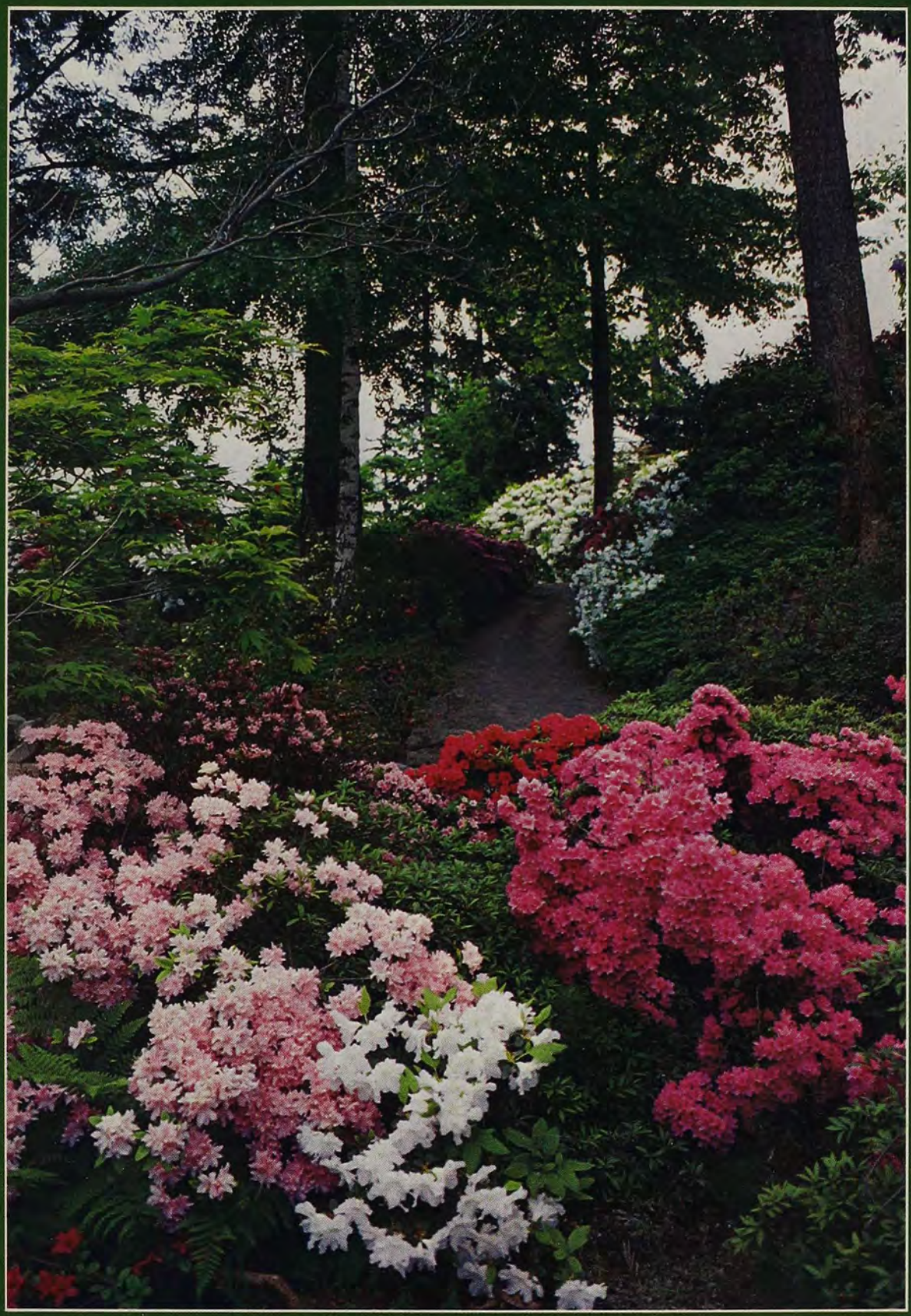
AMERICAN HORTICULTURIST

FEBRUARY 1981



Coming in April

Longwood Gardens

Detail of a pitcher plant.

As temperatures warm throughout the country in April, gardens everywhere come alive. It is a busy and exciting time for people who love plants, and an appropriate time to feature Martha Prince's observations about the April garden. Watch for her "April Diary." April will also bring a bit of France to our pages. David Lee will write about Montpellier, a city that has been important to the plant world for hundreds of years. F. Gordon Foster, an internationally recognized expert on ferns, will write about the importance of these ancient plants in medieval herbals. Lauralee V. Smith will discuss the cultural requirements of a deadly but beautiful genus of plants, *Nepenthes,* commonly called pitcher plants. The joys of alpine gardening also will be featured—in anticipation of the Society's Spring Symposium in Denver. Look for these features and more, plus our regular columns on "Strange Relatives" and books, as well as our pronunciation guide, in the April issue.

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FEATURES

ERRATA: In the December issue the photo captions on pages 34 and 35 were reversed. Also, contributor Jane Pepper was incorrectly identified as the horticulturist for Haverford College. She is, in fact, the new President of the Pennsylvania Horticultural Society. As the December issue went to press, she was the Society's Flower Show Business Manager.

COLUMNS

ON THE COVER: Although it is now February, spring is, happily, just around the corner. In this issue we get a head start on the season, beginning with our cover photograph of azaleas in bloom at Crystal Springs Garden in Portland, Oregon and continuing with a host of articles on subjects which herald spring's coming. Rejoice! It will soon be spring. Cover photograph by George Baetjer.

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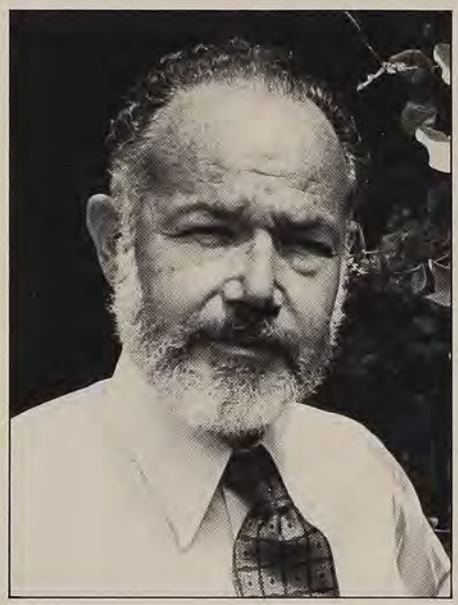
PRESIDENT'S PAGE



With the Christmas holiday season just past, many of you are still enjoying the bright color of a poinsettia plant. Poinsettias are lovely holiday accents, but they inevitably also bring to mind the question of poisonous plants in the home and garden. Stories of poinsettia poisoning are always appearing in print at this time of year, and the florist industry has stoutly defended this much maligned plant through its own educational programs, but questions of poinsettia toxicity continue to be asked. While recent evidence for fatalities resulting from ingestion of any part of the plant is totally lacking (there was a case reported in Hawaii in 1919), the milky juice of the plant can cause skin or eye irritation. The danger presented by the poinsettia is obviously small, but nonetheless real—but that is not the point of this editorial.

What I really want to discuss is the philosophy of our approach to poisonous plants in general. Stout denials of potential toxicity of the poinsettia and other house plants which may have poisonous parts by industry-sponsored publicity may help sales, but it is a disservice to the gardening public who are their customers. Plant poisoning is not a myth! Denying that a danger exists does not make it go away. Many plants do contain poisons, and the difference in dosage between a beneficial drug and a lethal poison is often only a matter of degree. Teaching caution to young children is the only reasonable approach to the plant poison problem.

The removal of all poisonous plants from the home or garden just isn't practical or necessary. More than 50 percent of all reported plant poisonings result from eating mushrooms. Even the most experienced mushroom collector knows how difficult it is to properly identify them. For the rest of us, the only thing to do is to avoid eating all wild mushrooms. After all, they are rarely cultivated, and the eradication of wild mushroom patches which spring up after a summer rain can only be done after the fact. There is no way to prevent the mushrooms from growing in the first place except to replace all of our lawns and gardens with a thick layer of concrete. Removal of all privet hedges and horsechestnut trees would leave a large gap in the urban landscape of the United States as well, but both of these plants are poisonous, and deaths from eating their fruit are well documented. The number of deaths is small; educating the public could make the numbers even smaller. After all, no one suggests removing the far more lethal automobiles that inhabit the same streets where these two common plants grow.

As gardeners, we should acknowledge that many of our common plants are a potential source of poison. Learn which plants in your front yard or your garden (including your vegetable garden) are poisonous and which parts of the plants are involved. If you want to do something even more positive, you might contact the poison control center at your local hospital and find out which plants have been responsible for poisoning in your community. Learn to identify these plants and teach your friends and their children to do the same; it would make an excellent project for your local garden club.

Learn to live with these plants and enjoy them for the good they do in improving your environment through their pleasant shade, attractive flowers or sweet scent. Respect their potential dangers, but do not let those possible dangers intimidate you. A thorny rose will scratch you if you aren't careful when cutting its flowers, but would you ever think of eliminating roses from your garden because of scratches caused by your own carelessness?

Gilbert S. Daniels

—Gilbert S. Daniels
President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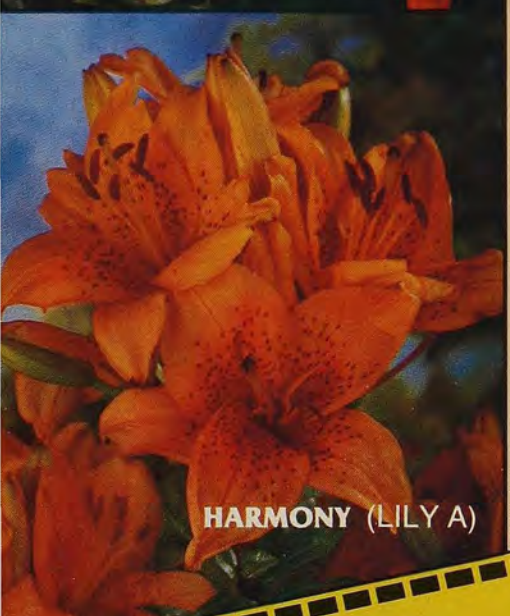
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GROWING PEANUTS IN CONTAINERS

When Jimmy Carter was President of the United States, one agricultural crop was in the news constantly. That crop was peanuts. Everyone knows of its commercial value, but few people know that *Arachis hypogaea*, as it is known botanically, also makes an excellent ornamental plant. Peanut plants will thrive in five-inch diameter or larger containers, and they make beautiful hanging baskets. The plant will produce flowers and lush foliage with proper care. Growing instructions are relatively simple to follow.

SEED—Obtain peanut seeds from any package of fresh, unprocessed peanuts. Many of the garden seed catalogues also carry peanut seed. The seed must be raw; if it has had any type of processing, such as parching or roasting, this will kill the seed and it will not germinate. If the peanuts are still in the shell, they should be shelled prior to planting. Almost any variety will grow a beautiful, full pot or hanging basket.

There are four market types of peanuts sold commercially for planting. These are Spanish, Virginia, Valencia and Runner types. Several different varieties of each type are available. Spanish peanuts have the smallest seed; they also reach maturity in a shorter period of time than do Runner or Virginia types. The Valencia type is slightly larger in seed size than Spanish. It has four seeds per pod, and its growth time to maturity is similar to the Spanish. Runner and Virginia type peanuts, on the other hand, require a longer time to reach maturity and have larger seeds. Many other types and cultivars are available for planting, but the list which follows may prove helpful as a guide. Consult your seed catalogues and select a variety adapted to your area and growing conditions.

Peanuts usually require 100 to 150 days from planting to reach maturity, therefore, most homeowners are actually better off planting peanuts in containers first—this means that plants will be ready to go outside as soon as the last frost is past. By shortening the time to maturity in this way, it is possible to grow peanuts in many areas where the season would not normally be long enough. Select an early maturing variety if the growing season in your area is short.

Photo by author

Although peanuts are most commonly grown as a field crop, they make excellent container plants. This cross section shows the root system and peanuts at different stages of maturity.

CONTAINERS—Peanuts can be grown in a wide variety of containers, but container *size* is very important. If you plan to grow peanuts only as an ornamental plant, a four- to six-inch pot is sufficient. However, if you grow the plants for the purpose of producing peanuts, then the larger the container the better. A 10- to 18-inch container with a 12- to 18-inch depth is best. A 10- or 12-inch diameter hanging basket also makes an excellent container, setting off the plant's ornamental features to best advantage. If the plants are to be transplanted to the garden or to larger containers after the season warms up, then use a three- to five-inch container. Always use containers that have drainage holes.

SOIL—Soil for growing peanuts should be loose and sterilized. Do not use a fine soil mix that tends to pack with age or one that holds too much water. Peanuts do not grow well in this type of mix; instead they like a mix of one third sphagnum peat moss, one third coarse vermiculite and one third perlite. This mix tends to dry out quicker than others, but it is excellent for root growth, which is essential for any peanut production. Any loose house plant or greenhouse soil mix that is already prepared also will be good for growing peanuts. These mixes are usually available from your plant and seed store, garden center, greenhouse and nursery. Stay away from those mixes that hold too much water.

The soil pH should be between 6.0 and 6.5. For most greenhouse or house plant soil mixes, this means adding a little more dolomitic lime than usual—about 10 to 15 pounds of lime per cubic yard of mix. This is approximately one-half pound of dolomitic lime per cubic foot (1′ high x 1′ wide x 1′ deep). Without enough calcium, which the dolomitic lime provides, the plant will produce a lower quality peanut and unfilled pods.

PLANTING—When planting, use about three seeds in each six-inch pot. Plant them directly in the container in which the plants will be grown about two inches under the surface of the soil and about one inch apart. Use more seed for larger pots (approximately five for each eight-inch pot). Adequate soil moisture must be present at the depth of seed placement to ensure germination. However, do not keep the soil too wet or rotting and poor germination of the seed will result. In five to 10 days the small peanut seedlings will emerge if growing conditions are favorable. Thin the plants if more than one plant emerges by removing the smaller, less vigorous plants, leaving a single healthy plant.

TEMPERATURE—A warm temperature is very important for good seed germination. Maintain a minimum of 65°F

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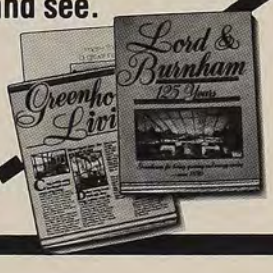

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the first two weeks after planting. Better germination and growth will occur if a 70° to 75°F temperature is maintained. After the seedlings have been up for a couple of weeks, cut the temperature back to 60°F to harden them. Peanuts grow much faster if they have a daytime temperature of 75° to 85°F.

LIGHT—Light is very important for growing peanuts, and plenty of light is required for optimum growth. In the greenhouse full sunlight is ideal. The more light the plant gets the better. Keep the plant away from heavily shaded areas.

If kept inside, peanuts should be in a sunny south window. Fluorescent light will work, but peanuts should be placed approximately six to 18 inches from the fluorescent tubes; any farther away and they will not get enough light. Plants that are grown in low light situations tend to be longer stemmed and less bushy.

FERTILIZATION—Peanuts are a leguminous plant, which means that they are able to supply their own nitrogen from the air with the help of nitrogen fixing bacteria in the soil. However, in most greenhouse soils these bacteria may not be present and a nitrogen deficiency will develop. Nitrogen deficiency on peanuts is characterized by stunted growth, yellowish leaves and reddish stem coloration. To correct the problem, apply a soluble nitrogen fertilizer such as calcium nitrate or a balanced soluble fertilizer such as 15-15-15 or 20-20-20.

Do not overfeed. Peanuts are extremely sensitive to fertilizer burn. A regular feeding program beginning with the young seedlings using a maximum of 200 parts per million nitrogen and potassium or of a balanced soluble fertilizer should be ideal. (Use approximately one teaspoon of a soluble fertilizer in one gallon of water.) Apply the fertilizer at the previously recommended rate once per week the first 30 days and at least twice per week thereafter. Don't use a granular garden fertilizer in containers because of its uncertain chemical reaction.

