attractive, pure) of the specimens. Maturity of the plant will be noted if flowers or fruit or offsets are present. Symmetry of ridges, spines, hair should show regular placement or gaps. The judges will look to see if the plant or plants are correctly named with genus and species. If a combination planting, the judges will look for compatibility and harmony, unity. Grooming and conditioning will tell if the exhibitor has removed any debris, residue or dead flowers and leaves. Some exhibitors will use gravel to top-dress the soil surface or double pot the container—be sure this is allowed. The judges will look to see if there are any bites, tears, bruises holes, pits, scars or other injury as well as any deformity. The container will be carefully examined for dirt, cracks or salts and to see if it is in proportion to the plant and centered in the pot.

#### 4. Propagation:

**Cuttings:** Stem or leaf cuttings can be made from many cacti and succulents (*Sedum*, *Sansevieria*, *Kalanchoe*, *Zygocactus*, *Cyrcus*, stem cuttings of *Pereskia*) Cuttings may need to “cure” a bit before replanting. Leaf cuttings may need to be directionally planted so be sure up is up and down is down (*Sansevieria*). (Activity: Allow students to make leaf or stem cuttings of cacti and succulents available.)

**Offsets** and pups: Offsets can be simply pulled off or cut off the mother plant and repotted. Plants forming dense individual crowns can be divided (*Mammillaria*). Those succulents that produce babies on the margins of their leaves can be rubbed off and repotted (*Kalanchoe*).

**Seeds:** In some species, the fruit dries and cracks open, releasing the seeds; in others the fruit is moist and fleshy and the seeds are dispersed via the excrement of the birds and animals that feed upon it. Some seeds are so small they must be sown with a strainer or using tweezers for slightly larger seeds. Sow in a shallow pan containing vermiculite or a mix of equal parts peat moss and coarse sand. Sprinkle tiny seeds on top of soil but put larger seeds just below the soil surface. Keep the seeds moist and under glass or plastic. Generally a poor germination rate overall. Some seeds will germinate in a few days, others can take a year or more.

**Grafting:** Many of the cacti, Euphorbia and *Asclepias* families can be grafted (because they have a cambium layer) from one to another by a **flat graft** (both understock and scion are cut straight across and joined—use for ball shaped scions), a **cleft graft** (wedge cut scion fitted into the cleft cut understock—use for tall, narrow stocks), **stab graft** (deep upward cut made in the stock and scion is wedged in—use for

flat, trailing plants on columnar or cactus-pad understock), or a **side graft** (both stock and scion are cut at the same angle and joined—also use for tall, narrow stocks). You see these for sale in the stores. The best time to graft is summer when scion and stock are in vigorous growth. Use sharp, clean blades and join pieces as quickly as possible securing with rubber bands, spines or toothpicks. Keep newly grafted plants in the shade for a few days.

5. Maintenance: Require very little care. Allow to go dormant once a year, usually in cooler weather.

**Repotting:** Although many cacti and succulents are slow growing and some prefer to be rootbound, they may eventually need to be repotted. Repot in the spring or the fall, not during the active growing period. Allow plants to establish for at least 2 weeks. Since repotting can be a prickly situation, use caution when handling. For thorny plants wear gloves or use a paper collar. (Demonstrate use of a paper collar.) If you get thorns in your fingers, remove spines with tape or rubber cement. If a milky Euphorbia gets its juice on you, wash off the corrosive latex with glycerin soap or turpentine to prevent burning and sticking.

**Fertilizing:** Give a very weak liquid fertilizer monthly in the summer or a teaspoon of bonemeal or superphosphate yearly.

6. Pests and Diseases: Plants will rot or get a fungus from **overwatering**. Cut away the diseased part, back to healthy tissue. Dust wound with sulfur and let callus over, then replant in fresh soil. Avoid using chemical sprays near these plants. Succulents are bothered by insects such as Mealy Bugs, Aphids, Red Spider Mites, and Scale. Follow the advice of your County Extension Agent and read and follow the label if using commercial chemicals.

\*Choose 2 succulents to study in depth:

<i>Aeonium</i>	<i>Agave</i>
<i>Aloe</i>	<i>Cotyledon</i>
<i>Crassula</i>	<i>Dudleya</i>
<i>Echeveria</i>	<i>Euphorbia</i>
<i>Faucaria</i>	<i>Gasteria</i>
<i>Haworthia</i>	<i>Hoya</i>
<i>Kalanchoe</i>	<i>Sedum</i>
<i>Lithops</i> (“Living Stones” or <i>Mesembryanthemum</i> )	
<i>Sansevieria</i>	<i>Sempervivum</i>
Any other cacti or succulent	

\*Check out the web site for the Cacti and Succulent Society of America  
[www.cssa.org](http://www.cssa.org)

## Optional Courses:

May be substituted for Units 7 through 10 (vines, cacti, herbs, fruits) or used as supplements to any of the primary units. (Should **not** be substituted for first 6 Units.) Each optional course remains four hours in length: the first two hours are lecture and the final two hours are hands-on workshop, propagation, tours, etc. If the optional course is comprised of two topics it is possible to have the topic split with two hours dedicated to each topic. Ensure qualified instructors present these specialized topics.

- \*Camellias
- \*Daylilies
- \*Bromeliads
- \*Roses
- \*Begonia
- \*Orchids
- \*Aroids
- \*Ferns
- \*Gingers
- \*Ornamental Grasses
- \*Citrus
- \*Palms
- \*Variegated Plants
- \* Native Plants and Wildflowers
- Water Gardening and Plants
- Tropical Plants/Exotic Foliage
- Endangered and Invasive Plants
- Conserviscaping and Xeriscaping: Low Care Gardening
- Butterfly and Bird Gardening / Gardening for Desirable Wildlife
- Youth Gardening in Horticulture
- Collecting Horticulture
- Making Educational Exhibits in Horticulture

\*Teaching outlines available in this manual. Others are still under development.



Optional Topic:

## Camellias

Objectives:

To note similarities and differences between the many species of camellias and the bloom types available.

To demonstrate the varied propagation techniques used by camellia growers.

To reveal the secrets of growing and showing award winning camellias.

References/Resources:

[www.camellia-accs.com](http://www.camellia-accs.com). In 1945 American Camellia Society was formed with 7500+ members in 44 states and 22 foreign countries with permanent HQ in Fort Valley, GA. Quarterly *Journal* and a *Yearbook* are respected world-wide for their information on camellia culture, research, new varieties and show dates and reports. International Camellia Society was formed in 1962.

Materials needed for this unit:

As many examples of the different species in the genus.

As many examples of camellia bloom types.

Grafting tools and layering material for propagation.

Gibberillic acid and specially formulated fertilizer

The Queen of the Southern Garden! A living symbol of elegance and aristocracy!

- I. Introduction/History: The genus *Camellia* has numerous other species, most of which have never been cultivated. In the wild, they are restricted to eastern Asia from Japan through southern and central China into Indochina with a few in the eastern Himalayas and Malay Archipelago. Camellias spread to the China of the Tangs and Sungs. Name then was "Pomegranate from across the Sea". When the Japanese adapted their writing from China, they used the three Chinese characters of the name for their own word "tsubaki". In the Ming Dynasty in China, 14<sup>th</sup>-17<sup>th</sup> Century, a plant of the camellia family was discovered in the wilds of the provinces of Yunnan and Szechwan and the name was "Mountain tea flower". Japanese culture of the day took up this name for their own tsubaki flower. Three different sets of Chinese characters were used to identify the Japanese name and is read "Sazanka" by the Japanese and is applied to the species *Thea sasanqua*. Known and cultivated in China and Japan from time immemorial. Some varieties of *C. reticulata* were hybridized and appeared in Buddhist temple gardens ten centuries before Christ. The name *Camellia* was given by Linnaeus to honor George Joseph Kamel, a Jesuit missionary who lived about 20 years in the Philippines taking care of the infirmary and pharmacy of Saint Ignace College in Manila. (He never saw or had the opportunity to see the flower.) He grew medicinal plants and roses in the college gardens and sent writings and data to English naturalists Ray and Petiver who made his work known. His roses looked much like camellia flowers. Linnaeus knew about Ray's *Historia Plantarum* where

the name of Kamel appears Latinized as Georgius Josephus Camellus. In honor of the missionary, Linnaeus coined the genus *Camellia* and it first appeared in Stockholm in 1735 in his *Systema Natura, Regnum vegetabile*. Later, in 1753, the specific name *japonica* was added in his *Speices Plantarum*. Camellias have been known for centuries in the Orient. *Camellia sinensis*, the common tea plant, was used as a beverage by Chinese as early as 500 B.C. According to legend, discovery of tea as a beverage was made by Nung, 2737-2705 B. C. It was a rare commodity in Japan during the Tang Dynasty (618-905 AD) and as such, the tea ceremony developed for the royalty and elite. From China and Japan, Camellias spread to other Asiatic countries and then travelled westward. First to arrive was *C. sinensis* whose leaves were used to prepare tea (1545). Probably came to England in the late 16th or early 17<sup>th</sup> century where it was kept in locked silver tea boxes in only the best houses. In 1660, Samuel Pepys writes "I asked for a cup of tea, a Chinese drink which I had not seen before". English people liked it and to avoid importing dry leaves, imported living plants. Fear of loosing profitable trade caused Chinese to substitute another species for *C. sinensis*, *C. japonica* but whose leaves are more leathery and cannot be used to make tea. The first species of camellia to enter the United States was the tea plant. Tea growing was attempted in both Savannah and Charleston but was a failure at both locations due to insufficient capital and other complications. Use of Camellias as ornamental plants doesn't appear in literature until much later. In Occidental literature there was a description and drawing of *C. japonica* by James Petiver, an apothecary with an interest in natural history. He maintained a museum with a large collection of woods, seeds, dried plants and stuffed animals and birds. *A Natural History of Birds* by George Edwards in England in 1745 had a colored plate showing a Chinese pheasant sitting on a shrub in the garden of Lord Petre (a physician of the English East Indies Trading Company). It was a camellia of considerable age with its simple red flowers, typical of *C. japonica* which he called a "Chinese Rose". Exact date when camellias were brought from the Orient to Europe isn't known. Claim is the first came to Portugal in first half of 16<sup>th</sup> century, but the earliest documented evidence shows camellias in 1808. It is documented that two camellias "Alba Plena" and "Variegata" were brought to England in 1792 by Captain Connor of the East India Company. Many others followed in the next 35 years. In 1829 William Beattie Booth read a paper describing six species of camellias which had been introduced into England. In 1820, first *C. reticulata* was brought to England from Canton, China by sea Captain Richard Rawes and named for him. In 1831 camellias came to Australia with a consignment of camellias for Camden Park owned by the MacArthur family. Included such varieties as 'Alba Plena', 'Rubra Plena', 'Incarnata', 'Myrtifolia' and 'Anemoniflora'. Australia has become important in camellia hybridizing. It was at this time that all the elegant gentlemen of Paris were not in style unless they wore a camellia in their lapel. The novel, *Lady of the Camellias*, 1848, was followed by the play and opera "La Traviata" in 1853. By 1861, a catalog of a European nurseryman showed about 1000 *C. japonicas*. By 1886, interest had

declined and didn't revive until following 1932 with the first public exhibition of camellias in the southern United States. In the United States, following the tea plantation trial, *C. japonica* was imported from England in 1707 by John Stevens of Hoboken, NJ. They became popular as greenhouse plants. In early 1800s, the camellia collections of the South were begun. Magnolia Gardens and Middleton Place of Charleston, SC became famous for their camellia collections begun in the 1830s. Camellia pioneer of the West was James L. L. F. Warren of Sacramento who had plants shipped to Sacramento in 1852. In 1920, Sacramento was named "Camellia City". After Civil War, camellia interest waned but took on new life after the turn of the century. Camellia shows became popular in the 1930s. Oldest living Camellia in Europe may be the Pillnitz *C. japonica*, reputed to be already 20-30 years old in 1770 when it was planted in the Pillnitz Castle Garden near Dresden, Germany. It measures 30'x38'wide. Since 1801 it has been protected by a heated wooden structure constructed over and around it during winter months. It is a single red and is similar to the first camellia to come to the Americans about 1798 in Hoboken, NJ.

- II. Classification: All are evergreen shrubs or small trees, dicots, most with small flowers of little ornamental value but there are many beautiful species still awaiting introduction to gardens, some with foliage or bark as their chief attraction rather than flowers. Color ranges from white to deep red with all shades/tints/tones in between. Flowers may be solid colored or marked—spotted, striped, speckled, bi-colored, picoteed margins, and variegated (some caused by viral infection). No true blue and yellow has yet been successfully accomplished. Work is being done. The pigment is in the epidermis. Any plant with red and white stripes will sport solid color. **Flower forms** are defined by the American Camellia Society as: **Single** (all stamens are central and obvious with one row of between 5 and 9 petals-'Yuletide', 'Amabilis', 'Eleanor Yates'), **Semi-Double** (conspicuous stamens with two or more rows of regular, loose or irregular petals, more than 9 usually 14-20-'Frank Houser', 'Akebono' --**Rose form** (semi-double in form with 9-20 petals, stamens form a concave center when fully open; imbricated petals—overlapping in a regular arrangement-'Mathotiana', 'Rosea Superba')), **Anenome** (also a single form-- Center is composed of intermixed petaloids and stamens-'Elegans'), Incomplete-double or **Peony -form** (also known as Informal Double--center is composed of mixed petaloid, stamens, and petals, OR center of irregular petals of full form with no stamens showing; deep rounded shape-'Debutante', 'Kings Ransom') , **Formal Double** (also known as Complete Double--stamens never show; numerous petal rows; fully imbricated- 'Grace Albritton', 'Sweetheart'). **Blooming periods** are identified as follows: **Early** (September to early November), **Early to Midseason** (Early November to Mid December), **Midseason** (Mid December to Mid February) and **Late** (Mid February to Mid March). **Sizes** include: **Miniature** (2 ½ " or less), **Small** (2 ½ to 3"), **Medium** (3-4"), **Large** 4'5"), and **Very Large** (over 5").



- A. Family: *Theaceae* (Tea family)
- B. Genus: *Camellia* is one of about 30 genera in this family.
- C. Species: Southern China has the greatest number of species. In recent years, botanists have tripled the number of known species from under 100 in the 1960's to almost 300 at the present time.
  - 1. *C. japonica*: Majority of our well-known cultivars are from this species.
  - 2. *C. sasanqua*: Small leaved species, giving rise to hundreds of cultivars. Most versatile camellia from the landscaping point of view. Makes excellent hedges, small trees, espalier, has small but very numerous fragrant flowers in a variety of colors. Different cultivars extend the season from early fall to mid-winter. Faster-growing, more sun tolerant than *C. japonica*.
  - 3. *C. sinensis* (*C. thea*): "Tea Camellia". The world's tea comes from this species grown mainly in plantations in highlands of tropical Asia, southern China and Japan and recently in other parts of the world where the climate is suitably mild and humid. Tender new shoots are plucked, fermented and dried in different ways to give black or green tea. Normally a shrub about 6-10 feet with thin serrated leaves and a rather insignificant creamy-white bloom with a hint of lemon yellow about 1" wide, borne on curved stalks from leaf axils. Grown for tea, plants are trimmed to about 4 feet and flowers rarely seen. *C. sinensis* var. *assamica* or "Assam Tea" grown in India and Sri Lanka with larger leaves and more vigorous growth.
  - 4. *C. reticulata*: Includes some of the largest-flowered cultivars. Many have been cultivated for centuries in China. Brought to England, by Captain Rawes of the East India Company. A much smaller flowered plant, growing wild in Yunnan is wild ancestor. Many additional cultivars documented mostly in Yunnan, often as temple trees up to 40 feet tall, hundreds of years old, known as the Yunnan Camellias. *C. reticulata* has upright, open-framework and sparser, larger leathery foliage than *C. japonica*. Late-blooming, flowering from late winter to mid-spring. Wild form is sold as "Wild Type", with irregularly cup-shaped, single reddish-pink flowers about 3" wide. Original 'Captain Rawes' still admired, has 6" semi-double, rich carmine-pink petals, coarsely fluted blooms. Newer cultivars have more compact growth. "Lila Naff" and "William Hertrich" are good cultivars. Zones 8-10.
  - 5. Others include:
    - a. *C. cuspidata*: Parent to a number of fine hybrids, cold hardy, Zones 7-10.
    - b. *C. granthamiana*: Late fall has large, flattish parchment-white flower with rolled back edges and a central mass of gold stamens. Discovered in 1955.
    - c. *C. hiemalis*: Generally placed with *C. sasanqua*. Blooms mainly in winter.
    - d. *C. lutchuensis*: Delicious fragrance from small white flowers, flushed pink on the outside.

- e. *C. nitidissima*: "Yellow Camellia". First yellow-flowered camellia in cultivation. Weak, lanky form, shy-flowering, prone to sudden death from root rot. Attractive foliage, very shiny. From 1970s.
  - f. *C. pitardii*: Open-branched shrub or tree to 20' with 2", 5 or 6 petals, rose-pink to white being used as a parent of hybrid cultivars.
  - g. *C. oleifera*: "Oil Seed Camellia" or "Tea Oil Camellia". Widely grown in China and Indochina for its seed oil used in cooking oil and in cosmetics. A good ornamental shrub or small tree, one of more cold-hardy camellias. White flowers to 4" wide, fragrant, opening from early fall to early winter. Zones 7-10.
  - h. *C. tsaii*: Widely cultivated wild species, glossy pendulous foliage, profuse tiny white fragrant five-petaled flowers along the branches. About 7'tall.
  - i. *Camellia x vernalis*: Placed with *C. sasanqua* but a hybrid of *C. sasanqua* and *C. japonica*. Distinguished by late-flowering (mid-winter to mid-spring).
  - j. *C. williamsii*: Popular for cold-hardiness and profuse bloom in clear colors borne over a long winter and spring season. Original raised in Britain in 1930s. Zones 7-10.
- D. Varieties/Cultivars/Hybrids: Few attempts made in 19<sup>th</sup> century to cross different species although hybrids in many other general were being produced—accidental hybrids from China and Japan but no deliberate successful crosses until *Camellia x williamsii* hybrids released around 1940. Slowly gained popularity and now make substantial proportion of new releases. Most widely used parents are *C. japonica*, *C. sasanqua*, *C. reticulata* but others including *C. saluensis*, *C. pitardii*, *C. cuspidata*, *C. lutchuensis* and more recently some small-flowered species such as *C. tsaii*. The diversity of foliage, flower and growth form is being extended. Addition of fragrance is one direction breeders are taking as well as developing small-flowered dwarf forms with dense habit, ideal for bonsai and rockery use. Mid season flowering varieties that bloom from November through January are best suited for Florida conditions. Warm fall temperatures may prevent early varieties from flowering properly. Late blooming selections may reinitiate vegetative growth before the end of the flowering period which results in "bullnoses". "Bullnosing" is characterized by poor quality flowers which do not open fully and may even drop while still tight buds.
- Hardy hybrids:** Dr. William Ackerman, National Arboretum, Washington, DC and Dr. Clifford Parks, UNC in Chapel Hill, bred a number of species, notably hardy *C. oleifera* to produce hardy camellias to withstand temperatures as low as -15 degrees F with little or no damage if there is shelter from winter sun and wind. Have 3 ½ to 4" flowers in October-November. 'Polar Ice', 'Snow Flurry', 'Winter's Charm', 'Winter's Dream', 'Winter's Star' and 'Winter's Waterlily'.
- April Series of Hardy Camellias:** developed by Camellia Forest Nursery of Chapel Hill includes 'April Dawn', 'April Rose', 'April Snow' and 'April Tryst'.

- III. Cultivation/Site selection/Transplanting: Plant in late fall though early spring when plants are dormant. This lets roots develop, plant becomes established and can provide enough moisture for the plant to develop new growth when spring comes. Container-grown camellias may be planted any time provided proper care is given. Bareroot and ball-and-burlapped plants are best moved during winter months. Space plants at least five feet apart and slightly closer if to be used as hedges. Dig hole at least 2 feet wider than root ball, leaving center of hole undug. Place root ball in the undug area and take off just enough soil to sit plant on so it is just slightly above ground level. Spread roots outward from center and fill the hole with loosened soil. Water well. Plant should not settle deeper into soil. If container-grown plant, wash soil from root ball when planting. Build up 'collar' of soil (about 3 inches in diameter) around prepared area to keep water from running off. Do not plant where root competition from shallow-rooted trees is severe. Transplant from November to February so the roots can become established before the summer heat.
- A. Light (exposure): partial shade. Plants in full sun are less dormant in warm spells of winter and may suffer damage if cold weather follows. Plants in sun may sunburn or scald the leaves, and appear yellow rather than deep dark green. Plants protected from intense morning sun, in a northern or western exposure, by a building or fence, will usually take colder temperatures than those in an eastern or southern exposure. Camellias need shadecloth on the roof if grown in a greenhouse. Too much shade will result in smaller flowers.
  - B. Water: Choose a site with well-drained soil. If area is low and wet, raised beds may be needed. First-year watering is essential when establishing a new plant. Don't let it dry out. Water is especially important prior to bud set and during bud development. Soak soil during dry weather (12" or more). Camellias prefer a moist, not wet, soil. Wet soil and poor drainage lead to root rot. If container grown, ensure there are drainage holes not just in the bottom, but along the side of the container near the bottom.
  - C. Humidity: Humidity in the greenhouse is needed to make larger flowers and will keep tender young growth from wilting. Use a mist nozzle or a humidifier.
  - D. Temperature: With increased heat, the need for water increases.
    - 1. Greenhouse grown: Greenhouse heat in the 40-50 deg. F. range is best since camellias enjoy a cool temperature.
    - 2. Container grown: Camellias make very good container plants and for those desiring to grow non-hardy types in areas where they would not survive outside temperatures, they may be summered outside and moved in for protection when necessary (portable).
  - E. Soil: Have a soil test made prior to planting to determine soil needs. Slightly acid soil is best pH of 5.5 to 6.5. Add organic matter to soil when preparing. Two to 4" of peat moss, composted cow manure, leaf mold, aged ground bark or sawdust improves drainage and fertility. Avoid planting under shallow-rooted trees whose roots come readily to the surface. The camellias would

have to compete for nutrients and water. For container-grown camellias, use a well draining, acid mixture that can hold moisture: 1 part peat moss, 1 part topsoil and 1 part coarse sand OR 1 part ground bark, sawdust, etc, 1 part leaf mold or rotted compost, 1 part topsoil, 1 part coarse sand or Perlite or vermiculite and 1 part half-rotted manure. Avoid letting plant become too root-bound. Container size will determine how often to up-pot or repot. Types of containers include plastic, clay, wooden tub, etc. Root prune by shaving away an inch of old root all around from the bottom. You can then reuse the old pot. Fill with new soil OR slide root-bound camellia from old container, or cut it away (slice down 2 sides and pull off). Loosen and remove old soil from sides and base of rootball, then repot with new soil.

- F. Fertilizer: There are numerous commercial fertilizers developed especially for Camellias and other acid-loving plants. Follow directions carefully. Feed in early spring (March) after blooming and frost dates are past. 12-4-8 with trace elements is a good first feeding. Give one Tablespoon to each foot of height, spread around the base, halfway from trunk to drip-line. In June, about 4 months after first feeding, apply the same amount of 5-10-15 with trace elements. In September/October give a small feeding of 0-20-10 to help blooming. Soil should be damp when feeding. Put fertilizer on top of the mulch and let rain wash it in or water in after placing. Do not feed ailing plants. Too little fertilizer is better than too much.

#### IV. Maintenance:

- A. Pruning: Most plants do not require a lot of pruning. Cutting blooms may be enough. Remove crossing branches, dead or dying or diseased twigs and branches. If plant is thick, it is wise to reach into the tree and remove selected branches at the trunk to keep an open center. This allows air circulation and helps avoid insect/disease problems. Also allows better penetration of spray. Prune lanky plants to control shape and size. Pruning is done after blooming is over, in the spring and before new growth starts. Pruning after June will remove next season's flower buds. Do not leave stubs. Use sharp, clean tools. Dip them in mix of 1 part Clorox to 9 parts water and dip after each cut, especially on diseased wood, so disease is not spread. Do not place cutters on the ground between cuts—they can pick up disease. It is a good idea to spray the plant with a protective spray of Benomyl after pruning to help prevent pruning wound infection (die-back fungus). Severe pruning is sometimes done to rejuvenate old, large, weakened plants. Sometimes this is done in stages—removing part of the tree branches one year and pruning/removing others the following year.
- B. Disbudding: Remove excess buds to promote size and health of remaining buds and to regulate the position of the blooms on the branch. Often a mass of buds are produced at the end of a twig instead of being evenly placed and some should be removed to let others develop. Do not disbud before September through November. Earlier disbudding allows more buds to set.
- C. Mulching. Mulch the soil around the camellia with 2" -4" of pine straw, bark or other organic material. Mulching keeps soil at a constant temperature, helps

prevent water evaporation, and helps in controlling weeds. Do not place the mulch against the trunk of the plant. Mulch breaks down and adds compost to the soil. Finely ground aged pine bark may be used but remember to check pH and fertilizer levels. When using organic matter, as it breaks down, renew to restore nutrients and texture.

- D. Gibbing: Began in the US by camellia growers in the 1960's. Use of gibberilic acid, a natural plant hormone, will force camellia flower buds to bloom earlier, breaking dormancy of the flower buds and oftentimes producing larger flowers (larger by 33%). Gibbing often allows less cold hardy plants to have open blooms which might not happen if cold occurs during bloom period. Gibbing is done in late summer or early fall. A vegetative bud next to a flower bud is twisted out, leaving a cup of scales into which a drop of gibberilic acid is placed. A vegetative bud is pointed and slender compared to the flower but which plump and round. The solution will be translocated to the flower bud which begins growing, noticeably, within 2 weeks. Blooming time varies between 30 to 90 days, depending on the particular variety. 20% of the buds on a large camellia can be gibbed. It is a good idea to space gibbing to avoid having all the blooms at one time. It is best to cut treated flowers or to prune the stems back because the terminal vegetative buds on treated stems usually won't make normal growth in the spring.
- E. Spraying: Spraying for insects should be done after freezing weather. A mixture of oil emulsion and Malathion to control Tea Scale, Red Spider Mites and Camellia Scale. Spraying in the fall should be done in September or October before the temperature gets below 40 degrees.

#### V. Propagation:

- A. Seed: (sexual) Seed ripen at different times, depending on the variety and location, but generally mature in the fall. Pods begin to crack slightly when mature. Collect them then. Soak for 12 hours (or crack) to hasten germination. Plant in good soil, peat moss or a combination of peat moss and sand. Keep mix moist. Some germinate in a month, others won't germinate until spring, if planted right after picking.
- B. Grafting: (asexual/vegetative) Grafted plants usually flower in one to two years. Before new growth begins is best time to graft—usually late winter/early spring. Understock, usually fast-growing, is used. *C. japonica* often is grafted on *C. sasanqua* or *C. oleifera* because it is resistant to root rot. Cleft grafting is most often used. Cut off top of understock, leaving a 5" trunk. Make a clean, sloping, trimmed cut. Make a vertical cut about 2" down the top side. Prepare the scion (cutting) by making it wedge-shaped at the bottom. Can soak the scion in a Benomyl/Captan solution to discourage die-back—1 Tbsp each to 1 gallon water. Hold slit in understock open with a knife and insert scion, making sure cambium layers of both are in contact. Use electricians tape or a strong rubber band to bind area tightly. Foil, wax or pruning compound can be used to protect the union. Cover the graft with a milk jug, jar, large Styrofoam cup to maintain humidity. If glass jar is used, cover it with a brown bag to keep sun off. Callusing starts in a few weeks and

by two months should be tightly knit. Raise the jar but if new growth wilts, replace. May need to provide shade for tender young graft. Grafts can grow 15-30" first season. May fertilize lightly with liquid fertilizer.

- C. Cuttings: (asexual/vegetative) Most common, easiest, least expensive but not the quickest. Cuttings make exact duplicates of the original branch. If cutting is taken from a branch that is a sport (mutant), the resulting cutting will usually be like the sport but may be like the original plant. Take new growth just after it hardens (May- August), 4-6" long (make a cut below the 5<sup>th</sup> or 6<sup>th</sup> node), remove the two lower leaves. This leaves eyes from which new growth comes, as well as the bottom end. Cut leaves left on in half to reduce moisture loss. Use one-half sand and one-half peat or vermiculite and perlite. Lack of nutrients force roots out in all directions seeking food. Use a container, box, pot, 4-6" deep with good drainage; place cuttings in mix about 2" apart and 2-3" deep. Cover with a pane of glass, cheesecloth, etc. to retain moisture. Keep moist (not wet) all times. By mid to late winter cuttings should be rooted. Transplant into pots or a protected bed. If only a few cuttings are to be rooted, use a pot of sand and cover with a soft-drink bottle or milk jug with the bottom cut out. After germination, transfer to containers or outside. If putting them in containers, trim off tap root system. If outside, leave tap root intact to help plant during drought or severe cold.
- D. Air Layering: (asexual/vegetative) Best time is early spring when new growth starts. Choose a healthy limb and about 12-24" from tip, remove a ring of bark 1 and ½ to 2 times the diameter of the branch. Use clean, sharp tool. The branch may have new growth but make sure the cut is on hardened wood. May brush or dust with rooting hormone. Wrap a handful of dampened sphagnum moss around the cut areas, enclose the moss with clear plastic and tie above and below the moss ball. Cover this ball with aluminum foil. When roots are visible though the plastic, usually by late summer or fall if begun in spring, cut the limb from the parent plant at the bottom edge of the moss, using sharp clippers. Remove the plastic covering and ties, leaving the moss root ball intact and soak in water until planting. Plant first in container until well-established, then into the ground. Often bloom the first year. If excess buds form, remove some.

#### VI. Pests and Diseases:

- A. Dieback affects *C. sasanqua* and *C. japonica*, caused by fungus *Glomerella cinquolata*. Usually requires a wound to enter—from pruning, lawn mowers, leaf scars, hail damage, etc. Rain, watering or insects moving across the wound can spread the disease. Sudden wilting of new growth, especially in early summer with leaves clinging to branches even after they are dead identified the disease. There may be cankers at the wound oozing pink masses of spores in wet weather. Control: sanitation. Fungus is inside the plant so spray isn't effective. Cut about 6" below the visible damage, collect and burn the twigs. Dip tools in mix of one tablespoon of Benomyl to 2 gallons of water between cuts and spray plants with the mix in the spring.

- B. Root Rot is caused by *Phytophthora cinnamonomi* fungus found in the soil. May be natural in the soil or brought in on the soil on the roots of other woody ornamentals. *C. japonica* is subject to root rot but *C. sasanqua* and *C. oleifera* are not. Usually caused by wet or poorly aerated soil. Yellowing and stopping of growth shows up in hot, dry weather. Control: Improve the drainage of the soil. Use *C. sasanqua* or *C. oleifera* for grafting stock, or use fast-growing varieties.
- C. Camellia Flower Blight affects only the blooms, and is caused by the fungus *Ciborinia camellia* Kohn. Usually becomes a problem in mid-January or late to early April. Warm, humid weather followed by a cold spell causes the fungus spores to bloom with subsequent infection. Brown spots on the petals, enlarging until the entire bloom is blighted and feels slimy. Infected blooms fall to the ground and hard resting bodies called sclerotia form under the bush or in the soil or debris for years. When temperatures are 45-70 F. in wet weather, the sclerotia germinate and make saucer-shaped mushrooms called appressoria, about 1/2" in diameter which release spores that are carried by the wind, land on a flower and cause the infection. Control: Remove and destroy all fallen blossoms. Drench the soil with Terraclor in late December or January. Eradication is not possible but is being worked on.
- D. Other diseases include leaf gall, sooty mold, lichens, nematodes and virus variegation. None of these are serious.
- E. Insects:
1. Tea Scale: A small sucking insect. Most common, most damaging insect pest. Infects only undersides of leaves with yellow chlorotic splotches on upper side, white cottony flecks/substance may be evident on undersides.
  2. Camellia Scale: Like the Tea Scale but infects only camellia leaves. 1/10<sup>th</sup> inch oyster-shell shaped female, light brown.
  3. Peony Scale: Less common than others but if present may kill branches and entire plants if not controlled. Found on branches and stems of camellias and azaleas. Hard covering of scale matches stem color. Scratch off scale and round, white waxy spot is left on stem.
  4. Wax Scale: Also found on stems and trunks, white, oval about 1/4" in diameter.

Control of Scale; Oil emulsion sprays are most effective if given early and applied properly. Plants must be thoroughly covered since this is a contact insecticide. Apply only during spring and fall when temperatures are 40-85 deg. F. Apply no more than 3 times a year, with at least two months between spraying. Do not apply in heat of the day. Orthene and Malathion are registered for scale control. Oils are compatible with other insecticides.

5. Aphids or Plant Lice: Small colonies of these attack undersides of leaves or along the stems of tender new growth. Suck juices with a long beak. Secrete honeydew on which sooty mold grows. Easy to dislodge often with strong stream of water. Repeat often. Use Cygon, Malathion spray.
6. Mites are very small sucking pests and usually found on underside of foliage. Dusty gray-appearing foliage is symptom as well as spider webs. Severe infestation may cause defoliation. Mites come in hot, dry weather.

Control: Spray with miticide (Kelthane) in mid May. Usually only one application is needed.

7. Camellia Bud Mites occurs under the scales of buds and foliage buds, turning the edges brown and if left unchecked, may cause bud drop.