GROWTH—After the seeds germinate and emerge from the soil, the plants usually grow very slowly until about 30 to 45 days after planting. Growth is more rapid between 40 and 100 days; the plant size is usually increased six to seven times during this period. Flowers will bloom about 35 to 40 days after emergence; they will open during the night and will usually wilt and die in one or two days. Flower development is the first stage of producing the peanut underground. About five to 10 days after the flower has shriveled, if it has been pollinated, the peg (immature peanut) will emerge from the stem of the peanut plant at the base of the flower stalk and penetrate the soil surface. It will penetrate to a depth of approximately two inches and in time develop into a mature pod.

SUGGESTED PEANUT VARIETIES FOR THE SOUTHEAST

Market Types	Suggested Cultivars
Spanish	'Chico', 'Starr', 'Tammut 74'
Virginia	'Early Bunch', 'Florigiant', 'NC 6'
Valencia	'N. Mex. Valencia A', 'Tennessee Red'
Runner	'Florunner', 'Tifrum'

Pegs should not be disturbed after entering the soil. Therefore, if you are transplanting the plants into the garden or into larger containers, do so at least five to 10 days before bloom date. Actually it would be better to transplant them even earlier so more of the flowers could be pollinated and less transplant shock would occur.

The plant is usually full of small, inconspicuous flowers when flowering occurs. However, only 10 or 15 percent of the flowers will produce a mature pod. Also, the smaller the container, the fewer the number of mature pods to be expected. The time required from flowering to a mature peanut will vary from 30 to 60 days.

PEANUT PESTS—The peanut leafspot disease is the biggest disease problem to hamper peanut yields. It infects the foliage, usually beginning on the lower leaves, and causes a light to dark circular lesion surrounded by a yellow halo. Control leafspot by spraying or dusting with a recommended fungicide at 10- to 14-day intervals (contact your local County Extension agent for local recommendations). Sprays are usually better than dust. Leafspot disease is usually no problem for greenhouse- or indoor-grown plants, and a light infection of leafspot disease left uncontrolled will still produce a fair yield of pods on your plants.

Two classes of insects (foliage feeders and soil inhabiting) attack peanuts. Foliage feeders are fairly easy to detect. How-

ever, soil insects feed on the developing pods below the soil surface and are more difficult to detect and control. Many of the same insects you find on greenhouse and bedding plants or house plants will attack peanuts grown in containers. Identify the insect and use a recommended control measure. Apply all pesticides in strict accordance with label instruction. Check with your local County Extension agent for recommendations.

HARVESTING—Peanuts should be ready for harvesting about 90 to 130 days after planting, however, this can vary depending upon temperature, light and variety. Harvesting should be delayed until about 65 to 75 percent of the pods have turned dark on the inside of the hull and the peanut kernel is dark pink in color. Immature peanut seed coats are white to pale pink. If the plant loses its leaves, harvesting should begin at once.

When ready for harvest, take the peanut plant out of its container, shake all of the soil off the roots and then remove the pods from the plant. Allow the pods to dry in the sun for three to six days after harvest. Do not allow them to mold while drying or while in storage. If you cannot dry the peanuts in the sun, then dry them in a light place with plenty of air movement. A fan blowing over the peanuts will help. After they have dried, bag them in a loosely woven container and hang them in a cool, dry area free of insects and rodents. If the peanuts are dried to a safe moisture level of 10 percent, they can be stored for several months without deterioration of quality.

Any plant enthusiast should be able to grow and enjoy this excellent novelty crop. If you are skeptical, just try a few to see how easy it is. Start early, though, because you may decide you want to make a second planting in the same season. Granted, peanuts will yield much better if grown in the garden, but then you miss their ornamental value as container-grown flowering and foliage plants.

—G. Douglas Crater

Mail-order suppliers: W. Atlee Burpee Seed Co., Warminster, PA 18991; The Yankee Peddler Herb Farm, Rt. 1, Box 251A, Burton, TX 77835.

Acknowledgement: The author wishes to express his appreciation to Ronald J. Henning, Extension Agronomist—Peanuts, University of Georgia, for his advice and recommendations with this manuscript.

THE RANUNCULACEAE FAMILY

Illustrations by Alice R. Tangerini

It's February. It's spring—somewhere. And the flowers are coming. But whether it is spring, summer, autumn or winter, flowers in the Ranunculaceae or buttercup family parade through our gardens and woodlands. Fabled in folklore, living in legends and literature, hear the names of some of our favorites: buttercups, larkspur, columbine, monkshood, clematis.

Although these plants are grouped together as one family on the basis of botanical distinctions or resemblances, the Ranunculaceae exhibit great diversity in flower structure. The differences in shapes of the parts or in the way the flowers are assembled often make it hard to believe the plants in this family are related. Their conspicuous dissimilarity cloaks their kinship.

Flowers of Ranunculaceae are usually borne on a spike, although sometimes the flower is solitary. Frequently the showy part of the flower consists of brightly colored sepals rather than petals; sometimes both are present. The flowers are mainly insect-pollinated, and the adaptations for pollination are an interesting aspect of the study of these plants. The family can be divided into two groups according to whether insects visit the flowers for their pollen or for their nectar.

Most Ranunculaceae are perennial herbaceous species which persist by means of a rootstock or rhizome which survives from season to season; in some species, adventitious roots swell into storage tubers. Leaves are commonly much divided. Specially adapted, submerged leaves occur on aquatic species; twining leafstalks enable some species to cling to supports.

A great many names in the family, both Latin and common, are familiar to gardeners. Among them are *Aquilegia, Aconitum, Delphinium, Anemone, Clematis,* and of course, *Ranunculus,* as well as a number of other genera. In spite of our devotion to their charm and garden utility, we must remember that several genera of Ranunculaceae are highly poisonous.

Beginning in early spring, a galaxy of garden favorites spreads before our eyes, each a star in its own right. *Eranthis hyemalis,* the winter aconite, its growth stirred by the warming sun in early spring, is one of the first flowers of the garden year. This perky, solitary, low-growing golden cup, with its ruff-like collar of green leaves, is not shy about snow and cold, appearing before or concurrently with crocus.

Ranunculus, from which the family name is derived, is a large group of plants, some of which are tuberous. These are the buttercups, also early bloomers, some species

blooming in May, others continuing into September. Flowers are formed of both sepals and petals; some species are yellow-flowered, some white. The petals have prominent nectar pouches which attract insects. *R. repens* 'Pleniflorus' is the creeping buttercup, with shiny, bright-green, compound leaves whose small double flowers are sometimes referred to as yellow bachelor's-buttons. *R. acris* is the tall, single-flowered species brightening meadows and roadsides. The Persian buttercup used by florists is *R. asiaticus*, not a hardy species.

Anemone, the windflower, occurs in a number of forms, from the delicate, daisy-like *A. blanda* in spring to tall *A. hupehensis japonica* in the fall, its bunches of white or pinkish blossoms likened to dogwood; and in between the almost gaudy hues of the teacup-size florists' hybrids, *A. coronaria*. In anemones the flower colors are present in sepals rather than in petals, their color attracting insects for pollination. (For more about these beautiful garden ornaments, see Lorraine Burgess' article on page 28.)

Some of the loveliest leaves in the Ranunculaceae family are the lobed, ternately compound, gray-green foliage of columbine, *Aquilegia*. Well-developed nectaries form the graceful spurs for which these nodding flowers are admired. Both petals and sepals are colored, often in combinations such as red and yellow, blue and white, pink and gold. A colloquial name for the flowers is granny bonnet.

With early summer the larkspurs arrive, lending airiness to the flower border with their finely divided, light-green leaves and dainty spikes of pink, blue, white or purple flowers; the back-pointing spur on each flower, which is the nectary, accounts for the common name, larkspur. Larkspur is an annual delphinium originally from southern Europe, but it was well known in Early American gardens. John Bartram, the colonial plantsman par excellence, and one of the first to experiment in hybridization, crossed larkspur types with some success.

The tall, stately perennial *Delphinium elatum* has been bred for centuries so that the modern gardener can choose among many strains and hybrids in various shades of blue, including one that is considered the only true blue garden flower. The well-developed nectaries of *Delphinium* species attract insects which pollinate the flowers. The plant name comes from the word dolphin, alluding to the shape of the flower, which is sometimes likened to the classical figure of the dolphin.

Aconitum, monkshood, blooms in late summer; the roots (and flowers of some species) are poisonous, accounting for the appellation wolfbane, as the plant was once used as a poison bait for wolves. The Latin word *Aconitum* is of uncertain origin, but the origin of the common name monkshood is readily seen in the contour of the purple, blue, white or even yellow flowers.

Most Ranunculaceae are perennial herbaceous species which persist by means of a rootstock or rhizome which survives from season to season.

Delphinium and *Aconitum* species, together with *Aquilegia*, appear to have a very different flower structure when compared to other Ranunculaceae. The flowers of *Delphinium* and *Aconitum* are asymmetrical and irregular; those of *Aquilegia* are regular but distinguished by a backward thrust of spurs. In *Delphinium*, the upper sepal is spurred as are two of the four petals. In *Aconitum*, the upper sepal (of five) is hooded, covering the two long-clawed, small petals; nectaries are present here too. In *Aquilegia*, the nectaries are located in the spurs.

Thick sepals furnish that glory and size which is *Clematis*. This genus includes about 250 species and many hybrids, most of them vining and semiwoody, native chiefly to north temperate zones. The flowers may grow either solitarily or in clusters, their brightly colored sepals attracting pollinating insects. The innumerable, splendid, large-flowered hybrids inevitably catch the viewer's eye, making a choice among them difficult. (See "Buying a Clematis" in *American Horticulturist*, April 1980). Species such as *C. tangutica, C. texensis* and *C. montana rubens* provide additional choices of flower form and color. The fall-flowering, fragrant *C. paniculata*, sweet autumn clematis from Japan, with its mantle of white flowers, gives the garden a final burst of fragrance in autumn. Its bunches of plumed seed or "hedge feathers" are characteristic of *Clematis* species.

Cimicifuga is a genus of tall, vigorous perennials, called bugbane because the unpleasant odor of its small, creamy flowers deters insects from visiting the plant. The spires of flowers borne from June to September are made showy by the petal-like stamens. *C. racemosa* grows six to eight feet tall, and the flower spikes may be three to four feet long; its root is used medicinally as a sedative and hence the plant is sometimes included in the herb garden.

Clematis montana rubens

The genus Clematis *includes about 250 species and hybrids, most of them vining and semiwoody.*

Other Ranunculaceae useful in the flower garden are *Trollius*, globeflower, a low-growing, spring-blooming plant bearing bright-yellow or golden globes made up of sepals and shorter petals; *Thalictrum*, meadow rue, with fine, gray-green foliage and tall, airy spires of lavender flowers having prominent stamens adapted for wind pollination; *Nigella*, an annual with light-blue or white flowers; *N. damascena* is love-in-a-mist; *N. sativa* is nutmeg flower, the seeds of which are sometimes used in seasoning.

From spring through summer and back again to cold weather, we cannot leave the garden without at least a nod to the nodding flowers of the hellebores. These are cold-weather-loving plants for the most part, blooming in late fall or in winter. Most prominent are *Helleborus niger*, the Christmas rose, and *H. orientalis*, the Lenten rose. The Christmas rose is white, borne solitary on its stalk. The Lenten rose is green to purple and differs from the Christmas rose in that the flowers are borne several to a stalk. The flowers have well-developed nectaries. One curiosity of this genus is that an oil-containing swelling on the seed attracts ants which then disperse the seed. All the hellebores are from Europe or Asia, and all *Helleborus* species are poisonous. (An article on *Helleborus* appeared in the December, 1980 issue of *American Horticulturist*).

From coast to coast in the United States and in parts of Canada, the woodlands, prairies and mountain crannies are also home to wildflower members of the buttercup family. In the East we cherish *Hepatica americana*, the earliest orthodox wildflower to appear there, and in nearby Canada, *Aquilegia canadensis*, American columbine; *Actaea pachypoda*, the poisonous white baneberry, or doll's-eyes, raised above the forest floor on red stems; *Ranunculus acris* everywhere; and anemones—the wood anemone, *A. quinquefolia*, the windflower solitary on its stalk, and the rue anemone, *Anemonella thalictroides*, a tuberous-rooted woodland species with several delicate flowers on each stalk. Inland, the spreading pasque flower, *Anemone patens*, is a prairie native, blooming in March and April. *Ranunculus cymbalaria* is desert crowfoot in prairie regions and seaside crowfoot in coastal areas. *Thalictrum, Aconitum* and other family members spread through the central states.

Mountainous regions of the American West are rich in Ranunculaceae. The parents of our long-spurred columbines are *Aquilegia caerulea*, the state flower of Colorado, and *A. chrysantha*, golden columbine from the Rockies. The famous red larkspur, *Delphinium cardinale*, is native to the canyons of California coastal ranges. California also boasts the orange larkspur, *D. nudicaule*. Menzies larkspur, *D. menziesii*, is native from the Rockies to the Pacific coast. The alpine buttercup, *Ranunculus eschscholtzii*, lives for years along surface streamlets in high western mountains. Its root system extends a little above the ground, and leaves and flowers arise from this exposed section. A mountain plant three feet tall, blooming in summer, is *Aconitum uncinatum*, the blue-purple flowered western monkshood, which ranges through the Sierra Nevadas and Rockies into British Columbia.

What a wealth of beauty and variety is to be found in the Ranunculaceae family! We can start with *Helleborus niger* in the winter, or at this time of year with *Eranthis*, and have the company of buttercup relatives throughout the year at home or in our travels.

—Jane Steffey

GIANT GOURMET MUSHROOMS LIKE THESE INDOORS YEAR 'ROUND'

the majestic Shiitake mushroom - revered by gourmets for its flavor, revered in the Orient as the Elixir-of-Life

by Hal Taub (At Lovin' Spoonful, I'm Chief Cook & Bottle Washer)

Like most Americans, I love mushrooms. Mushrooms on steak...in an omelet...stuffed mushrooms...as part of my salad...mushroom gravy—you name it, I eat 'em up.
When I can afford it!

With the price of mushrooms *mushrooming* to over $2 a pound for the small button type—when you can find them—and the fancy dried imported kind going for $20-$40 a pound and more, I think twice before indulging myself. Is it any wonder that I've even tried growing them myself? What I got for my labors was a handful of tiny buttons, along with some nasty comments and dirty looks from my neighbors. (Our American or "button" mushrooms require large amounts of manure to grow.)

A TASTE EXPERIENCE

Do I love my food? Let's just say that I very seldom miss a meal. Recently, on a business trip to California, I was treated to a business lunch at an absolutely delightful restaurant in Beverly Hills. Of course I ordered a mushroom salad. It was incredible! I had never tasted anything like it before. Not even the imported mushrooms came close. I can only describe the flavor as being somewhere between filet mignon and lobster! I not only ate my salad, I ordered two more to boot. In fact I almost OD'd on mushroom salad!

THEY ARE CALLED SHIITAKE'S

That was my introduction to the Shiitake Mushroom. Let me tell you, I did not leave that restaurant without learning their source. I discovered they were being raised in very limited supply by a Chinese American botanist, Dr. Henry Mee. I called Dr. Mee thinking I could tote a few pounds home with me. He most graciously invited me out to his facilities. I went to buy mushrooms, but instead, received an education.

ELIXIR OF LIFE

The first Shiitake spawned during the misty era of a hundred million years ago. Early chinese sages attributed great powers to the Shiitake and it was often called the Emperor's Food. In ancient China and Japan, it was eaten by royalty to fend off old age, revered as an aphrodisiac and fought over by Japanese warriors who fiercely guarded the growing sites.

In their natural habitat, it takes two years to bring a Shiitake crop to harvest. They grow on oak logs in the remote mountain forests of Japan. After 25 years of study and labor Dr. Mee has developed a method that cuts the time down to 45 days. He now produces some 100 pounds daily, of which the entire crop is taken by a relatively small handful of gourmet restaurants and shops.

MORE THAN I BARGAINED FOR

Rather than sell me a few pounds of mushrooms, Dr. Mee suggested I grow my own. He had perfected his process to the point where he claimed anyone who could water a house plant could enjoy fresh, luscious "Shiitake" mushrooms. Simply stated, he simulates their natural habitat by producing a "log" fabricated of 100% sterilized organic plant material, with nothing artificial, and no chemicals added. The log is then innoculated with pure culture of the "Shiitake" mushroom spore...and then cured or "aged" to hasten fruition under home environment with the addition of nothing but water. When Dr. Mee said I would not require any manure or fertilizer of any kind, I decided to give it a try.

SIMPLE AS A.B.C.

The instructions were simple. Start by soaking the log in water for 24 hours. Then simply place the tree in its own wooden planter-stand and set on a foam rubber pad, which is supplied with each log and acts as a moisture "reservoir". After that just mist it once a day. And, unlike buttons, Shiitakes thrive in daylight.

INCREDIBLE RESULTS

In only 5 days I actually saw mushrooms start budding, 10 days later I picked my first giant Shiitake. One month later I had enough for not only myself but my friends as well. What's more, Dr. Mee has informed me that I can expect the log to keep producing for the next 10 to 12 months. If you're growing more mushrooms than you can use, simply store the tree in the frig (or outdoors if the weather is cool) and it will stop growing. When you want more mushrooms, just place it at room temperature and it will start producing.

NUTRITION

With a virtually unlimited supply of my favorite food I've become something of an expert. Mushrooms are nature's unique low cal fat-free food. One pound contains fewer calories than a single apple! Shiitake mushrooms have more than twice as much protein and fiber as common button mushrooms, almost 3 times the minerals. Calcium, Phosphorous and Iron are present in large quantities, as are high levels of B Vitamins and Vitamin D2.

A FEAST

All of this nutrition stuff is great. But the eating is even better! One ounce of Shiitake will equal the flavor of an entire pound of buttons. They are super meaty, super mushroomy in taste, succulent, heady and 100% edible from cap to stem.

One of two slices turn an ordinary pot roast into a gourmet delicacy...an ordinary salad into an extraordinary taste sensation...a gravy into a nectar for the gods. And spaghetti; let me tell you about my spaghetti. I serve it with a mushroom meat sauce that is truly memorable!
My guests insist that Julia Childs had come in to cook for me!

AM I SELFISH?

My friends (and my wife) have accused me of being selfish. I admit to being somewhat of a miser when it came to sharing my mushroom crop. It seems every time I gave my friends a super-size Shiitake, they would come back and pester me for more. I finally had to ask Dr. Mee for additional mushroom logs to save my sanity and several valued friendships.

Dr. Mee is now producing a limited number of Shiitake Mushroom Log kits. We at the Lovin' Spoonful are fortunate in being chosen to introduce it to the general public. As a measure of our enthusiasm and our confidence we offer it to you at our risk. If the Shiitake is not every bit as delicious as we claim, or for any reason, you are not satisfied with the production of the log, return it for a full refund of purchase price. The cost is only $19.95, complete with everything you need to grow a bumper crop. We also include a selection of fabulous mushroom recipes. I guarantee it will be the most delicious investment you will have ever made.

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A Selection of Dwarf Annuals For the Garden

BY ALEXANDER IRVING HEIMLICH

In the last decade two changes occurred in the world of horticulture. First, a fast-growing group of dwarf annuals emerged that changed the face of gardening, beginning on the continent of Europe, spreading to England and later, to Canada and America. These everblooming annuals, once arranged and planted, formed carpets of color which endured from May until frost with a few lasting deep into the fall. At the various international expositions of flowers acres were devoted to these low-growing annuals. Second, a new set of gardeners appeared who were attracted by this fresh concept in gardening. They were impatient with the short flowering season of perennials which left spent flowers to be removed, a carpet with some color and before season's end, a design of foliage.

The new all-annual beds that resulted required little or no care other than feeding and watering. Moreover, they proved tolerant of whipping winds and drenching rains that leave most gardens in a devastated condition. The low annuals rose with the rising sun and before day's end smiled back at all who came to admire them. They were as merry as a refreshing breeze; they exhilarated onlookers and put them in a holiday mood. Dull eyes brightened as they gazed at the sparkling charmers.

A gardening lady we will call Mrs. Warren, who lived in a suburban area, for years took great personal pride in her garden. It was enclosed by a variety of trees, both evergreen and deciduous. Small shrubs and dwarf trees were well placed, but she had difficulty in maintaining her border and island plantings to her satisfaciton, a problem she eventually resolved in the following manner.

Mrs. Warren often gave dinner parties and particularly enjoyed the "hour of libation" when her guests wandered about the grounds and praised her horticultural efforts. One evening every part of her garden was in apple-pie order. Her guests, intrigued by the smooth flow of plants, the rich colors in evidence everywhere, gathered about her and asked innumerable questions: Where did this elegance come from? How did she do it?

Mrs. Warren explained: "The solution was amazingly simple, the process to reach it, agonizingly slow. Professionals made suggestions such as the block of *Potentilla* shrubs that you see, but a dimension was missing. That dimension was the dwarf plants you are looking at which furnish the rich, vibrant color."

"But," a guest interjected, "this change-over must have proved very expensive."

"Not at all," answered Mrs. Warren. "I spent less than I did previously, with more than satisfactory results. For years I have had a gardener, Giuseppe, who brought with him from his native Italy a love of good design and color. Over the years, he was disturbed when, despite his best efforts, results on these grounds were less than satisfactory. He was not to blame, for I was the designer here and he, the worker. But we both shared the disappointment. One day he said, 'It's not good to plant little plants next to big ones—they don't look right.' He suggested that we look at demonstration gardens where I could see some plantings he admired. There, right before my eyes, was the smooth flow of color I so admired in Lucerne, in Geneva and in Interlaken. I resolved then and there to change my gardening practices."

Following Mrs. Warren's visit to the demonstration gardens, she was still doubtful that she could get both color and variety in plants she desired. Giuseppe assured her that the large garden centers had not only many varieties of the new annuals, but also a wide selection in height and color. During the winter months Mrs. Warren and Giuseppe planned the radical change that her guests so admired. Tall perennials that she liked were placed in the border. Rock garden plants were relocated for spring color. Some island plantings were enlarged, others reduced. She showed Giuseppe a list of annuals she had selected from a dozen catalogs. He cut the list by half because most good, healthy plants in well-drained soil would grow 12 to 14 inches from planting time in May to maturity in late June. Mrs. Warren wanted plants that would retain their small size throughout the season. (Since seedsmen, sensing the enormous popularity of dwarf annuals, have worked overtime to furnish gardens year after year with ever-increasing families and colors, there were many plants to choose from.)

Mrs. Warren and Giuseppe selected some of the following plants.

IMPATIENS

Elfin® series—A series of hybrid impatiens which are very dwarf in habit. In shade they will attain a height of eight inches, in less shade or in partially sunny areas the Elfin series cultivars will grow as low as four to six inches. Elfin impatiens are available in crimson, fuchsia, orange, orchid, pink, rose, salmon, scarlet, white and a brilliant red which grows slightly taller than the others.

Futura series—The Futura impatiens are also a series of dwarf cultivars with a height of from six to eight inches. They are available in burgundy, coral, orange, orchid, pink, red, rose-pink, scarlet and white.

Fantasia series—Fantasia series impatiens are available in 10 bright colors, with flowers 1½ to 2 inches across, borne on compact, mounded plants that reach a

Dwarf annuals in massed plantings will provide beautiful, sparkling color in this garden from planting time until the first hard frost of autumn.

M. Oster

height of from eight to 10 inches.

Twinkles series—A white star surrounded by red, rose or scarlet is the hallmark of the Twinkles series. These cultivars are fast-growing plants with early and abundant bloom throughout the season. They provide neat, dwarf color set against dark-green foliage and reach six to eight inches in height. A half-dozen plants set in a shady area create a frivolous touch that twinkles and adds a gay note to the garden.

There are many other series of impatiens cultivars to select from, among them, the Minette, Ripples and Grande series, to furnish just the correct color or height for each planting.

BEGONIAS—Semperflorens or wax varieties

Begonias are one of the very best annuals for both sunny locations and partial shade. Mrs. Warren selected several varieties for her garden.

Cocktail series—This group features dark foliage with flowers borne well above the leaves. Neither the foliage nor flower color fade in the sun. 'Whisky' has pure-white flowers set freely on dark-bronze foliage. 'Gin' is a free flowering rose-pink variety. 'Vodka' is a free flowering plant with bright-scarlet flowers.

Tausendschon series—Tausendschon begonias are available in red, white and pink. They are profuse bloomers, flower early and remain compact, seven to eight inches in height. 'Linda' is a freely flowering variety, rich rose in color. It is disease resistant and can stand up to adverse weather.

There are other series of begonia varieties with varying heights, foliage and flower color combinations available to provide the perfect plant for each garden design.

BEGONIAS—Tuberous Rooted

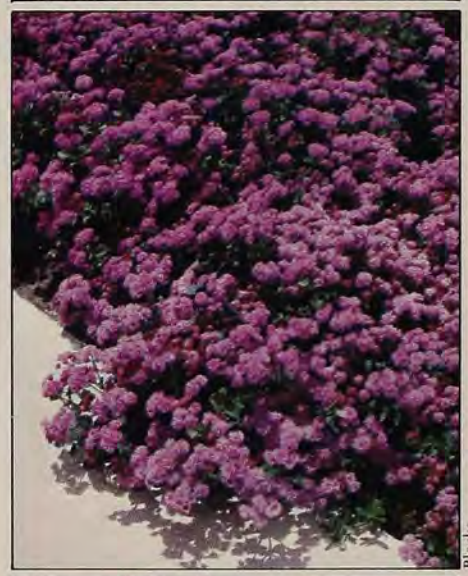
Nonstop series—'Nonstop Orange' and 'Nonstop Red' are compact, upright plants which bear medium-sized double and semi-double flowers. They are free-flowering plants and reach a height of eight inches. At the end of the season the tubers can be dug and held for replanting the following year.

CELOSIA

Mrs. Warren and Giuseppe pondered during their winter session whether to use any taller annuals. She finally agreed to use three cultivars of celosia. Plumed celosia was selected to provide the garden with a strong color accent as well as a silky texture. 'Golden Feather' bears golden-yellow spires while, in another section of the garden, freely branching 'Fiery Feather' produced spires of fiery red. Both are 12 inches in height. 'Empress Dwarf Red' is the only cockscomb celosia Mrs. Warren allowed Giuseppe to use. This cultivar has good comb formation with a uniform red color. It reaches a height of 12 inches.

Park Seed

Park Seed



Blocks

Blocks

FROM TOP TO BOTTOM: Futura Impatiens, Cocktail Begonias, *Ageratum*, *Dianthus*.

AGERATUM

Two dwarf, blue ageratum (*Ageratum houstonianum*) cultivars were chosen to be used in drifts with the red begonias. 'Blue Angel' bears large heads of rich bluish-mauve flowers and remains in color for a long time. This neat, compact plant is well suited for the garden. 'North Sea', the deepest blue-flowered ageratum, bears reddish-purple buds which open to lavender-blue flowers. It blooms freely and, like 'Blue Angel', reaches a height of six to eight inches. Mrs. Warren selected 'Summer Snow' for its pure-white flowers on compact six- to seven-inch plants to use in island beds with 'Fiery Feather' celosia. The golden ageratum, *Lonas annua*, was selected for its yellow clusters of flowers which lend a rich, fluffy effect to the plantings.

ASTERS AND CARNATIONS

Although Mrs. Warren preferred drifts of solid colors, she and Giuseppe decided to plant a few areas in a mixture of asters and carnations for variety. The aster they selected, *Callistephus chinensis* 'Dwarf Queen', is a dwarf, compact, branching-type aster with double flowers. The plants, which reach a height of about 10 inches, bear azure-blue, carmine, deep-purple, rose and white flowers.

The carnation or pink family is represented by several plants selected for these mixed plantings. While these representatives are all members of the genus *Dianthus*, commonly they are separated into two groups, carnation and dianthus. The plants known commonly as carnations are of the species *Dianthus caryophyllus*, which includes the florist carnation as well as the less welll-known border carnation. The group of plants commonly called dianthus or annual pinks are representatives of a number of other species including *Dianthus chinensis*. Mrs. Warren chose 'Juliet', a scarlet-red, fully double carnation variety with fragrant flowers borne on 12-inch plants. The dianthus cultivars they selected are almost half the height (six to eight

inches) of the aster 'Dwarf Queen' and carnation 'Juliet'. 'Snowfire', a former All-America Winner, bears single white flowers with cherry-red centers. Also selected were several varieties in the Charm series. The dwarf, uniform plants of 'Coral Charm', a bright coral pink; 'Crimson Charm', a brilliant crimson-red; 'Pink Charm', a light-pink cultivar; and 'White Charm', a pure-white flowered plant, will give an added touch of color to these mixed beds.

DUSTY MILLER

Mrs. Warren and Giuseppe decided on three dusty millers for use as border plants. *Centaurea cineraria* is a very effective silver-gray foliage plant with a mature height of six to seven inches. Two varieties of *Chrysanthemum ptarmiciflorum*, also commonly known as dusty miller, were also selected. 'Silver Lace' is a neat, compact plant with lacy, finely cut silver-gray leaves, and 'Silver Dust' is a cultivar with finely cut silver-white foliage.

MARIGOLDS

The bewildering number of marigold varieties available confused Mrs. Warren, but she selected from among the dwarf triploid hybrids 'Legal Gold', a very free-flowering, bright-gold F-1 hybrid. 'Legal Gold' has a long blooming season and reaches a height of from 12 to 13 inches. She also selected 'Yellow Galore' to use in some of her borders where a taller plant was required. Its flowers are lemon-yellow and borne on 18-inch plants.

SALVIA

Mrs. Warren chose two cultivars of salvia for their excellent red color. 'Carabiniere', a deep, fiery-red flowered plant, attains a height of from 10 to 12 inches. The slightly taller 'St. John's Fire' is also a popular red salvia.

ZINNIAS

The tiny, golden-yellow *Sanvitalia procumbens*, commonly known as creeping zinnia, was selected for its low growing habit (six inches) and daisy-like flowers. While Mrs. Warren intended it for a sunny border, it is also an excellent hanging basket plant.

Mrs. Warren chose members of two other strains of zinnias. One group contained four of the Peter Pan cultivars that are available in pink, plum, orange and scarlet.

Blocks

Blocks

Park Seed

Blocks

FROM TOP TO BOTTOM: Dusty miller, dwarf marigolds, Peter Pan zinnias, *Sanvitalia procumbens*.

The 12-inch plants freely bear double, three-inch blooms on bushy plants. The Peter Pan hybrid zinnias are also former All-America Award winners. She also chose plants from the Thumbelina Mini series because the compact, four-inch plants produce mounds of color all summer long in gold, salmon and white.

ALYSSUMS

Mrs. Warren now realized the enormous number of dwarf plant varieties available. Lack of space precluded the use of any of the numerous varieties of geraniums and petunias available. However, she and Giuseppe did select one last group of plants, cultivars of *Lobularia maritima*, the sweet alyssums.

A number of these long-lasting plants were planted as a border for all island plantings and along the border facing the evergreens and estate enclosure. All were no higher than three to four inches: 'Carpet of Snow', uniform, compact; 'Snowdrift', with somewhat larger flowers; 'Royal Carpet', violet-purple flowers that produce freely; 'Wonderland', cerise-rose, rich, bright color, free-flowering, compact.

Late in the season while Giuseppe was planting miniature bulbs, Mrs. Warren joined him and remarked that the garden was a huge success. As she spoke, snow began to fall. The sweet alyssum that twinkled and outlined the flower beds throughout the summer was still blooming, frost having long since extinguished other annuals. Now, as the first snow softly fell and blanketed the garden, the sweet alyssum bade farewell to what had been a colorful flower display all summer.

Plant Sources: Many of the varieties described can be obtained in seed form early in the season from the W. Atlee Burpee Company, 300 Park Avenue, Warminster, PA 18974 or from George W. Park Seed Co., Inc., 236 Cokesbury Road, Greenwood, SC 29646.