VII. Entering and the Schedule: a Standard Flower Show

- A. Exhibit camellias as a single bloom in a section entitled "Camellias" with classes for *C. japonica*, *C. sasanqua*, *C. reticulata*, etc, creating a class for each species. Sub-class by flower form. May be sub-classed by named varieties. May be sub-classed by color and/or size if only a few flowers are entered in a show. Gibbed, green house grown, slat or lath-house grown should be separate classes.
- B. If there is no Camellia Section, then single *C. japonica*, *C. reticulata* blooms may be entered under section entitled "Cut Flowers from Perennials" since they are usually exhibited with only two leaves and in a flat cup, in a class for Camellias.
- C. *Camellia sasanqua* are generally entered in the Arboreal Section in the Class for Flowering shrubs and sub-classed by named variety or by color or whether single or double.
- D. May be entered as a container grown plant.
- E. Schedule may have section entitled Collections/Displays and a class for cut blooms from 5 (or more) different named cultivars of *C. japonica*, or a class for cut branches of five different *Camellia sasanqua*. It is possible that the schedule could ask for a collection of five different camellia species. Club Competition of 7 different flowers can be entered.
- F. If all requirements are met and if listed in the schedule, camellias could be eligible for an Award of merit, and Arboreal Award, a Collector's Showcase Award, A Grower's Choice Award and the Award of Horticultural Excellence.

VIII. What the Judges are looking for:

- A. Plant Identification: naming is important for the educational value as well as proper identification for judging. Genus, species and cultivar name should be legible, visible and neat.
- B. Cultural Perfection:
  1. Peak of Perfection: Proper or prime maturity for exhibiting with no major faults. A mature bloom will be **fully open**, expanded to show its form according to the form classification. A specimen which is immature will not have petals expanded nor stamens/petaloids developed or in the proper place and showing ripe pollen. A past prime or overly mature, old bloom will lack vigor and freshness and appear slightly limp, the pollen will not be fresh, the stamens will droop slightly, the petals may be relaxed or turn slightly downward. Color may not be fresh. A healthy specimen has not signs of disease or insect problem, no evidence of scale. Any faults will affect the perfection of the specimen.



2. Quantity: Number of specimens as defined by schedule, number of blooms, proportional to size of specimen. Growth buds may be removed by exhibitor without penalty if removed before scar is distracting.
  3. Color: of flowers and foliage. The quality of the color (not the name of the color)—its clarity, purity, brightness, freshness, softness, freedom from fading, aging, muddiness. If variegated, or marked, definite coloration and clarity with not bleeding or smearing.
  4. Form: Flowers and foliage balanced, appropriate to type. Symmetrical form, **round**, proper placement and distribution of petals, petaloids and stamens. If classified by Camellia Society forms, should meet the form requirements. Double forms must have substantial depth of bloom.
  5. Substance: Firmness of tissue. Thickness or thinness of petals (depending on variety). Substance is the amount of water in the petals, making the flower hold its shape. Turgidity, firmness. Lack of substance or losing substance is shown by wilting, limpness, rolling petal edges, thinning petal edges and loss of fresh-appearing quality.
  6. Texture: Surface quality of bloom and foliage. Describes the surface quality of the petals—waxy, iridescent, shiny, crepey, has a sheen, smooth, or faulty because of roughness, ridges, dullness, lack-luster, etc.
  7. Size: Ideal for type, average or slightly above. Will vary with the cultivar, the conditions under which it was grown (green house, pot culture, protected, gibbed or general outdoor culture). If a miniature, smallness is desired. Small, average or large size is generally sufficient in a general Standard Show.
  8. Foliage/stem: Proportion, form, amount, color, length, condition, if applicable. At least **one but preferably two leaves attached** to the **1-2" stem** should be fresh, undamaged, free of disease or evidence of disease, no residue or spray.
- C. Condition/Grooming/Staging :
1. Health, blemish free: Evidenced by above qualities, damage due to insects, disease, physiological, mechanical problems.
  2. Grooming: Preparations the exhibitor can control: stem length, clean cut, foliage removed below water level, cleanliness, conditioning.
  3. Staging: Presentation, including container (size, type, cleanliness) and pose (attitude, wedging). Blooms are usually shown in a flat pan or cup.
- D. Distinction: Degree of superiority in all listed qualities. Near perfection with elegance, beauty. Any faults detract from distinction, but the flower may still have distinctive qualities, even with faults.

Optional Topic:

## Daylilies

Objectives:

To compare the similarities and differences between the types of daylily blooms.

To practice propagation techniques.

To learn the secrets of growing and showing daylilies.

References/Resources:

*Handbook for Flower Shows*, NGC, 2007

*Judging Daylilies*, American Hemerocallis Society, 2006

*The Daylily: A Guide for Gardeners*, J. Peat and T. Petit, 2004

*Southern Living Garden Guide*, 2004

Materials needed for this unit:

As many examples of daylily blooms and types as possible. (This will obviously be a seasonal topic—contact the “Digging It” Chairman for *Power Point* of this topic.)

Clumps for dividing.

Seeds for planting.

**Classification:** Herbaceous perennial, from China/Japan (recorded as early as 1100bc), evergreen (EV), semi-evergreen (SEV), or deciduous (DOR=dormant). Bloom from early spring to late summer (EE=very early, E=early, EM=early mid-season, M=mid-season, ML=later mid-season, L=late, VL=very late), many are rebloomers (RE) with second display in late summer to mid autumn—Look for ‘Happy Returns’ and ‘Stella D’oro’. Some flowers feature fragrant (FR) or very fragrant (VFR) flowers—Look for ‘Frozen Jade’. First introduced in England in 1556 and brought to America by early colonists in 1890. A monocotyledon with petals and stamen in sets of 3. Edible! Buds are palatable and nutritious in salads, soups and other main dishes. Roots and crown were found to be good pain relievers.

**Family:** *Hemerocallidaceae* (formerly *Liliaceae*)

**Genus:** *Hemerocallis*: *hemera*, Greek for Day and *kallos* meaning beauty, alluding to the short life of the beautiful flower. Its pre-Linnaean days was named *Ephemeron*: *Epi* Greek word for ‘upon’ and *Hemera* for ‘day’) Some are nocturnal (open just before sundown and close 24 hours later), some are extended (open early morning until about 10pm) and others Diurnal (open in the morning and close the next day)—max duration is 36 hours.

**Species:** about a dozen species on the specialty market or found in old homesteads: *H. fulva* is the common orange or “Tawny” daylily (a double form is called ‘Kwanso’), *H. flava* (aka *H. liloasphodelus*) is the common yellow or “Lemon” daylily. “Railroad Lily”, “Outhouse Lily”.

**Cultivars:** Many hybrids—more than 50,000 named selections—found in *Eureka*. Buy plants in bloom to ensure color/type. Look for selections that have won awards from AHS (Award of Merit or Stout Medal—Dr. A. B. Stout and Dr. Albert Steward were instrumental in bringing plant material from China that had never been seen outside the country—daylily hybridizers). Often sold as a ‘collection’ by growers. Ploidity=Some

cultivars are diploid—having 22 chromosomes and some are tetraploids—having 44 chromosomes—began in 1937, doubling chromosomes in each plant cell results in a bigger flower, stronger stem and lush foliage.

American Hemerocallis Society: (AHS—[www.daylilies.org](http://www.daylilies.org)), Region 12 is Florida ([www.ashregion12.org](http://www.ashregion12.org)) display gardens, growers, specialty nurseries, conventions, auctions, shows, sales.

**Daylily Culture:** Growing daylilies is easy: require little care once established. Thrive on neglect! Use as borders, mass sweeps, in herbaceous borders, on banks, roadsides, in rock gardens, in containers, as groundcovers. Plant bare-rooted plants in spring or fall on a mound of soil in a hole large enough to accommodate the roots. Be careful not to plant too deeply. Container-grown daylilies can be planted at any time. Space tall varieties 30 inches apart, space small ones 18-24" apart.

Sun: full sun (6 hours) to part shade.

Soil: will adapt to almost any type, but for best results they prefer well-drained soil amended with organic matter, especially pine bark—loamy, slightly acid.

Mulch well with decomposing organic materials.

Water/Humidity: requires regular watering, especially at bloom time. Can tolerate drought and flood! Excessive dryness can cause bud drop.

Temperature: USDA Zones 12-1 (grows in all 50 states). We are in Zones 8-9.

Immune to heat, winter hardy to -25 degrees.

Fertilizer: Fertilize in the spring, before they bloom. Apply a balanced fertilizer (10-10-10) to soil around established plants and water in. Keep fertilizer off foliage. Do not fertilize newly planted daylilies—even fresh manures will burn the roots. A second feeding after bloom is also happily received. Milorganite is recommended.

### **Propagation:**

Separation (Division) of the clump: Separate (divide) when clumps become crowded (usually after 3 to 6 years), dig and divide them in fall or early spring or when dormant. Remove any old, flat, darkened roots, and give the fan a haircut. Some varieties are soloniferous.

Seeds: allow seed pods (ovary) to develop and turn brown. They will bust open to reveal tiny black seeds. New plants look like blades of grass (Monocotyledon). Seeds can be kept in the refrigerator for next year's planting. Some bloom the next year, others may take 2-5 years. Pollination by bees, wind, man, water, etc). Cross readily. Pod parent retains the seeds. Pollen parent donates pollen. Pollen can be kept in freezer for years. Once pollinated, early morning, remove anthers and cover stigma. Plant seeds ½ to ¾ inch deep. Germination in just a few days. Seed auction on line.

Proliferations: A small plant on the sides of the scape. Allow proliferation to develop roots...treat as layering...or cut off and plant in potting soil or directly into the ground. Keep moist.

BAP: a chemical hormone which will cause the plant to replicate quickly.

**Pests and diseases:** Mostly pest resistant—tough plants.

Daylily Rust (*Puccinia hemerocallidis*): a fungus causing yellow to orange streaks and pustules to form on the leaves. Rust overwinters in the leaves. Spray at regular intervals with recommended fungicide according to label directions. Plant resistant selections.

Root rot (*Rhizoctonia*): Where water stands or where there is injury or damage and water gets in. Ensure well-drained soil.

Thrips: Tiny insects in crown of plant. Use Malathion or Sevin Dust.

Slugs: Chewing at crown and base of plant. Use slug bait.

Aphids: Sucking insects. Cause bumps on petals and injure the flowers, weaken the plants. Honeydew attracts ants. Spray with insecticide spring.

Deer and Armadillo will eat foliage or dig up the entire plant!

Daylilies are classified by size and form of the flower:

**Sizes** include four categories:

1. Extra Large: 7 “ or more in diameter
2. Large: 4 ½” or more but less than 7” in diameter
3. Small: 3” or more but less than 4 ½” in diameter (The term ‘pony’ is used to describe a medium-size plant with a small flower)
4. Miniature: less than 3” in diameter (Salter Daylilies outside of Gainesville specializes in mini)

**Forms** include five categories:

1. **Single:** basic daylily form—a bloom that has three petals, three sepals and six stamens.
2. **Double:** a daylily has extra petals or petaloids lying on or above the normal three petals (and three sepals) of an ordinary (single daylily). Extra or supernumerary petals lie on top of the normal petals and there are six regular stamens. This type of bloom has a layered or hose-in-hose effect.
3. **Spider:** Petals have a length to width ratio of at least 4:1. Spiders are measured with the segment fully extended: width measurement is taken at the widest point.
4. **Unusual Form:** the purpose of this class is to recognize unusual forms whose length-to-width ratio puts them outside the Spider classification.
  - a. **Crispate:** 1). Pinched (sharp folds giving a pinched or folded effect)
    - 2). Twisted: presents a corkscrew or pinwheel effect
    - 3). Quilled: floral segments which turn upon themselves along their length to form a tubular shape.
  - b. **Cascading:** narrow curling or cascading segments
  - c. **Spatulate:** segments markedly wider at the end like a kitchen spatula
5. **Polytepal:** having extra whole tepals (petals and sepals) in the two tepal whorls of a flower (more than the usual 3 sepals--usually four or

five sepals—in the outer whorl and more than 3 petals in the inner whorl).

**Subforms** are actually subclasses of the officially designated forms:

1. **Circular:** The flower appears round. Segments overlap and tend to be short, wide and stubby.
2. **Triangular:** Sepals recurve to make three flat sides while long petals extend into modified points.
3. **Star:** Petals and sepals tend to be long and pointed, separated by spaces.
4. **Flat** (or saucer-like): flowers are completely open and spread out except for the concave throat.
5. **Recurved:** Segments flare but ends of segments roll or tuck under.
6. **Trumpet:** Segments rise from the throat in an upward pattern with little flare. Often called a chalice or cup. Many species are trumpet form.
7. **Informal:** Segments have no definable shape and placement may be irregular, floppy, widely-spaced. Usually classed as 'Unusual Form' or UFO. New form "Dolly Parton" with breasts!

**Colors and Patterns:** Colors range from basic yellow, orange and rusty red to pink, vermilion, buff, apricot, plum, lilac purple, cream and near-white.

1. **Selfs:** Flower segments are all the same single color (stamens and throat may be different). When all flower parts are of the same color, it is termed a complete self. Monochrome.
2. **Blends:** Flower segments are an intermingling of two or more colors. Petals and sepals are both the same blend of colors (stamen and throat may be different).
3. **Polychromes:** segments have an intermingling of three or more colors. (Stamen and throat may differ in color).
4. **Bitones:** Petals and sepals differ in shade or intensity of the same basic color. Petals are the darker shade, while sepals are the lighter.
5. **Reverse Bitone:** Sepals are the darker color with lighter petals.
6. **Bicolors:** petals and sepals are of different colors. Petals are the darker of the two color values.
7. **Reverse Bicolor:** Sepals are the darker color with lighter petals.
8. **Eyes and Bands:** The flower has a zone of different color or a darker shade of the same color located between the throat and the tips of the segments. If the zone occurs on both the petals and the sepals it is termed an **eye**. If it occurs only on the petals, it is called a **band**.
9. **Halo:** The zone is faint or only lightly visible.
10. **Watermark:** The zone is a lighter shade than the rest of the segment.
11. **Contrasting edges:** The segment edges are either lighter or darker than the segment color. If an eye is present, the edge is usually, but not always, the same color. The width of the edge can range from a very narrow "wire-edge" to one-fourth to one-half inch width. Double edged daylilies have two contrasting colors running in parallel around the segments of a different color.

12. **Contrasting tips:** The segment tips, or more frequently only the petal tips, are a different or contrasting color from the body of the segment (sometimes as much as one third the segment length).
13. **Dots, dusting:** The surface color appears to be unevenly distributed over the background color. The color can appear to be finely misted on or dusted or it could be clumped into larger pools, which might be called dotted. Other terms which have been used uneven coloration include flecked, flaked, speckled and stippled.
14. **Contrasting midribs:** The midrib is the center vein running lengthwise through each flower segment. It is contrasting if it is a different color from the rest of the segment. Occasionally, the midrib is a shade or two darker than the segment color. The midrib can be flush with the petal surface, raised above it or recessed.
15. **Diamond dusting:** Tiny crystals in the flower's cells reflect light to give the flower a sparkling or glistening appearance.

**Texture:** Refers to the surface quality of the tissue structure of the flower.

1. Smooth
2. Velvety
3. Creped
4. Ribbed

**Substance:** Refers to the thickness of tissue structure of the flower.

1. Delicate
2. Heavy—Tetraploid types have unusually heavy, thick petals.
3. Leathery

**Scape Height (stature):** There is no relationship between size of the bloom and the height of the scape.

1. Low: 6" to 24"
2. Medium: 24' to 36"
3. Tall: over 36"—some as tall as 6 feet! (Developed from *H.*

*altissima*.)

4. Dwarf: Under 12"—(flowers of a dwarf can be any size)

(Developed from *H. minor*, *H. dumortieri*, *H. middendorffii* and *H. multiflora*.)

**Branching:** Allows one scape to bear more buds.

1. Top branched: branching occurs only near the top of the scape
2. Well branched: can begin near the top of the foliage
3. Low branching: can extend into the foliage.
4. Multiple: a number of side branches
5. "Three Way", "Four Way" etc.: with any number indicating the number of branches per scape.

**Foliage:** Lush, graceful and arching, narrow and grass-like, strappy, sword-shaped. Rich green in color. There is a hybrid with variegated foliage. Parallel veination.

**Roots:** Fibrous or fleshy root system (not a bulb). Roots readily absorb nutrients, but they can be overfed.

The American Hemerocallis Society is headquartered in Dexter, Georgia. Annual membership is \$25 per person (3 years for \$70), \$30 for household (per calendar year beginning in January). Youth membership, for those under age 18, is \$10 per year. Membership provides quarterly magazine, *The Daylily Journal*. Local and regional affiliation will be an additional cost.

National AHS conventions are hosted by different regions throughout the United States. (Florida is Region 12.)

[www.daylilies.org](http://www.daylilies.org)

Some Hybridizers in Florida include:

Art Gallery Gardens, 203 Oakapple Trail, Lake Helen 32744

Dragon's Mead Daylilys, 9431 N. Holland Rd, Panama City 32409

Sample Gardens, 3603 Lightner Dr., Tampa 33629 (This is also an AHS Display Garden)

Frank Smith Daylilies, 2815 W. Ponkan Rd., Apopka 32712

Ladybug Daylilies

Floyd Cove Nursery, Enterprise, 32725

Kennibrew Daylilies

Johnson Daylily Garden, 70 Lark Ave., Brooksville, 34601

Optional Topic:

## Bromeliads

Objectives:

To learn the similarities and differences between the different types of bromeliads

To practice propagating bromeliads

To learn the secrets of growing and showing bromeliads.

References/Resources:

Bromeliad Society International [www.bsi.org](http://www.bsi.org), 1508 Lake Shore Dr,  
Orlando, FL 32803

*Bromeliads* by Jack Kramer, 1981

Materials needed for this unit:

As many examples of the different types and subfamilies of bromeliads as possible.

Bromeliads for dividing and separating.

- I. Introduction Bromeliads (bro-melle-ad) entered recorded history some 500 years ago when Columbus introduced the pineapple (*Ananas comosus*) to Spain upon return from his second voyage to the New World in 1493. On that voyage he found it being cultivated by the Carib Indians in the West Indies. Within 50 years this tropical fruit was being cultivated in India and other Old World countries. It took some time for additional bromeliads to enter cultivation. It wasn't until 1776 that another bromeliad (*Guzmania lingulata*) was brought to Europe. *Aechmea fasciata* followed in 1828 and *Vriesea splendens* in 1840. "Spanish Moss" (*Tillandsia usneoides*) was commercially produced in 1860s to 1870s for mattress stuffing, for gun wadding and as auto upholstery in Model T Ford. Within the last hundred years, bromeliads have become more widely used as ornamental plants. Originally only found in royal botanical gardens or the private greenhouses of wealthy Europeans, their popularity has spread to the masses. Today bromeliads are more available to the enthusiast than ever before. New species are still being discovered and plant breeders are developing ever more stunning hybrids to choose from. Native to the Americas from southern US to Chili and Argentina. Dwell in rain forests.
- II. Classification: A tough **monocotyledon** (an angiosperm or flowering plant, with one seed leaf, flower parts in threes and parallel veining). **Monocarpic** (flowering and fruiting but once, then dying, although suckers may arise from the base). Two types: **Terrestrials** (growing in soil, take in water and nutrients through their roots.) and **Epiphytes** (a plant that grows attached to another for support only, drawing its nourishment from air, rain, and accumulated debris; not a parasite. Absorb moisture and nutrients through their leaves; roots are used primarily for support.). Dynamic **inflorescence** (multiple flowers on a common stem with each flower having its own pedicel) varies in form and color pattern (usually 3 petals and 3 sepals) and may contrast strongly with **bracts** (a modified leaf found either underneath the petal/s or on the stalk of an inflorescence—may be large (from ¼ inch to 15 feet long) and brightly colored (flower spikes may be red, orange, yellow, pink, purple or blue). Foliage is often zoned or marked in striking colors (striped, banded, spotted or mottled with a number of contrasting colors). All



bromeliads have whitish plant scales (scurf) on and under their leaves which absorb moisture. Both solitary and clustering types. Some are saxicolous—growing on or in rocks. According to Bud Martin of Blossom World Bromeliads in Sanford, FL the 5 genera easiest to grow in the home are: Cryptanthus, Aechmea, Neoregelia, Guzmania and Vriesea.

A. Family: **Bromeliaceae**

B. **Sub Families:** Classified according to manner of growth.

1. **Pitcairnioideae:** Grow in damp, shady locations. All are terrestrial requiring lots of water and adequate fertilizer when grown as pot plants. Heavy spines on leaf edges. Can take very dry conditions. Often mistaken for succulents. Have beautiful inflorescences.
  - a. **Dyckia:** very spiny terrestrial, drought tolerant, clustering. Tough succulent leaves. Often mistaken for cactus. Gold or yellow colored flowers appear from a lateral spike rather than the center of the plant.
  - b. **Puya:** Among the largest. Found at very high altitudes in the Andean highlands of South America. May take up to 10 years to bloom. *P. raimondii* is nearly 30 feet tall.
  - c. **Hechtia:** generally large plants, they require the same conditions as Dyckias.
2. **Tillandsioideae:** Largest subfamily. Most members of this subfamily are found growing as epiphytes on tree limbs, protected from direct sun by foliage and constantly bathed in moisture-laden air. All genera respond to light application of foliar fertilizers and/or time—release fertilizer in the potting medium when grown as pot plants. Named for Swedish botanist, Tillands. Most have smooth leaf edges. Many have a grey ‘bloom’ on foliage.
  - a. **Guzmania:** (guz-may-nya) Most are terrestrial but some are epiphyte. Over 150 species. Grow in low light, sensitive to heat and wet roots. Flashy foliage, showy flower-heads. Good in low light. Grow 2 to 3 feet tall and wide. Popular species: *G. lingulata* (grows to 20 inches across and bears a star-shaped orange flower head—also *G. ligulata minor*, a more compact variety), *G. magnifica* (robust, graceful, with star-shaped flower crown nestled in the foliage), *G. monostachia* (satiny green leaves in a dense rosette, poker-like flower stalk with white flowers and green bracts stenciled with red lines), *G. vittata* (soft green leaves barred with maroon on the reverse side).

- b. **Tillandsia:** (till-and-seeuh) Grey, epiphyte, includes *T. recurvata* (“Ball moss”), *T. fasciculata* (“Cardinal air plant”), and *T. usneoides* –looks like moss (“Spanish moss”). These are spineless, frequently called ‘air plant’. Over 500 species. Most have absorbent fuzzy, scaled, dull, gray leaves. They obtain their nourishment from the air (water vapor and minerals), rain, decaying leaves of the tree and filtered sunlight. Their roots are mainly for attachment and they get their nourishment through their leaves. They are not parasites upon the host tree. DO NOT pot tillandsias in soil. Most like to be mounted. Insignificant flowers. *T. caput-medusae* (thick, twisted leaves and blue flowers), *T. cyanea* ‘Anita’ (graceful arching leaves like a palm, bears an erect flower stalk with feathery pink sword of large purple flowers 3 inches across lasting up to 6 months, humid growing), *T. ionantha* (only 2 inches tall, leaves blush red, stalkless purple flowers, loves sun), *T. bryoides* (less than 1 inch), *T. argentea* (silvery species with short leaves spreading untidily outwards), *T. juncea* (long leaved with rush-like foliage spreading outward and a single flower stalk with terminal blooms held high above the plant).
- c. **Vriesea:** (vree-see-uh) epiphyte. Can be solid green, banded or mottled and the flowers resemble red-hot pokers and are almost always flat. Grow 30 inches tall. *V. splendens* (‘Flaming Sword’, grows to about 12 inches, flower stalk an orange sword of color), *V. malzinei* (compact claret colored leaves, cylindrical flower head with yellow bracts with green margins). *V. mariae* is the “painted feather”
3. **Bromelioideae:** While a large percentage of the members can be found growing as epiphytes in habit, most make the transition to pot culture easily. Many members of the genera are epiphytes or are found growing on rocks. Most adapt well to being grown in screen porch or pool areas or combined with plants in landscaping that receives some protection from the hot afternoon sun. Leaf edges are spiny. Leaves arranged in rosettes which may be cup-shaped, tall and tubular or vase-shaped. Foliage is marked and patterned in many colors. Inflorescences vary greatly from pin cushion type, almost hidden in the foliage, to tall, branched or unbranched, upright or arching. Produce berry-like fruits.
- a. **Achmea:** (Ahk-mee-uh) About 200 species all are epiphyte, generally cold hardy and have tanks. Grow 2 to 3 feet. Popular species: *A. fasciata* (“Urn

- plant”), *A. chantinii* (olive-green foliage with silver bands), *A. distichantha*, *A. recurvata* (colorful, cold-hardy miniature, flushes vivid pink when in bloom), *A. cylindrata*, *A. ornata*, *A. caudata* (yellow flowers), *A. pectinata*, *A. calyculata*, *A. gamosepala*, *A. ‘Royal Burgundy’*. *A. ‘Foster’s Favorite’* is a dwarf variety. Flowers persist for months. Stiffly arching, spiny-edged leaves.
- b. **Ananas:** Pineapples. The most important commercially. *A. comosus* (commercial Pineapple, large), *A. comosus variegatus* (smaller with ivory stripes), *A. nanus* (dwarf, ornamental Pineapple), *A. bracteatus striatus* (brightly striped 1–2 ft. arching leaves in green, cream and pink).
- c. **Billbergia:** (bil-berg-ee-a) epiphyte. Popular species: *B. nutans* (“Queen’s tears”), *B. pyramidalis concolor* (‘Summer torch’), *B. fantasia* (green leaves spotted ivory, green or rose, scarlet bracts and blue flowers), *B. venezuelana* (giant with patterned leaves of brown and silver, pink bracts and purple petals, from Venezuela). Pendent flowers last only 2 weeks. Named for Swedish botanist, Billberg.
- d. **Cryptanthus:** (krip-tanth-us) Greek for ‘hidden flower’. (“Earth stars”), terrestrial, growing to about 12”. Flowers are minimal, white and last only a day. A succession of flowers keep the plant in bloom for some time. Leaves are banded and arranged star-shaped. *C. roseus pictus* (aka *C. bivittatus* is the most frequently used plant in a dish garden with salmon rose and olive green leaves 4 to 8 inches across), *C. zonatus* (smaller with broad, wavy brownish green leaves cross-banded with silver). Produces offshoots on top of the rosette in the leaf axils. *C. bromelioides* (grows 14 inches across and has copper-red leaves). *Cryptanthus ‘Pink Starlight’* and ‘Ruby’ are two popular small species.
- e. **Neoreglia:** (Nee-or-ree-jeel-ya) Mostly epiphytes growing 8 to 10 inches tall and 18 to 24 inches wide. Prefer bright light. Flowers are stemless and stay low in the center of the plant. Blushing. Popular species: *N. carolinae* ‘Tri-color’ (white-striped variegation on leaves, when in bloom the foliage turns bright red and lasts 6 months), *N. lilliputiana* (smallest of the species), *N. ampullaceae* ‘Fireball’ (stoloniferous, compact and

colorful), *N. fosperior*, *N. mcwilliamsii*, *N. cruenta*, *N. marcon*, *N. spectabilis* (Fingernail plant).

- f. **Nidularium:** (need-ew-lah-ree-um) prefers shade. Popular species: *N. innocentii* (Bird's nest, large plant with purple leaves and white flowers deep in the center of the rosette), *N. regelioides*, *N. procerum*, *N. fulgens* (blushing in center at flowering time).
  - g. **Orthophytum:** semi-succulent plants that favor cryptanthus. Bloom in a similar fashion to cryptanthus.
  - h. **Portea:** Their blooms are the most decorative of all the genera. Generally large, terrestrial plants, reaching heights of 4 feet or more. *P. petropolitana extensa* (large spreading yellow-green leaves edged with spines, tubular pink, green and lavender flowers in branched racemes followed by blue berries).
- C. Genus: Over 50 genera. Written with upper case letter and either underlined or in italics.
  - D. Species: 2,700 species available. Written in lower case letters and either underlined or in italics.
  - E. Variety and Cultivar: There are thousands of hybrids available. The cultivar or hybrid name must appear on the entry tags. It is written with a single quote. Miniatures available.
- III. Environmental Considerations: (Optional handout: "Bromeliad Culture Brochure" furnished by the Bromeliad Society International.)
- A. Light: Medium light, filtered sun or bright, diffused light is best. Will sunburn and leaves turn yellow, markings fade and leaves become leathery. If not enough light the leaves will revert to green and become long, soft and drooping. Many grow well under artificial, florescent lights. As a rule, those with thin, flexible, spineless leaves tolerate dimmer light. Those with colorful foliage or thick, fleshy leaves do best in bright indirect light. Low light does not affect flowering.
  - B. Soil: Terrestrials prefer sandy soil and on rocky surfaces. A soil recipe for the terrestrials include: 50% peat, 20% vermiculite, 20% Perlite and 10% composted pine bark. Orchid bark is satisfactory. Cryptanthus and Dyckias grow well in African Violet soil. Dyckias can be grown in cactus soil. Medium must drain well, not pack down, provide stability while the rooting system develops (do not allow the plant to rock back and forth or wiggle as this damages the tender, developing roots. Stake if necessary). Prefers slightly acid to neutral pH. Do not plant too deeply (just to the base of the leaves).
  - C. Water and Humidity: Able to withstand periods of drought (xerophytes). Epiphytes have a water-holding 'tank' formed by their overlapping leaves.

Good to clean out the tank occasionally. Do not allow water to become stagnant. Keep moderately moist, never soggy. Best to use rainwater or purified water. "Channeling" of the leaves is a sign that the plant has been grown without proper moisture. Over watering will cause rot. Misting every few days is helpful especially for the softer leaved types. Group plants together or set on rocks in a plant saucer to increase humidity. Prefer humidity of 50 to 70%. Brown leaf tips can be a sign of dry air.

- D. Temperature: Most are comfortable where people are comfortable. May not survive if temperatures go below 40s, even if protected. Provide good air circulation. Average home temperature of 55 to 80 degrees is suitable.
- E. Fertilizer: Bromeliads can survive without supplemental fertilizer, but their growth will be very slow and the plants may never flower. The amount of light and the temperature can affect the utilization of fertilizers by bromeliad tissues. Bromeliads have fewer nutrition needs during the winter months; during the spring and summer, or if grown in very bright places, their nutritional needs increase. Terrestrial bromeliads can benefit from supplemental time-release fertilizer (such as Osmocote), as these bromeliads absorb most nutrition through the root system. 'Tank' bromeliads will thrive if given time-release fertilizer and periodic applications of water-soluble fertilizer at 1/3 to 1/4 strength monthly. May also use plant spikes. Fertilizer with high phosphorous can help blooming (10-50-20). Foliar feeding can be sprayed or poured over foliage since leaves absorb through scale-like pores.

#### IV. Propagation

- A. Division of Pups, offsets, offshoots: (asexual) Pups develop after the plant has flowered. A single mother plant may produce 3 or 4 pups over the course of a year or two. Separate with a sharp knife when the pup is large enough to show root initiation. Pups should have at least 5 leaves and may be 1/3 to 1/2 the size of the mother plant. Remove before it distorts the symmetry of the mother plant. Allow the pup to 'cure' for a time to callous over the cut area. Some offsets are attached by stolons and are often very woody. Use a rooting hormone. The "Flaming Sword" *Vriesea* reproduce with a new plant appearing within the rosette. Peel off the old foliage of parent plant as it dies.
- B. Seed: (sexual) Seedpods can stay on the plant for over a year. Seeds are berrylike (*Aechmeas*, *Billbergias*, *Neoregelias*, *Nidulariums*) or parachutes from capsule-like pods (*Tillandsias*, *Vrieseas*, *Guzmanias*) (show examples). May take up to 8 years for a seedling to mature enough to flower (some as soon as 2-3 years). Fresh seeds will germinate readily on wet, sterile Kleenex tissue in a shallow dish covered with a pane of glass. The plumpest seed gives the best promise of germination. The pollen must be dry and the stigma sticky.
- C. Pineapples can be propagated by cutting top from commercial pineapple about an inch below the foliage. Let cut heal a week or so then place on sand or rooting medium.

- V. Maintenance:
- A. Mounting: Epiphytic varieties. Select wood large enough to hold your plant when it is fully grown. Avoid galvanized nails or wire and copper as some metals are toxic to Bromeliads and avoid saltwater driftwood as growth will stop when the holdfast reaches the salty wood (soak for several days in fresh water). Avoid fresh wood with sap. Beware that soft wood will rot easily and wire may rust and break or cut the plant. Use covered wire. Mount on tree fern slabs, rocks, cork and various types of wood. Sphagnum moss fitted around the roots aids in the plant rooting to the wood. Wet the entire plant and wood often while rooting but allow to dry at roots between watering. Plant may be tied or stapled or glued in place.
  - B. Grooming: Removal of the bottom leaves, inconspicuous trimming tips of leaves. Removal of all dirt and debris from the leaf 'cups'.
  - C. Repotting: Bromeliads like to be somewhat pot bound in pot sizes 4 to 6 inches-in proportion. May need to repot every 2 years. Do not plant too deeply.
  - D. To initiate blooms: Reluctant plants set blooms when subjected to ethylene gas from ripe apples placed in a bag for 48 hours.
- VI. Pests and Diseases:
- A. Scale: Soft brown or hard black scale may develop, but sponging with soap or scale-oil will keep them clean. Malathion is effective as a control of scale when in the young, crawling stage.
  - B. Red Spider mites, Mealy Bugs: increase humidity. Use soapy water to spray, especially under the leaves.
  - C. Weevils: Native to southern Mexico and Central America.
  - D. Root Rot: may occur if roots of terrestrials are kept too wet.
- VII. Judging Considerations: Bromeliads may be listed in the schedule under container-grown foliage plants (non-blooming or foliage phase plants). May be eligible for a Grower's Choice or other local award. Epiphytes may be entered mounted, hanging, as on driftwood. Bromeliads should be sub-divided by genera. Mounted specimens will not be judged with containers and single grown plants should not be judged with clustering plants.
- A. Plant identification: Legible, plant completely identified with genus, species, cultivar, if known. Common name may be added. Binomial or genus and cultivar required.
  - B. Cultural Perfection:
    1. Peak of Perfection: proper maturity for exhibiting with no major faults, the degree of maturity. Flower: immature inflorescence permitted on foliage plant, but if emerging, then plant is penalized. Vigorous, stable, mature.
    2. Foliage: Amount according to type, proportional to stem, positioning on stem, if applicable. This plant has no stem per se. Faulted if leaves are small and yellowish or if leaves are

excessively elongated. Strap-like bromeliad leaves should be arranged in rosettes that are cup shaped, tall and tubular or vase shaped. The leaf edges are almost all spiny and leathery—Tillandsia groups have smooth leaf edges with a gray surface bloom on the foliage that traps moisture. Foliage is marked with attractive marking and patterns in many striking colors.

3. Color: Color of foliage and stem. If a gray 'bloom' is present, frosting should be uniform. Scaly bloom on leaves, if present, should be overall and unmarred. If variegated, mention the variegation as consistent or not. Look for rich, clear colors and markings. Sun scorching and yellowing is a fault.
  4. Form: Balanced, appropriate to type. Pup/s should not distort the form of the 'mother' plant. Look for 4-way symmetry, rounded without gaps, rosette.
  5. Substance: Firmness of tissue. These plants should be hard surfaced and leathery.
  6. Texture: Surface quality. Plants may appear shiny, slick, or fuzzy, according to type.
  7. Size: Ideal for type, average and slightly above. Be sure to check the entry tag to see if this is a dwarf variety. Size ranges from 4 feet to only inches, according to type. May choose to use the 'large gets full points', 'medium size deduct 1 point', 'small size deduct 2 points'.
- C. Conditioning/Grooming/ Staging: Mounting should be suitable for the plant type (epiphytes). The actual physical state or appearance of the plant at the time of judging.
1. Health, blemish free: Evidenced by above qualities, damage due to insects, disease, physiological, mechanical problems. Look for bites, spots, holes, tears, bruises, bends, cracks, etc.
  2. Grooming: Preparations the exhibitor can control: cleanliness, conditioning. If more than 10 leaves are trimmed deduct points accordingly. Residue removed from leaves. Nothing caught in 'water tank' or in leaves.
  3. Staging: Presentation, including container (Size, type, cleanliness) and pose (attitude, wedging). Should be a pleasing proportion between the plant and the container. Plant should be centered and symmetrical. Container should be suitable color and style.
- D. Distinction: The degree of superiority in all listed qualities.

\*May be entered as container-grown flowering plant. May be eligible for a Grower's Choice or other local award.

Optional Topic:

## **Roses and the *Roseaceae* Family**

Objectives:

To explore the similarities and differences between members of the *Roseaceae* family.

To practice rose propagation techniques.

To learn the secrets of growing and showing award winning roses.

References/Resources:

American Rose Society: Shreveport, LA ([www.ars.org](http://www.ars.org))

“The House Plant Expert” by Hessayon p. 199

“The Southern Living Gardening Book” by Oxmoor pp. 359-366

“All About Houseplants” by Ortho p. 70

“Plants-a-plenty” by Foster pp. 206-209

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Materials needed for this unit:

As many examples of rose bloom form, types, growth habits, and species as possible.

As many examples of plants and flower in the *Roseaceae* family as possible.

Roses for layering, cutting and grafting.

- I. Introduction: Roses are our national flower as well as England’s—the queen of flowers. Roses have been cultivated for over 5,000 years and fossils 30 million years old have been found in Colorado showing roses—one of the oldest flowers known to man. The symbol of love=Eros=rose. June is national rose month. Best-loved and most widely planted shrub in temperate parts of the world. The official Rose City is Portland, OR. Roses are often used in art, literature, music, mythology and even religion and medicine. There is the American Rose Society headquartered in Shreveport, LA ([www.ars.org](http://www.ars.org)) and some 23 test gardens around the nation that are used to select the All American Rose Selections annually. When giving roses consider the meaning: From “The Language of Flowers”: a white rose means ‘purity and spiritual love’, the yellow rose means ‘decrease of love and infidelity’, and a single rose means ‘simplicity.
- II. Classification: A deciduous or evergreen shrub. There are 4 flower forms (based on number of petals): Single: less than 8 petals (1 layer of petals, you can see the pistils and stamens), Semi-double has 8 to 20 petals (2 layers), double has more than 20 petals and the very double has 50-200 petals. When purchasing a rose look for the rating on the label (rated 1 to 10).
  - A. Family: *Rosaceae* –also includes blackberries, raspberry, Spiraea, Loquat, Photenia, Pyracantha, Cherry Laurel, Raphiolepis.
  - B. Genus: *Rosa*
  - C. Species: Species roses are those found in the wild (able to reproduce from seeds) including rugosas, briar roses, hedge roses. These are the ancestors of



all varieties (by sport or mutation). Includes 'Lady Banks's Rose', 'Macartney rose' (fall color), 'Cherokee rose' (non-native), 'Musk rose', 'Chestnut rose', 'Rugosa rose' (single form flowers), swamp roses.

1. Antique/Old Garden Roses: those introduced before 1867. Includes old European roses (Albas, Centifolias (cabbage with eye), Damasks, Gallicas) and the Moss roses (sticky coating) from Asia. China roses have whorled petals used for medicinal purposes, with continuous blooms including Portland, Boubons, Tea, Noisettes (clusters) and hybrid perpetual. (*Rosa chinensis veridiflora*, the green rose)
2. Hybrid Tea: most popular. First of the modern roses-cross between old garden Tea and hybrid perpetual. Large flowers with pointed buds produced one to a stem on plants 2 to 6 feet tall. Mr. Guillot as hybridizer. Includes 'Mr. Lincoln', 'Chrysler Imperial', 'Miss All-American Beauty', 'Touch of Class', 'Medallion', 'Tropicana', 'Peace', 'John F. Kennedy'. The first hybrid tea introduced in 1867 was 'LaFrance'. Shown disbudded.
3. Polyantha: 2<sup>nd</sup> of the modern roses: "many flowers"-small flowers in large sprays, low-growing to 4 feet tall, nearly ever-blooming. Includes 'The Fairy', 'China Doll'. Originals from this class appeared in the late 19<sup>th</sup> century.
4. Floribunda: 3<sup>rd</sup> of the modern roses-cross between hybrid tea and polyantha—"abundant flowers"- quantities of flowers in clusters on bushy plants. Flower sizes are smaller than those on hybrid teas. Most with informal shapes. Includes 'Impatient', 'Bridal Pink', 'Sexy Rexy', 'Orangeade', 'Sun Flare', 'Iceberg'.
5. Grandiflora: Cross between hybrid tea and Floribunda—1954--large flowers borne singly or in long-stemmed clusters on plants 8 to 10 feet tall. Includes 'Love', 'Queen Elizabeth', 'Gold Medal'
6. David Austen English Roses: New old garden roses crossed old garden roses (rugosa) with modern roses. Includes 'Abraham Darby', 'Charles Austin', 'Gertrude Jekyll', 'Graham Thomas' (yellow), 'Mary Rose', 'Othello'. Newest, Midiland and Explorer series of Canada, Iowa State, Dr. Buck.
7. Miniature: Should not exceed 12" in height, flowers are 1/2 to 1 1/2 inches across. Judged for its smallness. Perfect replicas of modern hybrid teas and floribundas. Everblooming, hardy. Include 'Starina', 'Coral Sprite', 'Cupcake', 'Minnie Pearl', 'Party Girl', 'Wow', 'Shortcake' and the Sunblaze series of roses. Some can be grown as ground covers such as 'Red Cascade'.
8. Climbing/Trailing: Natural climbers and climbing versions of bush roses. Long canes to 50 feet, repeat blooms. Grows on pergola, arch, fence, trellis, wire grids. Includes 'Don Juan', 'Solo', 'Tempo', 'New Dawn', 'America', 'Joseph's Coat', 'Golden Showers', 'White Dawn'.
9. Rambling: more pliable with lateral shoots. Bloom only once. Prune intensely (bloom only on new wood). Includes 'Velschoen blau' and the 'Seven Sisters' rose.

D. Variety/Cultivar: over 10,000 varieties—1,400 named for women. Centuries of hybridizing have brought the widest possible range of form and color. James A. Gamble Award (since 1961) is for fragrance. Most fragrant roses are Old Garden Roses such as China, Musk, Damask, Rugosa and Cabbage roses—sweet, spicy or earthy.

III. Cultivation:

- A. Soil: Well-drained, slightly acid, lots of organic material worked in. Plant in raised beds.
- B. Light: must have 5 or 6 hours of preferably morning sun daily. Need abundant light if grown indoors and may need supplemental light in winter.
- C. Water and humidity: provide ample water with soaker at roots during the growing season. Avoid getting water on foliage. Do not let plants dry out. High humidity is a must if grown indoors. Need good drainage.
- D. Temperature: During growing season keep at 50 to 70 degrees F. If temperature is below 10 degrees, give some protection.
- E. Fertilizer: Feed regularly every 2 to 4 weeks with rose food or balanced granular, time released fertilizer. Apply high nitrogen fertilizer every 2 weeks. Use dry commercial fertilizer applied to soil or slow release fertilizer. Liquid fertilizers are useful in small gardens or for foliar feeding. Do not feed when growing stops in winter, but begin again when new leaves appear. Fish emulsion is helpful in hot, dry weather. Chlorosis is evidence of an iron deficiency. When planting, include superphosphate (P) to boost flower production.
- F. Air Circulation: Prone to mildew. Consider spacing of plants, prune to urn shape.

IV. Maintenance: Buy from a reputable dealer. The AARS All American Rose Selections are good choice for they have been tested for 2 years. Choose disease-resistant roses and be sure to plant them in open areas where air circulation is good. All roses are available as bare-rooted plants from late fall through early spring (choose one of grade #1). Just before planting bare rooted plants, it is a good idea to immerse entire plant in water for several hours to be certain all canes and roots are plumped. Most roses are sold as budded plants on understock plant root systems. Buy container plants in mid- to late spring and put in the ground before summer heat arrives. For the south (FL, AL), plants don't go dormant, choose roses grown on Fortuniana rootstock.

- A. Mulch with leaves or pine straw to 2-4 inches deep to help conserve water, control weeds and regulate soil temperature.
- B. Prune, using a bypass blade (show difference between bypass and anvil blades), to remove dead, diseased, broken or crossing canes or weak canes with twiggy growth. Remove suckers. Cut back canes 12 to 30" at an outside bud. Prune away one-third of the bush leaving 4 or 5 canes. Prune to make bush urn shaped. Prune in coldest months when dormant (Valentines Day). Remove all the leaves. When cutting off old blooms (deadheading), cut back to node or 5 leaflets. Blooms are produced on new growth. Prune on a 45-degree angle just above the bud. All climbers should be left unpruned for the first 2 to 3 years.

- C. Disbudding; for larger blooms, remove some buds. For sprays, remove the terminal buds.
  - D. If container grown, repot in autumn using all-purpose soil mix or 1 part loam, 1 part peat moss and 1 part builder's sand.
- V. Propagation:
- A. Stem cuttings: Use of a rooting hormone is recommended. Will result in a plant on own roots. Take 6-inch softwood cuttings of miniatures, hybrid teas and floribundas in the spring to late summer. Use peat-perlite mix and place in bright light, misting often. Take 6-inch hardwood cuttings of previous season's growth, cutting just below the node, of climbers, hybrid perpetuals and large bush in fall or early winter. Use moist sand, sawdust or leaf mold as rooting mix and keep in cool, dark place.
  - B. Grafting or budding: Hybrid tea roses and grandifloras should be grafted onto nematode-resistant rootstocks of *Rosa fortuneana*.
  - C. Layering: Ramblers and climbers are good for soil or tip layering and root easily.
  - D. Seeds: Species roses grow from seeds found in hips (fruits). Hips are edible and contain the Vitamin C of 400 oranges.
- VI. Diseases and Pests: Best to use preventive care. Plant for good air circulation.
- A. Black Spot: foliage disease- fungus. Remove and discard spotted leaves. After pruning, spray plant with horticultural oil or lime sulfur every 7 to 10 days.
  - B. Powdery Mildew and rust: foliage disease. Apply fungicide.
  - C. Aphids, thrips, white flies, spider mites: eat the buds. Spray with insecticidal soap, horticultural oils or contact insecticides. Use systemic insecticides on thrips.
  - D. Grasshoppers, katydids, chewing insects: bite holes in leaves. Use dust or systemic.
  - E. Borers: embed in the canes. Seal wounds. Prune off affected areas.
- VII. Judging Considerations: Written into the schedule as separate section or as blooming perennial shrubs (Arboreal). Classes are usually by type or color.
- A. As cut flowers: Judged for blossom form and color, stem and foliage. Color should be true to cultivar without white, green or dark streaks on petals. Stem should be long enough to be in proportion to the bloom, straight, strong, with thorns (prickles) as far down as top of exhibit bottle. Foliage should be present with two to five sets of 5-leaflet leaves, symmetrically placed and well-spaced. Buds, stems and foliage developing at axil must be removed completely before exhibiting. Judged against perfection for the cultivar, hence name is especially important. Those not named or misnamed should not win a blue ribbon.
- \*Exhibition form: Flower should be one-half to three-fourths open. Petals spiraling symmetrically to a well-defined, high, pointed center which is

centered in the bloom. Deformed or discolored petals maybe removed at back, leaving no tab; a row may be removed if form is not destroyed.

\*Decorative form (informal): Flower may have low center but is still pointed. Profile may appear urn-shaped or flat on top, with petals ruffled or cupped. Deformed or discolored petals may be removed at back.

\*Spray form: Florets all at the same level, although arising from different axils on main stem. Form may be flat or slightly domed. A high scoring Floribunda, Polyantha or Miniature spray has two or more fresh florets in bloom, buds in all stages of development and more open blooms than buds.

- B. As container grown plants: Usually miniature roses, grown indoors or outdoors. Grown as small bushes, climbers or standards. Tree roses (standard) in containers are the result of grafting the bud of one type of rose (usually a floribunda) onto the elongated rootstock of another.
- C. As Collection or Display: see above considerations.

### **Some other plants in the *Roseaceae* family**

“Alabama Snow-Wreath”, *Neviusia alabamensis*, is a deciduous shrub native to Alabama. Ornamental multi-stemmed 3-6 feet tall and wide. Arching, delicate branches and clouds of feathery white flowers in spring with inch-wide bunches of white stamens, without petals. Medium green pointed, oval leaves to 3 inches long.

Apples: *Malus spp.* Deciduous fruit trees to 20-25 feet, needing full sun. Fruit usually ripens from June to early November, depending on the cultivar, and require significant chill hours (900-1200 hours below 45 degrees)—low chill requirement selections are “Anna” and “Dorsett Golden”. Most require cross pollination. Dwarf (5-8 feet tall) and semi-dwarf and Spur selections are available for the smaller garden. The “Flowering Crabapple”, *Malus floribunda*, is also deciduous and is usually ornamental with spectacular flowers in spring. Most reach 25 feet high and have oval, pointed leaves of deep green. Profuse single, double and semi-double flowers in white, pink or red before the leaves unfurl. Very cold hardy and need at least 600 chill hours.

Blackberry: Upright berry-producing, hardy vines with stiff canes to 4-6 feet. Trailing kinds, known as dewberries or boysenberries, are more lax plants. Crosses between the upright and trailing types are called semi-erect. Roots are perennial but canes are biennial. Sharp thorns cover most canes. Bear fruit in the summer (trailing types ripen earlier and are smaller). Need full sun, deep well-drained soil and regular water. Subject to scale, borers, anthracnose, leaf spot, powdery mildew, rust and cane blight (look for disease resistant selections). Practice good sanitation and cut canes back to 1 foot immediately after harvesting. The best selections are those with Indian names: ‘Apache’, ‘Arapaho’, Cherokee’, ‘Cheyenne’, ‘Chickasaw’, ‘Choctaw’, ‘Kiowa’, ‘Navaho’, ‘Oklawaha’, ‘Shawnee’. Thornless selections include: ‘Black Satin’, ‘Boysen’ and ‘Thornless Boysen’, ‘Dirksen’.

Cherries: Sweet cherries are the most common market type and are grown in the Appalachian and Blue Ridge Mountains. Have a high chill requirement. Trees reach 20-

35 feet tall. Need another selection to pollinate. Include 'Bing', 'Black Tartarian', 'Stella'. Fruit appears in late spring to early summer. Sour Cherries are pie cherries and are more widely adapted than sweet cherries—along the Atlantic coast and farther north and south. Smaller than Sweet Cherry trees to about 20 feet tall. Self-fertile.

Raspberry: Plants derived from *Rubus idaeus*, with red or yellow berries (red selections are the most common, yellow types are mutations of red raspberries), are native to North America, Europe, and Asia. Black raspberries (firmer and seedier with a more pronounced flavor than the red or yellow types) are *R. occidentalis* also native to North America. Purple raspberries are hybrid crosses between red and black types. Roots are perennial but thorny canes are biennial. Red and yellow raspberries are *ever-bearing* producing 2 crops on the same canes per year, fall and summer. *Summer bearing* types grow the first year and bear fruit the following summer. Most raspberries have a high winter-chill requirement but some cultivars are able to take the heat ('Heritage' and 'Autumn Bliss' for lower south and 'Dorman Red' and 'Redwing' for the coastal south). Prefer deep, slightly acid, moist but well-drained soil with plenty of organic matter. Need sun.

Eriobotrya japonica: "Loquat" Evergreen tree or shrub (15 to 30 feet tall) needing full to partial shade and little water once established. Native to China. Feature large, glossy, prominently veined foliage, dark green on top and rust-colored woolly beneath. Small, dull, white flowers, fragrant in fall. Fruit is orange to yellow 1-2 inches ripening in winter or spring. Susceptible to fire blight.

Kerria japonica: "Japanese Kerria", a deciduous shrub, arching form, needing light shade. Southern pass-along, colonial, plant growing 3-6 feet tall with showy yellow flowers, single or double, 1 1/2 to 2 inches across appear in spring but continue sporadically throughout the summer."Yellow Rose of Texas".

Photinia x fraseri: "Redtip": Bright colored red new foliage that matures to dark green. In early spring, all bear flattish clusters of small white flowers. Evergreen shrubs or small trees. Officially named 'Birmingham' from the Fraser Nursery in Birmingham, AL in 1940s. *P. glabra* is "Japanese Photinia", *P. serratifolia* is "Chinese Photinia" with coppery colored new growth and prickly-edged deep green leaves to 8 inches long and *P. villosa* is "Oriental Photinia".

Physocarpus opulifolius, "Common Ninebark": native deciduous shrub. Name refers to peeling bark. Graceful and arching growth to 9 feet tall. Rounded clusters of many tiny white or pinkish blooms appear in spring or early summer.

Pyracantha coccinea: "Scarlet Firethorn", evergreen shrubs needing full sun and moderate water. From the eastern Mediterranean can reach 20 feet tall if trained against a wall. Red-orange fruit. Fast growing. Bears flowers and fruit on spurs along wood of last year's growth. Small, spring blooms are dull creamy white, carried in flattish clusters. Nearly all species have needlelike thorns. Many new hybrids available.

*Prunus* spp.: evergreen and deciduous shrubs and trees

“Carolina Cherry Laurel”: *Prunus caroliniana*

“Cherry Laurel” *Prunus laurocerasus*

Taiwan Flowering Cherry: *Prunus campanulata*

Flowering Peach: *Prunus persica*

Nectarine: *Prunus persica nucipersica*

Flowering Cherry Plum: *Prunus cerasifera*

“Chickasaw Plum” *P. angustifolia*

Dwarf Flowering Almond: *P. glandulosa*

Japanese Flowering Apricot: *P. mume*

*Pyras communis*: European Pears noted for their soft, juicy, sweet flesh. Asian species often have coarse and gritty flesh and are usually used for baking or canning. Deciduous trees are pyramidal in form with strongly vertical branching. Feature leathery, glossy bright green leaves and bear clusters of white flowers in early spring. Most need cross pollination with another selection. Susceptible to fireblight. Need significant chill hours. *Pyras calleryana*: “Callery Pear” a deciduous ornamental tree to 50 feet tall with profuse pure white flowers in late winter or early spring. Gloss, leathery deep green leaves with fall color, oval, scallop edged 1 ½ to 3 inches long. Includes ‘Bradford Pear’, ‘Aristocrat’ and others.

“Flowering Quince” *Chaenomeles*. A deciduous shrub, among the first to bloom each year. Need sun to bloom, single to semi-double and double flowers, in a wide range of colors. Most types are thorny. Bear small hard, fragrant fruits. “Common Quince”, *Cydonia oblonga*, has tastier fruit containing lost of pectin. Needs cross-pollination. Many hybrids available with variety of height, spread and flower color. *Pseudocydonia sinensis* is Chinese Quince” rarely seen, with fluted trunk.

*Raphiolepis* spp.: Dependable evergreen shrub, tolerating wind and salt spray. Glossy, leathery leaves, compact form, bloom in fall with flower color ranging from white through pink to nearly red. Berrylike dark blue fruits. Drought tolerant, full sun to part shade. *R. indica* (“Indian Hawthorn”) is native to China. Usually grows to 4-6 feet tall and wide. Leaves are pointed and flowers are white tinged with pink. *R. umbellata* is native to Japan and Korea. Usually grows 4-6 feet but can grow as tall as 10 feet. Leaves are darker green and roundish. *R. x delacourii* is a cross between *R. indica* and *R. umbellata*.

*Rhodotypos scandens* “Black Jetbead” a deciduous shrub native to Japan and China. Single white flowers, 2 inches across, appear in late spring and early summer followed by pea-size, jet black, shiny berries, 4 per cluster in fall and persisting through winter—  
toxic.

*Sanguisorba* spp. “Burnet” syn. *Poterium*: perennials that grow from creeping rhizomes. Leaves divided feather wise into toothed, oval or roundish leaflets. Small flowers in dense, feathery spikes, similar to bottlebrush blooms. *S. minor* is “Salad or Garden

Burnet”, can reach 1 ½ feet tall and wide. Leaves have a mild cucumber flavor and are used in salad, soup and cool drinks. Self sows prolifically.

Spiraea spp.: deciduous shrubs in various sizes, forms and flowering seasons (spring bloomers with clusters of white flowers cascading down from arching branches and summer bloomers with pink red or white flowers clustered at the branch ends of shrubby compact plants.). *S. prunifolia* “Bridal Wreath Spiraea” features small, double white flowers resembling tiny roses. *S. thunbergii* “Baby’s Breath Spiraea” are billowy with round cluster of small white flowers appearing along bare branches in early spring.

Sorbaria spp.: “False Spiraea” is also in this family, a deciduous shrub blooming mid to late summer, producing big, plume like clusters of fine white or creamy flowers at branch ends. Flowers mature into brown seed clusters. Green, ferny-looking leaves are finely divided into many narrow, toothed leaflets. Spread by suckering.

Sorbus americana: “Mountain Ash”: Valued for showy flowers and showier orange-red fruits. From eastern North America mountain areas, growing 10-13 feet tall and wide. Dark green leaves with paler undersides are 10 inches long and consist of 11 to 17 leaflets. Also *S. aucuparia* “European Mountain Ash” and *S. tianshanica* “Turkestan Mountain Ash” and *S. alnifolia* “Korean Mountain Ash”.

Strawberries: *Fragaria x ananassa*. Full sun perennial (often treated as an annual) needing regular, constant moisture. Toothed, roundish, medium green leaves and white flowers. Grow 6-8 inches tall and spread by long runners (producing offset plants that can be pinched off to get bigger berries or keep the offsets and get rid of the ‘mother plant’) to about 1 foot across. Three main categories: June-bearing (produce one crop per year, highest quality), ever-bearing (bear one crop in the later spring and a second smaller crop in the fall), and day neutral (bear both spring and fall crop but more fruit in fall). Susceptible to many diseases and sensitive to local conditions.

Optional Topic:

## Begonia

Objectives:

To learn the differences and similarities between the many types of begonias.

To practice begonia propagation techniques.

To learn the secrets of growing and showing award winning begonias.

References/Resources:

The American Begonia Society: [www.begonia.org](http://www.begonia.org)

"*All About Houseplants*" by Ortho pp. 63-64, 75

"*The Houseplant Expert*" by Hessayon pp. 74-79

"*The Southern Living Garden Book*" by Oxmoor pp. 147-148

"*Ortho's Houseplant Encyclopedia*", p.15 and pp. 67-68

"*Houseplants Indoors and Outdoors*" by Ortho, p. 57-58, 65, 68

"*AHS Encyclopedia of Gardening*", p. 455

Materials needed:

As many examples of the types and forms of begonias as possible.

Begonias for propagating by leaf cuttings and stem cuttings.

- I. Introduction: Popular since the 18<sup>th</sup> century in the home or conservatory as flowering pot plants, foliage plants or flowering houseplants. The first species were discovered in Santa Domingo, West Indies) in 1690 by Charles Plumier (a Franciscan monk), who named them for his patron, Michel Begon. Rex varieties come from India (introduced in 1856) but most others are from Brazil (*B. semperflorens*, 1814) and the Andes Mountains (first tuberous species), Central America and Mexico (first rhizomatous), Africa and Southeast Asia. Most were developed in Southern California in 1920s.
- II. Classification: All types have both male and female flowers, known as incomplete flowers, on the same plant--monoecious. (Winged ovaries). Leaves are alternately arranged, obliquely ovate, with 2 stipules at the base. Cultural perfection is given the greatest consideration. Ease or difficulty for growing any given variety depends on varying environmental factors of different areas of the country. Classified as annuals or tender perennials; over-winter indoors. Some sources classify begonias as fibrous or tuberous or rhizomatous. Some classify by general appearance and similar culture.
  - A. **Family: *Begoniaceae***: Chiefly tropical herbs more or less succulent, usually with lop-sided leaves; male flowers with 2 petals, female flowers 3-5 petals having usually 3-angled ovary. Flowers are borne in clusters on fleshy stems.
  - B. **Genus: *Begonia***: Range in size from tiny miniature to very large.
    - Forms: 1. **Fibrous-rooted forms: Wax begonias or *Begonia semperflorens***: (ever-blooming: flower all year) outdoor bedding or border plants, treated as an annual, to provide a bright splash of floral color in partial shade. These are the bushy type begonias with cupped, roundish leaves set on crisp, fleshy stems. Dark leaved plants can take full sun. Grow about a foot tall.
    2. **Tuberous forms**: bear thickened roots that are used for propagation. Vibrant-colored type, exhibited as either cut or container grown plants with large flowered blooms, single, semi-double or double flower 3-5 inches across in a wide range of colors blooming in summer or and fall. *Begonia tuberhybrida* most popular tuberous begonia: 'Sugar Candy', 'Gold Plate', 'Guardsmen' or 'Diana Wynward'. Picotees are available. The Hardy Begonia grown outside in coastal and tropical south is a tuber. *Begonia x hiemalis*



hybrids are a cross between winter flowering begonia with hardy tuberous begonias. Lorraine types or *Begonia x cheimantha* hybrids (Christmas Begonia) blooms in winter with glossy round leaves, green stems and small flowers 1" across.

3. **Rhizomatous** forms: Largest group of begonias (Ornamental leaf). Bear thickened, jointed underground stems that are used for propagation. Rhizomes creep over or just under the soil surface. Some rhizomes are procumbent, others are erect. The 'eyes' are scars where old leaves have fallen off. Usually grown for their attractive foliage. Flowers are insignificant, in flower cluster 'clouds' above the foliage and should be removed. Leaves vary in size from inch long to yard wide. Leaf shape ranges from stars, ovals, spears. Leaf surface may be waxy and smooth to dull and deeply puckered. Leaf color includes shades of red or maroon, silver, browns, pinks and dark green. Stems usually hairy. *Begonia rex-cultorum* hybrids: bold, eye catching foliage with brilliant coloration and textures such as 'President Carnot', 'Helen Teupei', 'King Edward IV'. *Begonia masoniana* have the dark **iron cross**-shaped heart. Beefsteak Begonias (*B. erythrophylla*) have fleshy round leaves that are shiny green above and red below. **Eyelash** (*B. boweri*) and the crested edged **Lettuceleaf** begonias ('Bunchii'), the star begonia (*B. heracleifolia*) and the spiral or corkscrew begonias are very popular.

4. Cane-like stem types: also known as **angel-wing** or flowering begonias. Leaves are borne vertically on erect (upright), smooth stems with swollen nodes somewhat like those of bamboo. These are fibrous rooted. Leaves are asymmetrical and diverse in color, size and variegation. Some are silver spotted and have red underneath. Large airy flower clusters. *Begonia corallina* 'Lucerna' is most common. Trout-leaf (*B. x argenteo-guttata*) or shrub begonia, bare-leaf, hairy-leaf and fern-leaf (*B. foliosa*) are unusual cane-stemmed types. Look for the Kusler hybrids.

5. Trailing or scandent: Pendulous, well suited to hanging containers. Stems generally thin and weak. Flowers are 2"-3" across. *Begonia sutherlandii* is trailing species.

**C.Species:** Over 1500 known species. Elatior types with glossy round leaves, red stems and small flowers 2" across—look for Reiger (aka Hiemalis) strain of 'Heidi', 'Fireglow', 'Barbara', 'Madela', and 'Marco'. Hirsute or hairy-leaved begonias.

**D. Varieties** and Cultivars: Estimated to be 10,000 cultivars.

- III. Cultivation: In a plant family of such wide variation, it is natural that cultural requirements would also vary quite widely.
- A. Light: Bright light but not direct sunlight. A few hours of winter sun may be beneficial. Best in south, east or west filtered window. If grown for flowers, give more sun. Begonias are not shade plants.
  - B. Water and Humidity: Water freely when plant is in flower, but do not keep compost constantly soggy. Keep drier during winter dormancy and after flowering. Allow to dry out between waterings. All begonias detest overwatering—subject to crown rot. Moist air is needed to 50% humidity. Surround pots with damp peat or mist (microclimate).
  - C. Temperature: Average warmth--minimum of 55 degrees in winter. Avoid temperatures over 70-80 degrees during the day and temperatures 65-70 at night. Protect from frost. *Semperflorens* can take the coolest temperatures, while rex prefers more warmth.
  - D. Soil: Well draining, loose and rich in organic material—slightly acid. Humusy, coarse leaf mold, peat moss, fir bark, and sand all are used to grow Begonias.
- IV. Maintenance: Cut back and keep cool after flowering. Repot if necessary in the spring but bloom better when potbound. To create a bush plant, pinch back in spring. Light application of fertilizer when actively growing or in flower or every 2-3 weeks—consistent but light feeding. A dose of bone meal will help. For tuberous types, lift tuber, shake off dirt, dry tube in sun for 3 days and store in cool, dry place until next spring.

- V. Propagation:
- A. Vegetative division: Divide large clumps by the rhizomes. May be of any length so long as there are at least 2 eyes above and 2 eyes below the surface of the rooting medium.
  - B. Stem cuttings: New growth or cuttings from low down on the plant best for stem cuttings. Remove lower leaves and insert in rooting medium 1 or 2 nodes deep. Stems can also root in water.
  - C. Seed: Some tuberous hybrids can be raised from seed and germinate at 70 degrees. Seeds are dust-like. Sow in sterile medium, keep warm and humid.
  - D. Leaf cuttings: Leaf wedges can be taken anytime from a mature leaf. Remove petiole and cut so that each wedge has a vein along its center. Dip end in rooting hormone and place an inch apart, 1/3 deep in damp sand. Cover to preserve humidity and place for 10 hours of light daily. It will take up to 4 months for plantlets to form.
  - E. Layering: Pinning down the branch at the node or leaf joint. Sever when it has made roots.
- VI. Diseases and Pests:
- A. Scale, Aphids and red spider mites or mealybugs can be removed by washing or spraying with pesticide. Slugs dealt with in various ways.
  - B. Powdery mildew fungus can be controlled by improved ventilation, dry conditions and cooler temperature or fungicide.
- VII. Judging Considerations:
- Written into the schedule and entered in flower show as hanging basket, container grown foliage plant or cut decorative foliage. Rarely entered for bloom but consider flowers a bonus and indicative of maturity. If flowers are present, they should be evenly distributed over entire plant. Cut leaves or container grown begonias may be entered as a Collection or Display Some begonias suitable to a terrarium. Genus and cultivar names are required.
- A. Cultural perfection: indicative of health, vigor, and size according to type and variety and apparent age. Uniformity: unvarying in form, size and color. Color clear, no streaking. Coloration should be well defined.
  - B. Symmetry of plant shape, not leaf shape: must be typical growth pattern for the type. Stems evenly distributed for compact, balanced plant. Foliage sufficient to clothe stems.
  - C. Leaves should be crisp, clean and well-groomed. Leaves show gradual gradation of growth. Look for number of leaves. No holes in leaves or other obvious insect damage. No visible weather or handling damage. No curling, browned, or wilted leaves. No detached, loose or dried stipules present, but plants with dry, non-deciduous stipules should not be penalized.
  - D. Look for proper relationship or proportion of plant to container.



Optional Topic:

## Orchids

Objectives:

To observe the similarities and differences among this vast family of plants.

To practice propagation techniques.

To learn the secrets of growing and showing award winning orchids.

References/Resources:

*Handbook for Flower Shows*, NGC, 2007

American Orchid Society: West Palm Beach, FL—[www.aos.org](http://www.aos.org)

Local Orchid clubs: monthly meetings, Orchid shows and sales

Commercial Growers (about 200 mail order companies), books, magazines, catalogs, etc.

Orcho books “Growing Orchids for Wimps”

*Orchids*, Countryside Books, 1976 (rev. ed.)

*Orchids as House Plants*, Rebecca Tyson Northen, 1976 (2<sup>nd</sup> ed.)

*Orchids: An Illustrated Identifier and Guide to Cultivation*, Mike Tibbs and Ray Bilton, 1990

*How to Raise Orchids at Home*, Louis and Gladys Schirmer, 1953

*Orchids: Flowers of Romance and Mystery*, Jack Kramer, 1979

Public gardens: Fairchild Gardens in Coral Gables, Longwood Gardens near

Philadelphia, The Brooklyn Botanic Gardens, St. Louis Climatron, to name a few.