Your local garden center or nurserymen will likely carry many of them as well, usually in six-packs or as individually potted plants. Be sure to ask for them by their correct name and assure yourself that the plants have been correctly labeled at the nursery. Otherwise, you may not get a dwarf variety at all.

Although all or many of the dwarf annuals mentioned here can be grown from seed, for the effect described it is wise to plant the beds with either small plants in flats or, if cost is not important, plants grown individually in pots.

'Sakura Gasane'

Japanese Tree Peonies

TEXT AND PHOTOGRAPHY BY ANTHONY J. DE BLASI

Fragrant as a rose, gorgeous as an orchid, carefree as a buttercup, the tree peony is a near perfect plant for a temperate garden. Esteemed in China and Japan for ages, this beautiful shrub has been shy in spreading to our gardens for the simple reason that it is slow to propagate and to establish. Once past this initial hurdle, however, it is an easy and eager garden plant.

The tree peony originates from a small area in western China and Tibet. *Paeonia suffruticosa* (also called *P. moutan* or *P. arborea*), the species of our discussion, grows in the north of this range, while three other species—*Paeonia delavayi*, a dark red; *P. lutea*, a yellow; and *P. potaninii*, a maroon-flowered species—occur in the south. While the latter species are relatively small flowered, *P. suffruticosa's* blossoms, which range in color from pure white to red, are large and dramatic.

Upon first seeing it, explorer Reginald Farrer wrote (c. 1917): *I sat at last and rested, gazing down the steep loess tracks to the little village so pleasant-looking in its grove of poplars, till my eye was caught by certain white objects . . . that were clearly too big by far to be flowers . . . Through the foaming shallows of the copse I plunged, and soon was holding my breath with growing excitement as I neared my goal, and it became more and more certain that I was setting eyes on* Paeonia moutan *as a wild plant . . . all considerations of botanical geography vanish from one's mind in the first contemplation of that amazing flower, the most overpoweringly superb of hardy shrubs.*

Here in the brushwood it grew up tall and slender and straight in two or three unbranching shoots, each one of which carried at the top, elegantly balancing, that single enormous blossom, waved and crimped into the boldest grace of line, of absolute pure white with featherings of deepest maroon radiating at the base of the petals from the boss of golden fluff at the flower's heart . . . For a long time I remained to worship . . ."

Dubbed "The King of Flowers" in China (the related herbaceous peonies being designated as "The King's Ministers"), the tree peony has been celebrated in poetry and paintings. It is referred to in literature dating back 1,400 years. Chinese rulers decreed that such noble flowers could only be planted in the gardens of imperial palaces.

Japanese Buddhist monks brought these Chinese plants to Japan in the sixth, seventh and eighth centuries (along with such well-known members of the rose family as apple, peach, cherry and quince). There, over a long period of time, through patient crossing and selecting according to Zen-oriented criteria of form, color and performance, the Chinese stock was transformed into a truly Japanese strain of tree peony. In its new guise the tree peony emerged even more ravishing in its beauty.

The first tree peony to reach the West was shipped to Kew Gardens as early as 1785, but it was explorer-botanist Robert Fortune who, in 1846, brought back the finest plants yet to come out of China. He left us the remarkable description of a Mandarin "sitting for hours, smoking and drinking tea, while he gazed at a tree peony covered with four hundred flowers," and it was from this Chinese stock that European breeders developed their own group of varieties.

Hybridizers in different parts of the world have, over the centuries, developed three distinct groups of tree peonies. The Japanese varieties, the group treated in this article, are considered by many to be the most beautiful. They have narrow, fine foliage and broad, crinkled, satiny petals. The Chinese or European varieties are known for their large, double blooms resembling the flowers of their herbaceous cousins and the last group, known as Lutea, is characterized by its yellow-flowered hybrids and slightly later blooming season.

My acquaintance with the tree peony dates to a chance encounter many years ago during a walk through the Japanese grounds of a botanic garden. I had never before seen, read or heard of this plant. I was then 12 years old, and this was the closest to a vision from a spirit world that my impressionable mind had yet perceived. The sight of the huge flower buds, the enormous white blossoms of such exquisite petal formation and silky texture, hovering above a tall, graceful plant of unusual gray-green leaves, had a profound and lasting effect on me. Among the many thoughts crowding my mind at this sudden confrontation with an object of such outstanding beauty was the wonder at how such an enormous flower could appear to float in air in seeming defiance of gravity and with such serene and confident poise. What other blossom that may exceed a foot in diameter is so graceful?

The tree peony is unusual in other ways. It is not really a tree but a shrub. Like its well-known herbaceous relatives, its center of renewal is its root system. But, unlike its cousins, the tree peony is a "perennial that forgot to die down to the ground." Its stems grow woody and hold the next season's buds above the ground.

The word *tree*, in tree peony, stems from the desire to contrast it with its herbaceous relatives and also, perhaps, from the fact

To many, the Japanese tree peony surpasses in beauty the orchid, the camellia, the regal geranium, the rhododendron or any other flower prized for its large size and striking appearance.

that the taller varieties *can* be trained into something like a little "tree." While this practice results in irresistibly beautiful specimens, it leads to ultimate frustration since, after a number of years, the older stems tend to die away to be replaced by new shoots from the root. There goes your "tree!" It is best to allow the plant to shape itself and not interfere with its normal inclination.

The natural shape of the tree peony is, typically, a cluster of woody steams of various ages giving rise to a canopy of gracefully arranged leaves. The leaves of Japanese varieties are finer, more sharply defined and deeper cut than herbaceous peony foliage, a puzzle of division into three's, whirled around the current season's stems and reminiscent of the foliage of the bleeding heart (*Dicentra spectabilis*). The shrub may rise from four to six feet and spread that wide. In or out of bloom the tree peony is an artistic plant, an attractive sight from spring to fall when, in cold climates, the leaves turn red or purple before they fall off.

Coming into bloom generally in late May, ahead of herbaceous peonies, the tree peony is hardy in a band that roughly corresponds to Arnold Arboretum's Zone 5 (U.S.D.A. Zone 6). North of that zone it needs a snow cover or winter protection similar to that given roses. Tree peonies also do well in much of California and further south than the herbaceous peonies.

In the dormant state the defoliated stems are hardly worth a second look. But wait until the life force stirs within them in the spring. Then it strains our language to describe the explosion of activity. In 10 weeks the red buds charge through a dancing cloud of changes. Urgent, supple red stems, leaves and buds wiggle their way into existence. As the foliage and stems expand and their reds merge to green, their motions decelerate, and the sparkling new dress above the stems becomes a rich foil to the flower buds as they swell and burst to reveal their colorful secrets.

The Japanese, who understood the power of suggestion long before the advent of psychology, gave their flowers colorful names that conjure up appropriate images in the mind such as "Palace of Violet Light" ('Shiko Den'), "Kingdom of the Moon" ('Gessekai') and "Ashes of the Setting Sun" ('Hino Tsukasa').

We find such poetic flights infectious. In our garden we have revelled in the shimmering, serene white of 'Gessekai' whose purity speaks of another world; the strange gray-lavender of 'Kamada Fuji' that hints of sacred origins; the incredible mahogany-maroon of 'Koku Tsuru', giving no clue to the sorcerer who invented it; the vibrant red of 'Taiyo', telling of great ruby quarries in a land of eternal sunlight; the radiant pink of 'Sakura Gasane', speaking of volcanoes that spew nothing but molten rose quartz; the friendliness of 'Hana Daigin', so generous with it bouquets of giant purple roses, steeped in rose perfume; and the imperious, deep purple of 'Rimpo', whose lavish but icy beauty reminds us of Turandot, that princess of Chinese legend whose great beauty and cold heart brought many an aspiring young prince to an untimely death.

In all these images the eye spies a mysterious infusion of Japanese style, a haunting affinity to the tea ceremony, flower arranging and other Japanese art forms. The blossoms seem clearly the conception of some great Japanese artist yet, unnatural as they seem, they are not artificial but real. Abounding in waves and twists, frills, fringes and crinkles, the petals may be purple, rosy-red, salmon, pink, white, scarlet, maroon or lavender, textured in silk, satin, velvet or crepe.

To many, the Japanese tree peony surpasses in beauty the orchid, the camellia, the regal geranium, the rhododendron or any other flower prized for its large size and striking appearance. Tree peonies also possess a quality of aloofness and indefiniteness, an aura that springs from elements that are fleeting and evasive, a "now you see it, now you don't" feast for the eyes that recalls the dazzling luxury of a tropical butterfly flitting in a Brazilian rain forest, the ephemeral, restless iridescence of a hummingbird poised for a sip of nectar or a rainbow hovering amidst the rising mists of a remote waterfall. Like the star that fades from view, its essence slips from our grasp the harder we try to scrutinize it. It seems, after all, to be a grand illusion.

The color of 'Gumpoden' ("Temple Adorned with Many Flowers"), for example, changes according to the light that plays on it. In the morning, 'Gumpoden' is not the same as it is in the afternoon, nor is it the same on a cloudy day as in sunshine. The reason is that, close up, it is a blend of colors which seem to vary depending on the position of the petals, forever rearranging themselves with the changes in temperature. The base of the petals is steeped in a glowing reddish-purple fading to a grayish blue-lavender toward the edges. At a distance the overall effect is that mid-tone of purple which often occurs in phlox or iris. A pearly cast over the petals adds intrigue to the play of lights.

Other wonderful varieties of Japanese tree peonies are: 'Rimpo' ("Bird of Rimpo"): a tall, majestic plant with an "umbrella" top when well developed, studded with deep-purple flowers with a velvet nap and exciting golden centers. Its flowers are double with fluted petals and must be seen to be believed.

'Renkaku' ("Flight of Cranes"): tall, rounded plants smothered with large, clear-white, double goblets holding prominent yellow centers that produce an avalanche of beauty on older, established plants.

'Hana Kisoi' ("Floral Rivalry"): a tall plant with immense, semidouble blossoms

It is best to plant tree peonies in the fall when the plants are dormant. Bare-root stock planted in the spring can spell disaster. At that time of year plant only tree peonies grown and offered in containers.

of mid-to-light, feminine pink with deeper shadings on the petals which are large and creped. A frilly show-off.

'Yachiyo Tsubaki' ("Long Hedge of Camellias"): a tall, slender plant with fine foliage. The flowers are fragrant and seem made of luminous, coral-pink silk. A good choice where space is limited.

'Hinode Sekai' ("World of the Rising Sun"): the gem of the dwarfs. A low, bushy mound of fragrant, rose-red, double flowers wonderfully waved and wrinkled. A classic of the Japanese style. One thinks of the double red azalea whose flowers never stopped growing in size and whose petals developed ripples in the expansion.

'Haru No Akebono' ("Dawn in Spring"): a medium-sized plant with lovely, double, light- to blush-pink flowers. The petals, exquisitely waved and crimped, are almost white at the edges with a rich, rosy flush at the heart of the blossom. A refreshing picture, delicate and enchanting.

'Jitsu Getsu Nishiki' ("Finest Brocade"): another low grower. Pale-green foliage with flowers that are semidouble chalices of brilliant ruby red occasionally flecked with white at the petal edges. The heart of the bloom is a color of such exciting intensity that you will be drawn to it over and over again to stare at the elusive fire.

'Taiyo' ("Great Emperor"): a medium-to-tall bushy plant, free with its double, brilliant red flowers. It is thrilling to behold and if you like red this is one of the reddest!

'Koku Tsuru' ("Black Crane"): a plant of low-to-medium height with very dark, black-red flowers that are truly different. Both the plant and blossoms are artistic in the true Japanese tradition.

'Kamada Fuji' ("Wisteria of Kamada"): a medium-tall plant with delightful, true lilac-lavender flowers that are packed tightly with many wavy and crimped petals. This one is easy to fall in love with.

'Kinkaden' ("Hall of the Golden Flower"): a low-to-medium sized plant with pale-green foliage. Its huge, double flowers of artistic conception sport a deep scarlet that will haunt you. This is the aristocrat of the Japanese tree peonies.

This list is not intended to eclipse the value of the hundreds not mentioned. Whatever style of plant you choose, be sure to choose named varieties. Buying by color may save money, but you may end up with seedlings of inferior merit. A tree peony will last for years, so invest a bit more and buy the best plants available. The best way to procure these plants is to order them from specialists who are knowledgeable about their propagation and early care and who will guarantee that the variety you choose is the one you will get. Place your order during the summer to avoid the fall rush.

The differing personalities among these Japanese varieties are already apparent in March or April as each one comes into leaf. Some are thin and wiry, others compact and burly. Some slow and deliberate, others fast and precipitate. There is more agreement in early foliage color, typically reddish or purplish, those of 'Hira No Yuki' among the liveliest reds in the group and those of 'Gumpoden' being a unique, dusky purple right up until it blooms. 'Kinkaden' is a nonconformist with its strange, pale, grayish, yellow-green color at this time. In full leaf, some plants are willowy and sway in the breeze, such as 'Gessekai' while others, like 'Kamada Fuji' and 'Rimpo', are nearly stone-rigid in the wind.

A tree peony's early spring growth will take a lot of punishment from the weather. Only a severe frost or prolonged exposure to a windy blast may damage the young shoots. While these plants appreciate a spot protected from the winds by a windbreak, a wall or a building, keep them at least four feet from a foundation and at least 12 feet from any tree, shrub or aggressive perennial. Do not allow any lawn edge to creep up to them. Avoid early spring cultivation since subterranean shoots may be emerging. A loose mulch of organic material is an asset in their culture, reducing or eliminating the need to cultivate.

In the rare event that an underground shoot appears, having a markedly different appearance from the rest of the plant, with broad, herbaceous-peony type leaves, pull it out. It is from the understock upon which the tree peony scion has been grafted. Should this spurious growth persist, trace it to its source with a trowel, removing only what soil may be in the way of finding the troublesome shoot, and cut it off where it joins the understock.

Full sun will produce the sturdiest plants and the most blooms, but the flowers may not last long or hold their color. A fine spot would be one that is sunny except between 11 a.m. and 3 p.m. If you have just a few plants, and you have the time during the flowering period, grow your peonies in full sun and shade the flowers during the hottest part of the day with beach umbrellas. It may seem like a bit of a fuss, but your flowers will last much longer and in greater perfection. It would be better to choose a spot where midday shade occurs naturally, such as by a large, tall tree with high branches south of the planting site and perhaps one to the west. Constant, filtered sunlight is nice during the blooming season, but unless it is bright, such light may reduce the number of blooms from year to year.

It is best to plant tree peonies in the fall when the plants are dormant. Bare-root stock planted in the spring can spell disaster. At that time of year plant only tree peonies grown and offered in containers. Choose a well-drained site and dig a hole two feet deep and at least two feet wide. Incorporate a generous amount of organic matter into the soil but add no fertilizer except bone meal. Do not add manure. Set the plant so that the crown or joint be-

The tree peony does not lend itself to frequent shifting about to find the best spot for it. Each transplanting sets a tree peony back for well over a year and constant moving may irreparably weaken a plant.

tween stem and roots is at least five inches below the surface. If the plant is so small that such a depth would bury it, keep a hollow in the soil around it and fill it in as the plant grows.

Do not tamp or pound the soil. Instead, flood the planting hole with water and apply a light mulch of loose, organic material. Before winter sets in (the first year only) mulch the top heavily but remove this cover early in the spring. During the growing season soak the plants during dry weather. An application of bone meal after blooming and the maintenance of a two- to three-inch mulch will suffice to keep the plants nourished. Do not try to pump them with fertilizer to get them to grow faster. You will have to be patient the first few years while they muster their energies in their own time and in their own way.

Here is a flowering shrub you never have to prune! The wood carries next year's flowers so you should only remove dead or weak wood or a branch growing where you don't want it. The annual increase in wood is slow, and there is no need to keep these plants in check.

The tree peony does not lend itself to frequent shifting about to find the best spot for it. Each transplanting sets a tree peony back for well over a year and constant moving may irreparably weaken a plant. You should decide well in advance of planting how you wish to use tree peonies in your garden, then stick to the plan and give the planting project your noblest gardening efforts.

Choose each site carefully. The Japanese tree peony is decidedly oriental in form and it would be a mistake to use it in squared off, formal schemes. Don't make beds of them. Keep them off-center or to the ends of borders. If you choose to landscape with them, don't box them in among yews or other monoliths, instead, stage them so that they may be viewed from every angle. If they are set back from the edge of a walk, keep any edging plants low so as not to obscure their form. Avoid windswept corners or air funnels and hot, southern or western exposures that receive no shade at midday. Unlike many other garden plants, the Japanese tree peony does not suffer from being alone. One plant in your favorite spot is a great way to enjoy its beauty in an uncluttered, intimate setting. The regal bearing of this plant seems eminently suited to flanking steps, brushing a statue, gracing a sundial or birdbath or posing at a gate.

The first few years after planting it would be wise to pay special attention to the plant's needs for water, cultivation and protection from frisky pets or active children. An occasional wilting of a stem is no cause for alarm, just remove it. This is a sign that the plant does not "need" the stem or is not "ready" for it. Growing pains, you might say. In fact, a young plant may retire entirely underground, perennial-fashion, but it will spring forth with new stems the following spring. Patience is perhaps the chief cultural requirement in the early years. You may be rewarded with a flower the first spring, you may not. The first flowers will be inferior and should not be taken as a promise of things to come.

Tree peonies are not unbreakable. The taller ones, if grown in the open, can snap in a squall. To prevent such disasters you may wish to carefully set a strong, permanent stake somewhere in the middle of the plant, to which one or more of the susceptible branches could be tied. Never tie a stem that has not matured. Keep the stake lower than the top of the plant and use something strong but soft for tying. Thick black, green or gray knitting yarn is a good choice.

As this floral monarch takes hold in your garden its performance will gradually swell to legend-like proportions. Against the vagaries of the weather, and in contrast to the ups and downs of some garden plants, its performance seems immune to events around it. The number, size and quality of its blossoms will increase from year to year, and it may easily become the most dependable performer in your garden for generations.

Is the Japanese tree peony faultless? It would rate high on each of the following counts: neatness, beauty of color, beauty of form, longevity, tolerance of general neglect (once established), lack of pruning, trimming, dividing requirements, lack of elaborate or extensive feeding programs, freedom from disease and/or insect damage, hardiness and ability to stand up to rough weather. You may fault it for not being evergreen or for blooming only once a year, but such a great show, as with rhododendrons, for example, could really only occur once a year.

With its sterling qualities and regal refinements, the Japanese tree peony will offer itself over and over easily, in a tireless stream of pleasure to those who are wise enough to invite it to their gardens. When it blooms, it will transform even the most modest of gardens into a showplace that will rival the splendors of a palace garden.

The *American Peony Society Bulletin* contains information on all aspects of peony culture, ranging from the old-time favorites, the tree peonies—both Japanese, European and Lutea hybrids—to the exciting new hybrids and recent breakthroughs in breeding. Write for information. 250 Interlachen Road, Hopkins, Minnesota 55343.

Mail-order sources: David Reath, Vulcan, MI 49892; Louis Smirnow & Son, 85 Linden Lane, Brookville, Long Island, NY 11545; Charles Klehm & Son Nursery, 2 East Algonquin Road, Arlington Heights, IL 60005; and Wayside Gardens, Mentor Rd., Hodges, SC 29653.

'Hodai'

'Taiyo', the "Great Emperor."

'Renkaku'

Growing the Gladiolus

Douglas Drewes

BY DONALD W. JACKSON

The popular gladiolus, a member of the Iris family, is one of the easiest summer flowers to grow. Although many people believe that the showy, colorful displays of gladiolus are grown from bulbs, they are mistaken. This beautiful flower is derived not from a bulb but from a structure correctly called a corm. The spring crocus, autumn crocus *(Colchicum autumnale)* and freesia are other examples of cherished flowering plants which originate from corms.

In rather simple but adequate terms, a corm is the swollen base of a stem axis surrounded by dry, scaly "skins" that technically are leaves. A corm, whose inner structure is mostly a solid mass of storage tissue, is a true stem, that is, it has distinct nodes and internodes. Its structure is noticeably different from that of a bulb, which is composed of thick, fleshy scales such as those seen in the ring pattern of the cross section of an onion. Common examples of bulbs include the well known amaryllis, snowdrops *(Galanthus)*, tulips and daffodils.

The soil requirements of the gladiolus are not excessively demanding. Although a sandy loam soil with a pH ranging from 6.0 to 7.5 is preferable, it is important to provide the corm with a well-drained soil for maximum development. Bacterial blight *(Xanthomonas gummisudans)* can be a serious problem in unseasonably wet weather or in areas with poorly drained soil conditions. Depending on the size of the area, it is often advantageous to add organic matter to a heavy soil in a particularly desirable location. The addition of organic matter improves the soil's physical structure and will encourage the production of larger blooms. Avoid using fresh manure as it may cause the corms to rot. In a heavy clay soil the addition of organic matter as well as sand can help improve drainage.

Gladiolus corms may be planted during midwinter in the mild regions of our country and after all threat of frost has passed in the more northern climates. By staggering the planting dates of the corms one to two weeks apart, you can plan for continuous bloom throughout the flowering season, which is quite important if cut flowers are to be the fruit of your labor. Keep in mind that the corms will generally come into flower from eight to 10 weeks after planting, so don't plant too close to the early frost date in your area. In northern areas, plantings can be staggered from about early to mid May through mid July with safety.

The corm should be planted approximately four to five inches below the soil surface, with the concave side down. A balanced garden fertilizer mixed with the soil but not in direct contact with the corms will help ensure the continued development of the corm. Follow the manufacturer's directions as to the amount to be used under your conditions.

Gladiolus corms require little care after planting. Be sure that they are located in a spot that receives sun for at least part of the day and adequate water. The flowers will require staking in most locations, particularly in windy areas.

The spikes should be cut when the lowest blossoms begin to show their first signs of color. The cut should be made with a sharp knife diagonally through the stem. By severing the stem at an angle, more surface area is left to conduct water up the stem, thus increasing the vase life of the blooms. When cutting flowers, always leave at least three of the lower leaves on the plant as they are needed to manufacture food to produce next year's corms.

As the corm begins to develop, new roots descend into the soil, and one or more of the buds also start to mature. While the original corm continues to provide for the development of the flowers, it slowly begins to shrink in size as it uses up its stored food resources. At the same time, a new corm is forming on top of the old corm for next year's growth. After the plant has stopped flowering, the foliage continues to manufacture food which further strengthens the new corm. By the end of the summer when the foliage has dried, one or more new corms have formed in addition to a number of miniature corms called cormels, which can be stored with full-sized corms and grown to flowering size next season.

In mild regions leave the corms of gladiolus in the ground and insulate with soil, fallen leaves or preferably straw, or else remove them and plant them in midwinter. In the northern states, remove the corms from the soil and store them for the winter months. The gladiolus is a very tender plant and will not stand frosts or freezing. It is important to carefully remove the corms from the soil to guard against the disease corm rot *(Botrytis gladiolorum)*. This fungus is introduced to corms through bruises or damaged areas as a result of improper handling. Grade the corms for quality and keep them at 85° to 90°F for 10 to 14 days to promote drying, then store them until spring in a place where the air freely circulates at temperatures of approximately 40°F.

In addition to the disease organisms mentioned, one insect pest can prove to be a problem—thrips. These insects can overwinter on the corms and will damage flowers and foliage during the summer. Control insect and disease problems by dusting the corms with a recommended insecticide and a commercially available fungicide treatment prior to storage as well as before planting to ensure their health and continued vitality.

Although the gladiolus requires a number of important steps to allow for its proper growth and development, the beauty it provides throughout the summer, especially with modern hybrid varieties, is obviously well worth the gardener's time and effort. With so many modern hybrids available, the choice among varieties is almost infinite. A wide selection of colors as well as height, flowering time, size of flower head and even hybrid flowers with different colored throats are available. Since the brochures put out by the gladiolus suppliers listed at the end of this article contain accurate and detailed descriptions of each selection, and often include fine quality color illustrations as well as the names of the parent varieties, the consumer is well guided by them. Always remember when purchasing gladiolus corms to select the largest, healthiest individuals, as they have the greatest potential to produce the most impressive flowers.

Gladiolus are easy to grow and can provide a spectacular garden display.

An Alphabetical List of Selected Gladiolus Suppliers:

Ray Dittus, 4667 Cabana Way, Sacramento, CA 95822; Earl Ferris Nursery and Garden Center, Hampton, IA 50441; The Flower Garden, Java, SD 57452; Gruber's Glad Garden, 2910 West Locust, Davenport, IA 52804; Joe Hartman, 72 W. Pioneer Trail, Aurora, OH 44202; Idaho Ruffled Gladiolus Garden, 612 East Main Street, Jerome, ID 83338; Pleasant Valley Glads, 163 Senator Avenue, Agawam, MA 01001; Rich Glads, P. O. Box 84, Marion, NY 14505; John Scheepers, Inc., Flower Bulb Specialists, 63 Wall Street, New York, NY 10005; Sprinkles Glads, Bob Sprinkle, 13511 E. Kingswood, R. R. 3, Delton, MI 49046; Squires Bulb Farm, 3419 Eccles Avenue, Ogden, UT 84403; Walnut Grove Glads, Joe Nitchman, 6572 West Smith Road, Medina, OH 44256; The Waushara Gardens, Plainfield, WI 54966.

Integrated Pest Control

BY NIGEL E. A. SCOPES

In recent years more and more gardeners and greenhouse owners are turning from purely chemical means of pest control to more integrated systems. Such systems combine any number of control measures, including the use of insect predator and parasite populations, sterile male insect release techniques, application of insect pest disease organisms and trapping. They do not necessarily exclude the judicious use of chemical pesticides. Gardeners have found that years of random use of wide spectrum pesticides without regard to the identity of pest organisms or the size of populations present have led to the decreased efficiency of such measures. Many strains of pests (for example, whiteflies, red spider mites, leaf miners and some aphids) have developed an immunity to chemicals currently in use. Thus, natural selection has led to the need for ever stronger and more toxic chemical control measures. By combining a number of biological measures, which separately might not have provided adequate control, gardeners can control their pest problems without resorting to the use of chemicals except in situations of extreme infestation.

Ornamental greenhouses with their wide diversity of plant species and warm growing conditions provide the ideal environment for perpetuating populations of both indigenous and exotic pest species. Under these conditions chemical pest control is severely limited because of uncertainty about the phytotoxic effects of modern pesticides on some plants. Moreover, use of chemicals is restricted in areas where toxic substances can endanger the public. For these reasons, integrated pest control systems are the ideal alternative.

Fortunately, the ornamental greenhouse also provides the ideal environment for natural enemies of troublesome insects, especially exotic pests. These species of parasites have the added advantage of not being preyed upon in turn by hyperparasites, a situation which can occur when using indigenous species.

Suitable natural enemies to control whiteflies, aphids, red spider mites and mealy bugs are being mass-reared in different countries. There is also extensive information in the literature about natural enemies of other pests, a notable example being the parasites of scale insects. Many caterpillar species also may be controlled biologically by applications of a "bacterial insecticide."

Vast ares of greenhouse production in Europe have the major pests controlled biologically on a wide range of crops such as tomatoes, cucumbers, peppers and chrysanthemums. In Britain, for instance, approximately 1,000 acres use natural enemies for controlling the major pests, while in Holland the figure is about 2,500 acres.

Before you begin any program of biological control, determine the extent of pest attack and the approximate number of insects present. Reduce excessively large pest populations with pesticides prior to the introduction of any natural enemies. This is especially important in the case of honeydew-secreting insects such as whiteflies and aphids, because the sticky nature of honeydew dramatically reduces parasite efficiency.

The greenhouse whitefly can develop over a wide range of temperatures, adults surviving 0°C for many weeks. The adult whitefly usually lives on the younger leaves laying about five eggs per day. Six to 15 days later (24-15°C) the eggs hatch to mobile larvae (crawlers). After two or three days these become sedentary scales on the undersides of leaves. All of the developmental stages which suck the plant juice cause damage. In addition, honeydew excretion is "rained" onto the leaves below. Under high humidities sooty molds develop on this highly nutritious substance. Serious damage may be expected when the number of scales exceeds nine and the number of adults exceeds more than four per square centimeter.

Encarsia formosa, a minute chalcid wasp, is an efficient parasite of whitefly at warmer temperatures (above 65°F). It lays its eggs in mature scales, though its efficiency is seriously impaired when the density of whitefly scales is excessive (five to 10 scales per square centimeter), causing a rain of honeydew which deters the wasp. As the parasite attacks only one developmental stage of its host, effective control must necessarily take time; three to four generations of parasites are usually needed to eliminate the pest. However, once control has been achieved it will be maintained for many months. The parasitised pupa turn black, providing a clear indication of the progression of parasitism. It is impossible to accurately quantify rates of introduction as each greenhouse has a different problem, but as a general guide, *Encarsia* should be introduced at two-week intervals, using one to two individuals per square foot, until black scales appear on the plants.

The glasshouse red spider mite, *Tetranychus urticae*, is also a widespread pest in greenhouses, and, like whitefly, has become resistant to a wide range of pesticides. It damages plants by inserting its feeding stylets into the leaf and sucking out sap. The resulting white pinprick marks

reduce the effective photosynthetic area of the plant. In extreme cases, the pests may spin webs which completely cover the terminal shoots of the plant. The survival of this mite in commercial greenhouses is facilitated by its ability to hibernate in the structure as the day length shortens in autumn and to reappear again in the spring when the temperatures rise. Ideal conditions for controlling this pest occur early in the season when the new infestation begins. Control, using the predatory mite *Phytoseiulus persimilis*, can be guaranteed so long as pesticides are not used. The time necessary to achieve control is primarily dependent on temperature. For instance, at 60°F some six to seven weeks must be allowed for elimination of the pest while at 75°F or higher less than three weeks is sufficient. High temperatures (86°F), especially in bright sunlight, together with low humidities, are lethal to the predator. Once they have consumed all the mites the predators will search large areas and gradually die out due to starvation. Rates of introduction on commercial crops are on the order of one predator per eight square feet, but this rate would have to be increased perhaps as much as tenfold for small trees and shrubs where growth is occurring simultaneously on the many branches or where dense populations of the pest are present. Perhaps the most important benefit of maintaining control through the season is that by the end of August there should be no mites left to hibernate, thus preventing attack next season. Trials have been initiated to exploit *P. persimilis* in the United States on ornamental foliage plants in nurseries and shopping malls. Preliminary results are very encouraging.

The peach-potato aphid, *Myzus persicae*, attacks many plants both in Europe and the United States. It lives in loose colonies causing damage by sucking plant juices and excreting honeydew. Damaging populations have only been determined for chrysanthemums, where the aphid, if present in greater numbers than three per leaf, migrates onto the flowers and makes them unsaleable.

Aphidius matricariae, a parasitic wasp naturally present in England, effectively controls this aphid over a wide temperature range (50-80°F). Each wasp lays between 50-150 eggs which are inserted singly within an aphid. The parasite larva grows and eventually kills the aphid whose skin balloons out and turns a silvery-gold color. The adult parasite cuts a flap in this shiny skin and emerges to mate before repeating the cycle. Parasites, because they depend on their host for development, will provide more lasting control than predators, and *A. matricariae*, if introduced before the pest becomes serious, can provide protection for at least a season.

Much has been written about the use of different predators for aphid control. The larvae of ladybirds, lacewings and hover flies provide effective and rapid control of large aphid populations. However, expensive and regular introductions of their larvae (every two to three weeks) are required to maintain control, as the adults lay eggs only in the presence of large numbers of aphids. The predators tend to migrate as the aphid density falls, thus allowing aphid numbers to increase again.