Materials needed for this unit:

Examples of as many types of orchids and blooms available

Orchids for propagation and flowers for dissection

Containers, potting mixes, fertilizers, and tools needed for propagation

**Definitions:**

**Monopodial:** Orchids that grow in one direction. A monopodial plant has foliage along its single stem as well as adventitious roots which secure and feed it. Growth of the main stem is continued indefinitely by the terminal bud. Flowers are produced from the leaf axils.

**Sympodial:** Having a creeping axis or rhizome terminated after one season by a swollen growth known as pseudobulb and topped by one or more leaves. At the base are two eyes from which further lateral growth takes place.

**Pseudobulbs:** Above ground organs used to store food and moisture which enable the plant to withstand seasonal periods of drought. May be ovoid and a few inches long or cylindrical or stem-like and several feet high.

**Velamen:** the white spongy coat found on the roots of epiphytic orchids. Their purpose is to absorb moisture from the damp air or soak up moisture as water falls on the plant. It also protects the conductive channel of the root.

**“Blind” growth:** an orchid that will not flower.

**“Freaks”:** any strange mistake in growth that happens once in a while on perfectly normal plants (i.e. a flower with no lip or with the wrong number of parts, a column fused to lip, sepals fused together, otherwise deformed flowers).

**Family:** *Orchidaceae* The largest plant family, mostly from Tropical Asia and America, Africa and Australia. One in seven of the world's flowering species is an orchid. Some as small as the head of a pin, others saucer size, thumb size to a ton. All are perennial monocotyledons.

Shape is symmetrical but irregular with 3 sepals (almost always colored: upper is generally largest), 3 alternating petals forming a corolla (2 petals are alike, called laterals, the third is always different in shape, called the *labellum* or lip—may be an apron, pouch, may be fringed, waved, curled, etc. and may have tails, horns, crests or teeth) and a column (upper portion is rolled into a fleshy tube around the column—the reproductive mechanism—stamens and style are fused to form). At the tip of the column is a cap (anther) that holds the pollen grains, called *pollinia*. (Refer students to the Orchid drawings for reference.) (Allow students to dissect the orchid flowers and discover each part.) Shapes sometimes resemble insects or animals to attract pollinators. Wide range of colors and some with spots, stripes. No black orchid yet. Classified by growth habit:

**Epiphytes** (clinging to tree branches in order to obtain light and air—not parasitic), **Lithophytes** (tropical orchids covering the base and forks of trees or filling crevices in rocks) and **Terrestrials** (soil-loving plants growing in the ground—*mycorrhiza* dependent). A few Orchids are **Saprophytes** (existing on dead or decaying animal or vegetable matter in the ground or on rotting logs) and a rare few are **semiaquatics** (grow in water). Either tuberous or fibrous roots, stems without annual rings, leaves with parallel veins—some few native to Florida are leafless. Orchids were admired by the Japanese at least as long ago as the eighth century. The first orchid to be recorded in both written and graphic form by the Chinese was *Cymbidium ensifolium*. Orchids were used chiefly for their supposed medicinal properties, especially as aphrodisiacs. The word *orchis* means testis, referring to the underground tuberous roots which are similar in shape to testicles. The conservation and protection of existing orchid stocks throughout the world has become a matter of prime importance.

**Genus:** 500-600 genera, of which about 25 are of practical value. Some are epiphytic, others terrestrial. Originally Lindley in 1826, divided Orchids into 5 main tribes based on the number of fertile stamens and their relative position on the column and the structure of their pollen masses.

**Species:** 35,000 species. Range in size from a pin head to a dinner plate. Range in colors from purple, lavender, pink, rose, red, yellow, white, orange, green, alone or in combination. Some (80%) are fragrant (smell of chocolate, cinnamon, butterscotch, rootbeer), some odorless, some foul-smelling (to attract pollinators). Flowers may be produced in abundance on long pendant spikes, or solitary at the end of an erect stem.

**Varieties:** 50,000+ varieties in the world.

**Hybrids:** Grex, 1,000,000—denoted by pollen parent x seed parent. A compilation of registered crosses that are approved is maintained by the Royal Horticultural Society in London and is published every three years in *Sander's List of Orchid Hybrids*. Produced by man.

**Native Orchids:** Hardy natives found in most parts of North America and Europe. Epiphytic (mostly tropical; must be kept dry during some period of their growth cycle). Grow in rainforests, fields and under waterfalls. Examples that grow in nature in various habitats include: *Pleiones*, *Disas*, *Habenaria*, *Dactylorhiza* and *Epipactis* to name a few.

**Botanical Orchids:** a term applied to any orchid species or hybrid which is purely a collector's item and which has no general commercial or exhibition value. Have flowers that are more distinctive, and equally as charming as the flowers of large, showy exhibition hybrids.

**Vandas:** Epiphytic with about 70 species, produce racemes of 12 or more flowers. Flowers vary in size and color but most are flat and round. Large orchids from Asia. Aerial roots need free access to moisture and nutrient from the air. Like bright indirect light. Monopodial, grown in open wooden baskets using chunk bark medium. Heavy feeders.

**Phalaenopsis** ("Moth or Butterfly" orchids) Belong to the Vanda Group. Monopodial (bears leaves in 2 rows on opposite sides of central stem; continue to grow taller each year—growth is upward). Two or three pairs of long, leathery leaves, 6-12" long. Likes warm, humid summers. Flowers in winter and early spring with inflorescences/ spray of 10 to 20 large, round, flat, velvety flowers that last 4 or 5 weeks. Medium light. Prune old flower spikes. No water storage organ, may need to water daily in summer. Susceptible to leaf and crown rot. Heavy feeders, fertilize weekly. Repot after flowering. Generally epiphytic and shade loving.

**Cymbidiums:** (name means 'boat' referring to the boat-shaped lip) Terrestrial (fleshy roots are in soil and need water throughout the year.) Native to Asia and the Far East, indigenous to high elevations of the Himalayan and Khasia Mountains (cool nights, mild days). Flowers are carried on long arching spikes/sprays and their delicate colors, heavy waxy substance and good keeping qualities make them a favorite with growers. Require high light intensity. Heavy feeders, fertilize weekly during growing season. Repot immediately after flowering in a larger pot, every other year. Not recommended as house plants. Worst enemy is red spider. Need shading outdoors.

**Dendrobiums:** A large and diverse/variable genus with many species (1,500) and thousands of hybrids cultivated. Native to the Far East, Korea and Pacific islands where they are mostly epiphytic. Flowers in fall and winter, opening gradually and lasting for a month—some shy to flower. Evergreen and deciduous types: Evergreen types retain their leaves and require no definite resting period. Deciduous types should be 'rested' beginning late November with cooler temps and restricted watering to encourage flower bud development. Repot soon after flowering and just as new growths begin to develop. Prefer small pots and grow well in fir bark. Propagated from vegetative 'off shoots' which develop from buds located at the leaf nodes. Pseudobulbs are cane-like.

**Cypripediums** ("Lady Slippers") Terrestrial, native to North America, dwarf to moderate size. This genus contains about 50 species. Not usually grown in greenhouse or the home, wildflowers.

**Paphiopedilums:** (Also called "Lady Slippers" because of its pouch-shaped lip) (Paphia was the Goddess Venus and *pedilon* refers to slipper or shoe. Meaning derived from the

Greek words which refer to the pouch.) Terrestrial, a type of *Cypripediums* for cultivation. Native to Southeast Asia, China, India with about 50 species. Warm types have mottled leaves while cool types have green leaves. Leaves should be deep green and rigid without wrinkles. Require considerably less light. Have continuous growth but no water-storing organs. Repot/divide soon after flowering annually. A long-lasting flower that looks as if it is carved of wax. Not carnivorous—the pouch attracts pollinators.

**Oncidium:** (“Dancing ladies/dolls”) daintier than the larger species. In the *Odontoglossum* group (name means ‘tooth’ and ‘tongue’ referring to the projection on the labellum), the largest and most interesting group in the Orchid family (about 750 species)—found predominately in the mountainous regions of the Andes (cool). Yellow and brown or white and brown flowers bloom profusely at various times of the year. Don’t mind being outdoors or on a windowsill. Natural creepers that do best wired to a slab of tree fern or allowed to grow up a tree fern pole. Contains a group called the “mule ear” or “burro ear” *Oncidium*s characterized by fleshy leaves shaped exactly like the ears of those animals.

**Miltonias:** (“Pansy Orchids”) Named in honor of the Viscount Milton. About 20 species in this epiphytic species. Also in the *Odonotglossum* group with two distinct types: Warmth tolerant Brazilian types with star shaped flowers and cooler growing Colombian varieties with rounder, flat flowers in striking colors. Large, delicately fragrant, sweetly rounded, dainty flower resembling pansies with butterfly markings. Flowers are produced two to four to a stem. Need cool temperatures and copious watering during vegetative periods. Leaf spotting disease is common. Prefer small pots, repot after flowering—leave 2 bulbs with leaves and 2 older bulbs. Not recommended as house plants.

**Brassias:** (“Spider Orchids” because the sepals and petals of their star-shaped blooms are extremely long and thin—some exceeding 10”.) Flowers stand in two neat rows on a curving stem, all facing the same direction and come in shades of green and brown with a speckled lip of a lighter green. In the *Odonotglossum* group.

**Epidendrums:** (Poor Man’s Orchid) one of the most prolific (about a thousand species) and one of the easiest to grow-epiphytes. This group also includes *Encyclia* (or shell orchids) and were originally brought to England aboard the *HMS Providence* by Captain Bligh. Tall, thin, reed like growths constantly put forth new plantlets. Free flowering with colors ranging from white to yellow, pink, orange, purple and all shades in between. Many are fragrant. The flower spike is prone to producing keikis (baby plants) after flowering or may re-flower on the same spike.

**Cattleya:** Flashy, most familiar/popular—principal flower of the Orchid cut-flower industry, corsage orchid. Approximately 65 species in this genus. Over 60% of the orchid plants in cultivation are of this species or hybrids. Named after William Cattley, a patron of botany. Native to Central and South America. The discovery of *Cattleya* was by mistake as they were used as packing material around other plants being shipped from South America. Evergreen, epiphytic, monocotyledon, often fragrant, Have a broad tongue-shaped lip that may have a frilled or fringed edge. Has two groups: **Uni-foliolate** or

labiates and **Bi-foliate** (2 or 3 leaves to the pseudobulb). Certain cultivars produce clusters of 20 3" flowers per inflorescence while others bear flowers as large as 7 inches, in clusters of four or five—flowers may last up to 10 days. Lush dark green leaves with a slightly yellow cast and a hard leathery texture. *Brassavola* types are known for their attractive, frilled labellums.

The plant has a woody rhizome, is sympodial (most common, new growth comes from base of plant each year, matures in one season and produces flowers), epiphytic and forms pseudobulbs (water storage). High light. Blooms can last up to 6 weeks, fragrant. Repot in spring when new growth has appeared. Can be mounted to a board or planted in a slatted basket.

**Calanthes:** Over 150 species in this genus. Two groups: evergreen and deciduous, terrestrial. Most bloom at Christmas. Collected from Himalayas and areas of Burma and Thailand. Deciduous *Calanthes* should be allowed to rest, without water, for a period until new growths emerge. Remove old roots.

**Bletia/Bletilla striata** ("Chinese Ground Orchids"): Terrestrial perennial for outside. Light shade, dappled sun. Moist well-drained soil with organic matter. Plants have grass-like deciduous or nearly deciduous foliage and attractive small flowers.

**Phaius tankervilleae** ("Nun's Orchids" because the petals and sepals give it a hooded look): A terrestrial plant. Robust and lovely orchids have showy flowers that can grow under untoward conditions.

**Vanilla:** *Vanilla planifolia*: Has economic value as the source for the familiar flavoring. A tropical, climbing, vine-like plant with large, oval-shaped succulent leaves and large, tubular yellow flowers. Vanilla was brought to Europe around 1500 but was not successfully cultivated until 1807. Currently Madagascar produces about half the total world crop with Mexico ranking second. The plants prefer shady, moist, almost cool places.

**Macodes/Ludisia:** ("Lady Slipper" type) low light **Jewel Orchid**, valued for its foliage rather than for the flowers. Dark leaves with bronze or copper-colored netting.

And others: *Catasetum* which shoots the pollinia when a trigger is touched and has separate male and female flowers. *Cycnoches* "Swan Orchid" which is deciduous and highly fragrant. *Masdevallia*, the most beautiful and colorful with paddle shaped leaves. *Pleurothallis* with heart-shaped leaves and tiny flowers. *Restrepia* that forms flowers at the back of the leaves. *Ascocentrum* is a miniature form Vanda-type monopodial orchid and *Ascocenda* is a hybrid cross between the two. **Miniatures:** Plants must not be more than 6" at maturity. A true miniature may have large flowers or some almost microscopic.

## 2. Uses:

In a greenhouse/glasshouse: controlled growing conditions

In the home: a sunny well ventilated room/conservatory and a place next to the window where the temp is normally lowest, plus relatively high humidity near 70% is ideal.



Orchids are tolerant and can adapt to many conditions met in the average home. May be grown in a light cart or orchid case.

Outdoors in tropical climates: Taken outdoors in warm season into lath house, shade house or hung under a tree. Natural conditions of circulating fresh air, cool nights, morning dew and occasional rain tend to rebuild jaded tissues and favor the development of new growth and bud initiation.

In a terrarium: delicate orchids of smaller size and the miniature orchids will do fine in a glass terrarium on moist coarse sand or sphagnum moss.

### 3. Growing and Showing:

Potting materials:

Containers: Osmunda root fiber and peat have the greatest water holding capacity

Potting Mix: lava rock (stone), tree fern slabs, shredded fir bark and charcoal. For an open compost: A mix of peat, perlite and bark is recommended for use in controlled greenhouse conditions. A slightly acid pH is preferred.

**Temperatures:** Leaves should feel cool to the touch. Preferred night time temperature groupings:

Warm: over 65 degrees: Phalaenopsis and Vanda

Intermediate: 60-65 degrees: Cattleya, Epidendrum, Oncidium and Dendrobium

Cool: 60 degrees or less: Odontoglossums

Orchids need to be protected from cooler temperatures and 50 degrees is often the minimum temperature. Avoid rapid temperature fluctuations.

**Humidity:** average requires 50%-90%. Mist often or set on rocks in tray of water or by a table top fountain.

**Watering:** depends on the size and type of pot (Clay or plastic, large or small), and time of year. Usually water weekly—more frequent in summer. Phalaenopsis and Paphiopedilums prefer moister, Cattleya, Oncidium and Dendrobium like dryer (but never completely dry). For mounted Vanda, daily watering may be necessary. Do not get water on the leaves. Use water-soluble fertilizers with a 1:1:1 ratio for plants growing in Osmunda, tree fern, charcoal, stone or peat. Apply at a rate of 1.5 tsp per gallon of water. Plants grown in bark should be fertilized with a 3:1:1 ratio. Slow-release fertilizers can be applied once every 3 months (depending on the temperature).

**Light:** Bright, indirect light. Most orchids require part shade for optimum growth and flowering. 70-80% shade is needed for Cattleya, Dendrobium, Oncidium, Vanda and Epidendrum. Phalaenopsis thrives on only 10-15% sun. **Artificial light** culture is usually carried out in a basement and the plants are normally grown under lights only during cold months. If the plants show any red pigmentation in their leaves, it is a sure sign that light levels are too high.

**Air circulation/ventilation:** use fan or place in wind. Caution: do not place near gas stoves or smokers.

**Fertilization:** In summer, once a week. In winter, once a month. Water weekly weakly using ¼ to 1/2 teaspoon per gallon of liquid fertilizer, unless blooming. Give fish emulsion monthly. As a general rule: use commercial fertilizers at half the stipulated strength.

#### 4. Propagation:

Division: of sympodial types: Count from the new growth back to 4 pseudobulbs, cut the rhizome, and remove the clump ("lead division"). Be sure to use a sterile knife for each cut and dust the cut area with a fungicide. (Allow students to divide orchids provided.) Division of monopodial types: Taller monopodials can be cut off at the top and set down into a potful of fresh medium. Try to keep aerial roots along the stem. Mist all divisions often and lessen the light given.

Seed: After the bloom is pollinated it may take up to 6 months to a year for the flower to dry. Each seed pod contains millions of dust-like seeds. (Show example seed pod, if available) Only a few seeds in a million ever produce plants that reach maturity. You may need a sterile flask for germination or use agar with sugar. In a community pot sprinkle seeds and you may get 50 to 100 plants. Tiny seedlings are susceptible to damping off. Leave there for 1 year then transplant to a community pot with 25 plants and leave there for 2 to 5 years before placing each in its own 2 ½" pot. After 5 years, you may get a bloom. Best left to the professionals! Seedlings require a soft light and a warm, humid environment.

Meristem cloning: Micropropagation and tissue culture allow for mass production of Orchids. French biologist, Georges Morel was one of the first to make a breakthrough in this process. Lateral buds are dissected under microscope so that tiny apical cells can be harvested and placed in a sterilized flask of agar. The tiny pieces of tissue produce a globular mass that becomes a plantlet.

Keiki: like proliferations, babies. Once they develop their own 2- to 4 inch long roots, they can be detached and planted individually.

#### 5. Maintenance:

Repotting: Repot if outgrows pot or if it has been in the same potting mix for 2 or more years. Repot when new growths are extending beyond the pot or when the potting medium has broken down to the point where optimum growth is no longer possible.

Repot when new vegetative growths are sending out a flush of roots (new roots are evident as little bumps). A general rule: Cattleyas, Oncidiums, Dendrobiums and Epidendrums need to be repotted every 2-3 years.

Cleanliness: Hygiene in the greenhouse is essential.

Staking: Tall flower spikes will require the support of stakes made from bamboo cane or strong wire.

#### 6. Pests and Diseases: Beware of bargain plants!

Environmental diseases: When the plant is not taken care of and all its needs met it has weak growth. That opens it to not only weaken but also retards its ability to fight off diseases and recover from insect damage.

Pathogenic diseases: *Water on the leaf or sheath or pseudobulb is a partner to the spread of disease.* Fungus and bacteria will normally affect only weakened plants. Bacterial diseases show up as black or brown spots or as irregular areas beneath the tissue (necrotic areas). The best defense is to remove the area or isolate the plant and spray with a fungicide. A virus is systemic and affects the entire plant. Viruses appear as irregular light colored flecking or streaking which later turn black. The plant should be isolated or destroyed.

Insect Diseases: An insect will attach any part of the plant. Some can be removed by hand. Use horticultural oils or Neem oil. May need insecticide or insecticidal soap for control of Thrips (feed on tender young growth by sucking plant juices, move rapidly), red spider mites (found on the underside of leaves where it sucks juices and creates small white speckling, multiplies rapidly), or orchid scale (white puffy colonies on the sheath). Use insecticide early in the morning or late in the evening.

#### **7. Entering Orchids in the Flower Show:**

Orchids can be entered in classes designated for cut flower or spray of a perennial, blooming container-grown plants (including mounted on a board), or as a collection or a display. It might also be fun to enter orchids as a club competition display! (Show a schedule that has classes for orchids). Allow students to compose a display of 7 orchids. Complete plant identification is required: For a hybrid, genus and cultivar names or parentage required; binomial require for a species. (Show entry tag and how to fill it out properly.)

#### **8. What the judges are looking for:**

Only the cultural perfection of bloom is considered, not the foliage!

For Phalaenopsis, branching is acceptable as long as the terminal bud/bloom is intact

With multiple blooms on a stem, flower should be well spaced, not crowded. The

blossoms of most hybrid Phalaenopsis should all be facing the same direction.

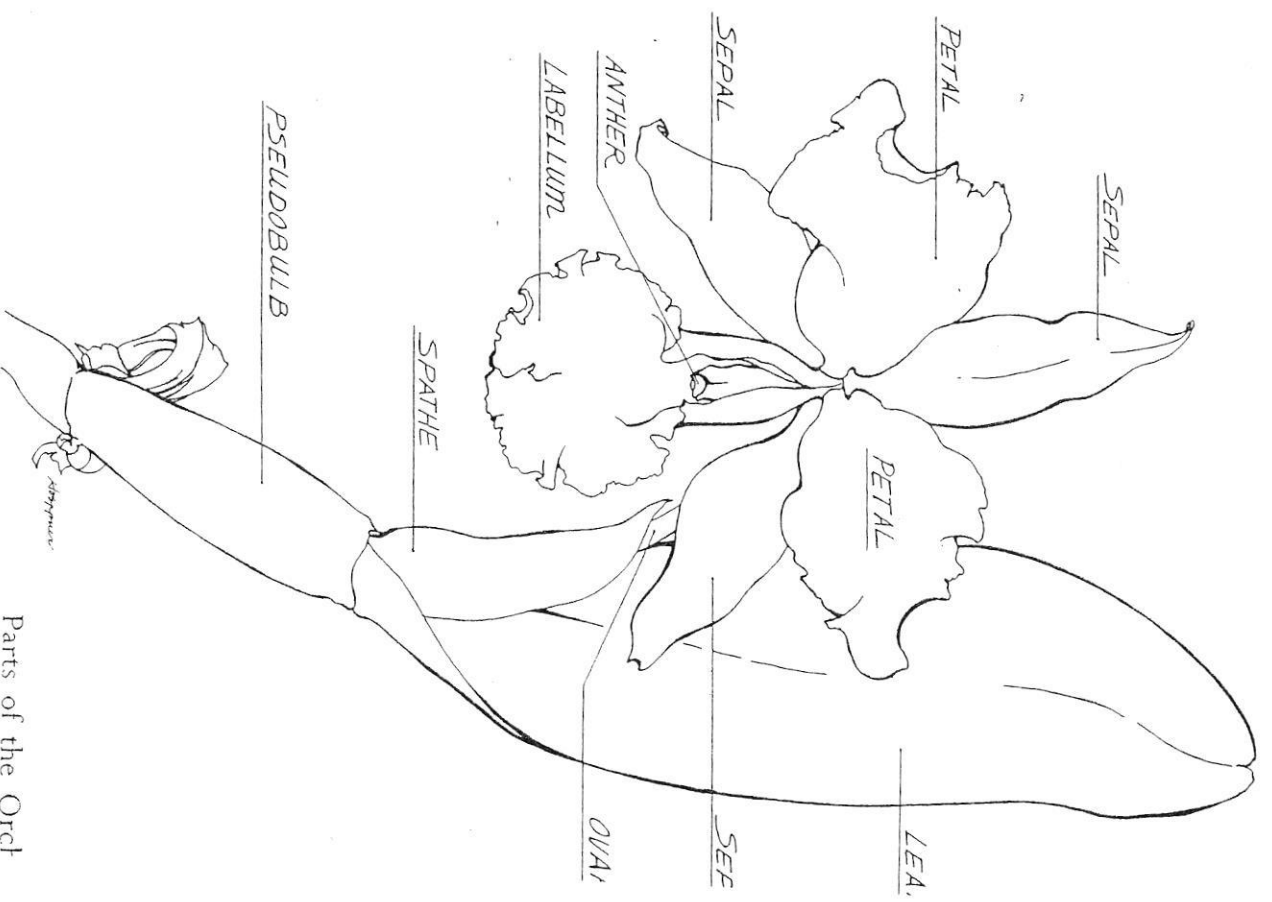
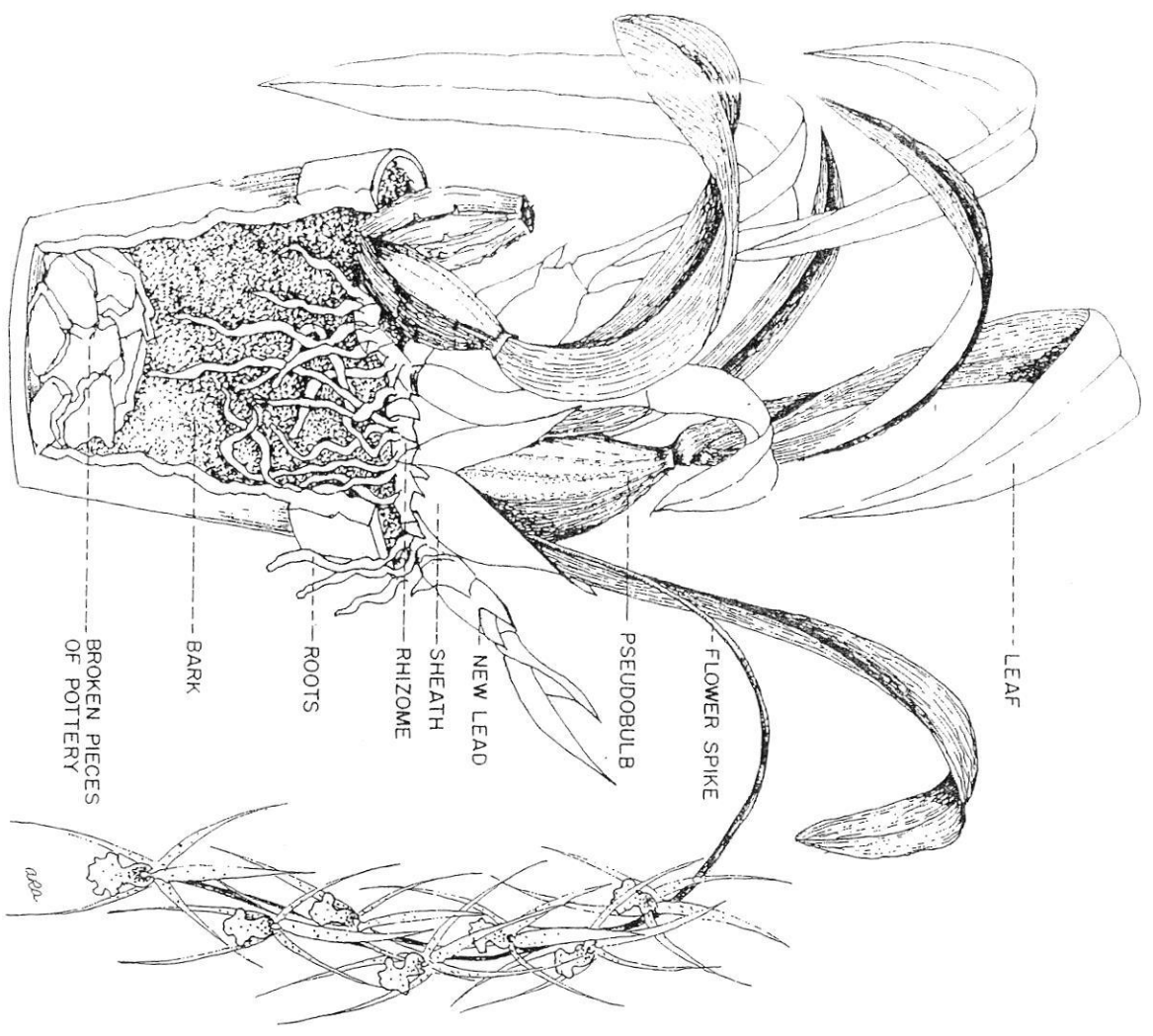
Roots extending over the container are acceptable. Container, however, should be clean.

Symplodial orchids like Cattleya need not be centered in a container.

Dried sheath may be removed for a tidier looking plant.

The Royal Horticultural Society started judging orchids in 1859 through its Orchid Committee and awarded certificates and commendations. The American Orchid Society uses a point scoring system with pins awarded for various criteria. The system is now highly regarded and the largest judging institution. There are many awarding bodies throughout the world.

The Orchid Plant



Parts of the Orct

Optional Topic

## Aroids

Objectives:

To note similarities and differences between the many species of Aroids and the spathe and spadix type bloom.

To demonstrate the propagation techniques used by Aroid growers.

To reveal the secrets of growing and showing award winning Aroids.

References:

*Aroids: Plants of the Arum Family*, 2<sup>nd</sup> ed. 2000, by Deni Bown  
International Aroid Society, Inc. ([www.aroid.org](http://www.aroid.org)) P. O. Box 43-1853, South  
Miami, FL 33143  
*Aroideana* (IAS publication)

Materials needed for this unit:

As many different types of Aroids as are available to represent this huge family.

Aroids for propagation and sharing.

- I. Introduction: Native to tropical America and West Indies (most needing moisture and shelter, but some are from semi-desert regions), believed to be from the Cretaceous Period (136 million years ago). The name *Aroid* means “acid” plant (caustic) and *Aroid* evolved into *Aron*, evolved into *Arum*—Greek for “Fire”. May be tuberous, rhizomatous or fibrous-rooted. Grown for their ornamental foliage (some may be small, huge, complete leaves, divided leaves (*Fenestrations*: dividing and piercing the leaf from within during development—tissue ceases to grow yielding slashes, holes), juvenile and/or mature leaves, patterned, variegated, flushed with color—may arise directly from a rhizome or corm or be alternately placed along the stem—“The King of Foliage”), some for flowers and food. Petioles may be channeled, round, flat, long, or short and may differ in color from the leaf. **Cataphylls** are sheaths (highly modified leaves) that cover the new foliage (at growing points to protect young leaves from injury) and colors (thicknesses, lasting qualities) may vary. Flower (inflorescence) is a **spathe** (white or colored, a modified leaf or bract, surrounds or subtends/protects the spadix) and **spadix** (a cylindrical organ (elongated axis) bearing both male and female flowers (many small greatly reduced/inconspicuous/minute flowers—male flowers on top third, female flowers on bottom third: often with a sterile band between the two—seldom bear viable seed (viability only 20 days)—female stigma receptive 24 hours before pollen (pollen grains vary in shape, size, texture, consistency) is shed---can only be pollinated from another source—this prevents self-pollination) arrangement, typical of this family. In some cases, the spathe and spadix are fused together (*Spathacarpa* or “Worm Plant”). Plant forms vary: may be self-heading (or rosette types, developing a trunk-like stem), vining, trailing or a combination; can be compact or loose; single plants may multiply and send up plants from the base. Air roots are active

organs of absorption. Many Aroids have a distinct odor about them to attract pollinators (some smell sweet others nauseating). Some Aroids attract ants to deter other pests, some produce a resin to stick pollen, may mimic other plants or pests. The fruits produced are poisonous to humans—dispersed by birds or bats and can be red, orange, yellow or purple. Aroids are said to have curative properties, used for bites and stings. Poultices are applied to draw out toxins and make soothing, healing compresses. Stimulating aroids are used to stimulate blood circulation and help arthritic conditions. Expectorant aroids have decongestive properties for bronchial illness and a remedy for coughs. Insecticidal aroids are used to deter or kill insects and intestinal parasites. Anti-cancer aroids are showing results in childhood leukemia and Hodgkin's disease.

- II. Classification: perennial shrub, vine, monocot, monoecious and dioecious. Some are aquatic (rheophyte—living in fast moving water) or semi-aquatic, grassy, climbing and tree types or epiphytes. Some are tuberous, rhizomatus, corms or fibrous rooted. Petioles may be channeled, round, flat, long, short and may differ in color from the leaf.
- A. Family: *Araceae* (Arum)—Seven subfamilies: *Gymnostachydoideae*, *Photodeae*, *Monsteroideae*, *Lasidideae*, *Calloideae*, *Aroideae* and *Orontoideae*
- B. Genus: 115 genera and 1500 species.
1. **Philodendrons** (Phileo= to love + dendro= tree, referring to tree-climbing habit). A jungle plant, introduced by Rear Admiral Bligh in 1793. Mass-marketing of houseplants began with Philodendrons. Over 220-500 species. Most are climbers and can become a nuisance. They rarely flower. *Philodendron lacerum* recorded as first introduced into Florida by the Spaniards. *Philodendron scandens* (velvet leaf) is popular, 'Brasil' is new heart-shaped cultivar with splashes of cream and green on the leaf. *P. panduriforme* is shaped like horse head. *P. cordatum* syn *P. oxycardium* ("Sweetheart vine") is the common heart-leaf philodendron, a popular indoor plant, leaves 2 to 3 inches across, a twining, trailing vine that can be trained up a moss stick. **Variety:** Vining/climbing and self-heading/upright: *P. selloum* (saddle leaf, finger and palm-like), native to Brazil, is semi-self-heading and hardy. *P. domesticum* (spade leaf) Self-heading types form rosettes of foliage (stemless) and in time, as old leaves fall, develop what looks like a stem: **Cultivar:** Many now have colors from nearly black to very pale: 'Red Emerald', 'Burgundy' (*P. x Burgundy* resembling spade-leaf but with red stems and glossy green leaves), 'Emerald King', 'Emerald Queen' (dark, spear shaped, vigorous and cold resistant) and 'Emerald Duke', 'Florida', 'Golden Erubescens', 'Goldiana', 'New Yorker', 'Orlando'. *Philodendron x 'Xanadu'*: deeply divided usually drooping, dark grey-green leaves grow up to 18

inches long and 8 to 12 inches wide appearing on long, smooth petioles. Each leaf is divided into 15 to 20 lobes.—*Monstera deliciosa* syn *P. pertusum* (“Mexican Breadfruit”, “Swiss Cheese Plant”, “Split leaf” or cut leaf philodendron). Introduced before 1848. Mature leaves up to 3 feet, broadly ovate-cordate.

Pinnatifid halfway to midrib, sections in turn, divide again, many scattered perforations. Leafstalks 1-2 feet long, sheathed at base. Juvenile leaves sometimes entire and much smaller, become more divided and perforated with age. Stem stout and woody, close-jointed, scandent, tree-climbing, forms long ropy aerial roots at each node. Inflorescence typical spathe and spadix.

Spathe whitish to pale yellow curving around the spadix. Spadix about 8 inches long, cone-like, juicy, edible. Pineapple aroma, pineapple-banana flavor, fruit rarely forms outside tropics.

2. **Spathiphyllums** (“Peace Lily”, “White Sails”) Easy maintenance houseplant, sword-shaped leaves, drooping gracefully on long thin petioles. Look for its identifying crook neck on the stem. Bloom intermittently throughout the year and the blooms last up to one month. Bloom more often and profusely if slightly rootbound. Flowers arise on thin stems and hover gracefully over foliage. Browning of leaf tips due to too much or too little water or salt build-up. ‘Clevelandii’ is free branching and free flowering commercial plant. *S. wallisii*, from Columbia, is a vigorous plant, glossy-green, thin-leathery leaves, inflorescence on reed-like stem, ovate spathe white turning green with age, spadix white, maize-like. *S.* ‘Mauna Loa’ is diploid hybrid of compact habit, leaves dark glossy green, very floriferous over long period. Pure white 4-5 inch spathes, somewhat cupping, soft-leathery and slightly scented. *S. floribundum*, dwarf, compact with matte, satiny green leaves with pale center band, broadly winged petioles, small white spathes with short green and white spadix.
3. **Anthuriums**: (“Tail Flower”) Over 500 species of Anthuriums, many leaf forms, shapes and textures. Grown commercially for cut flower industry. Veins may be showy, colored, depressed, prominent. Petioles may be channeled, triangular or colored. *A. scherzerianum* is the “Flamingo Flower”. *A. andraeanum* has exotic, waxy, flaming red flowers in the florist trade in colors including red, pink, green—major product of the Hawaiian Islands. Bisexual flowers, dioecious. Some grown for foliage: *A. clarinervium*, *A. crystallinum*, *A. forgetii* (with oval peltate leaf) and *A. warocqueanum* (velvety leaves). Likes well drained soil. Few terrestrial types, most like high elevations, steep gradients. Some medicinal uses: destroys intestinal worms.
4. **Alocasias**: (“Taro”) 60-70 species from Asia, Australia. Need constant warmth and humidity along with shade. Rhizomatous

with large, rather glossy, heart-shaped leaves with various textures and veining. *A. wavriniana* will have indented edges, are wavy. *A. macrorrhiza* (“Giant Taro”), *A. cadierei*, *A. chantrieri*, *A. watsoniana* (enormous leaves with white veining). *A. amazonica* (“African Mask”), *A. sanderiana*.

5. **Colocasias** (“Elephant Ears”) Taro, a staple in subtropical Asia and Hawaii (poi—must be cooked and cooked to neutralize toxins). *C. esculenta* is most common. A tuber, usually with a red blotch at the ‘navel’.
6. **Dieffenbachia** (“Dumb Cane”) 30 species, sensitive to drought, fumes and temperature changes. Highly poisonous and bring about sterility. Used to commit suicide or as punishment. Nearly all have green and white foliage, variegated and patterned. Young plants have a single thick trunk and multiple stems as it matures. *D. seguine* is the most common. *D. exotica* is native to the lowlands of Costa Rica. *D. picta* species has numerous cultivars mostly green and creamy colored. Named for J.F. Dieffenbach, a German botanist.
7. **Aglaonemas**: (“Chinese Evergreen”) Native to China, will bloom and set viable seed. *A. modestum* is hardiest, solid green. *A. communtatum* has cultivars with gray, silver stripings and mottling. This plant is the old-world counterpart for the tropical American Dieffenbachia.
8. **Epipremnums**: (syn Scindapus, syn Pothos, “Devil’s Ivy”) *Epipremnum aureum* is the golden pothos. Most common houseplant, rapid grower, easy care. Solid green, green with yellow or green with white. Vines or climbs on support.
9. **Caladiums**: Peltate, heart-shaped leaf, tuberous-rooted herbs. *C. bicolor*. Often grown as an annual, usually shade loving but many grown in sun. Topical foliage plants, membranous leaves most beautifully marked in many colors and patterns, on slender petioles. Tall, 12-18 inches, to dwarf, to 9 inches, varieties available. Fancy-leaf types are rounded, elongated heart-shaped, peltate leaves. Lance-leaf types are longer, narrower elongated leaf. Grown for beautiful foliage ranging from white to red and greens. May be zoned, patterned, speckled or splattered. Inflorescence typical spathe-spadix but remove bloom to keep leaves forming vigorously. Closely related to *Xanthosoma* but differs in pollen grain structure. Likes wet, light. 57 species. Holds leaves nearly horizontal. Edible.
10. **Nepthytis** (syn Syngonium): “Arrowhead vine” A climber when juvenile—adults are epiphytic. Undergoes successive changes in leaf shapes as it grows—first sagittate to hastate with variegation then 3 to 11 leaflets and no variegation. *S. podophyllum* is also known as ‘goose foot’ because of the shape of the leaves. Introduced about 1870 the most highly variegated clones have



been selected to produce varieties. Colorings such as cream foliage, faintly green to pale pink leaves. 'Maya Red' is a pink variety. 'White Butterfly' has marbled white variegation, inconsistent. 'Flutterby' gets its name from the shape of the leaves and forms a bushy clump instead of vining. New varieties with ruffled, puffy leaves. Climbing habit, may need support if not in hanging basket. Seldom branching. Leaf blades are horizontal to the soil line. Immature plants are upright, older plants vine. Longer vines have fewer leaves, resulting in a leggy plant. Will root in water.

11. **Zantedeschia** ("Calla Lily")= Arum) A tuber/rhizome. *Z. aethiopica* (common calla) largest, milky white blooms to 6 inches, with spotted leaves. Richardias include: *Z. albo-maculata* (spotted calla) creamy white blooms, *Z. elliottiana* (Golden calla), spotted foliage, yellow blooms, and *Z. rehmanii* (pink calla) rosy-purple varying to white with pink margins. *Z. melanoleuca* (black-throated calla), greenish-yellow with conspicuous black-purple spot at the base inside, leaves white-spotted. An apricot calla is 'Helen O'Connor'. Park's Seed introduced the 'New Zealand' line in 1988 which has vivid colors of red, purple, bronze, yellow, bi-colors, pinks, whites with mottled and variegated foliages. Calla lilies can be 'forced' (takes about 2 months from bulb to bloom). Requires 3 years to bloom from seed.
12. **Amorphophallus** ("Voodoo Lily") several renowned species make the news for their huge (flower to 11 feet tall but average is 6 feet tall) and foul-smelling flowers (attractive to pollinators—sometimes referred to as the "corpse flower"). Name means "shapeless" or "deformed phallus". Smaller ones have speckled stems and a single leaf so divided as to appear like a small shrub. Others have leaves as large as umbrellas. Goes dormant in the dry season. A tuber that will sometimes make bulbils at the leaf axils. Bloom only with maturity. Leaves have a central petiole and are tri-segmented. Stems are dappled or can be black. Look for cultivar 'Knojac'. Edible. Official flower of the Bronx, NY. 200 species. First found in Sumatra in 1878. Seeds sent to growers because the tubers range from 57 to 165 pounds and are prone to rotting. Likes shade.
13. Others: **Arisaemas** ("Jack-in-the-pulpit"), **Orontium** ("Golden Club"), **Symlocarpus foetida** (Skunk/Swamp Cabbage), **Pistia** ("Water Lettuce"—matt forming), *Typhonium*, *Zamiculca*, *Dracontium*, etc.

C. Species: more than 1500 species.

D. Varieties and Cultivars: Hybrids by Robert McColley until his death and then by Dr. Howard Miller of Bamboo Gardens in Orlando. Bred for

beauty, strength and versatility as house and office plants. All are protected by plant patents.

- III. Environmental Factors: Grown outside as foundation, border, mass planting or grown inside in containers.
  - A. Light: Bright and indirect light. Will adapt to, tolerate low light conditions indoors. Rotate. Some are tropical, understory plants and can thrive on filtered light.
  - B. Water and Humidity: Most are jungle-dwellers where humidity is high. Keep lightly moist, do not over water. (Water needs may be determined by type of container-plastic or clay, hanging basket, age of plant, wind, etc). Increase humidity by misting, grouping or setting in pebble filled trays. Brown tips indicate plant has been allowed to dry for too long. Most won't tolerate wet, soggy soils.
  - C. Soil: rich fertile, moisture holding but quick draining, slightly acid.
  - D. Fertilizer: Use weak (quarter strength) liquid fertilizer as you water (balanced fertilizer is fine). Fertilize during active growth in spring and summer, infrequently in winter resting period. Foliar feedings let plants absorb needed nutrients.
  - E. Temperature: These are tender, exotics. Try to keep above 55 degrees F. Avoid sudden temperature changes. Those Philodendrons with velvety or highly variegated foliage need more warmth than average kinds.
  
- IV. Propagation:
  - A. Cuttings: Cut so that you have at least 2 joints (nodes). Root in sandy peat medium. Root in water to which charcoal has been added.
  - B. Division: Division of crowns, particularly self-heading types. Can be done anytime of the year.
  - C. Air Layering: Seldom used because of ease of rooting
  - D. Seed: seldom used except by specialists.
  
- V. Maintenance:
  - A. Repotting: When become root-bound. Repot in spring before new growth starts.
  - B. Support: Climbing aroids need support that holds moisture. Aerial roots will attach to support and absorb moisture from it, as well as stabilize plants. Climbers need support to climb on for characteristic leaves to develop.
  - C. Practice cleanliness: Wash leaves occasionally with a gentle spray, wipe clean.
  
- VI. Pest Management: Generally insect-free
  - A. Dry, hot indoor air may encourage spider mites (wash foliage and increase humidity). Hard to see but will promote a pale and sick looking plant.
  - B. Root rot (a fungus): from stagnant soil or soil poorly draining or standing water. Repair the soil mix.

C. Mealy bugs: pick off and spray. Dab with alcohol swab.

VII. Judging Considerations: May be entered as cut flowers, as cut decorative foliage, as container-grown plants eligible for a Grower's Choice Award, flowering or foliage, and eligible for an Award of Merit, or as a Collection or Display, cut or container-grown eligible for Collector's Showcase Award.

A. Plant Identification: Binomial name required along with cultivar, if applicable. Legible.

B. Cultural Perfection:

1. Peak of Perfection: Proper maturity for exhibiting with no major cultural perfection faults. Actively growing, fresh. Flowers are a sign of maturity.
2. Quantity of flowers or Amount of foliage/stem: Number of specimens as defined by schedule, number of blooms, proportional to size of specimen. Sturdy stem in proportion to bloom; petiole well proportioned to leaf blade. Proportion, form, amount, color, length, condition. Foliage should be full but uncrowded, shaped correctly.
3. Color: of flowers and foliage
4. Form: flowers and foliage balanced, appropriate to type. Balanced, symmetrical, well-rounded foliage. No gaps or one-sidedness.
5. Substance: firmness of tissue. Substantial, full, turgid, no indication of wilting or limpness.
6. Texture: surface quality of bloom and foliage—will vary with species.
7. Size: typical for genus. Ideal for type, average or slightly above—will vary with species.

C. Condition/ Grooming/ Staging:

1. Health/Blemish free: evidenced by above qualities, damage due to insects, disease, physiological, mechanical problems. No cuts, tears, bruises, holes, slits, damage.
2. Grooming: Preparations the exhibitor can control. Stem length, clean cut, foliage removed below water level, cleanliness, conditioning. All dead or dry foliage removed.
3. Staging, presentation including container: presentation, including container (size, type, cleanliness) and pose (attitude, wedging). Containers should be plain, clean, properly sized for specimen or of a color to blend or harmonize, not distract. No cracks or algae or salts, no decorations unless schedule controls.

D. Distinction: degree of superiority in all listed qualities.



## Optional Topic

### Ferns

#### Objectives:

To observe the similarities and differences among this vast family of plants.

To practice propagation techniques.

To learn the secrets of growing and showing award winning ferns.

#### References/Resources:

*All About Houseplants* by Ortho pp. 59-61

*The Houseplant Expert* by Hessayon pp. 137-141

*Plants-a-Plenty* by Foster pp. 263-266, 285-287

*The Southern Living Gardening Book* by Oxmoor pp. 229

American Fern Society

#### Materials needed for this unit:

Examples of as many types of ferns available

Ferns for propagation and dissection

Containers, potting mixes, fertilizers, and tools needed for propagation

Introduction: Discovered as some of the oldest fossils. Fossil evidence from 230 to 600 million years old. Ferns make up a large part of coal deposits. One of the oldest plants on the evolutionary timeline. Ferns are mostly perennial and rhizomatous (underground stem). Some ferns are deciduous, others are evergreen. Many are on the protected and conservation lists. Ferns lack flowers and do not produce seeds (Cryptogams). Popular in Victorian times for the conservatory. Not brought inside the living area until advent of central heating—gas fumes and coal fire smoke are toxic to nearly all ferns. Parts of the ferns have been used for medicinal purposes—roots and rhizomes to fight pain and induce perspiration to relieve fever. A tea was made from fern fronds to improve the blood.

- I. Classification: Categorized by growth habit, frond form, indusium shape and the location and structure of the **sporangia** (spore cases which form on underside of fronds). Terrestrial ferns are Mesophytes that grow in moist, shaded tropical and temperate forests. Epiphytes grow on the trunks of trees and in rock crevices. Xerophytes grow in deserts where they may remain dormant for long periods of time (resurrection ferns). Aquatic ferns grow floating or submerged in water.
  - A. Family: Pteridophyta includes ferns and fern allies (formerly Filices). Pteris means ferns and phyton means a plant.
- B. Genus: Numerous genera.
  1. *Adiantaceae* are the **Maidenhair** ferns (*Adiantum*). Look for black stems.
  2. **Bird's Nest** ferns (*Asplenium nidus*) are in the *Aspleniaceae* family. Sometimes referred to as "Spleenwort". Upright fronds grow in a circular arrangement with a fuzzy crown. Fronds are wavy and apple green with deep brown center vein. Grow up to 4 feet tall. Native to Asia and Polynesia.

4. *Davalliaceae* are the Rabbit's or hare's foot (*Davallia canariensis*), squirrel's foot ferns (*Davallia mariesii*). These are the **Polypodium** ferns and feature a thick rhizome that creeps over the edge of the container.
  4. *Nephrolepis exaltata* are the sword ferns including all **Boston** type ferns.
  5. Clumping ferns, *Polypodiaceae*, such as the **Staghorn** fern (*Platycerium bifurcatum*), have two types of fronds, upright foilar (fertile) and flat basal (sterile) fronds—many are epiphytes (air plants) growing best when attached to pieces of bark or other porous material.
  6. Those ferns in the *Pteridaceae* family have prominent rhizomes. *Pteris cretica* is the 'Ribbon or 'Brake' fern. Sometimes called **Table** ferns.
  7. *Pellaea rotundifolia* or 'Button Fern' is a small fern with round, leathery leaflets. Fronds grow in more horizontal fashion.
  8. Others: *Dicksoniaceae* and *Cyathaeaceae* are the majority of the tree ferns (New Zealand Tree Fern), *Dicksonia squarrosa*, grows to 20 feet. Holly and Fishtail ferns are in the *Dyopteridaceae* family—*Arachnoides simplicor variegata* is the East Indian Holly Fern, *Cyrtominum falcatum* is the Holly fern. *Ophioglossaceae*- produce only one or two fronds a year—deciduous. *Marattiaceae*—some tree ferns. *Osmundaceae* with fertile and non fertile fronds such as Cinnamon fern (*Osmunda cinnamomea*) and Royal fern (*Osmunda regalis*). *Schizaceae* such as Japanese Climbing ferns (*Lygodium japonicum*). Wood ferns, such as the resurrection fern, and the Japanese painted ferns are in the *Woodsiaceae* family. *Woodwardia* species are the Chain ferns (Netted chain and Virginia chain). One of the most popular ferns is the Leatherleaf fern, *Rumohra adiantiformis*, often used in florist arrangements.
  9. The aquatic ferns, growing on top of the water, are in the *Salviniaceae* family.
  10. Fern Allies: include the *Equisetaceae* or horsetails that are segmented and have a cone type structure that produces spores. *Psilotaceae* are the simplest form of a plant with many undifferentiated cells. *Selaginellaceae* are the Peacock ferns.
  11. The 2004 Perennial of the Year is the Japanese Painted Fern, *Athyrium niponicum* 'Pictum', with maroon stalks and greenish gray foliage. In the group referred to as Lady ferns.
- C. Species: Over 12,000 species to choose from with 80 foot tall trees to tiny moss-like specimen. Many are native and are found in a wild state all over the world, even in the Arctic.
- D. Varieties and Cultivars:

- VII. Cultivation: Ferns consist of the roots, the rhizome, tightly coiled fiddleheads or croziers (new fronds), the frond and pinnae. The stipe is the petiole equivalent of a frond or leaf. The costa is the major vein.
- A. Light: Grows well in light shade, dappled sunlight (as found in the native tropical woodlands) or bright indirect light. Place in east or north facing window. Avoid exposure to direct sunlight (100-3000 foot candles).
- B. Water: Soil must be keep moist but not wet (too wet leads to rotting). Reduce water in winter. Humidity is essential—Use a humidifying tray or mist regularly.

C. Temperature: Needs cool air. Hot, dry air is trouble. Average 60 to 70, even 80 degrees in the day, cooler at nights. Minimum temperature of 50 to 55 degrees. Bring inside to avoid injury by freezing temperatures.

D. Soil: For terrestrial ferns, use an all-purpose soil mix. Repot once a year before the growing season or add fresh soil. Ferns like a predominately organic potting medium—use 100% peat moss for epiphytic ferns or combine 75% peat with 25% sand.

VIII. Maintenance: Remove old, dead, damaged or discolored fronds promptly. Remove any moss that grows on pot or soil surface. Loosen topsoil so air can circulate. Repot in spring when the roots fill the pot. Do not bury the crown of the plant. Be sure the fern has enough room to develop. Fertilize little but often during the growing season with packaged liquid fertilizers applied about one-half strength. Ferns take nutrients from decomposing sphagnum peat moss. Transplant or move ferns in the spring. Mulch with shredded leaves 3 to 4 inches deep each fall.

IX. Propagation:

A. Spores: reproductive structures are found on the underside of the fronds and are called sporangia—this is where the spores are produced. The size and shape of the sporangia are used for identification. A group of sporangia are called sorus (the dots on the back of the leaf). An indusium covers and protects the sorus. To grow ferns from spores shake spores, when ripe, onto sterilized ground sphagnum moss in a well-drained container. Maintain soil moisture by covering the container with plastic. Prothallum is the tiny fern plant that produces the reproductive bodies in the alternating generation of the ferns. It takes at least a year to produce useable plants.

B. Vegetative division: Divide large clumps by the rhizomes.

C. Offsets: Some ferns produce young plants at the ends of stolons or runners (Boston ferns) or on fronds (Mother Fern). Staghorn ferns produce “pups”.

X. Diseases and Pests:

A. Scale: brown shells irregularly scattered on fronds, especially on Bird’s Nest ferns. Caution: ferns are easily injured by fungicides and insecticides.

B. Fungus problems which produce black spots are usually caused by over watering. Over watering can also cause crown rot.

C. Mealy bugs can cause deformities to the foliage and can be treated with horticultural oils or dab with alcohol.

D. Snails and slugs can be a problem but are easily controlled.

VII. What the Judges are looking for:

A. Written into the schedule and entered in flower show as hanging basket, container grown foliage plant or cut decorative foliage. Tree ferns may be entered as arboreal. Cut or container grown ferns may be entered as a Collection or Display. Some ferns are suitable for terrariums.

B. Cultural perfection: indicative of health, vigor, and size according to type and variety. Presence of spores on back of fronds is an indication of maturity and health.

C. Symmetry must be typical growth pattern for the type (e.g. symmetry of Boston fern is different from Staghorn fern mounted on a board slab).

D. Fronds typical in form and color for variety and/or type. The uniform growth and a large number of fronds are important qualities. Look for gradation of foliage. Fronds should be crisp, clean and well-groomed.

E. Look for proper relationship or proportion of plant to container.



Optional Topic:

## Gingers

Objectives:

- To observe the similarities and differences among this vast family of plants.
- To practice propagation techniques.
- To learn the secrets of growing and showing award winning gingers.

References: For more information: [www.oldcity.com/gingers](http://www.oldcity.com/gingers)—Dr. Tom Wood, nursery owner, Gainesville, FL area.

Materials Needed for this Unit:

- Examples of as many types of gingers available.
- Gingers for propagation and dissection.
- Containers, potting mixes, fertilizers, and tools needed for propagation.

**Classification:** An herbaceous, tropical, rhizomatous plant commonly found in tropical Asia and India.

1. Family: Zingiberaceae
2. Genus- Nearly 50 genera.
  - a. *Alpinia*-these are the shell gingers (*Alpinia formosana*), produce flowers on last year's foliage, leathery leaves. Spring blooming.
  - b. \*\*\**Costus*-this is the Spiral ginger with a true above ground root with spirally arranged leaves. (*Costus spicatus*, *Costus barbatus*, *Costus speciosus*), prefer shade, colorful bracts some only 24" tall, others 8' tall.
  - c. *Curcuma*-related to Tumeric. Most send up flowers first then put on leaves. Need 4 to 6 hours of sun each day (*Curcuma ornata*, *Curcuma elata*). Usually have a purple stripe down leaf.
  - d. *Globba*-dancing lady gingers. Like the shade and damp. (*Globba winitii*, *Globba globulifera*)
  - e. *Hedychium*- Butterfly Gingers. Name translates to mean 'sweet snow'. From 18" to 12' tall. (*Hedychium coronarium*, *Hedychium coccineum*). Intensely fragrant.
  - f. *Kaempferia*-Asian crocus. Use as a ground cover. Prefer deep shade. Flower in early spring. (*Kaempferia gilbertii*)
  - g. *Zingiber*—Cone gingers. (*Zingiber zerumbet*, *Zingiber officinale*)
  - h. 50 new genera proposed by hybridizers.
3. Species: approximately 1400 species
4. Varieties and cultivars: Many now with variegated foliage and fragrance.

**Cultivation:** Grown anywhere that the ground doesn't freeze. In springtime, plant root stocks just below surface of the earth. Water moderately and fertilize once before the rainy season. Hardy and adaptable.

1. Soil--All gingers will grow well in fully drained, organic soil (add compost or peat) with a somewhat acid pH between 5.0 and 7.0.

2. Light-- most gingers grow and flower best with partial shifting shade but in the south, some do well in bright light conditions. Prefer 2 to 4 hours of noon shade.
3. Water-- moderately- may go dormant during times of drought. Cannot tolerate standing water.
4. Temperature-- Have a normal dormancy in the winter. Grown in USDA Zones 8 and 9. Those with above ground stem will suffer in cold. Some strictly tropical species will yellow and curl in temperatures below 50. To avoid cold damage, mulch heavily with leaves, bark, pine needles.
5. Fertilizing: Fertilize with a balanced fertilizer with micronutrients such as 10-10-10 during the growing season being careful not to get any on the leaves as it will burn them.

**Maintenance:** If yellowing leaves appear unsightly, cut them off. To ensure continuous bloom, remove the old inflorescence. Divide old clumps to prevent root rot.

**Propagation:**

1. Division of clumps and separation of the rhizome-Best done in early spring just as buds are starting to swell. Cut with a sharp knife from the top to include 2 buds. Leave for a day or 2 to cure the ends.
2. Stem cuttings-4" to 6" cut placed in Perlite in the summer.
3. Bulbils- Globbas have small, whitish round or pointed bulbils in the flower or on the stem that can be collected and planted.
4. Seed-Seed should be planted within a week of harvest. Plant twice as deep as the seed's diameter in sterile potting medium.

**Diseases and Pests:** minor problems from Mites, sometimes Nematodes in sandy soils. Mushroom root rot on old congested clumps.

**What the Judges are Looking For:**

As cut foliage shown in Horticulture section for Cut Decorative Foliage: Foliage and stem should exhibit proper conditioning, straight and strong. Not wilted or rolling. No evidence of bugs, residue, holes, bites, etc.

As cut flower shown in Horticulture section for flowers from Bulbous plants: Be sure to look at flower and not just the colorful bracts. Ensure flowers are fresh with no evidence of wilting, bruising. Check stem and leaves, if present.

As potted plant: Plant centered in container, container clean and appropriate with no debris on surface. Check plant overall health and appearance.

As an herb: Cooking and medicinal gingers are sometimes entered.

Optional Topic:

## Citrus

Objectives:

- To observe the similarities and differences among this family of plants.
- To practice propagation techniques.
- To learn the secrets of growing and showing award winning citrus fruits.

References:

- Citrus Growing in Florida*, 3<sup>rd</sup> edition by Larry K. Jackson, 1991
- The Southern Living Garden Book*, Steve Bender, editor, 2004
- Botanica's Trees & Shrubs*, 1999

Materials Needed for this Unit:

- As many examples of citrus as available.
- Citrus for propagation and dissection.
- Containers, potting mixes, fertilizers, and tools needed for propagation.

**Introduction:** A number of original wild species of this genus (Citrus) of evergreen small trees, originally native in the Southeast Asian region, is very uncertain as many of the cultivated forms are probably of ancient hybrid origin following their domestication, which took place mainly in China (Himalayas) and India. *Poncirus* and Kumquat are from China. Primitive orange was called Shaddock, mandarins also very old...between 6<sup>th</sup> century BC and 2000BC. Citron not known until 4<sup>th</sup> century AD, the lemon 10<sup>th</sup> century AD.

While largely cultivated for their fruit, citrus plants have the bonus of looking attractive in the garden with glossy evergreen leaves and fragrant flowers. Most species are frost tender to some degree but a few tolerate very light frost; the lemon is the most cold resistant, especially when grafted onto the related *Poncirus trifoliata* rootstock, and the lime is the least cold resistant, doing best in subtropical locations. All citrus can also be grown in pots, as long as the containers are large and the citrus are grown on dwarfing rootstocks.

Florida is no longer #1 in citrus production due to freezes and citrus blight, canker like diseases. Now Brazil is #1 followed by Mexico, Cuba, Puerto Rico, Italy and Spain. In the USA, Florida, California, Arizona and Texas all produce citrus. Commercially worth \$2 billion a year. 585 million boxes were sold in a year. In Florida over 800,000 acres are in groves.

The orange blossom is Florida's state flower!

**Classification:**

**Family: Rutaceae** (Rue)

- a. Orange subfamily: Auranthioideae: oil glands in leaves, rind and bark, leathery rinds

Tribe Citreae

- b. 3 sub-tribes: Primitive Citrus, Near Citrus Fruit trees and True citrus fruit trees (Citrus, Poncirus, Fortunella /Kumquat)

Thorny/spiny shrub or tree with fragrant white flowers. Evergreen with compound leaves. Petiole with wings. Winglike appendages on leaf stalk. (Have students observe the branches of the tree and note spines, compound leaves and appendages.)

Hesperidium fruits: rind is the mesocarp and is whitish and spongy (Albedo). The outer is the exocarp with oil glands (Flavedo). Parchment partitions. Fruit is a berry—

**hesperidium** (pulp vesicles). (Have students cut into an orange and observe the structure of the fruit. If flowers are available, have students dissect the fruit to identify reproductive parts.) All citrus fruits ripen only on the tree. Don't go by rind color; taste fruit to determine its ripeness.

***Poncirus trifoliata***. Genus named in 1815. "Flying Dragon", cold hardy, bitter oil pulp, rootstock for Satsumas, deciduous, thorny. (These plants are prolific where fruits fall. Try to have seedlings to share.)

Fortunella or **Kumquat** "Golden Orange" is ornamental, evergreen, shrubby trees to 10 feet tall. Nearly thornless, cold hardy to 10 degrees, blooms late in the spring.

Citrus: **Sweet oranges**: *Citrus sinensis* are the common, navel, blood and acid-less oranges. (Have a selection of these fruits on hand to taste!) Trees grow about 25 feet tall in dense globes.

Early producing in September to November, Midseason producing December and January and Late producing February to August.

**Blood orange**: These are characterized by red coloring/pigmentation in flesh, juice and rind. Flavor has raspberry overtones. Need chilly nights during ripening. Main kinds grown are 'Moro', 'Sanguinelli' and 'Tarocco'.

Acid less: curiosity in Florida, have no commercial value.

Seeded and Seedless: seedless meaning few or no seeds or less than 6. (Plant seeds!)

Cultivars: 'Valencia' is late maturing (March to June) and was named in 1877. Premier juice orange. Widely adapted bearing nearly seedless fruit in midwinter and spring. 'Delta' and

'Midnight' are seedless selections ripening a little earlier. 'Rohde Red' has more highly colored flesh than 'Valencia'

'Pineapple': Leading midseason (January to February) juice orange, smell, taste and shape like a pineapple. Fruit tends to drop from tree after ripening.

'Hamlin': Matures early (October to January) few seeds, Mr. Hamlin owns the property this was named for. Juice orange.

'Parson Brown': seedy and small juice orange, early fruit ripening. Named for Reverend Brown

'Lue Gim Gong' Chinese gardener. A hybrid of Valencia and Mediterranean Sweet.

'Pope Summer' or 'Glen Summer' discovered in 1916 by Mr. Pope. Produces July to August

'Jaffa' ('Shamouti') Midseason (ripens winter into spring), nearly seedless eating orange from Israel. Grown in South Texas.

'Washington' Red flesh in Florida.

'Cara Cara' is the first rosy-fleshed navel bearing at about same time as 'Washington'. Red flesh in Florida.

'Marrs' Low-acid fruit with few seeds, ripening fall into winter. Grows well in South Texas.

**Sour oranges:** *Citrus aurantium*. These marginally frost-hardy small trees are grown as ornamental shrubs or for their fruit, which are used to make marmalade and jelly.

**Navels:** most started in California. Has a **stylar end** (actually an aborted secondary fruit)(Show stylar end). 'Salad Fruit' a 1835 introduction.

**Grapefruit:** *Citrus x paradisi*. Discovered in Barbados in 1750. Hung in clusters (thought to be forbidden fruit). The US produces 74% of all world since 1823, 69% coming from Florida. Grapefruit is 1/10th as popular as an orange. Pink and red forms. Early and midseason and late types. Trees grow to about 30 feet tall and wide. Heat zones 12-10.

'Duncan' Oldest known grapefruit selection in Florida and the one from which all others developed. Extremely seedy white flesh with better flavor than modern seedless types. Good for juice, hardy.

'Marsh': "Triumph of Florida". Main white-fleshed commercial kind. Seedless offspring of 'Duncan'. A pigmented form, 'Pink Marsh' ('Thompson') tends to lose its pink tones as the season progresses.

'Star Ruby' 1926 introduction with red flesh, seedless. Tree is subject to cold damage, erratic bearing and other growing problems.

Mandarin Group: specialty fruits, zipper/loose skinned "Kid gloves". Often slightly flattened-looking fruit. Most produce in winter. Many mandarins tend to bear heavily in alternate years.

**Satsuma:** *Citrus unshiu* Japan 1600 AD, grapefruit origin.

'Owan' introduced in Florida in 1876, cold resistant.

'King' *citrus nobilis*, from Saigon, introduced 1880 to California. Largest of mandarin, thick rind.

**Tangerines:** introduced in 1841 (*Citrus reticulata* Blanco). Imported from Tangers (Morocco). Selections with red-orange peel are usually called tangerines. 'Clementine' (Algerian tangerine). Sweet, variably seedy flesh. Ripens early, holds well on tree.

'Dancy' (*Citrus tangerina*) Traditionally Christmas 'tangerine'. Ripens late fall into winter. Needs high heat. Small, seedy fruit. Alternating cycle of overbearing one year.

'Ponkan' "Chinese Honey Orange". Early crop of seedy, very sweet fruit. Alternate bearer, good for Florida.

'Oneco' tangerine from India introduced in US in 1888 by Royal Palm nursery.

'Cleopatra' *citrus reshni*.

**Lemons:** *Citrus limon*

Citrus lemons from Burma. Commercially produced in Florida in 1870. Lemon concentrate is big market. Gets scab disease due to high humidity. Most grow 20-25 feet tall and wide.

'Eureka' Familiar lemon sold in grocery stores. Some fruit all year in mild climates. Big, vigorous, nearly thornless tree. Prune regularly to maintain tree shape and make fruit easily accessible for harvest.

'Lisbon' mostly produced in California. Fruit is similar to 'Eureka', but tree is bigger, thornier and more cold tolerant. 'Lisbon Seedless' is the same but without seed. These are the best lemons for hot, dry areas. Bear some fruit all year in mild climates. Prune regularly to maintain tree shape and make fruit easily accessible for harvest.

'Sicily' produced since 1953

'Harvey' introduced in 1940 by Harvey Smith

'Villafranca' introduced 1875 from Sicily

'Ponderosa' (American Wonder) Thorny lemon-citron hybrid, naturally dwarf. Seedy, thick-skinned, moderately juicy fruits weighing up to 2 pounds apiece. Some fruit all year., More susceptible to cold than true lemon. Thrives indoors.

'Meyer' (*Citrus meyeri*) is ornamental, some juice but doesn't look like a lemon.

'Improved Meyer' is a hybrid between lemon and sweet orange or mandarin. More cold tolerant than true lemon. Bears yellow-orange, juicy fruit with few seeds throughout the year. Can grow to 15 feet tall but is usually considerably shorter.

### **Limes:** *Citrus aurantifolia*

Small thin skinned, very acid, from Malaysia, not cold hardy. Naturalized in Canaries and West Indies.

**Calamondin** (*C. madurensis*) from the Philippines. A mandarin-kumquat hybrid with fruit like a very small orange but sweet, edible rind. Juicy, tart flesh has some seeds. Variegated form is especially ornamental.

'Rangpur' often called Rangpur lime, though it's not a lime and doesn't taste like one. Fruit looks like and peels like a mandarin. Less acid than lemon; a good base for punches and mixed drinks.

'Bearss' ('Persian', 'Tahiti') Commonly grown in Florida. To 15-20 feet tall and wide. Thorny and inclined to drop many leaves in winter. Angular and open when young but forms a dense, round crown with mature. Seedless. Almost the size of a lemon. Is green when immature, light yellow when ripe. Matures winter to late spring though some fruit ripens all year.

'Palestine sweet' (*C. limethioides*) Shrubby plant to 15-20 feet tall and wide, with acidless fruit resembling that of 'Bearss' and used in Middle Eastern, Indian and Latin American cooking. Ripens fall or winter.