There is need for a single treatment to control all aphid species attacking a crop. Such a treatment is being developed, and there is hope it may be commercially available for use on chrysanthemums and other ornamental crops in the not too distant future. It is a fungus, *Verticillium lecanii*, which periodically occurs naturally in greenhouses on several species of insects. The efficiency with which it can decimate pest populations prompted a detailed research program at the Glasshouse Crops Research Institute (England) into its potential as a commercial insecticide. The infective element of the fungus is the spore which, under suitable conditions, germinates and yields a fine waft of filaments which penetrate through the insect cuticle and, once inside the body cavity, spread and rapidly kill the insect host. After death the mycelia spread and cover the insect body, producing masses of spores which, in turn, will infect more insects.

The fungus is initially applied as an aqueous spore-spray. Such spores are cultured in liquid media containing relatively cheap, readily available nutrients. Fermentation lasts three to four days, after which the spores are separated from the nutrients. They are resuspended for spraying in water that contains a wetting agent.

V. lecanii has so far been thoroughly tested on chrysanthemums, and in commercial nurseries spore-sprays have completely controlled all troublesome aphid species. Aphids killed by the spore-spray carry sporulating fungal growth which perpetuates the fungus and controls aphid infestations for the duration of the crop.

Multiple sprays would be necessary to control whitefly as only the adults or young larvae are affected, so there is little likelihood of the parasite, *Encarsia formosa*, being replaced by this fungus. However, since the fungus *V. lecanii* does not harm *E. formosa*, their use could be integrated. For example, where a whitefly infestation was too dense for successful control by *E. formosa*, pest numbers could be reduced by a spore-spray to a level at which the parasite could establish satisfactorily. The fungus also may be a useful adjunct in winter when low temperatures prevent *E. formosa* from performing efficiently. In addition, *V. lecanii* has not been observed to harm other biological control agents such as *P. persimilis*, the red spider mite predator, or adult *A. matricariae*, the peach-potato aphid predator. Furthermore, the fungus can be safely integrated with many chemical fungicides and pesticides although some, such as thiram or captan, are toxic and are best avoided.

Thus *V. lecanii* has a potentially promising future in integrated control. Indeed, the consistent control of aphids on chrysanthemums has already attracted companies interested in large-scale production and marketing of the fungus. Perhaps the most important consideration before the fungus becomes available commercially will be safety testing. Preliminary data strongly indicate that *V. lecanii* is harmless to man, other warm-blooded vertebrates and use-

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Hardy Anemones For Perennial Gardens

TEXT BY LORRAINE MARSHALL BURGESS
PHOTOGRAPHY BY GUY BURGESS

This article will extol the wonders and pleasures of hardy anemones, members of a large and charming genus of perennial herbs widely distributed mostly in the north temperate zones. Anemones, commonly known as windflowers or lilies-of-the-field, are members of the large buttercup family (Ranunculaceae) and relatives of larkspur (*Delphinium*), columbine (*Aquilegia*) and virgins-bower (*Clematis*).

Hardy anemones are widely different from each other—in color, season of bloom and in plant habit or form. Blooming periods extend from very early spring into late summer and fall. The plants can have rhizomes as well as fibrous or tuberous roots, and they range from *Anemone blanda*, a star-like flower that carpets the ground soon after the snowdrops bloom, to the many varieties of Japanese anemones with their delicate flowers borne on tall and spreading stalks from late summer into the first frosts of fall. All anemone flowers lack petals but are prized for their showy petal-like sepals.

Although anemones have been around for centuries they are sometimes overlooked by both new and veteran gardeners. Records show that they bloomed in Egyptian gardens during the reigns of the Pharaohs and were named for and closely associated with the Roman goddess, Venus.

Dealing with specifics, let us start with *Anemone blanda*, the mountain windflower of Greece and Asia Minor which is much favored throughout this country. This tuberous-rooted plant is so dainty and charming that you should make room for one or more clumps in a moist, well-drained corner where its lovely flowers will brighten your garden for a few weeks each spring. If you live in the cooler reaches of this country, north of Kentucky, Maryland and the very southern coasts of New England (north of Arnold Arboretum Zone 6, USDA Zone 7), plant them out in the spring. If you garden south of that area spring or fall plantings will do.

A. blanda's star-shaped flowers rise from five- to eight-inch-tall stems to form a daisy-like cover in various shades of sapphire, sky blue, mauve, pink and white. Planted en masse, these plants can be a real delight in either formal or naturalized plots.

A. canadensis is a native North American species that lends itself to cluster planting, particularly in naturalized areas. It is hardy from northern New England west through southern Canada and British Columbia. Its one- to two-inch white flowers reach peak bloom in June. This plant serves the gardener best around and under large shrubs or spreading over rock outcroppings where its light-green leaves and white flowers provide an attractive contrast against darker backgrounds. It is sometimes considered to be invasive and undesirable, and placing them in these locations tends to discourage its over-enthusiastic spreading.

A. caroliniana is another wilding found in the woodlands of the eastern United States and in the prairies of the Midwest. Its flowers may be creamy white, purple or red, and its seed heads, which follow soon after, are both woolly and attractive. It grows from a tuberous root and is best collected where it thrives—with the property owner's permission of course. It also might be found in nearby nursery centers where it is valued as a desirable native. *A. caroliniana*, like *A. blanda*, is hardy only to Arnold Arboretum Zone 6.

If you are wanting other similar specimens to enhance a woodland garden, consider *A. cylindrica*, commonly known as the long-headed anemone or thimbleweed. It looks somewhat like *A. canadensis* but bears small, greenish-white flowers in June. Its plumed seed heads are conspicuous and almost as showy as its flowers.

Perhaps the most distinguished member of the genus is the Japanese anemone, a misleading common name today as it now refers to two groups of plants, *A. hupehensis* var. *japonica* and *Anemone* x *hybrida*. These plants are an exceedingly graceful group that are hardy in much of the country. This hardiness zone, roughly corresponding to Arnold Arboretum Zone 5 or USDA Zone 6, stretches from coastal New England west through southern Ohio, cental Kansas and New Mexico and then swings north through the mild coastal regions of Oregon, Washington and British Columbia. This zone also includes areas surrounding Lake Erie, Lake Huron and the southern tip of Lake Michigan. With a good fall mulch to protect the plants from harsh weather they will survive in more northern areas. Their buttercup-like flowers in pale to rosy pink are a favorite in late summer and fall. Perhaps they are so loved because they bloom at a time when most other summer perennials are fading. Their scattered branching of pink flowers, borne on plants 2½ to three feet tall, is especially attractive for massing in a border, and their flowers are good cut for use in fall bouquets.

There are many popular varieties of Japanese anemones, including the silvery semidouble pink 'September Charm', 'Alba' in sparkling white and 'Margarette' in a double rose-pink. These anemones appreciate a rich, moist, well-drained soil in a location that is lightly shaded and protected from strong winds. To increase one's stand, propagate by division of the old clumps in the spring, by seed or by root cuttings that can be taken at anytime during the growing season. Once well established, the

Anemone quinquefolia

The Japanese anemone, variety 'September Charm'.

plants do better if left undisturbed as they do not transplant readily.

A. nemorosa, the European wood anemone, is a woodland carpet plant native from Europe to Siberia and hence very hardy. (Arnold Arboretum Zone 3, USDA Zone 4, same as *A. canadensis*.) Its delicate design resembles *A. quinquefolia*, the spring flowering wood anemone of the Eastern and central United States. This eight-inch solitary flowered windflower grows in sun or shade, and it is particularly attractive silhouetted against dark greenery.

One of the great sentimental favorites is *A. patens*, the purple-blue pasque flower of North America. It flourishes naturally in the midwestern prairies into the foothills of the Rockies. Once a rare and treasured wilding, it and its hybrids are now recommended as low-growing plant features in border displays or for use in the rock garden. It is grown for its blue-violet flowers as well as its unusual showy seed heads. When domesticated, it thrives best in a cool, moist corner of a garden. No special soil mixture is needed if the area is well-drained. It survives well with no more than a gathering of leaves for winter protection in the same hardiness zone as the Japanese anemones.

Another plant that is also commonly known as the pasque flower is often confused with *A. patens*. It is the European pasque flower, *A. pulsatilla*. This plant is also grown for its showy, ornamental seed heads as well as its bell-shaped blue or reddish-purple flowers. A number of cultivars of *A. pulsatilla* are available, including 'Alba' with white flowers and contrasting yellow stamens, and 'Rubra', whose flowers range in color from brick-red to maroon.

The foliage of both *A. patens* and *A. pulsatilla* develops after the flowers have bloomed and has a lovely, feathery, silken texture caused by the long silken hairs on the stem and leaves. The fruiting heads of both species are very ornamental as they form long, feathery plumes.

The grapeleaf anemone, *A. vitifolia* 'Robustissima', is one of the earliest of the fall blooming strains (August into October) and is known as one of the hardiest varieties of the lot (not surprising, as it is a native of the Himalayas). Easy growing with free-blooming flower clusters in vivid pink, it is as tall as or a little taller than the Japanese varieties.

There are other species, not always found in standard catalogs, but worth keeping in mind. *A. multifida* is a native of North America as far north as Alaska and bears mostly solitary white flowers. *A. magellanica* from South America is similar but with cream-white and much divided basal leaves; *A. sylvestris*, an anemone as hardy as *A. canadensis*, is known as the snowdrop windflower. It bears fragrant, white, nodding flowers and grows well in shade. A double-flowered form, 'Flore-pleno', is available in Europe. *A. vernalis* is a dwarf pasque flower of Europe with unusual two-inch flowers in spring. These flowers are purple on the outside and white inside the cup. To acquire any of these varieties takes ingenuity and personal enterprise.

There is still another group of anemones called the poppy anemones which are grown in greenhouses for cut flower production. Cultivars of *A. coronaria* are the most commonly grown plants for this purpose although, unfortunately, they are not hardy north of the coastal areas of North and South Carolina, southern Arkansas and central Texas. Two other species, also grown for cut flower production, are *A.* x *fulgens* and *A. hortensis*. These two species are more hardy than *A. coronaria* (Arnold Arboretum Zone 5). In more northern areas they can be grown with some additional annual care. The tuberous rhizomes need to be lifted each year in cooler areas and replanted in spring.

As a general rule, all the hardy anemone species prosper in rich, loamy, well-drained soil and partial shade. Water freely during dry weather, protect new transplants from the midday sun and look for container-grown stock that has already wintered over successfully. If container stock is not available, purchase bare root divisions. Collect as many of these plants as you can find and enjoy them for years to come.

The hardy anemones are special enough for any gardener. They give us charming flowers early and late in patterns both colorful and delicate and suitable for sun or shade. Why not try this versatile branch of the buttercup family in your garden?

Sources: Wayside Gardens, Hodges, SC 29695; *A. pulsatilla, A. japonica* and *A. vitifolia*. White Flower Farm, Litchfield, CT 06759; *A. magellanica, A. pulsatilla, A. vulgaris* and *A. blanda*. Van Bourgondien Bros., P.O. Box A, Babylon, NY 11702; *A. blanda*. French's Bulb Importer, P.O. Box 87, Center Rutland, VT 05736.

Anemone patens.

Kirengeshoma palmata

TEXT AND PHOTOGRAPHY BY MRS. RALPH CANNON

Some 10 or 12 years ago Reginald Perry, a distinguished plantsman from Enfield, England, sent me three young plants of a fascinating perennial which grows in cool shade and accumulations of soft leaf mold. *Kirengeshoma palmata,* commonly known as yellow waxbell, is a member of the saxifrage family, and botanists classify it in a genus with only one or perhaps two species of perennial herbs native to Japan and Korea. It was first discovered in 1888 on the islands of Shikoku and Kyushu in southern Japan where it grew in wet mountain woods. Seed was first sent to Kew Gardens in England in 1891. From there, it soon migrated to our shores.

My three young Japanese woodlanders were settled into my garden in a site selected to their tastes. Kirengeshomas will not tolerate drought. They like cool, moist soil with the presence of leaf mold and well rotted compost without lime. I planted them side by side with large-leaf hostas (a particularly attractive companion plant for *K. palmata*) partially shaded by maples that provide the cool shade they require. By late spring, after the frosts had passed our region, they had put forth new shoots and now bloom profusely every year.

Given a site to its liking, *Kirengeshoma* has a robust constitution. My plants have proved to be completely hardy even when submitted to temperatures of −20°F winter after winter without any extra covering except the leaves and litter of a naturalized area. Do not be alarmed when they disappear entirely in the late fall. Growth will reappear again in late spring. Plants will attain a height of three to four feet.

Kirengeshoma palmata, a native of Japan, is commonly known as yellow waxbell.

The fact that *K. palmata* has a relatively undemanding temperament is difficult to imagine when its exotic flowers are in full bloom. The rich, canary-yellow, bell-shaped flowers have a waxen texture and contrast beautifully against the dark-green leaves. These flowers, about 1½ inches long, are borne in terminal clusters as well as in the axils where the leaves join the main stem. They are especially prized since they appear about the first week in September when many favorites are fading fast.

To be properly admired *K. palmata* needs to stand apart from other tall plants. It likes to grow freely and throws itself loosely into a fountain shape. The graceful plants with their maple-like leaves are lovely and handsome even without flowers.

K. palmata can be grown from seed. Frances Perry and Leslie Greenwood, in their book *Flowers of the World,* have given an account of how to grow the plant. They write as follows: "Sow seed sparingly in a light wooden box and when they have grown to a height of 2½ inches sink the box in the soil where the plants are to grow. In time the container will rot away and the roots will find their way downward."

If your plants bear seed, the seed will ripen in late October. There are three parts to each pistil, and seeds should be at least three per capsule. Be sure to gather them before they fall out. Regrettably, seed germination is erratic and tardy. This may account for the scarcity of plants in nurserymen's lists. The fastest method of propagation is by division of the short, stout rhizome, using a sharp knife for separation.

Kirengeshomas, whether obtained from seed or division, are very slow growers. You have to wait a few years before they begin to reward you with their waxen flowers. As they grow older they flower more generously. These splendid plants are long-lived and will happily remain undisturbed for many years. Given the right growing conditions and time, they will provide beautiful, unique bloom in the late summer or early fall.

There is a fascination in growing rare plants, but how often do we pause to consider just why a plant is rare? When I see my well developed clumps of *Kirengeshoma* I wonder why more gardeners do not grow them. Without a doubt, possessing and growing these out-of-the-ordinary plants gives great satisfaction to lovers of the unusual. At the same time kirengeshomas will add extra beauty and interest to any garden, for instead of being spring glories like so many other garden favorites, their special appeal comes in the fall.

Source for mail-order:
Perry's Hardy Plant Farm, Enfield, Middlesex, England.

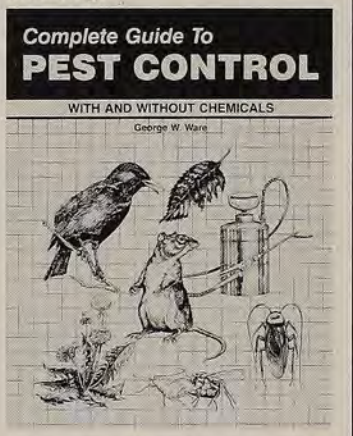
BOOK REVIEWS

A NOTE TO OUR READERS—Many new gardening books are published each month, only a few of which we are able to review. We try to select books which are outstanding in their coverage of the subject matter, present new information or treat the subject matter in a more unusual way than do other books on the same subject. We also try to present reviews on a broad variety of subjects. If you are looking for books in some subject area related to gardening which has not yet been covered, let us know your desires and we will try to include reviews on that subject in future issues.

DRIP SYSTEM WATERING FOR BIGGER AND BETTER PLANTS.
Jack Kramer. W.W. Norton & Co. New York, New York. 1980. 144 pages; hardcover, $9.95.

Drip watering is a system that was originally developed for growing commercial crops in arid regions. The idea is to get adequate water to the plant without waste. Gardeners in dryer parts of the country will find the detailed instructions given in this book very helpful, but gardeners elsewhere might also benefit by installing drip systems. Raised bed gardening, house plants on a patio or in a sunroom, and even the dry spells of late summer are all situations in which the installation of a drip system might help. Good photographs and line drawings supplement the simple instructions for installing your own hardware. The list of sources is unfortunately brief, but you should be able to get the necessary equipment from a local greenhouse and grower's supply firm.