**Citrons** (*Citrus medica*) First citrus cultivated. Plant is small, thorny, irregular in shape; grown for its big, fragrant, unusual fruit. Very cold sensitive. Rind/peel of 'Etrog' preserved/candied for fruit cakes. Pulp and juice useless.

**Tangelos** (*Citrus x tangelo*): Hybrid of tangerine (*Citrus reticulata*)/mandarin and grapefruit. Best with a pollenizer like 'Dancy' or 'Clementine' or another tangelo. Grows 20-30 feet tall and 10 feet wide. Some cultivars are:

'Minneola' bears bright orange-red fruit (often with a noticeable neck) with rich, tart flavor and some seeds.

'Orlando' or 'Lake' produces mild, sweet, fairly seedy fruit about a month earlier than 'Minneola'

'Nova' Cross between 'Clementine' mandarin and 'Orlando' tangelo. Juicy, richly sweet fruit fall to winter. Needs a pollenizer.

'Lee' Hybrid between 'Clementine' and an unknown pollen parent. Fairly seedy fruit matures fall to winter. Has best flavor if grown in Florida.

**Tangors** is a cross of tangerine/mandarin and sweet orange. Especially well adapted to sweet orange-growing areas in Florida. Select 'Murcott' or 'Honey tangerine' or 'Ortanique'.

'Temple' found in Jamaica in 19<sup>th</sup> century. Bears a winter-to-spring crop of sweet to tart, seedy fruit. Needs high heat and is more cold sensitive than other Tangors.

Pomelo/Shaddock: *Citrus grandis*

**Limequats:** These hybrids of 'Mexican ' lime and kumquat are more cold tolerant and need less heat than their lime parent. Good lime substitute. Edible rind. Some fruit all year, but main crop comes from fall to spring. 'Eustis' bears fruit shaped like a big olive. 'Tavares' has elongated oval fruit on a more compact, better-looking plant than 'Eustis'.

**Cultivation:** standard fruit trees 20-30 feet tall, dwarf

1. Soil: Quite tolerant as long as the soil is fast draining, friable, slightly acid and loamy.

2. Water: Be consistent, regular, moist but not standing, soggy water. Water heavy during active growth and fruiting.

3. Fertilizer: balanced or high nitrogen and potassium, slow release or 8-4-9 and magnesium for good fruiting. One pound per inch of trunk diameter. Apply micro-nutrients: iron, zinc and magnesium.

4. Temperature: Most kinds of citrus flourish in areas with warm to hot summers and mild winters. Most sensitive are lime. Depends on rootstock and location.

Intermediate temperature for sweet orange, grapefruit and some mandarin and hybrids. Cold resistant (in the teens) are Kumquat, Satsuma, mandarin, calomondin and the Hardy orange (*Poncirus trifoliata* used as rootstock).

5. Sun: They need full sun and protection from wind, especially during the summer months.

**Maintenance:** Prune only to remove twiggy, crossing growth, weak or dead branches and to balance. Caution thorny.

**Propagation** by grafting or from seed. Almost all are grafted. Seedlings bear 10-15 years old.

**Pest and Disease:** Subject to a wide range of virus diseases, they can be invaded by many pests including citrus leaf miner, bronze orange bug, spined citrus bug, fruit fly and scale...use horticultural oils.

Citrus canker is a contagious bacterial disease: brown spot with halo. Stop producing, loose vigor.

What the judges are looking for:

Fruits may be displayed on a plate. Since most are medium in size, 3 to 5 will be needed in an exhibit. Fruit should be table-ready.

May be exhibited in a Display  
May be exhibited as a Collection.  
May be exhibited on the stem.



Optional Topic:

## Ornamental Grasses

Objectives:

- To observe the similarities and differences among these families of plants.
- To practice propagation techniques.
- To learn the secrets of growing and showing award winning ornamental grasses.

References:

- Ornamental Grasses, Bamboos, Rushes & Sedges* by Nigel J. Taylor, 1992
- The Southern Living Garden Book*, pp. 143-145, 165, 295, 297, 320
- AHS Great Plant Guide* p. 488, 526
- Identification Manual for Wetland Plant Species of Florida* by R. Dressler, D. Hall, K. Perkins & N. Williams, p. 111
- The Botanical Garden* by Roger Phillips and Martyn Rix, vols. I and II.

Materials needed for this course:

- As many examples of ornamental grasses as available
- Grasses and seed heads for propagation and dissection.
- Containers, potting mixes, fertilizers, and tools needed for propagation

**Introduction:** Interest in Ornamental grasses began in the 1980s because Washington DC landscape architect, Jim Van Sweden and Wolfgang Oehme used grasses in public planting at the Smithsonian Institute, Federal Reserve Building, and the WWII Memorial. Prior to that, Europe, especially Germany, was the center of grass development—especially by Karl Foerster in the 1940s. Grasses make up 20% of the plant's vegetation as grasslands: savanna, prairie, plains, pampas. We even have a 'River of Grass' in the Everglades! The grass family is undoubtedly the most significant plant group in terms of usefulness to humans—considered staple foods in most parts of the world. All the world's important grain crops are grasses. Wheat (*Triticum aestivum*), Rye (*Secale cereale*), Oats (*Avena sativa*), Barley (*Hordeum vulgare*) and Corn (*Zea mays*) are best known cereal grasses. The bamboos (giant grasses) are useful in building and crafts. Many grasses are used in lawns or as ornamental annual or perennial plants. Distinctive forms and colors add interest to the garden and flower shows. 'Ornamental Grasses' is really a catchall term used to describe not only true grasses, but related grass-like plants in other families including reeds, rushes, sedges, wood rushes, bull-rushes and a host of others. Characteristically having narrow leaves, hollow, jointed stems and spikes or clusters of membraneous flowers borne in smaller spikelets. Clumping/bunching or spreading/running/creeping by stolon or rhizome, evergreen or not, with color, form, texture, sound, and movement to inspire us. Grasses are monocotyledons—one seed leaf, parallel or linear venation and reduced or vestigial flowers. Birds are attracted to the seed heads, sometimes nesting in the leaves, and insects hiding within. **Cool season grasses** do most of their growing in spring and fall. They set roots quickly in cool spring weather, blossom in early summer, go dormant in the hottest part of the summer and resume their growth in fall. **Warm Season grasses** grow rapidly in the warm summer months, become dormant in winter and turn beautiful colors in the fall.

Uses in the garden: accent, specimen, water garden, ground cover, containers, fence or hedge and in natural areas. Not to be walked on! Excellent for erosion control.

#### Numerous genera

General distinctive forms and colors of annual and perennial grasses add interest to garden and flower show. May be container grown.

Specimens may include:

Those having distinctive leaf structure

Patterned or colored foliage

Decorative seed heads—Seed heads may appear to have a dried quality as long as stem is green and fresh indicative of current years growth.

Mature Size: Tall or large which can exceed 12 feet (7 to 12 feet), medium or midsize 5-7 feet, compact, short or small 8-18 inches, and minimal (12" or less).

If shown in a flower show, schedule should indicate length of stem; 30 inches? Unlimited? Bamboo

Usually measured from cut end to tip.

For those having decorative seed head, measured from cut end to tip of seed head.

Single stems unless schedule designates otherwise. Inflorescence and blade may be entered as single exhibit unless disallowed.

Stemless grasses: shown as 5 blades or as a container grown plant

#### Classification:

Families: names ending in *-aceae*

A. **Poaceae**: (formerly *Gramineae*) Grass family-- Herbs and shrubs, usually sprouting from underground rhizomes (underground stem), sometimes reedy-stemmed. Bambusa. Flowers in spikelets.

B. **Cyperaceae**: Sedge family –Perennial herbs often growing in swamps, leaves 3-ranked, grass-like or assembled at the top of long slender stems. Clump forming and with runners. Leaves with papery sheathing. Dense tuft of narrow evergreen leaves, standing erect, but soon lengthening and arching outwards in symmetrical fashion to produce a mop-head or ‘pudding basin’ hairstyle effect. Flowers are unisexual (male and female flowers on same plant) in separate spikes or in different parts of the same spike. Female flower enclosed in a sack-like structure (perigynium), which later encloses the fruit. Fruit is a nutlet, (some 2-sided or 3-angled). Resembling grasses but having solid rather than hollow stems. “Sedges have edges”—solid triangular stems.

C. **Juncaceae**: Rushes—Annual or perennial, grasslike herbs, usually from a rhizome, often clump-forming, sometimes colonial. Leaves are cylindrical/round or flattened, with sheaths at bases.”Rushes have ridges”. Inflorescence stalked, usually branched, with or without leaflike or stemlike bracts. Flowers are small, green to brown or reddish with 6 sepals and 3 or 6 stamens. Fruit is a 3-chambered capsule with many small seeds. Most species

prefer saline or freshwater marshes, swamps, shores, meadows, sloughs, wet forests, wet roadsides, ponds or streams.

Definitions: **Glumes:** (husk, to peel), either of the 2 empty sterile, chaffy bracts at the base of a grass spikelet or similar structure on the spikelets of sedges,

**Awns:** any of the bristly fibers on a head of barley, oats

**Lemma:** the outer or lower of the 2 bracts or scales surrounding or enclosing the flower of a grass,

**Spikelet:**(ear of corn) a small spike or unit of grass inflorescence (as in the flower cluster of grass), consisting of one or more flowers and their bracts.

**Ligule:** a thin membrane attached to a leaf of grasses at the point where the blade meets the leaf sheath

**Culm:** a stalk , stem, akin to blade of grass, the jointed stem of various grasses, usually hollow)

Genus:

1. **Grasses:** Generally low maintenance, deer resistant, insect and disease tolerant. Grasses have very architectural forms: strong vertical lines or graceful fountaining arches. Their colors range from blue, red, variegated, tan and chestnut brown. Grasses provide seasonal interest in motion and sound after the seed heads are gone. *Achnatherum*, *Aegilops*(annual, related to rye and barley), *Agropyron*, *Agrostis*, *Aira* (hair grass), *Alopecurus* (foxtail grass), *Andropogon* (native blue stem), *Anthoxanthum*(Vernal grass—short, flat upper leaf blades and loose, elongated heads of spikelets), *Arrhenatherum* (bulbous oat grass or onion couch), *Arundo* (giant reed with corn-like leaves striped green and white), *Avena* (animated oat—fodder, branching head of hanging spikelets with long, stiff awns), *Bothriochloa* (beard Grass), *Bouteloua* (mosquito or signal-arm grass), *Briza* (quaking grasses with dangling spikelets trembling or dancing in the wind—large, smooth, rounded spikelets on very thin and delicate stalks-dry ground, perennial or annual), *Bromus* (brome, reserve grass), *Calamagrostis* (Feather reed grass—the cultivar ‘Karl Foerster’ was the perennial plant of the year for 2001, a cool season grass with vertical form to 3”, likes sun and moisture), *Chasmanthium* (spangle grass or Northern Sea Oats--grows in shade—dangling flat, oatlike seed head, wide flat leaves to 4’, “wild oats”), *Chionochloa* (tussock grasses from New Zealand all featuring dense clumps of arching foliage), *Coix* (Job’s tears), *Cortaderia* (Pampas grass—huge tufted plants with tall stems and dense heads of silky florets—saw-edged blade—male and female flowers on separate plants-male plants the branches of inflorescence point upwards, female plants they are more spreading), *Corynephorus* (grey hair grass), *Cymbopogon citratus* (Lemon Grass), *Dactylis* (British native cocksfoot), *Deschampsia* (Tufted or wavy hair grass—tufted 2’ grasses with a branching head of small, shining spikelets with short awns, sun perennial), *Elymus* (invasive but fine Blue Lyme grass, Blue wide rye), *Eragrostic* (African or weeping love grass), *Festuca* (fescue or blue grass, 6” clump), *Glyceria* (Manna Grass, 2-3’, sun, variegated, grown in water), *Hakonechloa* (Golden-

yellow streaked-Japanese Forest Grass, waterfall form, fall =pink and red highlights, 14", part shade), *Helictotrichon* (Blue oat grass, spiky dome form cool season, evergreen full sun 18", powder blue foliage, gravelly, infertile soils), *Holcus* (carpeting or velvet grass), *Hordeum* (Squirrel's tail or foxtail barley), *Hystix* (Bottle brush grass—means porcupine), *Imperata* (Japanese Blood Grass—no flower), *Koeleria* (Crested hair grass), *Lagurus* (Hairs tail), *Melica* (nodding Melick—smooth, often silvery spikelets on very thin and delicate stalks, with only the lower 2 florets fertile—dry ground—'Atropurpurea' is purple form), *Milium* (Bowles' golden grass), *Miscanthus* (Maiden grass, Silver grass, Eulalia grass—at least 40 forms, striped and red leaves—tufted, fountaining plants with leaves up the stem and a flat-topped or pyramidal head of branches on a short axis and silky-flowered spikelets—'Gracillimus' is narrow, 'Strictus' has yellow bands, 'Variegatus' since 1900, 5-6'tall, flowers 8'), *Molinia* (Purple moor grass—tolerates part shade-'Sky racer', deciduous, sun and moisture, 2-3' tall with 5' flower stalks), *Muhlenbergia* (Muhly grass 2-4' tall, sun to light shade, native to NC and FL), *Nolina* (Basket grass, ground cover), *Panicum* (Panic grass, Deer tongue grass and red switch grass-late season red foliage, fine texture, 6', sun, 'Shenendoah', 'Heavy metal', Dallas Blue', 'Cloud'), *Pennisetum*, (fountain grass—Grasses with long heads of spikelets each surrounded by slender bristles—dry ground, annual or perennial—'Burgundy Giant' 6', sun to shade), *Phalaris* (Ribbon or canary grass—perennial or annual—branching or compact head of small, crowded, 3-flowered spikelets. White striped form 'Picta', commonly used as birdseed, 3', invasive), *Phleum* (Timothy grass or cat's tail), *Phragmites* (Reed used for thatching, tall plants forming reed beds, with branching heads of silvery spikelets—swamps, perennial), *Poa* (mat-forming meadow grass), *Polypogon* (Beard grass), *Rhynchelytrum* (Ruby or natal grass), *Saccharum* (9' tall Revenna grass), *Sesleria* (Blue moor grass—leaves are blue-green, underside is white), *Setaroa* (Foxtail millet), *Sorghastrum* (Indian grass, 'Sioux Blue' blue foliage, upright, 3', sun, flowers 8-12" long), *Sorghum* (Broom corn), *Spartina* (Cord grass), *Spodiopogon*, *Stenotaphrum*, *Stipa* (Pheasant grass—perennial, large tufted plants with tall stems and loose heads of awned spikelets or shorter plants with exceptionally long and silky awns, dry ground or mountains, rocks), *Triticum* (Bread wheat, most common temperate cultivated grass—used for pasta and semolina), *Zea mays* (maize, Indian corn—stout annual, tall with male flowers at the top and female in the lower leaf axils—Maize is the 3<sup>rd</sup> most important grain crop in the world after rice and wheat. Developed around 6000 years ago by selection from the wild annual teosinte—earliest finds in Mexico).

**2. Bamboo** (Giant Grasses) subfamily of grasses found throughout the tropics (generally where clumpers or sympodial types are found) and in moist temperate areas in Asia and South America (generally where the running or monopodial types are found), particularly diverse in China and Japan. Hard-walled with ringed joints and shallow roots. Fastest growing vegetative plant growing 1 foot per day, 2" an hour. Has a bad reputation for spreading aggressively. Plant a root barrier 30" deep or container or choose clumping

kinds. Some grow 70 feet tall with 8 inch diameter. Over 150 cultivars of the species. Treat as a grass with high nitrogen fertilizer as needed. Rarely flowering, wind pollinated: *Arundinaria disticha* (dwarf fern leaf bamboo, can mow, *A. pygmaea*). *Bambusa* is the clumping type. *Chimonobambusa*, (distinctly swollen nodes), *Chusquea* (Chilean bamboo with thick, solid, pithy culms of greenish yellow, clump forming. Sheathed, branches numerous at the node), *Himalayacalamus* (rounded sheaths and pubescent ligule), *Indocalamus*, *Phyllostachys* (Black (Nigra) bamboo with hollow stems, sheathed, grooved, cold hardy, edible new shoots, fast spreader. *P. aurea* is “Golden Bamboo”, fishing poles to 20’), *Pleioblastus* (Dwarf and variegated, spreading, persistent sheaths), *Pseudosasa* (Arrow bamboo, Green Onion Bamboo, cold hardy 15’ tall, thicket-forming and sheaths persistent and longer than the internodes), *Sasa* (large leaved, spreading with slender stems), *Sasaella* (spreading with slender, upright stems and rather small leaves from Japan), *Semiarundinaria* (thicket-forming bamboo with falling sheaths hanging by their bases) *Shibothea* (2 feet tall, cold hardy, slender stems, textured leaves), *Sinarundinaria* or *Fargesia* (slender hollow canes, branching at nodes) *Yushania* (rampant grower, in forests in China, from Taiwan to northwestern Himalayas. The American Bamboo Society is located in Solano Beach, CA.

3. **Sedges:** *Carex* (flat, grass-like leaves in groups of 3, triangular flowering stems and the male and female flower on separate spikelets—males at apex), *Cyperus* (from South Africa—flat, grass-like leaves in groups of 3, the triangular flowering stems, and the male and female flowers on short, flattened spikes arranged in a much-branched or simple umbel), *Eriophorum* (cotton grass—grass-like leaves in groups of 3, with a triangular tip and with long silky hairs that surround the fruit. Used to stuff pillows), *Schoenus*, *Scirpus* (Fiber Optic grass), *Uncinia* (grass-like leaves with triangular tip, the terminal spike with male flowers at the tip, female below, the female flowers with a long hook protruding from the tip of the utricle). Pollination by wind.

4. **Rushes:** *Juncus*, *Lazula* (woodrush) with flat, grass-like leaves, usually with scattered white hairs on the surface and small brownish flowers followed by dark brown, shining capsules. Seeds dispersed by ants. Many of these plants feature pale brown seed heads in the summer.

Species:

1. **Grasses:** *Cortaderia selloana* (Pampas Grass) an Argentinian name, native to South America, Named after Friedrich Sellow. A perennial grass, large, densely clumping. Sheathed. Evergreen. Dioecious with both male and female plants. Reaches 6-8 feet in height with an equal spread. Grows rapidly. Hardy to Zone 5. Leaves are simple 5’ to 7’ long, 1/2” wide at the base, tapering to a point at the drooping apex. The leaf margins are saw-toothed! Flowers are silvery-white, tiny, in terminal panicles (plumes) 1’ to 2’ long and held 1’-3’ above the leaves. Plumes appear in August, persisting until January. Often used in dried arrangements. Grown commercially in California. Seed (fruit) is caryopsis, small and usually not viable. One cultivar has a pink plume. *C.s.*

*pumila* has waist high foliage."Gold Band" is gold and green, "Silver Comet" is green and white.

***Miscanthus sinensis*** (Chinese Silver Grass, Eulalia, Japanese Silver Grass) A herbaceous perennial with upright clump growing to 8' tall. Species is hardy to Zone 5 (other species and cultivars will vary slightly). Native to eastern Asia but being bred in Germany. Leaf blades are mostly basal arising from a large clump. Leaves are flat 3' to 4' long, Sharply serrate! Flowers are pale pink to reddish and are borne in a loose, terminal panicle that is 8" to 10" long. The flowers are long lasting when dried. Bloom period is fall but the flower effect of the plume lasts nearly all winter. Many cultivars including 'Gracillimus' (Maiden Grass), 'Purpurescens' with silver pink inflorescence, and reddish foliage, 'Zebrinus' (Zebra grass) with horizontal yellow bands on leaves), 'Yaku Jima' (a dwarf variety to 4' tall). 'Silberfeder' is a German selection with 7' plumes, striped foliage to 5', clumping.

***Pennisetum alopecuroides*** (Chinese Pennisetum, Perennial Fountain Grass) Pennisetum is derived from *penna*, a feather, and *seta*, a bristle and refers to the feather bristles (awns). The flowers look like bottle brushes. Likes sun. A herbaceous perennial with leaves strongly arching creating a mounded habit, 3' to 4' tall. Hardy to Zone 5, native to China, Australia and Eastern Asia. Culms are slender and grow to 4'. Foliage is bright green in summer and turns golden brown in fall. Single flower spike is 5" to 7" long and bristles are long and prominent with a scabrous texture. Resembling bottle brushes in fall. Cultivar 'Hameln' is a dwarf fountain grass 2' to 3' tall as is 'Weserbergland'. *P. setacum* is Purple Fountain Grass. 'Caudatum' is an early bloomer with white plues. 'Viridescens' has broad leaves.

2. **Sedges:** *Carex elata* 'Aurea', *Carex hachijoensis* 'Evergold' (both gold leaved). *Carex glauca* is silver-gray evergreen sedge reaching 10 to 12 inches high. Hardy to Zone 7. *Cyperus alternifolius* (Umbrella flatsedge). *Carex morrowii* (Japanese sedge).

3. **Rushes:** *Juncus effusus* 'Spiralis' is know as Corkscrew Rush which is very descriptive of the strange mode of growth—spiralled, cylindrical, shiny green leaves. *Juncus inflexus* 'Afro' has blue green leaves and needs neither damp soil nor water. Lazula (Wood rush, 1 foot evergreen)

Cultivars/Varieties: Within the last 5 to 10 years over 200 new varieties have been introduced. Over 20 varieties of *Festuca* alone!

Cultivation:

A. Light: Grasses grow best in full sun but will tolerate partial shade. Some grasses can be grown in shady areas.

B. Soil: Grasses grow well in most soils except very wet ones and tolerate drought and salt spray. Little soil preparation is needed—just remove weeds from an area and plant. Add peat, humus to 8-12 Inches for well draining.

C. Water/Humidity: While the majority of grasses can thrive in a xerophytic or naturalized environment, some perform well in water gardens (*Carex*, *Arundo*, *Cyperus*, *Scirpus*, etc). Drought resistant.

D. Fertilizer: rarely needed, but nitrogen is good.

E. Temperature: Annual warm season grasses can be killed by frost. Hardy cold season perennial grasses return each spring. Heat resistant.

Maintenance: very low maintenance once established.

1. Mulch: To maintain even soil temperature, moisture and to discourage weeds, mulch grasses to 3 inches with organic material.

2. Pruning: Grasses should be cut back to 18' high after blooms fade in late winter or before new growth appears in spring—cut within 1-2" of the ground for low growing plants. Transplants best in Spring.

3. Coping with aggressive species: Invasive species can be grown in pots, physically restricted by a barrier or bordering material, or simply allot the space and divide when the space is exceeded.

4. No need to deadhead or stake.

Disease and Pests: Ornamental grasses are usually low maintenance in relation to insect and disease problems. They provide snug winter shelter for many beneficial insects. Occasional green fly or black fly. Rust on the leaves should be treated early with suitable products.

Propagation:

A. Division of Rhizome: Divide the clump in spring to mid summer. Division is required every 3-5 to 10 years to prevent the center of the plant from opening up. Simply lift the grass and pry apart the crown with a spade or two back to back forks. Replant and water regularly until established.

B. Seed: Annuals are usually grown from seed (awns) each year. If the grass is hardy, direct sow collected dry seeds in the autumn. Cover lightly with soil and keep moist. If the grass is tender, sow into prepared soil after danger of frost has passed or sow in pots or trays, harden off and then plant outdoors. Some reseed freely (*Panicum* or switch grass)

What the Judges are Looking For: Ornamental Grasses can be used as specimen or accent plants, screens or informal hedges, ground covers, in park settings, as massed plantings and in small show gardens. Ornamental Grasses may be entered in sections of cut annuals, cut perennials, cut decorative foliage, container grown or collections and displays in the Horticulture division. Can be considered an herb (*Cymbopogon*). May include those having distinctive leaf structure, patterned or colored foliage, decorative seed heads or by size: Large (exceed 12 feet), Midsize (5-7 feet) or Compact (8 to 18 inches).

Schedule should indicate length of stem, measured from cut end to tip or cut end to decorative seed head. The seed head may be dry but the stem should still have evidence of being green and fresh, current year's growth. Number per bottle? Use the foliage form or flowering form for all in a class.

**Cultural Perfection:** described as the end results of a plant having received the culture necessary to grow as near to perfection as possible. The plant should be actively growing, vigorous, fresh, alert, full of substance, free from

damage, disease, insect problems, clean and well-groomed. The symmetry is the placement of the plant parts equally about an imaginary line drawn through its center. Vigor is the strength and vitality of the plant, no wilting or limpness. Color of the foliage and seed head should be typical for the specific grass. Many of the grasses are grown for their color which should be even and well developed in both foliage and seed head. Some grasses color in late summer and fall and should be shown to display this color. Many grasses are large plants, which, when grown in a container, will not develop full size. Maturity is determined by the presence of seed heads, or flower spikes and development of plant into its typical habit of growth--arching, mounding, tufted, etc. The form of the plant should be typical for the habit of growth. Leaf blade placement on stems should be uniform with uniform spacing between leaves. If long, single blades are typical, they should be evenly spaced around a well-rounded plant. If the form of the foliage is correct, the symmetry will be well developed.

**Grooming and Staging:** Staging is the presentation of the plant at the time of showing. Container should be clean, harmonious, not cracked or broken, in proper proportion to the plant. Free from dirt and debris, residue and dried or dead leaves.

**Distinction:** Marked superiority in all respects. Consider the points deducted above and use the rule of thumb to justify taking additional points here.

**Labeling:** Label should be readable, correct botanical naming on an acceptable card/tag/marker placed where it can be seen. It should be un-smearred and correctly spelled.

Awards Eligibility: Sectional Awards of Merit, Grower's Choice, Collector's Showcase and Horticultural Excellence if scoring 95 or better.



Optional Topic:

## Palms and Cycads

Objectives:

To compare the similarities and differences between the types of palms and cycads.

To practice propagation techniques.

To learn the secrets of growing and showing palm and cycads.

References:

International Palm Society, Lawrence, Kansas

Cycad Society: [www.cycad.org](http://www.cycad.org)

Palm and Cycad Society of Florida: [www.plantapalm.com](http://www.plantapalm.com)

ENH 1094/EP354 UF EDIS publications: "Palms for North Florida"

"Native and Exotic Palms of Florida", UF Bulletin 152-A

Materials needed for this unit:

Seed and potting mix suitable for starting.

As many examples of fronds or plants as possible.

Cones if available.

**Introduction:** Linnaeus referred to palms as the "princes of the plant kingdom". Palms stand for all that is noble and grand in the plant world. Dr. Henry Nehrling wrote that "Florida is the land of Palms". Economic value includes fiber (coir), fruit, wax, oil, wood.

**Classification of Palms:** Any of various chiefly tropical evergreen trees, shrubs or woody vines of the family Arecaceae having unbranched single, cylindrical trunks, suckering or branching trunks with a crown of pinnate, palmate or costopalmate leaves having conspicuous parallel venation. Trunks can be manipulated by man to be clean, fatter than natural. A prominent part of the Florida landscape. Approximately 2800 species of palms known with 12 native to Florida (8 in south FL and 4 in north FL). The finest display of palms (some 700) can be found at Fairchild Botanical Gardens in Miami.

Family: Arecaceae (formerly Palmae)

Genus and species: Approximately 200 genera (10 native to the USA) and over 2800 species.

### A. Palms for your landscape:

*Butia capitata* (Brazilian name meaning 'dense headed'-native of South America): Pindo Palm, This is a medium sized (commonly 10-12 feet tall but sometimes up to 30'), slow growing, single trunked (1-2 foot diameter), erect palm stiff, with a strongly recurving canopy. The leaves are pinnate, 8-10 feet long, the petiole is induplicate (folded like a trough) armed with straight thorns pointing toward the leaf tip. Blue-green in color. Can be used as a specimen, accent or street planting or in planters. The leaf bases persist along the entire trunk. Flowers are monoecious, small and on a stalk up to 5 feet long. Fruits are drupe, yellow to red, oblong and ovoid shaped to 1 inch long, densely clustered, pulpy, fibrous and edible with pineapple/banana taste (also called a Jelly Palm and mistakenly referred to as Cocos: coconut). Fruits can be messy along a sidewalk. Can be propagated from seed. This palm needs full sun and tolerates hot, windy conditions including asphalt and concrete areas. Highly drought tolerant. Tolerates various soils and moderately salt tolerant. Problems include micronutrient deficiency,

scale and the palm leaf skeletonizer. One cultivar, 'Strictior' features erect petioles vice recurved. Zones 9-10 but can be grown in all areas of Florida.

*Sabal palmetto*: Cabbage Palm, our state tree, commonly growing 20-40 feet tall but can grow up to 90 feet tall. A monocot. This is a medium sized, single trunked (to 18" in diameter), erect palm with a dense, tight globular canopy, native to the eastern US (does not occur naturally in the western portion of the panhandle). The leaves are costapalmate (fan shaped) to 6 feet long and 3 feet wide, divided 1/3 of the way to the base. Segments are long, tapering, pointed, with a split at the apex. Many threads, filaments or hairs are in the sinuses. Overall color is green or grey-green. The petiole is unarmed but goes completely through the length of the leaf. The flowers are hermaphroditic, inconspicuous and on stalks to 4 feet long hidden among the leaves and multi-branched. The fruits are drupe, brown-black and globose to ¼ inch in diameter and shiny, ripening in the fall. Propagation is from seed. This palm enjoys full sun to partial shade. It is highly salt tolerant, easily transplanted and grows in various soils. Can be used as a specimen tree, framing tree or street planting. "Boots" usually fall away leaving a smooth or slightly ridged trunk. Root zone can migrate up the trunk. Several related species: *Sabal minor*, or Bush Palmetto, stays low, has a smooth petiole and flatter leaf. Can take some shade as it is an understory palm without a trunk. The *Sabal mexicana* is better known as the Texas Sabal Palm and *Sabal bermudana* or Bermuda Palmetto are also available. Problems include the Palm weevil and palm leaf skeletonizer.

*Serenora repens*: Saw palmetto, named for botanist Sereno Watson) A clumping palm, low and bushy with multiple trunks. Can reach heights of 20 feet tall but normally upright in the 4-5 foot range. Spread increases with age. Growth rate is moderate. Flourishes in all areas of Florida—can take salt. Native to sandy areas and pinelands and coastal locations throughout the southeast US. It often forms extensive, dense colonies. The trunks normally creep along the ground and are rarely erect. They sucker in contact with the ground. The trunks are 9 to 12 inches wide and covered with brown fiber and old leaf bases. Leaves are palmate to 3 ½ feet wide, deeply divided into 25-30 stiff, tapering segments with cleft tips. The leaves are normally green, but there are bluish-silver varieties. The 3-4 foot long petioles have small, sharp sawteeth covering the margins of the basal half. Flowers are whitish, small on a 3 ½ foot long flowerstalk with numerous short branches. Flower stalks appear among the leaves in spring. The flowers are a source of high-grade honey. Fruits are yellowish, turning black at maturity, ellipsoidal to 1 inch long, ripening in August through October. The saw palmetto needs full sun to partial shade and will grow in even poor soils so long as they have good drainage. It is highly salt tolerant and virtually pest free. Propagation is from seed. Seedlings grow very slowly and transplants poorly from the wild. Gives a naturalistic effect to any yard. There is a silver variety. Natural medicine to prevent prostrate cancer.

*Washingtonia robusta*: Mexican Fan Palm--Washington Palm named after George Washington, means strong/stout. A large single-trunked erect palm with loose, globose canopy to 80 feet tall but commonly seen at 40-50 feet tall. Rapid growth and native to southwestern US and Mexico, can be grown in all areas of Florida in Zones 9 and 10. The leaves are palmate to 4 feet across, divided half way to the base. Features many threads in sinus when young, disappearing with age. Segments are bright green, petiole reddish-brown, armed with thorn pointing in both directions. Leaves often persist forming a dense skirt. The trunk can be 2 feet wide or wider at base with angled rings and vertical cracks

present. Flowers are hermaphroditic, small, numerous, on a white stalk to 12 feet long. Flowers are not showy. Fruits are drupe, black, oval and about 1/3 inch long. This palm needs full sun and is moderately salt tolerant. Tolerates various well-drained soils. Propagation is by seed. Problems include the palm weevils, root rot, persistent leaves. Armed petioles on falling leaves are dangerous. Resistant to Lethal yellow Disease. Can be used as specimen, accent for tall buildings and as street plantings. The cultivar *W. filifer*, Petticoat Palm, has a larger trunk.

*Rhapidiphyllum hysterix*: Needle palm, native (Rapidly falling into history) 4-ply leaf, cleft leaves, needles at base. Low-growing to 6', an understory plant (can take shade), clumping. Needles are part of the leaf sheath and can be pruned off. Leaves are palmate, very dark green on top but whitish on back and divided almost to the petiole. Trunk is covered with brown fibrous mat. One of the most cold hardy to zone 7: Native from Florida to South Carolina.

*Phoenix canariensis*: Canary Island Date Palm: very long pinnate leaves spanning 12' and a massive trunk of 3' diameter. Very cold hardy palm. Give it plenty of sun and plenty of room (at least 25' from edge to edge). Fast growing. Leaf petioles have dagger like spines. Not a true date producer. Related palms: *Phoenix dactylifera*, true date palm, *Phoenix robelini* or pygmy date palm is a graceful plant from SE Asia. Feather-shaped leaves are medium green with individual segments narrow and soft looking. The base of each leaf is modified into spines. Needs bright indirect light. *Phoenix reclinata* or Senegal date palm suckers at the base to form a multi-trunked clump.