COMPLETE GUIDE TO PEST CONTROL—WITH AND WITHOUT CHEMICALS.
George W. Ware. Thomson Publications. Fresno, California. 1980. 290 pages; paperbound, $18.50. AHS discount price, $16.00 including postage and handling.



"Complete," in this case, is the key word in the title. This is the best treatment of pest control in and around the home and garden that I have seen in recent years. It is intended for use by the homeowner and is limited to those pest control means which are available to the general public. Insects, plant diseases, weeds, mammals and birds are all included among the pests discussed. Balanced and rational recommendations are given for both chemical and non-chemical means of control, and the advantages and disadvantages of each method are thoroughly analyzed. Detailed identification of many pests and individual recommendations for alternate methods of control make this a worthwhile reference book no matter what your personal preference may be for control methods.

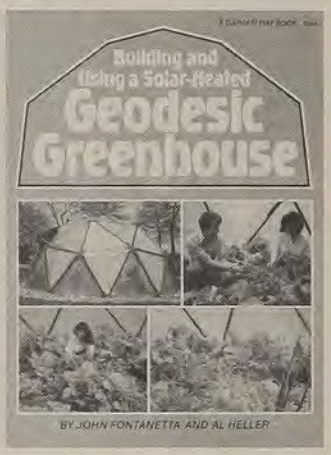
GATHER YE WILD THINGS—A FORAGER'S YEAR.
Susan Tyler Hitchcock. Harper & Row. New York, New York. 1980. 182 pages; hardcover, $10.95. AHS discount price, $8.95 including postage and handling.

Fifty-two essays, arranged seasonally, treat with nearly as many potential sources of edible wild plants. The lovely drawings of G.B. McIntosh complement the author's enjoyable writing style. Hitchcock mixes her own emotional reactions to wild plants with down to earth directions on how to gather and prepare their useful parts. An excellent book for anyone who enjoys a walk in the woods or open fields.

JOHN CLAUDIUS LOUDON AND THE EARLY NINETEENTH CENTURY IN GREAT BRITAIN. Lois Fern (Editor). Dumbarton Oaks. Washington, D.C., 1980. 133 pages; hardcover, $17.50. AHS discount price, $17.00 including postage and handling.

John Claudius Loudon was one of the most prolific and influential garden writers of the early 19th century. He was concerned with both garden style and content, and many of his books and journal articles are still read today. Five authors, including his wife, Jane Loudon, present a history of his influence on horticultural development as viewed from the time of his death in 1843 to the present day. Many fine illustrations and an excellent bibliography of his work help the reader to understand the fervor of his interest in gardening and the importance of his contributions. For anyone interested in the history of horticulture this book is highly recommended. However, it is appropriate to criticize this book for its lack of an index. The preparation of an index would have clearly established this series of papers as an authoritative biography of a great gardener rather than just another homage to his influence upon and his achievement in horticulture.

BUILDING AND USING A SOLAR-HEATED GEODESIC GREENHOUSE.
John Fontanetta and Al Heller. Garden Way Publishing. Charlotte, Vermont. 1979. 194 pages; paperbound, $9.95. AHS discount price, $9.20 including postage and handling.

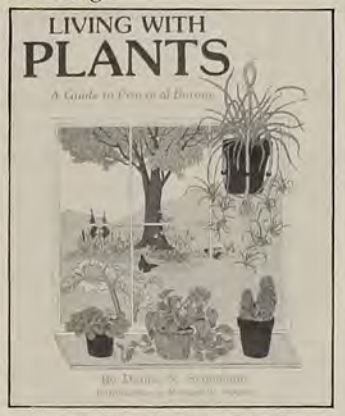


For the do-it-yourself gardener, the geodesic dome makes an inexpensive and efficient greenhouse design. The greenhouse described in this book was designed and built by a group of students at Fordham University and has been used for a number of years in New York City to successfully grow vegetables throughout the winter without using any supplementary source of heat. Complete and detailed instructions are given for the construction of the greenhouse. Anyone who can handle a hammer and saw should be able to successfully build it. Suggestions on interior layout are given in one chapter, but most of the horticultural decisions are left to the reader. Construction blueprints refer to a 23-foot diameter and $11\frac{1}{2}$-foot-high dome covered with a double layer of polyethylene film, but adjustments for a larger or smaller structure are given in the last chapter.

FLOWER AND VEGETABLE PLANT BREEDING. Leslie Watts. International Scholarly Book Service, Inc. Forest Grove, Oregon. 1980. 182 pages; paperbound, $22.50. AHS discount price, $19.25 including postage and handling.

Most books on plant breeding stop with the theoretical discussion of basic genetics and breeding systems. Less than a third of this book deals with theory; the rest is devoted to a practical discussion of methods and applications of plant breeding in specific vegetable and flower crops. For the serious amateur plant breeder, this is an excellent textbook and reference work which not only clearly explains the background and techniques of plant breeding but also includes many tricks-of-the-trade which are applicable to small-scale breeding programs as well as large commercial operations.

LIVING WITH PLANTS—A GUIDE TO PRACTICAL BOTANY. Donna N. Schumann. Mad River Press. Eureka, California. 1980. 327 pages; paperbound, $14.20. AHS discount price, $11.80 including postage and handling.



The subtitle of this book almost tells it all. This is a guide to botany for the non-scientist. Technical language is kept to a minimum and where used, the terms are explained clearly when they are first mentioned and again in a glossary for later reference. What plants are, how they grow and what you can do to keep them growing indoors and in the garden is the subject of this book. The author has done an excellent job of presenting the background of botany and horticulture which should be part of the basic knowledge of any good gardener.

—Gilbert S. Daniels

Instructions for ordering books by mail: Send orders to the attention of Dorothy Sams, American Horticultural Society, Mount Vernon, VA 22121. Make checks payable to the Society. Virginia residents, add 4% sales tax. When a discount price is not listed for a book, please add $1.25 to the price listed to cover the cost of mailing and handling.

Continued from page 27

ful insect pollinators, but more thorough tests are a necessary prerequisite to commercial availability of the fungus.

Mealybus are serious pests of ornamental plants grown in protected environments, and under such conditions large populations may breed throughout the year. *Leptomastix dactylopii* is an internal parasite which penetrates the "wool" produced by these pests to lay its eggs and has been used in the United States and Canada. Alternatively, a ladybird predator, *Cryptolaemus montrouzerii*, has been used with great success, and the occasional imports of this predator to England have given outstanding control on several plant collections.

Caterpillars are frequent pests of many ornamental plants and are normally controlled by pesticides which are highly deleterious to parasites and predators. Avoid this interference with biological control of other pests by thoroughly spraying with a formulation of the specific bacterium *Bacillus thuringiensis*. This bacterium acts as a stomach poison causing a rapid paralysis of the caterpillar's mouth and subsequent death. It is specific to caterpillars, has no known effects on mammals and is completely non-phytotoxic.

There are, of course, many other pests of ornamental plants which could be controlled by natural enemies, but regular supplies of these products are not available. Such pests would usually be controlled by pesticides, but this method presents problems, especially of phytotoxicity and interference with natural enemies.

Integration of chemical treatments with biological control relies on three basic concepts. First, a selective pesticide can be used which will kill a particular pest without harming the natural enemies of other pests. An example is a pirimicarb, which is specific to aphids and leaf miners (but also highly toxic to man). Second, the spatial separation of chemical and biological methods can be used to control the target pest without affecting natural enemies. For instance, *Thrips tabaci* pupates in the soil, and pesticide drenches aimed at killing the

MAJOR GREENHOUSE PESTS AND THEIR NATURAL ENEMIES

Pest	Natural Enemy	Remarks
Trialeurodes vaporariorum (greenhouse whitefly)	*Encarsia formosa* (wasp parasite)	Not effective at temperatures below 60°F
Tetranychus urticae (greenhouse red spider mite, two-spotted spider mite)	*Phytoseiulus persimilis* (mite predator)	Not effective above 85°F in dry conditions
Myzus persicae (peach-potato aphid green-peach aphid)	*Aphidius matricariae* (wasp parasite)	May be used at temperatures between 55-80°F
Pseudococcus sp. (mealybugs)	*Cryptolaemus montrouzieri* (ladybird predator)	Not suited to low temperatures
	Leptomastix dactylopii (wasp parasite)	
Various caterpillars	*Bacillus thuringiensis* Specific bacterial spray	Complete spray coverage of all foliage essential (Commercially sold as Dipel or Thuricide)
Leaf miners	*Opius* spp., *Diglyphus* sp. (wasp parasites)	
All aphid spp.	*Verticillium lecanii* (pathogenic fungus)	Used as a spray

pupae there will safely eliminate this pest. Adult whiteflies lay eggs on the apical foliage, and careful spot spraying directed at this portion of the plant avoids harm to scales and parasites living on the lower foliage. Lastly, parasites, when pupating, are protected from sprays by the skin of the host and even thorough spraying of a nonpersistent chemical may have only a minimal effect on the parasite.

To date, biological pest management systems are becoming an established practice on the major glasshouse food crops throughout Europe to avoid problems of resistance and phytotoxicity which occur when pesticides are extensively used. Such systems are being developed for ornamental crops, especially poinsettias, chrysanthemums and various foliage plants, both in nurseries and mixed display plantings.

The decision to use integrated pest control means that one is committed to a long-term strategy, and the best results will be obtained only if time is spent learning about the pests and their natural enemies. The degree of pest control should be better than that obtained with chemicals, without the problems inherent in use of the latter.

Mail-order Sources for an Integrated Pest Control System:

TRIK-O (trade name for Trichogramma wasps), Gothard, Inc., P.O. Box 370, Canutillo, TX 79835. Recommended for flower and vegetable gardens, berries, grapes, fruit and nut trees and many field crops; controls apple coddling moth worm; Vitova Insectary, Inc., P.O. Box 475, Rialto, CA 92376. Lacewings and Trichogramma wasps and fly control parasites; Eastern Biological Control Co., Route 5, Box 379, Jackson, NJ 08527. Trichogramma wasps; Indoor Plant Protection Service, 1594 Sunset Lane, Wooster, OH 44691. Natural enemies for control of red spider mites, whiteflies and mealybugs; Fairfax Biological Laboratory, Clinton Corners, NY 12514. "DOOM" (milky disease spores control Japanese beetle grubs; other grubs.); International Mineral & Chemical Corp., Crop Aid Products Department, 5401 Old Orchard Road, Skokie, IL 60076. Thuricide *(Bacillus thuringiensis)*; Thompson-Hayward Chemical Company, P.O. Box 2383, Kansas City, KS 66110. BIOTROL *(Bacillus thuringiensis)*; Hopkins Agricultural Chemical Company, P.O. Box 584, Madison, WI 53701. RYANIA (controls coddling moths on apples; corn borers on corn).

USING COLOR EFFECTIVELY

Much of the visual impact of a blooming garden can be destroyed unless the owner plans for effective use of color. Unfortunately, many American gardens are a haphazard kaleidoscope of colored bits without plan or pattern. If any thought is given to an overall color scheme, it is usually expressed as a chromatic display in an all-red, all-yellow or all-blue monotony. That such gardens do succeed occasionally is because, unless planted to a single flower, the natural variation between species and varieties will introduce an element of interest. Floral pigments are too subtle, too protean to be held to a single monotone.

Working with color in the garden can be a highly sophisticated area of interest which only a fortunate few are capable of expressing to the fullest. This does not mean that the backyard gardener should avoid the time and effort needed to create a beautiful, harmonious display. By observing the plantings of botanic gardens, Extension Service test sites and the like and making notes on the combinations that please him, a gardener may develop and define his own taste and preference. It must be kept in mind that there are no hard and fast rules to dictate the use of tints and hues in the garden. Much of the knowledge needed must be acquired by trial and error, in other words, by experience. Plants will often need to be moved from place to place until a satisfying harmony of color results. Bulbs, annuals, perennials and woody landscape materials will need to be selected carefully, with the overall scheme in mind.

An example of testing color combinations by trial and error is the experience I had of planting bright yellow coreopsis, a perennial, with a rich, blue annual, larkspur. When this display bloomed, it was brilliant, but almost too much so. The following fall, I moved the coreopsis to another part of the border and substituted a fall seeding of the same blue larkspur with a crimson annual poppy, 'American Loginn'. When this combination bloomed, it was every bit as spectacular as the yellow and blue of the previous year. But, because the crimson of the poppy had enough blue in it to form a more subtle harmony, the garden effect was far more pleasing to the eye.

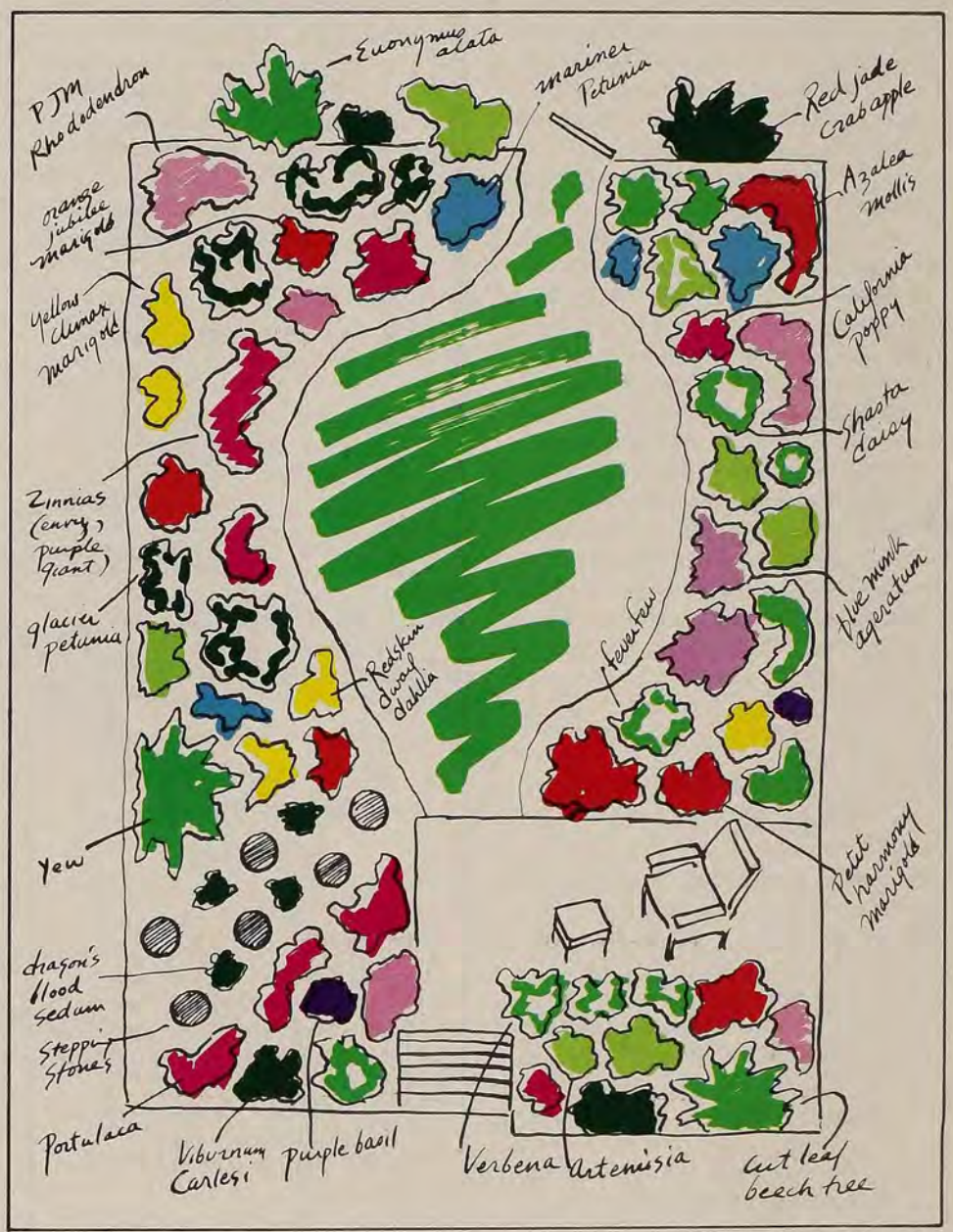


Illustration by Robyn Johnson-Ross

A number of preconceived ideas about "painting pictures with flowers" have crept into the literature of horticulture. One which calls for the elimination of all color has probably had more attention than any other—the all-white garden. Another theory holds that white is essential in all gardens to "harmonize discordant combinations of color."