*Trachycarpus fortunei*: Windmill Palm (native to China, named after Robert Fortune, means 'rough fruit'). Small to medium sized, single trunked, erect palm with a slow growth rate—an understory plant—some shade needed. Usually seen 5-10 feet tall but can grow to 40 feet tall with a trunk 1 foot in diameter or more slender, densely covered with brown fibers (furry) and old leaf bases. The leaves are palmate to 3 feet across, divided almost to the base. Segments often drooping near tips, dark green above, glaucous beneath. Petiole is unarmed but bumpy and rough. Flowers are monoecious, small, yellow and fragrant. The flower stalk is very short, branched. Fruits are blue when ripe, tree-lobed to 1/2 inch long. Propagation by seed. Enjoys full sun to partial shade, fertile well-drained soils. Is moderately salt tolerant and moderately drought and wind tolerant. Use as an accent, specimen, or framing tree or in an urn. Does well in confined areas—doesn't like wind. May get scale, palm aphids, root rot and is moderately susceptible to Lethal Yellowing Disease. For a dwarf windmill palm try *Trachycarpus nana*. *Trachycarpus wagneriana* or "Waggy Palm" or "Bonsai Palm" is highly wind resistant and cold hardy and likes full sun.

\*Mule Palm, *X Butiagrus nabonnandii*, is a hybrid made by crossing the cold-hardy pindo palm with the more tropical queen palm. The result is a cold-hardy palm with a tropical feel that grows in Hardiness zones 8-11. It is salt-tolerant but needs good drainage.

*Bismarkia nobilis*: Bismark Palm is good for south of Lake Okeechobee where temperatures don't get below freezing. Native of Madagascar. This palm gets to be massive! Silvery blue-tinted fronds are stiff, giant fans, bold form. Difficult to move once established. Full sun to light shade.

#### **B. Indoor and container-grown Palms:**

*Chamerops humilis*: European or Mediterranean Fan Palm is native to southern Europe. A small palm with stiff petioles and light gray or silver cast. It has a deeply cleft, palmate leaf. Petioles are armed with thin but sinister, orange teeth. Usually seen as a 2' to 6' specimen but may grow to 15'. Can be grown in containers. Produces suckers. Can be multi-trunked or pruned to a single trunk. Slow growing, full sun.

*Chamaedorea elegans* or Bamboo or Parlor Palm, comes from the highland forest of Central America (Mexico). Very tolerant of low indoor light and cool night temperatures—hardy to 10 degrees. Feather -shaped leaves and fern-like appearance. Frequently sold in 2" pots for use in dish gardens and terrariums. Single stem but often planted in clusters. In time the plant will grow to 3' or more and may produce the woody, many-branched stalk bearing its flowers. Bears bright red fruit. *Chamaedorea erumpens* (or *C. microspadix*): Bamboo palm grows up to 6' with fronds spaced farther apart on the trunk giving a bamboo-like appearance. Oriental in feeling. Develops basal suckers, forms natural clump. Give low light and moist culture. *Chamaedorea radicalis*, the Dwarf Bamboo Palm are used as indoor plants. Understory palm. *Chamaedorea hooperiana* 'King Maya' is another classic palm developed for indoors.

*Livistona chinensis*: Chinese Fan Palm from Asia is a minor player usually found in landscapes as large ground hugging plants. Slowly grows to a height of 30' with a 10' spread outdoors. Palmate leaves are folded lengthwise in the middle of the leaf, yellow green in color. Mostly sold as a houseplant but can be used outside in protected areas.

*Raphis excelsa*: Lady Palm features dark green fronds that arch, fan shaped and a trunk with a mat of woven fiber. Native to SE Asia. Slow growth reaching to 10' (only getting about 2' tall indoors) but easy to divide new plants (basal shoots) formed in the bottom of the pot (Propagation by division). Prefer low levels of light, dappled shade to full shade indoors. Water evenly, feed monthly with liquid fertilizer during the growing season. Use a well-drained potting soil. Durable and resistant to neglect. Scale is the only major pest. Can be pricey.

#### C. Other Palms of note:

*Paurotis wrightii*: Saw Cabbage Palm

*Roystonea regia*: Cuban Royal Palm is a south Florida favorite, native.

*Pritchardia thurstoni*: is similar to *Pritchardia pacifica* or the Fiji Fan palm.

*Pseudophoenix sargentii*: Sargent's Cherry Palm from the FL keys

*Coccothrinax argentata*: Florida Silver Palm, native small

*Thrinax parviflora*: Jamaica thatch Palm, native, small

*Thrinax microcarpa*: Brittle Thatch Palm, native in the keys, stout tree up to 30' tall

*Caryota mitis*: Fishtail Palm or the Teddy palm grows to 40' tall

*Veitchia merrillii*: Christmas Palm

*Geonoma*: understory palm

*Normanbya*

*Reinhardtias*

#### Culture/Care:

Fertilizer: Fertilize in September, December, March and June with a granular fertilizer (equal rates of nitrogen and potassium plus minor elements) around the outside perimeter of the dripline and under the dripline but never against the tree. Granular

fertilizer with slow-release form of nitrogen and potassium are best, in equal amounts. Magnesium deficiency causes yellowing of edge of leaves..treat with Epsom salts. Lack of potassium causes yellowing and loss of the canopy.

Water: Palms can be overwatered. Most of them only need a good watering once a week otherwise leaching can occur.

Repot when they become root bound. Can root prune. Can plant deeper than original root level.

Transplant in warm months (May – September) if you cut the roots. Can transplant anytime if in a pot.

Pruning: Lower leaves can be selectively pruned if yellowing or brown. Remove brown floral parts as well.

**Classification of Cycads:** Tough tropical evergreens, relics of the age of dinosaurs—100 or 200 million years old. Superficially resemble palms and ferns—NOT a palm--more closely related to Pines and Ginkgo than palms. Some 100 species of these primitive seed-bearing plants still persist, dispersed among 10 genera and four families all across the earth—one is native to FL. Classified as ancient, endangered gymnosperms with the common attribute of having a naked seed. Both male and female plants produce modified leaves which resemble cones, which provide a climate-controlled chamber for the delicate process of fertilization to occur—requires moisture. These produce pollen and seeds. Tough evergreen leaves are always compound with a varying number of pinnae, or leaflets, arranged along an elongated leaf axis. Cycads produce one flush of new leaves per year, unfurling, usually during the spring and summer months. Fertilize cycads monthly during the growing season. Some cycads will produce cones one year and leaves the next. The leaves radiate from a stout trunk, which remains short for many years. In short, cycads resemble a massive armored fern! Enjoy from a distance as these can be ferociously armed with sharp-toothed leaflets or spiny petioles. All cycads contain carcinogens which maybe absorbed through the skin so be sure to wear gloves when dealing with seeds. The finest display of cycads (over 750 types) can be found at Fairchild Tropical Botanical Garden in Miami, a living museum that provides seeds and other propagules.

A. Zamiaceae: Over 53 species in this wide-ranging genus and contains a variety of forms.

*Zamia floridana* (syn *Z. umbrosa*, *Z. silvicola*) (Coontie/Comptie/Conti or Florida Arrowroot/Comfortroot) A shrubby plant, evergreen with woody subterranean stems and only the leaf bearing tip exposed. Densely foliated and depending on the individual, may have arching to full erect leaves. Overall height ranges from 1-3 feet tall. Growth rate is variable and clumps spread slowly. Native to the east and west coast of Florida as an understory plant in pine and oak woodlands and hammocks as far north as southern St. Johns County—considered an endangered plant. Once harvested by native Seminole Indians because of its high starch content in the underground stem and made into ‘Arrowroot flour’. Leaves are pinnately compound, deep green glossy, leathery leaflets. Often erroneously referred to as fronds, the leaflets are known as pinnae. Leaflets are highly variable, ranging from 3-5 feet in length, 1/8inch to 5/8 inch in width but mostly rounded and flat. They may be variously twisted or in one plane. They have parallel venation and possess a small amount of serration near the apex. As the subterranean

stems grow they are continuously pulled into the ground—contractile—branching dichotomous. Flowers of this plant are dioecious: male plants bearing slender male cones in which pollen is produced. The females with fat, seed bearing cones, each sporophyll possessing two naked ovules. Sporophylls of both sexes are shield-shaped and peltate. The cone stalk and sporophylls are heavily tomentose and are rusty to dark brown, borne near the ground and hidden among the crown of leaves. Technically, there are no fruit, but the naked seeds borne in female cones have a thick scarlet to orange fleshy, foul-smelling seedcoat (called the sarcotesta), underneath which lies a stony seed. These ripen in fall-winter, at which time they fall apart, revealing the orange colored seeds. Propagation is by seeds planted after the fleshy layer is removed and the stony layer is scarified (nick with a sharp knife or use concentrated sulfuric acid). Seeds are not long-lived and should be planted as soon as possible. If the seed of any cycad rattles when shaken, it is no longer viable. Seeds that float may also be discarded. Stems often referred to as tubers, may be divided—harvested for starch. Use a sharp spade and keep watch for fungal infections. This plant takes no special requirement other than good drainage. Can survive in a variety of soils and light conditions. Sometimes infected with Scale. Use as a foundation planting or as a subject in small gardens. Larval food for the Atala Butterfly (*Eumaeus atala*). Since this is such a variable species, selection may be made amongst the various forms which can be found in the nursery: wider or narrower leaflets, arching to erect leaves and leaflets which are twisted versus those which lie in a single plane. For a cycad grown as a houseplant, try *Zamia pumila*.

*Encephalartos* plants are native to south and central Africa. Over 60 species, most with suckering and clumping habit. Known as Bread Palms or Kaffir Bread because the seeds and stem starch are used to make bread. These are among the most formidable of all cycads with ferocious armament on both leaflet and leaf stalks. *Encephalartos horridus* is extremely large with unyielding spines. *Encephalartos ferox* is native to Mozambique and is the most attractive and available species in the genus. Leaflets are bright green and glossy, and have a number of prominent sharp teeth along their margins. The scarlet cones may be produced five at a time in the crown of female plants and up to 10 at a time in male plants. Considered one of the fastest growing in the genus reaching cone bearing age at 12 years. Usually no more than 3 feet tall.

*Zamia skinneri* is a rainforest type cycad.

*Macrozamia* is from Australia and has a colored area of the callous tissue at the base of the leaflets. Over 40 species.

*Lepidozamia* is from Eastern Australia and contains 2 large, understory species. The male cones open in a prominent spiral at maturity.

*Certozamia* or “Bamboo Cycad” is from Central America and has over 16 species with prickles at the petiole base. Cones of most species have 2 prominent spine-like horns on the outer part of the sporophylls.

*Dioon* is a cycad from drier regions and likes a gritty soil mix. From Central America. Twelve species have stiff, straight, non-articulate leaflets with sharp points at the tips. *D. edule* is one of the most cold hardy, drought-tolerant cycads for north Florida.

B. Cycadaceae:

*Cycas revoluta*: Japanese Sago Palm, King Sago Palm—Greek word meaning ‘rolled backward’. An evergreen palm-like plant, upright, often suckering, rarely branched to 10 feet tall, usually much shorter and with slow growth. Native to 3 islands in southern Japan. Hardest of all *Cycas* spp.—approximately 10-20 species in the genus *Cycas*. Leaves are pinnately compound, 3-4 feet long in rosettes. Leaflets to 7 inches long, 3/8 inch wide, glossy green, sharp tips, and stiff. Leaflets reduced to prickles at base of rachis. Leaf scars and persistent leaf bases and spines remain on the trunk. Trunk and leaves are winter hardy. Flowers are dioecious: male cone (microstrobilus) cylindrical to 24 inches tall. Female without cones but with modified scale-like leaves, brown felt covered, grouped into a globose mass. Fruits are ovate orange-red seeds to 2 inches in diameter, somewhat flattened. Propagate by seed (gather seeds only when cones begin to disintegrate—the King Sago seeds will sink in water) or the division of suckers. Carefully cut the sucker from the trunk and place in sharp, sterile sand or a half and half mixture of vermiculite and perlite. Only the very base of the offset should be covered. Bottom heat speeds root development. First to emerge from the seed is a long, thick primary taproot. Cycad potting mix should be similar to what one would use for succulents. Sagos enjoy full sun to partial shade, various well drained soils. They are moderately salt tolerant. Scale, mealy bugs, leaf spot and micronutrient deficiencies (particularly magnesium) can be a problem. Use as a specimen plant, accent, in and urn or to create a tropical effect.

*Cycas taitungensis* (Emperor Sago) has leaves twice as long (to 8') and trunk twice as big as *C. revoluta*. From Taiwan. Doesn't get scale.

*Cycas circinalis/Cycas rumphii*, the Queen Sago, with much larger leaves (8-9 feet long and longer and wider leaflets). Leaflets are flat, pliable and have a light, powdery bloom that makes them a duller green. Much more graceful and palm-like than the Japanese sago. Very tender to frost. The Queen Sago seeds will float.

*Microcycas calocoma* is a large plant from Cuba and is sensitive to cold and hard to obtain. It is a primitive plant.

C. Boweniaceae: Have bipinnately compound leaves and dichotomous venation. Mostly from Australia. Has a subterranean stem.

*Bowenia serrulata* with multiple cones about the size of pine cones

D. Stangeriaceae: From eastern coast of South Africa. Only one species.

*Stangeria eriopus*: Looks much like a fern. Leaves are produced one at a time.

**Culture:**

Seeds: unavailability (lack of pollinators or inefficiency of pollen transfer—some cycads are wind pollinated, others insect (beetle) pollinated) receptivity of female cone does not always coincide with release of pollen, slow to germinate. Hand pollination does not guarantee viable seed production.

Division: inadequate, aggravates already endangered status.

Maintenance: Fertilization, irrigation and pruning will result in a healthy, well-grown plant. Prune off all old leaves in early April. Fertilize with slow-release fertilizer and irrigate as needed.

**What the judges are looking for:**

Caution! Some flower shows will not allow palms or cycads in the show due to size of the exhibit. Because they are so large, they are often difficult to display or are top heavy. Palms may be exhibited out of water and simply placed on a table.



Optional Topic:

## Variegation in Plants

Objectives:

- To observe the similarities and differences among this vast family of plants.
- To practice propagation techniques.
- To learn the secrets of growing and showing award winning variegated plants.

References:

- Gardener's Latin* by Bill Neal (1992)
- Variegated Plants: a Gardener's Index to Patterned Foliage* by Susan Conder and Andrew Lawson (1994)
- Variegated Leaves: the Encyclopedia of Patterned Foliage* by Susan Conder
- The Plants, Life Nature Library* by Fritz W. Went (1963)
- [www.Gardenguide.com](http://www.Gardenguide.com)
- [www.plantdelights.com/tony](http://www.plantdelights.com/tony) or go to [Plant Delights Nursery, Inc.](http://Plant Delights Nursery, Inc.) 9241 Sauls Road, Raleigh, NC, 27603 (919) 772-4794
- [www.bbg.org](http://www.bbg.org) Brooklyn Botanical Garden
- [www.rhs.org.uk](http://www.rhs.org.uk) Royal Horticultural Society
- Horticultural Science* (4<sup>th</sup> ed.) by Jules Janick (1986)
- The Plant World* (4<sup>th</sup> ed.) by Harry Fuller and Zane Carothers (1963)
- Biology* (2<sup>nd</sup> ed.) by Helena Curtis (1978)
- [www.en.wikipedia.org](http://www.en.wikipedia.org)

Materials needed of this unit:

- As many examples of leaf variegation as available.
- Variegated plants for propagation and dissection.
- Containers, potting mixes, fertilizers, and tools needed for propagation

**Introduction** and Review: Variegation is a testament to nature's creativity, ingenuity and simple randomness. From the Latin root *varius* meaning various.

A. Normal green tissue: Cells contain **chloroplasts** (football shaped bodies that can turn within the cell to take best advantage of the light-40 or 50 per cell, millions per leaf!) with light-reacting **pigment** (any substance that absorbs light), chlorophyll, necessary for the plant to conduct photosynthesis (converting the sun's energy into sugar). **Chlorophyll** absorbs light and lends its green color to the majority of plants. Carotenoid pigments also absorb light and are found in chromoplasts. **Carotenoids** make up the plant world's second family of color and is divided into two groups: carotenes (orange color—as in carrots, beta-carotene and vitamin A) and xanthophylls (yellows). **Anthocyanins** (a flavonoid) are the plant world's third family of color pigments. They range in shades from palest pink through red to flamboyant purple (violatin). Anthocyanins, contained in the sap of cells and cell vacuoles, are readily influenced by relative acidity (a contributing factor in hydrangea color, along with soil aluminum: in neutral soil it flowers pink, in acid soil it flowers blue). These pigments are responsible for beautiful fall color in leaves. **Leucoplasts** contain no pigment (colorless) while **chloroplasts** contain pigment (colored).

B. Variegated plants/ornamental leaves include annuals, biennials, tender plants, herbs, perennials, grasses, climbers, trees and shrubs. Usually grown for the foliage with insignificant flowers. Variegation in leaves is caused by a loss of light absorbing pigments in the plant cells. **Remove only the green chlorophyll and the result is**

**yellow variegation. Remove both chlorophyll and the yellow pigment xanthophyll and the variegation is white.** Yellow variegated leaves are still quite efficient at using the energy of sunlight to produce sugars. Plants tend to grow a little more slowly but will usually tolerate the same conditions as their green leafed relatives. White variegated areas on leaves use none of the sun's energy. Plants with this type of variegation grow more slowly and are often far less vigorous than their plain leafed cousins. Many need shade to prevent burning of the white areas. In the wild they would soon die out but observant gardeners have gathered the best into cultivation.

**Definitions:** Variegation is defined as **two or more colors per leaf—not a one-colored leaf!** Includes the whole spectrum of greens (ranging from the clear hues of children's crayons to smoky gray-greens), acid yellow greens, cool milky greens and intense blue-greens. Remember, one color can be masked by another: yellow pigment is masked by blue, when both together produce green. (Demonstrate this concept with color film.) Depending on the proportion of carotenoids and chlorophylls, leaves may look anywhere from yellowish green to dark green, with all possible gradations between them. Variegated foliage also offers white, pure yellows (the most advancing color), oranges, reds and purples; shades and tints of cream, beige, pink, salmon, apricot, mauve, russet, scarlet, burgundy and crimson (think of the colors in new coleus). In addition to the bicolor forms, there are tricolors (Zonal Pelargoniums) and multi-colors.

A. How and why of variegation

1. Virus: various viruses transferred in many ways—some by thrips, for example. In "Parrot" tulips the virus causes an unusual mosaic pattern (stripes, flecks, feathering) on the dark petals and in the leaves. Often called tulip 'breaking'. Mosaic virus affects Clivia, Iris, Abutilon, and Aspidistra.
2. Chlorophyll: Meristematic tissue losing its ability to produce chloroplasts. Usually causes zonal variegation as in Clovers, Bromeliads, Pelargoniums, Oxalis and Coleus.
3. Mineral deficiency and environmental conditions: Variations induced by differences in moisture, light, soil nutrients and other environmental factors are not inherited and will not pass to future generations. (Show example of environmental influence). Iron or magnesium deficiencies can cause yellowing generally referred to as Chlorosis and should not be entered in a flower show.
4. Sports or mutations: (**Sport** is a *visual change* in form, color, or growth habit of a plant due to mutation.) (**Mutation** is a *change in the genetic makeup* of a plant.) Variegated trees and shrubs usually originate from naturally occurring mutations or sports. However, mutations within plants are not always stable and shoots can **revert** to the original green (show example of reversion). The green reverting shoots contain higher levels of chlorophyll and produce more food for growth. As they are more vigorous than variegated ones, they will finally overtake the variegated shoots in size and vigor, so it is advisable to remove them as soon as they are noticed. Take out the affected shoots back into wood containing variegated foliage. This often means removing entire shoots. Occasionally shoots change to cream or yellow, but because of the lack of chlorophyll these shoots often grow weakly and are less of a problem.
5. Reflective variegation: Sometimes called 'blister variegation' is due to light being reflected off the leaf surface, usually white or silvery. This

is caused by an air layer trapped or located directly under the epidermis of the leaf—example: Pilea.

6. In the case of Rex Begonias, colored hairs can cause a plant to look variegated.
- B. Do not usually reproduce from seed (except for Nastursiums and Money Plant). To retain the variegated feature, these plants are **propagated vegetatively** (asexual) such as from cuttings or layering.
- C. Less vigorous and weaker due to less chlorophyll for photosynthesis. May need to provide extra fertilizer. Technically, variegation signals some level of interference with a plant's ability to photosynthesize food.
- D. Consequently, variegated plants are neither as hardy as their all-green counterparts—nor as impressive in the flower department. They are rarely seen in the wild.
- E. Light requirements vary but a general rule is **the lighter the plant, the more sun while the darker the variegation, the more shade needed**. Morning light is softer, afternoon light is harsh.
- F. Color can change from season to season.
- G. In monocotyledon leaves, variegation *typically* appears in linear form instead of in irregular patterns as on dicotyledonous leaves. Exceptions to that rule: *Miscanthus sinensis* 'Zebrinus with banded variegation and some philodendrons with irregular venation and variegation.

**Forms of Variegation:** Can be sharply defined or subtle, can be large scale or minute. Variegation often follows the natural geometry of plant foliar tissue, producing lines, veining, splashes, and edges of symmetrical elegance but it also expresses itself in masterpieces of irregularity. (Show examples of each)

- A. Striped: iris, ribbon grass, zebra grass (monocots)
- B. Spotted: *Hypoestes* ("Freckle face")
- C. Edged: serves to enhance the natural leaf shape
  1. Marginate: emphasis on edges, striking contrasts
  2. Medio-variegation: center is variegated rather than the edge.
- D. Veined: accentuates the internal structure of a leaf: Canna, arum
- E. Mottled
- F. Marbled or Mosaic: genetic defects in African violets, virus in Tulips
- G. Patterned-mirror image
- H. Splotch, blotch, splash
- I. Underside of leaves, (birthmarks in African violets)

**Landscape use of Variegated Foliage:** Overused, variegation can be very messy. Grown for effect, using a scattering of bold, bright white or yellow painted foliage to contrast with a greater mass of plainer green leaves, it can be fabulous. Use variegation for contrast rather than as the dominant theme. There is no lack of varieties to suit any site or situation.

- A. Specimen plant
- B. Brighten dark corners.
- C. Unite a planting scheme by combining the colors of adjoining plants.
- D. Define neighboring plants more sharply and let light and texture into what otherwise would be a green mass.
- E. Provide color and pattern over a long period, even through the winter. "Variegated plants add a welcome bit of insanity to any garden."

**Botanical Nomenclature** used with Variegated Foliage Plants:

- A. The entry tag: the key to educating the public.  
(\*Review how to write botanical binomial names if needed (genus, species and cultivar))
- B. Latin clues: *albomaculatus* (having white spots), *albomarginata* (having white margins), *argenteoguttatus* (silver spotted), *argyraeus* (silvery), *atamasco* (stained or streaked with red), *atomarinus* (speckled), *aurantifolius* (golden leaved), *bicolor* (2 colors), *cadmicus* (metallic appearance), *callizonus* (having beautiful zones or bands), *calophrys* (with dark margins), *coloratus* (colored), *conspersus* (spattered, speckled), *discolor* (of 2 or more different colors, variegated), *diversicolor* (diversely colored), *erubescens* (blushing, turning red), *fasciatus* (marked with broad bands of color), *guttatus* (spotted, speckled), *lentiginosus* (freckled), *leopardinus* (spotted like a leopard), *limbatus* (bordered, marked by a margin), *lineatus* (lined, with lines or parallel stripes), *maculatus* (spotted or blotched), *marginalis* (with a distinct margin or border), *marmoratus/marmoreus* (marbled or mottled), *mesoleucus* (with a white central stripe), *nebulosus* (clouded), *notatus* (marked or stamped, spotty), *ocellatus* (eyed), *pardinus* (with leopard-like spots), *pictus* (painted/brightly marked), *polifolius* (with white or gray leaves), *praetextus* (bordered, edged, fringed), *punctatus* (dotted), *quinquepunctatus* (five-spotted), *septempunctatus* (seven-spotted), *striatus* (striated, striped), *striatulus* (faintly striped), *tessalatus* (checkered), *tigrinus* (stripped like a tiger), *tricolor* (3 colors), *tripunctatus* (3 spotted), variegate or variegates (variegated), *versicolor* (variously colored), *vittigera* (bearing stripes), *zebrinus* (zebra-stripped), *zonalis/zonatus* (zoned or banded with a distinct color)
- C. Writing Variegated Foliage into the Schedule:
- Cut Decorative Foliage or cut herbaceous plants:  
examples: *Plectranthus* (syn *Coleus*), Ivy (*Hedera helix* or *H. canariensis* 'Glorie de Marengo'), Canna, Zebra Grass, Hostas (*Hosta crispula* and *Hosta decorate*), *Houttuynia cordata*, *Eleagnus pungens* 'Maculata'. If a vine is entered, should be a maximum of 24" in length and leaves graduated in size.
  - Container-Grown Plants: Schedule must specify maximum container size. Sections may include Container Grown Foliage or Container Grown Blooming. Single/self multiple, or multiple planting of the same plant. Containers include hanging baskets as well as combination plantings, decorative pots, or other containers.
  - Arboreal: Cut branches of trees or shrubs. Cut specimens exhibited to demonstrate both beauty and utility of trees and shrubs in the landscape. The schedule should state maximum length of 30" from tip to cut end. Sections may include classes for 1) flowering branches, 2) branches showing beauty of foliage, 3) branches showing fruit/berries or cones. Examples: *Ligustrum*, *Euonymus*, variegated hollies (*Ilex aquifolium* 'Argentea Marginata' and 'Golden King'), some vines, *Rosa wichuraiana variegata* 'Curiosity', *Aucuba*.
  - Collection: Must consist of at least five different cut specimens, five different container-grown plants, or fruits, vegetable, or nuts. Fresh plant material may be: 1) one family (Begoniaceae), 2) plants with like characteristics (variegated!), 3) different types or species within a genus (*Hosta*, *Cornus*), 4) different cultivars within a genus or species

- (*Caladium*), 5) five different cut/container grown annuals, biennials, perennials, or sets of fruits, vegetables, or nuts, or 6) five different cut branches.
- e. Display: Must consist of at least five different cut specimens, five different container-grown plants, or collections of fruits/vegetables/nuts. Fresh plant material may be listed as: 1) one family, 2) plants with like characteristics (variegated!), 3) different types or species within a genus, 4) different cultivars within a genus or species or 5) five different cut/container grown annuals, biennials, perennials, or sets of fruits, nuts or vegetables, or 6) five different cut branches.
  - f. The Petite Flower Show: Variegated miniature, dwarf or naturally small foliage can be entered and should be noted on the entry card. Some things to look for include: If **the tag** says it is a dwarf variety, then we go with that. "Sold to me as...". Just be sure you are not looking at immature growth. We want the small version of the large plant. Look for **the species name** (usually descriptive) to include the words "*nana*" or "*nanus*" meaning dwarf, "*minima*" meaning least or smallest, "*minor*" or "*minus*" meaning smaller, or "*minutus*" meaning very small. How about "*inconspicuus*", "*parvus*" or "*parvulus*" also meaning small? Other species names beginning with or including the prefix "*brevis*" which means short may also be considered if it refers to height. Have you seen a species name "*pumilus*" or "*bumilis*" meaning dwarf or low growing? Additionally, **the cultivar name** may give you a hint as to size: 'Tiny Tim', 'Lilliput', 'Baby Doll', and 'Tom Thumb'.
- D. What the Judges are looking for: The fair and objective assessment of each specimen. Do not let your color preferences affect your judging!
1. As **Foliage** : Probably the majority of variegated specimens in a flower show will be from foliage plants. Variegated foliage plants offer lasting color while flowers fade quickly.
  2. As **Arboreal**: There is a wide variety of trees and shrub which feature variegated leaves.
  3. As **Combination Plantings** A variety of leaf shapes, **foliage colors** and plant forms will lend interest, but too many colors and patterns destroy unity.
    - a. Dish garden: miniature landscape in an open container.
    - b. Planter: a group of plants grown in a container for artistic effect, either indoors or out.
    - c. Terrarium: a miniature landscape in a transparent container.
    - d. Trough: a naturalistic landscape in miniature
  4. As **Collection** :Many gardeners collect variegated plants and add to their collection when new plants come on the market. Gardeners are drawn to the vibrant colors and know that these plants will provide color throughout the season or all year long.
  5. As **Display** :
    - a. Exhibited for artistic effect as well as cultural perfection. Artistic effect and cultural perfection are equally important. Cultural perfection includes vigor, condition, typical growth habit or symmetry, substance, color, size, state of maturity and floriferousness if applicable.
    - b. Each cut specimen or container-grown plant is judged individually, then display as a whole is judged.

c. Correct labeling in an attractive, complimentary manner adds to overall display and its educational value.

Other consideration:

6. As Educational Display: "to further horticultural education"

**Educational Value** (60 points): interest to viewers (25 points), clear, concise presentation (15 points), adequate educational signs or tags (10 points), follows NGC objectives (10 points)

**Staging** (20 points): craftsmanship, technique (10 points) and distinction (10 points)

**Creativity and expression** (20 points)

2) Use in Designs: fresh or dry, adding contrast, interest, color

Optional Topic:

## **Native Plants and Wildflowers**

Objectives:

- To observe the similarities and differences among these families of plants.
- To practice propagation techniques.
- To learn the secrets of growing and showing award winning native plants and wildflowers.

References:

- Florida Wild Flowers: An Introduction to the Florida Flora* by Mary Francis Baker, 1976
- Florida Wild Flowers and Roadside Plants* by C. Ritchie Bell and Bryan J. Taylor, 1982
- Wildflowers of Louisiana and Adjoining States* by Clair A. Brown, 1972

Materials Needed for this Unit:

- As many examples of wildflowers as possible.
- Seeds, cuttings and soil mixes, containers and labels for propagation.

2013 was the Year of the Wildflower!

Wildflowers are one of Mother Nature's loveliest gifts. Their changing panorama of colors, shapes, sizes and heights provides delight throughout the seasons. Wildflowers can be used anywhere. In the home landscape they are ideal for creating colorful beds and borders, as well as offering a lower-maintenance alternative for large areas or replacing turf grass. Wildflowers can be planted to cover large, open areas or assist in the recovery of a landscape that has been damaged or destroyed by the actions of people, a natural disaster or the spread of invasive plants.

### **HISTORY OF WILDFLOWERS**

Many of our favorite wildflowers have been growing in European gardens for centuries. Even some of our native wildflowers enjoyed more popularity in Europe than in the U.S. where they went unnoticed by gardeners. When early explorers came to North America, they discovered the bounty of plants growing in the New World. They eagerly brought many of these plants back to Europe where they were sought after by gardeners wanting something new and different for their gardens.

During colonial times, ornamental flowers were often grown in the Pleasure Garden or Pleasure-Ground, the designation for the flower garden. President George Washington had flower gardens at his home but most of his written notes were about the trees and shrubs he planted at Mt. Vernon. One native wildflower that Washington did plant and record was Cardinal Flower (*Lobelia cardinalis*). He probably grew many foreign or exotic flowers since Washington avidly collected and traded plants with correspondents in Europe.

President Thomas Jefferson, an avid horticulturist, plant collector and seed saver, grew wildflowers in his garden. He also noted planting Cardinal Flower after it was recommended by his nurseryman friend, Bernard McMahon, who included it in his 1806 book "The American Gardener's Calendar", the first horticultural reference for American gardeners. While Cardinal Flower may have been one of the first trendy plants in the New World, it's interesting that this North American native wildflower was introduced in Britain in 1626, more than 150 years

before being mentioned in American references. McMahon noted “Here we cultivate many foreign trifles and neglect the profusion of beauties so bountifully bestowed upon us by the hand of nature.”

Other plants in Jefferson’s garden may have been from the 290 native plants described and collected by Meriwether Lewis during the Lewis and Clark Voyage of Discovery in the early 1800’s. More than half of the plants were new discoveries to white people including Lewis Flax (*Linum lewisii*) (one of many plant species named after either Lewis or Clark) and Scarlet Globemallow (*Sphaeralcea coccinea*). They also described Blanketflower (*Gaillardia aristata*) and Purple Coneflower (*Echinacea purpurea*).

Informal and wildflower gardens became fashionable with the publication of *The Wild Garden* in 1870 by England’s William Robinson who described them as “a delightful feature of a place”. This style of garden contrasted with the highly manicured and formal designs that had been popular in American and Europe. Wild gardens featured hardy, herbaceous plants, including both native and exotic species. They were designed and placed where they would thrive with little additional care.

The cottage and old-fashioned gardens of the 1800’s also included a few native perennial wildflowers but mostly focused on designs that included peonies, hollyhocks, phlox, roses, violets and other European favorites. By the end of the 1800’s many landscape designers began to emphasize hardy herbaceous plants in recognition of their lower maintenance. Noted horticulturist and botanist Liberty Hyde Bailey wrote, “The interest in native plants has never been so great as now.”

Wildflowers and native plants have continued to attract attention throughout U.S. gardening history. They are currently experiencing a resurgence in popularity by both gardeners and public officials for their beauty and their valuable contributions to the environment.

### **Definitions: WHAT IS A WILDFLOWER?**

Wildflower is not an exact term that is well defined. Some people say a wildflower is a plant that was not intentionally seeded or planted and grows without cultivation. Others classify a wildflower as any plant growing without the help of man regardless of the country of origin. Still others define a wildflower as a plant found in a specific geographic area that was grown from seed or plants also from that area.

Wildflowers and other plants that were growing before European settlement in what we now call the United States, Canada and Mexico are called **native plants or indigenous species**. Other plants, often referred to as exotics or aliens, were originally brought here from another part of the world. Many exotic species including flowers, grasses, trees and shrubs are among our favorite garden plants. A few, including some wildflowers, have escaped and become established as part of a local environment or naturalized. Some exotic species have even become invasive and are considered noxious weeds that need to be eradicated.

### **Uses: WHY PLANT WILDFLOWERS**

A garden of wildflowers offers benefits to both the gardener and the environment. Once established, properly chosen wildflowers require less maintenance than traditional landscape plantings which can mean less watering, fertilizing, pest control and mowing. Some plants have deep root systems that prevent water run off and soil erosion, and enable them to withstand drought. Their growth also brings earthworms and beneficial soil microorganisms to enhance soil



health. And colorful blossoms can be arranged into lovely, casual bouquets that brighten the home.

Flowers provide nectar and pollen sources for bees, butterflies and other pollinators, while ripened seeds are a food source for birds and wildlife. Current research suggests that native plants and flowers might be more attractive to native bees than exotic flowers. Even a small area in a garden or landscape planted with wildflowers that bloom at varying times throughout the growing season helps attract and support pollinators.

## **HOW TO CHOOSE WILDFLOWERS**

Before purchasing seed or plants, think about what you are trying to achieve with your planting. If you want only native wildflowers in your garden find out what is native to your region and what type of growing conditions are needed. Do you want to attract bees and other pollinators or encourage butterflies to visit your garden? Look for plants that produce the type of flowers preferred by these insects. Are you interested in a garden that is filled with color from spring to fall? Choose a mix that has a variety of flowers and bloom times.

Some wildflowers have very specific soil, water, light, temperature and fertility requirements and won't grow outside of a specific geographic range or set of conditions. Others are easier to grow because they have adapted to a wide range of environments. Does the plant like full sun, partial sun or a shaded location? Does it require constant moisture or will the plant survive periods of drought during the year? Does the plant like rich, fertile soil or does it grow better in a poor soil with lower fertility. Choose plant varieties that are matched to the conditions of your site.

Many types of wildflower mixes are available from seed suppliers. Some mixes contain only native wildflowers and may be formulated to grow in a defined geographic region or climate. Other mixes contain varieties that are both native and exotic. Some mixes have a balance of annual and perennial species to provide fast color and long-term beauty. Other mixes contain mostly annual flowers for a quick-growing wildflower garden. Not all of the wildflowers contained in mixes will grow in every garden but there are usually enough different types in each mix to provide a nice variety. Remember that successful wildflower gardens are created over many years as plants that are best adapted to your garden conditions become established and thrive.

There are many sources available to help you find the best native wildflowers for your garden. The Xerces Society ([www.xerces.org](http://www.xerces.org)) has several fact sheets and publications that suggest good native plants for geographic regions in the U.S. The Lady Bird Johnson Wildflower Center has an extensive database of commercially available native plants that can be searched to provide recommendations by state ([www.wildflower.org](http://www.wildflower.org)). Local native plant societies and government organizations are also good sources of regional information.

## **PREPARING THE SOIL**

The next step in creating an eye-catching field of flowers is to prepare the soil by removing weeds and other unwanted vegetation. If the soil is compacted, till lightly so the soil is loose and germinating seeds can put down roots. A bow rake is great for loosening the top layer of soil. Digging or roto-tilling too deep will bring up weed seeds and other plants that will need to be removed later to avoid competing with the wildflower seeds. While it may not be practical or necessary to amend the soil before planting wildflowers, you can add organic matter such as compost or well-rotted manure before planting depending on the site.

## **PLANTING FROM SEED**

Wildflower seed and seed mixes can be planted in either spring or fall. Spring rains help seeds germinate and plants get established before many weeds have a chance to grow. In warm climates, fall is a good time to plant wildflowers when cooler temperatures and winter moisture provide better conditions for seed germination and growth. In cold climates, a dormant seeding of wildflowers can be done in the fall when temperatures are low enough that seed will not germinate until weather warms up the following spring, similar to what happens in nature. Some seeds, especially many of our native perennial wildflower species, need a chilling period to break their dormancy. This is provided naturally by the change in temperatures from winter into spring.

Scatter seeds by hand or with a small spreader. Seeds can be raked into the soil or lightly covered with soil. Water thoroughly right after planting and keep seeds and seedlings moist for about 4-6 weeks. Gradually reduce watering as seedlings develop. Identify and remove weed seedlings as soon as possible since they will compete with wildflowers for water, nutrients and space. For dormant seeding, watering after planting seeds is not necessary.

## **CARE OF THE WILDFLOWER GARDEN**

A wildflower planting just like a colorful meadow created by Mother Nature will look different from month to month and year to year. Annual flowers are more abundant at first because they grow and flower quickly. In following years perennial plants become established and start flowering, in addition to annual flowers that may reseed themselves.

The first year is a time to help wildflowers get established. Not all seeds will germinate right away but may be waiting for the right environmental conditions before they begin to grow. This is especially true with perennial wildflowers so don't get discouraged or be disappointed if you don't have that instant flower meadow. For more immediate results you may want to combine seeding wildflowers with planting a few container-grown plants. Plants will quickly get established and compete with weeds that may appear. Be sure to identify and remove weeds when they are small to prevent them from spreading. Depending on needs of your wildflowers provide additional water if rainfall is sparse, especially during periods of extended hot temperatures. Avoid cutting flowers after they bloom so they can go to seed. Seed will drop to the ground and spread to fill in your planting.

During the second year, you may see new plants grow from seeds that didn't germinate the first year. Water if rainfall is not adequate, especially in the spring. Additional water may be needed in the summer during extreme or extended periods of hot weather. Continue to remove weeds as they appear. As wildflowers become established the need to weed should taper off. Fill in bare spots with additional seed or container-grown plants.

After the third year and beyond your wildflower planting should require minimal maintenance. Remove large weeds that may move in. You may want to move plants that have grown too close and are crowding each other. Use them to fill in bare spots or sow additional seed to cover those spots. Additional water may be needed in the summer during extreme or extended periods of hot weather. Fertilizing is generally not required. In a garden setting, you can mulch around established plants with compost or well-rotted manure. Cutting or mowing wildflowers in fall to a height of about 6 inches will keep the planting looking neat and help spread seeds. Periodically disturbing the soil by digging or raking can also help regenerate a wildflower garden by creating good soil contact with seeds that have fallen to the ground.

Some wildflowers, especially prairie plants and grasses, benefit from being burned every few years. Fire occurs in many ecosystems as a way to get rid of woody plant invaders that move into a site as part of natural plant succession. Fire also helps break the dormancy of some seeds and stimulates the growth of other species. However, burning should only be done by someone with the understanding and expertise to do it safely and effectively. In the home landscape mowing, hoeing, digging and other means of soil disturbance can achieve the same goal.

### **WHERE TO BUY WILDFLOWERS**

Gardeners have many choices when creating a wildflower garden. Local nurseries and garden centers sell both seeds and live plants. Retail, Internet and catalog seed companies sell wildflowers as individual species and mixes. Many seed companies also sell mixes for a variety of special uses—wildflowers for cutting, fragrance, partial shade, attracting butterflies or pollinating insects, and more.

Digging plants from the wild is not recommended and might be illegal. State and federal laws protect some native plant species that are threatened or endangered. Collecting seed must be done carefully. Removing too much seed could reduce or destroy a wild plant population.

### **SOME POPULAR WILDFLOWERS IN FLORIDA:**

First, our state wildflower!! *Coreopsis lanceolata* is one of 15 species of *Coreopsis* found in Florida. Some folks refer to this plant as “Lance-leaf” *Coreopsis*. It is a perennial growing to 2 feet tall in height, with bright yellow, 1-2 inch blooms in spring, summer and fall. This particular species features slightly hairy, small leaves, mostly in a rosette near the base of the plant. These plants need only a minimum of water to perform and thrive. You will notice that this plant is frequently used in roadside plantings along our interstates and by-ways.

This plant reseeds freely but if you prefer, plant purchased seeds in November, December or January in full sun. Prepare a seed bed or mow grassed areas very short, leaving the clippings. Broadcast seed evenly over the area, and lightly rake to ensure seed-to-soil contact. Moisten or leave watering to nature. Maintain like an old-fashion flowerbed, or leave alone. Mow in October and November after seed has dried. In a short time, you will have plenty of plants to share.

“Joe Pye Weed” *Eupatorium purpurea* and now has a new name *Eutrochium*. A member of the Asteraceae family. Blooms late summer into fall (July to September). Called “Joe Pye weed” after Indian healer from New England, Joe Pye, who used this herbaceous plant to cure many ailments including typhus. Generally large plants with big domes of small flowers, clusters of small purplish tubular disk flowers, that are rich in nectar and pollen, attracting butterflies especially Monarchs. Bumble bee pollinated. Native alongside the highways and kin to the Wild Ageratum and Mist Flowers. A perennial up to 10 feet tall on stems that are purplish and hollow. Leaves are 4-7 inches long and whorled around the stem. Flower clusters are in a panicle and are also whorled. Also available in a dwarf cultivar called “Little Joe”, and “Chocolate” Joe Pye Weed with white flowers and purple-brown stems. The hybridized form ‘Gateway’ has a deeper purple dome of flowers. You may also hear of it as “Spotted Joe Pye Weed” (*Eupatorium maculatum*) which has purple spots on its green stems, a slightly smaller plant. Easy care needing 6 hours of sun and almost any soil type and regular water.

Tulip Tree or Tulip Poplar, *Liriodendron tulipifera*, is a deciduous tree belonging to the Magnolia family. It is native and grows fast to 60-90 feet tall with a conical spread of about 35-50 feet. Leaves shaped like a blunt ended, lobed, maple leaves, they turn bright yellow in the fall and can be 4-8 inches in length.

Tulip-shaped flowers 2 inches wide bloom in late spring and are a greenish yellow with an orange mark at the base. Not showy on the tree since the flowers are usually so high up. Trees need to be mature to bloom (10 years+).

Needs full sun and a deep, rich, well-drained, neutral to slightly acid soil. Has shallow fleshy roots that are difficult to garden through. Propagates easily by seed.

There is a hybrid with yellow-edged leaves 'Aureomarginata' (sold as 'Majestic Beauty'). A more columnar and smaller version 'Arnold' (also known as 'Fastigiata') is also available.

#### Ageratum "Mist Flower", *Eupatorium*

"Wild or Hardy Ageratum" sometimes called "Mist Flower" –*Eupatorium coelestinum* (Syn *Eupatorium incarnatum*) A native plant in the Asteraceae family reaching 3 feet tall with branching stems. This perennial, vigorous, free spreading (read invasive in fertile soil) plant bears broad clusters of fluffy blue flowers in the fall that exactly resemble the annual, "Floss Flower" or *Ageratum houstonianum*. Flowers are composite in composition with disk and ray flowers forming a head rich in nectar and pollen. Leaves are in opposite pairs, toothed, dark green, triangular shaped, and up to 3 inches long. There are some hybrids of this plant such as 'Album' with pure white flowers and 'Cori' with exceptionally clear blue blossoms blooming later in the year and 'Wayside Form' a compact plant growing to only 15 inches. This plant is kin to the "Joe-Pye Weed", *Eupatorium purpureum*

"Goldenrod"-*Solidago*—Many types of native Goldenrod species exist in our area. Along the dry, pineland roadsides you may see the perennial herb, *Solidago fistulosa* with rough, elliptic leaves about 4" long and hairy stems to 6 feet tall. These have tough, woody, spreading rootstocks. Closer to the beaches you will find *Solidago sempervirens* or Seaside Goldenrod with stems to 8 feet tall and spoon-shaped basal leaves. All the Goldenrods are in the Asteraceae family featuring the disk and ray flowers with yellow heads of many small, one-sided racemes in terminal panicle. It was thought that Goldenrod caused Hay Fever but it is actually another plant blooming in the fall that causes this condition, Rag Weed. Many hybrids are available on the market showy plumes of bright yellow flowers. Look for 'Cloth of Gold', 'Crown of Rays', 'Golden Baby', 'Goldenmosa', 'Gold Spangles' and a dwarf selection called 'Laurin'

*Liatis elegans* or *Liatis spicata*- "Spike Blazing Star" or "Gay Feather"—perennial herb from a small corm. Flower cluster a spike-like raceme up to 2 feet long. Flower heads purple or white and flowers open from the top down the stem. Butterfly attracting but also favored by deer.

**Native Vines** Yellow Jessamine (NOT Jasmine) or *Gelsemium sempervirens* is a high-climbing twining, woody vine with slender, wiry stems and evergreen, opposite lance shaped leaves. The fragrant yellow trumpet flowers are about 1 inch in diameter producing an oblong ¾" capsule of seeds. Common in thickets, clearings and the coastal

plain areas of the southeast. Blooms in early spring, late winter. Has a distinct smell when cut.

*Ipomea coccinea* (Scarlet Morning Glory) and *Ipomea quamoclit* or Cypress Vine: Both are vigorous annual vines whose tangled stems twine over the adjoining vegetation. The Morning Glory is an essentially unlobed crimson flower with ovate, angular, entire leaves about an inch long while the Cypress vine has pinnately dissected leaves. Widely naturalized in Florida and much of the USA, these weedy but colorful vines may be found along railroads, fencerows and in gardens and waste areas. A tropical vine.

*Passiflora incarnate* (Maypop or Passion Vine) is a perennial vine that climbs by means of tendrils and spreads by underground stems (hence the name “Maypop” as it may pop up anywhere!). The leaves are alternate, deeply 3-lobed with 2 conspicuous glands at the summit of the petiole. The beauty of the flower is not only in the colors of the floral parts but also in the delicate arrangement of parts. The flower is about 3” in diameter and has reflexed, green sepals, 5 yellowish green petals, a mottled purple and white fringe, 5 drooping yellow stamens suspended around the pistil which has 3 to 4 reflexed stigmas and a conspicuous ovary. The edible fruit is a green berry, oval shape, 2-3 inches long. Widely distributed in LA, TX, AR, MS and Florida. Blooms May to September.

*Passiflora lutea* (Yellow Passion Flower) is a perennial vine with slender, tender stems, high-climbing with tendrils and spreading by underground stems. Leaves are thick, broader than long, 3-4 inches wide, obtusely 3-lobed at the apex. Flowers are yellow green, nearly an inch in diameter featuring short stiff, yellow fringe at the edge. Fruits are drooping, fleshy berries about ¼ inch in diameter. Widely distributed but not common, found in thickets along streams. Blooms May into July.

#### **Wildflowers for Spring and Summer:**

*Verbena tenuisecta* (Moss Verbena)

A weedy but colorful tropical introduction (naturalized), this Verbena is often abundant on roadsides and in clearings and waste areas from South Florida into coastal plain of the Carolinas and Texas. The stems of these spreading or prostrate perennials root at the nodes, and a single plant may form a clump a meter in diameter—forms low, dense mats with short erect, terminal, purple flower clusters. The small ovate or triangular, opposite leaves are divided into many linear segments. You should be seeing this all along the roadside and in parking lots.

*Daubentonia punicea* (syn *Sesbania punicea*) “Red Rattlebox”

A widespread but not frequent introduced perennial established along roadsides, ditches and waste places of the coastal plain from central and northern Florida to Texas and North Carolina.

The seeds in the persistent, four-winged legumes rattle when the stalks are shaken, giving it the common name. Shrub-like, 4-8 feet tall. Leaves pinnately compound, 8-10 inches long. Leaflets 12 to 40 about 1 inch long, linear-elliptic. Flower cluster drooping and densely flowered. Standard dark red to orange-red, about 1 inch wide. Reported as an escape from cultivation.

Saururus cernuus “Lizard’s Tail”

Very common and abundant in wet sites, cypress swamps, usually in standing water. An aquatic perennial, colony-forming herb about 3 feet tall with extensive rhizomes. Leaves alternate, petioled. Leaf blades about 6 inches long, cordate (heart-shaped) to broadly ovate, distinct converging veins. Flower cluster slender raceme, nodding or trailing at tip, blooming from base upward. Flowers white, crowded, no perianth.

**Other Wildflower favorites:**

**Spiderwort**, Trinity flower: *Tradescantia virginiana*: Perennial herb, old fashioned, long lived plant. Coarse textured, deep green foliage, lance shaped leaves, arching...grass like looking. Three petal terminal cluster blooms in shades of blue and purple and rarely, white. Clumping habit to 16” tall. Cut back to the ground in July for repeat summer blooms. Now hybridized varieties for larger blooms and rich purple, pinks and red colors. Prefer slightly acid to neutral soil that is moist and well drained but very adaptable. Sun or light shade. Bee and butterfly attracting. Will reseed and can become invasive.

Wild Petunia: *Ruellia caroliniensis*: A perennial herb about 12” tall. Leaves opposite and ovate and about 4” long. Flowers are trumpet shaped, visually bluish, photographs purple and rarely white... readily shed when picked.

Florida Leucothoe: *Leucothoe populifolia*: Shrub, evergreen, native to the south. Problem free, sculptural shape—upright and arching. Fast growth Foliage is light olive green, alternately arranged to 5” long, and in spring, clusters of tiny white flowers, like bells, are found under the leaves. Understory planting in part shade best. Likes moist, well drained soil rich in organic matter. To 12 feet tall and wide. Several hybrids now on the market including *Leucothoe fontanesiana* or the Drooping or Weeping Leucothoe and *Leucothoe axillaris*, a dwarf variety.

“Stokes’ Aster” or *Stokesia laevis* is a perennial native wildflower found in many of the ditches along the by-ways in Escambia County and District I. Its shaggy purple composite flower (a central button of small florets surrounded by a ring of larger rays) is held aloft on a branched stem from its evergreen basal rosette of 2-8 inch leaves that have a faint white cast down the mid-vein. The native plant is very rugged and adaptable but would be very happy with regular water and full sun. It is not unusual to have blooms from May to September. This plant has been hybridized in the plant industry and now several named cultivars are available and the flowers range from deep purple, powder blue, lemon yellow to white. Look for names like “Blue Danube”, ‘Bluestone’, ‘Purple Parasols’, and ‘Silver Moon’ among others.

Pinelands hibiscus: *Hibiscus aculeatus*: A perennial herb with annual ascending to erect stems to 3 feet tall. Leaves alternate, palmately 3-5 lobed, about 2-4 inches long, irregularly cleft, with large sinuses between lobes. Stem and foliage densely covered with trichomes, which feel rough to the touch. Flowers 2-3 inches wide, funnel-shaped, dark center, corolla yellow, turning purplish with age. Capsule about 1 inch in diameter, densely hairy. Confined to low, moist pinelands, along ditches, sloughs, wet sites. Bloom may to September.

Orange or Butterfly Milkweed: *Asclepias tuberosa*. Herbaceous perennial, stems ascending to erect 2-3 feet tall, strongly hairy. Leaves lanceolate, 2-4 inches long, nearly sessile, bright green

above and slivery pubescent below. Flowers complex, reflexed sepals and petals, bright orange or yellow, erect hoods and horns in many flat-topped clusters on side of stem. Widespread in the drier upland soils. Difficult to transplant. Propagated by root cuttings and by seed. May to July bloom.

Ti-ti: *Cyrilla racemiflora*. Semi-evergreen shrub or small tree with attractive lustrous/shiny, alternate, obovate/elliptical leaves from 2.5 to 5 inches long, bearing numerous showy, sub-terminal racemes (drooping or spreading) of tiny(1/4") white, closely spaced flowers. "Leatherwood", as this plant is also known, is frequent in swamps, low woods, and stream banks, throughout Florida and on coastal plain. A very good honey plant. Blooms April to June.

Bull Nettle, Stinging Nettle, Tread softly: *Cnidioscolus stimulosus*. Herbaceous, rhizomatous, monoecious perennial covered with stinging hairs. Plants up to 24 inches tall. Leaves palmately 3-5 lobed with margins entire to slightly dentate, alternate. Fragrant flower cluster terminal, composed of staminate and pistillate flowers. Perianth of staminate flowers white, salverform, about 1 inch across with perianth tube about 1 inch long. Pistillate perianth quickly deciduous, ovary developing into 3 lobed capsule. Bloom May to July.

#### **Native Ferns:**

Bracken Fern: *Pteridium aquilinum*

Resurrection Fern: (*Polypodium polypodioides*)

Royal fern (*Osmunda regalis*)

Southern Wood fern or Shield Fern:

Cinnamon Fern: Cinnamon fern (*Osmunda cinnamomea*)

Woodwardia

Native American Hollies: Hollies are all **Dioecious**: separate male and female plants. Shrubs or trees provide cover and food for birds.

*A. Ilex opaca* (American Holly): on the conservation list due to indiscriminate cutting for Christmas boughs. Evergreen tree native to eastern USA. Slowly grows to 40-50 feet tall, 20-40 feet wide, densely pyramidal when young, then becomes open, irregular and picturesque with age. Spiny green leaves reach 2-4 inches long, may be glossy or dull. Show some bronzing in winter. Red berries. Site in a wind-protected spot. Subject to many pests, with leaf miner being perhaps the most troublesome. Rarely bothered by deer.

*Ilex glabra* (Inkberry): Stolons. Coastal native to eastern North America. To 10 feet tall and wide, with thick, spineless dark green leaves to 2 inches long (leaves turn olive green in winter). Berries are black. Grows in sun to partial

*Ilex vomitoria* (Yaupon): Black drink called Cassena brewed from leaves. Drought and salt tolerant. Evergreen shrub or small tree. Native to the South. Grows in almost any soil. Good plant for the beach: tolerates salt spray. Grows to 15-20 feet tall with narrow, inch-long shallowly toothed, spineless leaves dark green leaves. Can be grown as standard or sheared into columnar form—good topiary plant. Tiny scarlet berries are borne in profusion. Resists damage by deer.

*Ilex cassine* (Dahoon Holly): on conservation list. Native to swamps and moist lowlands from NC to FL and A. Dense, upright habit to 20-230 feet tall and 8-15 feet wide. Leathery medium green leaves 2-4 inches long, toothed only at the tips. Heavy crops of

small berries in red to reddish orange (sometimes nearly yellow). Grows naturally in wet, acid soils, tolerates mild alkalinity and has some salt tolerance. Regular ample water.

*Ilex decidua* (Possum Haw): deciduous, found along streams. Native to the southeast. To 6-10 feet tall possibly to 20 feet tall. Pale gray stems, shiny dark green leaves to 3 inches long. Orange to red berries last into winter or spring.

*Ilex verticillata* (Winterberry or Blackhaw, Black Alder) Deciduous shrub native to swamps of eastern North America. Unlike most hollies, this one thrives in boggy soils, but it will succeed in any moist, acid, organic soil. Species and most selections grow 6-10 feet tall and wide, eventually forming clumps by suckering. Dark green, oval leaves to 3 inches long may turn yellow in autumn. Female plants bear enormous crops of bright red berries that ripen in early fall and last all winter. Plant one male plant for every six females.

#### Holly Cultivation:

A. Soil—Hollies grow well in fully drained, light and sandy soil with a somewhat acidic pH between 5.0 and 7.0. Several exceptions that like wet soil.

B. Light—Most hollies grow and flower best with partial shifting shade but in the south, some do well in bright light conditions.

C. Water—moderately- may go dormant during times of drought.

D. Temperature—Depending on variety, will grow just about anywhere.

E. Fertilizing: Hollies are heavy feeders. Fertilize with a slow release organic fertilizer with bone meal or superphosphate, such as 10-6-4 during the growing season or use inorganic fertilizer such as Osmocote. Best to fertilize in mid March—not summer or fall. Hollies are shallow rooted so feed 1/3 application inside the dripline and 2/3 application outside the dripline. Use 1 pound of fertilizer for every inch of trunk diameter.

Holly Maintenance: Mulch well (2 to 3 inches) to protect shallow root system and to conserve moisture. Pruning may be done after bloom or at anytime during the year including late spring to early summer, but best at Christmas, when dormant. Prune to shape and control size, open for circulation in interior for better pollination and light, increase fruit production, rejuvenate, train into leader, remove dead, damaged, or diseased branches. Also prune for formal shaping such as geometric shapes. Large cuts should be made flush with trunk. Prune to proper bud to indicate direction of growth. Used as topiary and Bonsai. Note: Hollies do not like to be transplanted!

#### Holly Propagation:

A. Asexual propagation by:

1. Cuttings: Will come “true” to parent. Use an active, live twig of the current season’s growth—ensure mature with dark green leaves. Take cuttings in mid to late summer. Cutting can be small but 10 to 14 inches is preferred. Note position of growth on parent. Remove the bottom 1/3 of leaves. Make a wound by slicing outer bark and cambium. Dip end in root hormone powder. Put in rooting medium of 1/2 sand or Perlite and 1/2 damp peat moss. Plant 3 to 4 inches deep. Cover for humidity or mist. Needs good drainage. Heat roots if possible to 72 to 75 degrees.

2. Root Cuttings: take roots the size of a pencil. Insert in rooting medium so only the tip shows.



3. Budding and grafting: Cut into stock and place scion in. Can be used to put male and female on same bush. Can be used to have 2 or more colors of berries on same plant.

B. Sexual propagation by seed: Flowers usually bloom in April, May or June depending on species. The fruit is a berry-like drupe. Only female plants produce seed. Gather berries when mature. Crush and wash the pulp away, discard floating seeds. Some varieties have hard seeds that may require a year to 18 months to germinate—Most germinate sooner. Place seed in mixture of peat moss and sand in baggy. One source says to refrigerate for 3 months before planting. Used to propagate species or wild types. Not variety specific.

Holly Diseases and Pests: Minor problems from Scale. Use horticultural oil to control. Minor problem with leaf miners, Aphids, Mealybugs (Isotox or a miticide). Fungus causes Holly tar spot, mildew, blight, rust and scab.

Wild Bergamot (*Monarda fistulosa*) Also called Beebalm, the whorls of pink to lilac colored flowers open in summer to attract bees, hummingbirds and a variety of other pollinating insects. It gets the name Wild Bergamot from the aromatic leaves that have a scent reminiscent of the bergamot orange tree of Europe. Monarda had many medicinal uses to the Native Americans. Today the leaves are often used to make tea. Plants do best in dry open areas and woodlands but can grow in moist soils as long as they are well drained. (Zones 3-9)

Eastern Columbine (*Aquilegia canadensis*) despite its species name is native to the East and Midwest U.S. as well as eastern Canada. It is one of about 30 species of Columbine found in North America. Columbine is often found in a shady woodland setting though they have a deep taproot that enables them to grow in dry sites. The colorful red and yellow flowers that open in spring and summer are a favorite of hummingbirds. (Zones 3-9)

Indian Paintbrush (*Castilleja sp.*) is another much admired wildflower that seems to grow without care in its native environment that ranges throughout North America depending on the species. It derives its name from the striking orange-crimson spikes that appear in spring and resemble a brush dipped in paint. However, Indian Paintbrush can be difficult to grow from seed and establish in the garden. They are considered hemi-parasitic which means they need to grow in close proximity to other wildflowers and grasses. Indian Paintbrush produces roots that attach themselves to a range of plants that grow nearby to obtain some nourishment. Without these host plants, Indian Paintbrush declines and eventually dies.

**What the judges are looking for:** Ensure the schedule for the flower show includes classes for native plants and wildflowers. Many do not. Ensure your specimen is correctly labeled and grown by you (not just picked from the roadside!). Ensure the flowers are fresh and undamaged. Ensure the specimen is long enough to show natural growth and form.

May be displayed as a single flowering annual or perennial, as an ornamental grass, as an arboreal branch, as an herb, depending on its designation in your reference books. Native plants can be used in combination plantings or entered in a Collection or Display of plants. It is always a good idea to enter your native plants as an Educational Exhibit to inform the public about the wonderful plants.



## Contract to Teach Florida Horticulture Study Series

Club name: \_\_\_\_\_

Course Chairman: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

Email address: \_\_\_\_\_

Instructor: \_\_\_\_\_,

This is to confirm the date of \_\_\_\_\_ for you to instruct unit number \_\_\_\_\_ of the Horticulture Study Series to be held at:

Place: \_\_\_\_\_ Begin time: \_\_\_\_\_ End time: \_\_\_\_\_

Address: \_\_\_\_\_

Directions if needed:

We agree to pay the following:

Instructor's fee: \$100 for each 4 -hour course (or \$25 per hour)

Mileage: 35 cents per mile each way

Meals: breakfast, lunch and dinner one each per day, if needed and bill presented

Plant materials: up to \$35 per course for samples, if needed and bill presented.

Lodging for one night, if needed:

Lodging Preference: Private home \_\_\_\_\_ or Hotel \_\_\_\_\_

Please confirm this agreement by signing this copy and return to the above chairman in the envelope provided. Thank you! We look forward to seeing you soon.

Sincerely,

Chairman, Horticulture Study Course

Signed: \_\_\_\_\_

Instructor, Horticulture Study Course

Date: \_\_\_\_\_



## Instructor's Outline Format for Plants to be Studied

Note: A number of outlines for specific plants already exist for your use. Just call the State Horticulture Study Chairman for a list or copies. If you develop an outline for a plant not already developed and on file with the chairman, it is expected/hoped that you will share it with all course instructors at the next refresher training meeting, if not before.

When creating an outline for a specific plant, please use this format in its development.

1. **Definitions:** define any and all terms associated with the plant type or family. The glossary of the *Handbook for Flower Shows* will be the primary source for all definitions. If possible, please use the books listed as required reading for the Horticulture portion of Flower Show School to develop your specific plant outlines. Include botanical nomenclature and what the name means.

2. **Uses:** consider where and how this plant can be used: inside or outside in a container, outside in the landscape, how it is to be used in the landscape, benefits of growing this plant, etc.

3. **Growing and Showing:** examine the best site for the plant (sun or shade), how to best prepare the site for planting, how to choose the best plant at the nursery, how to condition, prepare or groom a cut specimen or container grown plant for the flower show. According to the flower show schedule, where would the plant be entered and placed? Do you know the full botanical/cultivar name? How best to transport the specimen. What awards the specimen might be eligible for. What the judges are looking for, etc. (go over the qualities listed on the appropriate point scoring form, explain the Standard System of Awarding).

4. **Propagation:** discuss and demonstrate the sexual, vegetative and asexual ways this plant may be propagated.

5. **Maintenance:** What do we have to do to keep this plant in top shape in our landscape or in the home? Include methods of pruning, pinching, deadheading, and reasons why they are necessary, when to prune. Discuss the benefits of mulching. When and how to fertilize, spray, etc. Is staking necessary?

6. **Pests and Diseases:** What are the insects, virus, bacteria that plague this plant? Prevention: emphasize the need for good gardening practice. Emphasize the use of integrated pest management (IPM) practices: natural methods vs. chemicals.



## **“Digging It” Student Note Taking Form**

Type of Plant Studied: \_\_\_\_\_

Botanical Name:

Genus \_\_\_\_\_ Species \_\_\_\_\_

Common

Name: \_\_\_\_\_

Family: \_\_\_\_\_ Other \_\_\_\_\_

relations: \_\_\_\_\_

Varieties or Cultivars and

Hybrids: \_\_\_\_\_

Cultivation/Environmental:

1. Soil:

2. Light:

3. Water/Humidity:

4. Fertilizer:

5. Temperature:

Propagation:

Maintenance:

Pests and Diseases:





## Horticulture Study Course Evaluation

Course # \_\_\_\_\_ Date \_\_\_\_\_ Location: \_\_\_\_\_  
Instructor \_\_\_\_\_

Please share your comments on this course so that we may continue to improve programs and better meet your needs:

**Content:** Did the course of instruction and student outline contain the information you expected and needed to know?

**Materials:** Were sufficient examples, visual aids, and supplies available so that each student could fully examine and experience the concepts being discussed?

**Organization:** Was the course of instruction logically organized and presented, building on your prior knowledge and skills?

**Presentation:** Did the instructor appear to be prepared, knowledgeable, and familiar with the course materials so that the presentation flowed well and all questions were fully answered?

**Facility:** Was the facility conducive as a learning environment and appropriate to the needs of the course? Lighting, temperature, restrooms, parking, and comfort of chairs, etc.

**Comments:** Please add your comments on the overall course of instruction, instructor, or committee preparations. What did you like the most and what did not suit your needs?

**Optional:** Evaluation completed by: \_\_\_\_\_  
I wish to discuss noted problems; contact me \_\_\_\_\_



**Student Roster (excel spreadsheet)**



## Sample Budget for Horticulture Study Courses

### **Estimated Income:**

Student course fee: (charge per course or one fee for all 10 courses). Recommend no more than \$20 per student per course.

Ways and Means/ plant sale (the more you have to sell, the more money you can make)

Luncheon (optional but additional fee of approximately \$5 per student per course).

Coffee and morning snacks (optional or can be included in course fee)

### **Estimate Expenses:**

Instructor and guest speaker fee: (not more than \$100 per course, or \$25 per hour)

Instructor mileage: (recommend not less than 35 cents per mile)

Instructor accommodations: (hotel or home as indicated)

Instructor meals: (while traveling and during instruction)

Student Certificate fee (\$1 per student upon completion of all 10 courses)

Course horticulture samples/examples

Student handout duplication

Postage

Rental of facility and set up



## Registration for Horticulture Study Courses

(Note: Courses may be registered individually or in their entirety as needed)

Name of Club \_\_\_\_\_ District \_\_\_\_\_

Chairman's name \_\_\_\_\_

Chairman's address \_\_\_\_\_

Chairman's email address \_\_\_\_\_

Facility/Location \_\_\_\_\_

	Date	Instructor
Course 1: Introduction (required) (Must be taught first)	_____	_____
Course 2: Annuals (required)	_____	_____
Course 3: Perennials (required)	_____	_____
Course 4: Trees and Shrubs (required)	_____	_____
Course 5: Bulbs (required)	_____	_____
Course 6: Containers (required)	_____	_____
Course 7: Vines (or optional topic) Please specify title of optional topic _____	_____	_____
Course 8: Fruits, Nuts & Vegetables (or optional topic) Please specify title of optional topic _____	_____	_____
Course 9: Herbs (or optional topic) Please specify title of optional topic _____	_____	_____
Course 10: Cacti & Succulents (or optional topic) Please specify title of optional topic _____	_____	_____

Please mail this registration form to the State Horticulture Study Chairman as noted in the current BOI.





Florida Federation of Garden Clubs, Inc.

Emblem

**Certificate of Achievement  
Awarded to**

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For completion of

**Florida's Horticulture Study Course**  
"Digging It"

President \_\_\_\_\_

Date \_\_\_\_\_

Chairman \_\_\_\_\_