A few years ago, the fad for all-white gardens resulted in thousands of such plantings in fashionable suburbs all over America. This enthusiasm has, fortunately, died down, although some die-hard fadists still insist that they continue to cultivate them because they are so lovely by moonlight. Almost anyone will admit that they take on an ethereal, dream-like beauty on the few nights of the year that a full moon and a cloudless sky happen to coincide. Compared with the pleasure that can be experienced in a colorful garden filled with sunshine, I think the price is too high to pay.

To return to the theory that white "harmonizes"—this may be true. If flower colors clash when planted next to each other, the chromatic irritation they generate can be softened by planting a white-flowered plant between them. The introduction of white weakens the chroma or intensity of both offending blooms, but this characteristic is exactly why the use of white flowers for this purpose is not satisfactory. Today's color television sets illustrate the principle behind this effect. Older sets projected the colored picture in dots against a background of white light. Research showed, however, that if each dot was surrounded by black, the color was not washed out and appeared much more brilliant. Gardeners who want brilliant color effects will do well to copy their TV sets and eliminate white flowers entirely. When, however, existing gardens are filled with perennials too valuable or costly to replace, the chromatic clashes can be tamed by interspersing existing plants with masses of white.

This washing out of color will be less drastic if, instead of white flowers, light buff tints are used. The zinnia variety, 'Isabellena' is the perfect soft, dull orange-yellow for this purpose. Of similar color is the annual phlox variety, 'Chamois'. Both are compatible in combination with almost every other color in the spectrum. Where perennials are wanted instead of annuals, there are a number of pale buff species suitable for this purpose. One is the yellow foxglove, *Digitalis grandiflora.* In spring, the Breeder tulip varieties are rich in dull art shades that blend well with most colors.

Eliminating white flowers entirely from the garden calls for an eye for color harmony. A combination which is always lovely combines pastel tints of lavender, blue, violet, soft pinks which carry a hint of lavender and soft, pale yellows. In this combination, avoid salmon pinks unless they are delicate and low in yellow. When pale yellows are used, they should not be brassy or lemony, but should tend towards straw and chamois tints. Such a garden is restful and does not tire the eye even when viewed year after year.

A combination which is much more likely to draw ohs and ahs from garden visitors is one which deliberately combines strong contrasts. As one observer once phrased it inelegantly, "It stinks in the eye." Strong contrasts can be both artistic and striking—they are by no means to be shunned if they satisfy your taste.

One effect to avoid is the patternless jumble which results from planting without regard for color harmony and contrast. There are gardeners who will argue, "Mother Nature doesn't pay any attention to color schemes. She mixes up flowers of every possible color and her effects are beautiful." Whatever you may think of that outmoded anthropomorphic fraud, Mother Nature, your effort should be to outdo most of the results of haphazard growth in the wild. Call to mind the really spectacular natural displays you have seen and 95 out of 100 will probably have been vast sheets of a single species of wildflower forming a solid field of only one color.

Few home gardeners have much hope of reproducing the visual impact of thousands of California poppies flowering in brilliant orange, of Texas bluebonnets stretching as far as the eye can see or of fireweed blazing among the dead ashes of a burned out forest. Yet, within the confines of a suburban lot, they should be able to produce gardens far more pleasing than an abandoned field that has been invaded by a motley company of wildings.

The one lesson that we can learn from flowers massed in fields is the visual impact of a single color when contrasted with another color, not in dots here and there, but in great mounds. When plants of a species are scattered singly throughout a long border, the flowers they produce are unimportant flecks, even if the individual blooms are as massive as those of a peony or are as brilliant as full-blown oriental poppies. When plants are grouped in drifts or clumps of some size, they become more visually exciting. True, the more dramatic the individual plant, the fewer of them will be needed to produce a striking effect. For example, three peonies of the same or a harmonious pink are as important when in bloom as two dozen large-flowered tulips. One mature lilac in the landscape will excite the eye as much as will a dozen shrubs of the Siberian dogwood (*Cornus alba* 'Siberica').

When planting for color harmony, the times when a plant is out of bloom must be considered. Although three peonies in a group can be a lovely sight in June, for the rest of the growing season they will be little more than low-growing shrubs in the landscape. By comparing the blooming season of a given plant with the periods during which it affects color relationships only through its foliage color, a complete change in color schemes is possible from

one season to the next. The introduction of superior varieties of hardy chrysanthemums, for example, makes possible a late fall garden developed around a combination of the closely related tints and hues of bronze, yellow, orange, maroon and crimson. Grow the plants necessary for fall color in the vegetable garden and move them into position in full bloom when wanted. Fill the same border with lavender, pink, rose, primrose-yellow and cream-colored tulips for spring display followed by a show of crimson and blue annuals in summer.

A color combination which is likely to draw ohs and ahs from garden visitors is one which deliberately combines strong contrasts.

These, then, are some general rules to follow when designing gardens for best color display, but there are more specific tools at hand for the gardener who wishes to pursue color harmony further. One tool is the use of a color chart. Such charts seek to make color identification more "scientific" and accurate as well as standardized. Simply identifying a tulip as red, for instance, leaves a great deal to the imagination as there are any number of hues of the color red, many not necessarily complementing one another.

Of the five major color charts for horticultural use, I have owned four. One of these, the Ostwald, was tossed on a rubbish heap when I found it all but impossible to use because the tiny color swatches, fixed side by side on strips, confused more than they helped. Perhaps the most comprehensive of all, the Ridgway chart of color and color nomenclature, presents its 1,150 named, hand-painted colors on small swatches as well, but fortunately the colors are separated on a gray background. About half the Ridgway colors have little or no use in horticulture. Ridgway was an ornithologist, and few flowers come in tints and hues of olive, brown, gray and green. The most practical chart for gardeners was the Nickerson color fan of the American Horticultural Society, unfortunately out of print and not to be reissued. The Horticultural Colour Chart of the Royal Horticultural Society of Great Britain is another color standard for horticultural use which is, unfortunately, also out of print.

Lacking an accurate color chart, you may want to try recording color notes with felt point pens. Most are much too vivid in color, but you can acquire certain tones made for artists in a fuller range of colors than current color charts. The Magic Marker Liner series is particularly useful and available in art stores.

Why make color notes? They are valuable because the best way to work out harmonious color combinations is by observing the actual plant in bloom in public gardens. Few of us have color memory good enough to retain the true color value of a certain flower observed two or three days before. A trip to a nearby trial garden, a seed producer's garden or a state experiment station garden is a delightful experience for even the non-gardener. By making color notes on the combinations that satisfy your taste, and writing down the names of the plants and the cultivars grown, you will be able to transfer the knowledge to your own display.

Two state experiment station test gardens that are particularly instructive are at the University of Illinois in Urbana and the Pennsylvania State University at University Park. One of the best places in America to observe perennials in bloom is at the Boerner Botanical Gardens, Hales Corners, Wisconsin, just outside Milwaukee. Californians are fortunate in that their home state produces most of the flower seeds sold throughout the Western world. Firms that maintain large test and display gardens there are Bodger Seeds, Ltd., El Monte, 91734; Denholm Seed Co., Lompoc, 93436; Goldsmith Seeds, Gilroy, 95020; Ferry-Morse Seed Co., San Juan Bautista, 95045; and Waller Seed Co., Guadalupe, 93434. In addition, a list of trial and display gardens of the famous All-America Selections can be acquired by writing AAS, P.O. Box 344, Sycamore, IL 60178. There are 141 such gardens in Canada and the United States (including one at River Farm). This list, as well as a list of recent award winners and other informative material, is available for 50¢.

The time and trouble needed to learn about floral color may seem a bother, but it soon becomes a fascinating hobby, the benefits of which you can observe in your garden year after year.

—R. Milton Carleton

CONTRIBUTORS

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R. Milton Carleton is the author of 17 books and over 1,000 magazine articles, mostly on horticultural subjects. He is a fellow of the American Association for the Advancement of Science and was the recipient of the Hutchinson Medal in 1965 for his achievements as President of the Chicago Horticultural Society. With Robert Pyle and others he founded the American Horticultural Council, the parent of the American Horticultural Society.

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Jane Steffey is the current horticultural advisor to the American Horticultural Society, handling member inquiries. She retired from the U.S. Department of Agriculture in 1971 after an administrative career in the Soil Conservation Service and Extension Service. In USDA employee activities she held office in the USDA garden club and in the Organization of Professional Employees of the Department of Agriculture. She is a graduate of Hood College with a major in botany.

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PRONUNCIATION GUIDE

Guide to Botanical Names in This Issue

The accent, or emphasis, falls on the syllable which appears in capital letters. The vowels which you see standing alone are pronounced as follows:
i—short sound; sounds like i in "hit"
o—long sound; sounds like o in "snow"
a—long sound; sounds like a in 'hay".

Aconitum uncinatum
ak-o-NY-tum un-si-NAY-tum
Actaea pachypoda
ak-TEE-ah pak-ee-PO-da
Ageratum houstonianum
adge-er-A-tum hew-stone-ee-A-num
Anemone blanda an-em-O-nee BLAN-da
Anemone canadensis
an-em-O-nee can-ah-DEN-sis
Anemone caroliniana
an-em-O-nee ca-ro-lin -ee-A-na
Anemone coronaria
an-em-O-nee cor-o-NAIR-ee-ah
Anemone cylindrica
an-em-O-nee si-LIN-dri-ka
Anemone hupehensis japonica
an-em-O-nee hu-pay-EN-sis ja-PON-i-ka
Anemone X fulgens an-em-O-nee FUL-jens
Anemone hortensis
an-em-O-nee hor-TEN-sis
Anemone X hybrida
an-em-O-nee HY-brid-ah
Anemone magellanica
an-em-O-nee madge-el-LAN-i-ka
Anemone multifida
an-em-O-nee mul-TIFF-i-da
Anemone nemorosa
an-em-O-nee nem-o-ROS-ah
Anemone patens an-em-O-nee PAY-tenz
Anemone pulsatilla
an-em-O-nee pul-sa-TILL-ah
Anemone quinquefolia
an-em-O-nee quin-qui-FOL-ee-ah
Anemone sylvestris
an-em-O-nee sil-VES-triss
Anemone vernalis
an-em-O-nee ver-NAL-iss
Anemone vitifolia
an-em-O-nee vit-i-FOL-ee-ah
Anemonella thalictroides
ah-nem-o-NELL-ah thal-ik-tro-EYE-deez
Aquilegia canadensis
ak-qui-LEE-jee-ah can-ah-DEN-sis
Aquilegia caerulea
ak-qui-LEE-jee-ah see-REW-lee-ah
Aquilegia chrysantha
ak-qui-LEE-jee-ah kri-SAN-tha
Arachis hypogaea
ah-RACK-iss hy-po-GEE-ah
Callistephus chinensis
kal-ISS-tef-fuss chi-NEN-sis
Centaurea cineraria
cen-TAW-ree-ah sin-er-AIR-ee-ah
Chrysanthemum ptarmiciflorum
kris-AN-thee-mum tar-mick-i-FLOR-um
Cimicifuga racemosa
sim-i-SIFF-yew-ga ray-si-MOS-ah
Clematis montana rubens
CLEM-ah-tiss mon-TAN-ah REW-benz
Clematis paniculata
CLEM-ah-tiss pan-ick-yew-LAY-ta
Clematis tangutica
CLEM-ah-tiss tan-GEW-ti-ka
Clematis texensis
CLEM-ah-tiss tex-EN-sis
Colchicum autumnale
KOL-chi-kum aw-tum-NAL-ee
Cornus alba KOR-nus AL-ba
Delphinium elatum
del-FIN-ee-um ee-LAY-tum
Delphinium cardinale
del-FIN-ee-um car-di-NAY-lee
Delphinium menziesii
del-FIN-ee-um men-ZEES-ee-eye
Delphinium nudicaule
del-FIN-ee-um new-di-CALL-ee
Dianthus caryophyllus
dy-AN-thuss care-ee-o-FILL-us
Dianthus chinensis
dy-AN-thuss chi-NEN-sis
Dicentra spectabilis
dy-SEN-tra speck-TAB-i-lis
Digitalis grandiflora
di-ji-TAL-iss grand-i-FLOR-ah
Eranthis hyemalis
air-AN-this hy-MAL-iss
Galanthus ga-LAN-thuss
Helleborus niger hell-eh-BORE-us NY-jer
Helleborus orientalis
hell-eh-BORE-us or-ee-en-TAY-liss
Hepatica americana
ha-PAT-i-ka a-mer-i-KAN-ah
Kirengeshoma palmata
kir-eng-ah-SHOW-ma pall-MAY-ta
Lobularia maritima
lob-yew-LAIR-ee-ah ma-RIT-i-ma
Lonas annua LOW-nas AN-yew-ah
Nigella damascena
ny-JELL-ah dam-ah-SEEN-ah
Nigella sativa ny-JELL-ah sa-TY-va
Paeonia arborea
pee-OWN-ee-ah ar-BOR-ee-ah
Paeonia delavayi
pee-OWN-ee-ah day-LAV-ee-eye
Paeonia lutea
pee-OWN-ee-ah LOO-tee-ah
Paeonia moutan
pee-OWN-ee-ah MOO-tan
Paeonia potaninii
pee-OWN-ee-ah po-TAN-in-ee-eye
Paeonia suffruticosa
pee-OWN-ee-ah sa-fruit-i-KOSE-ah
Potentilla po-ten-TILL-ah
Ranunculus repens
ra-NUN-kew-luss REE-penz
Ranunculus acris ra-NUN-kew-luss A-kris
Ranunculus asiaticus
ra-NUN-kew-luss ays-ee-AT-i-kuss
Ranunculus cymbalaria
ra-NUN-kew-luss sim-bal-AIR-ee-ah
Ranunculus eschscholtzii
ra-NUN-kew-luss ess-SHOLTZ-ee-eye
Sanvitalia procumbens
san-vi-TAL-ee-ah pro-KUM-benz
Thalictrum thal-ICK-trum
Trollius TRO-lee-us

A Summer of Lilies

A White Flower Farm collection of named varieties of lilies provides bloom from June through early September.

Our continuous-flowering Lily collection is made up of 12 bulbs, 6 varieties carefully selected for diversity of color, form, and blooming time. Lilies are delightful growing by themselves, in a mixed perennial border, or in containers on the terrace. A great cut flower, too.

Bloom begins in late June with *'Enchantment,'* an upward facing form that has been called the best Lily originated in this century—it's a vigorous self-propagator, too. *'Black Dragon Strain'* is striking in the garden and in arrangements, a frequent choice of flower show entrants. The flowers of *'Burgundy Strain,'* about half the size of others in the collection, are charming, dancing sprites. *'Pink Perfection'* (shown above) sports huge trumpets of rich dark pink on 6-foot stems—it is a spectacular plant in a spectacular genus. *'Connecticut Yankee,'* hybridized in this state by Messrs. Stone and Payne whose work is recognized internationally, has remarkable beauty and vigor. Last to bloom, in late August or early September, is the sensational Gold-rayed Lily of Japan, *auratum platyphyllum,* a favorite for decades.

Bulbs are the largest size commercially available, and each variety is identified. Bulbs are shipped in early spring. With good first culture (instructions are included with each order) they will last many years. Not recommended for frost free climates.

Please order...Lily Collection #4210, $33 plus shipping and handling as follows...states east of the Mississippi River, add $4.95; west, (except those states listed below) add $6.60; Pacific states plus Alaska, Arizona, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming, add $8.25. Connecticut residents please add sales tax.

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