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## EC12575 Bulbs and their Uses

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# BULBS *and* THEIR USES

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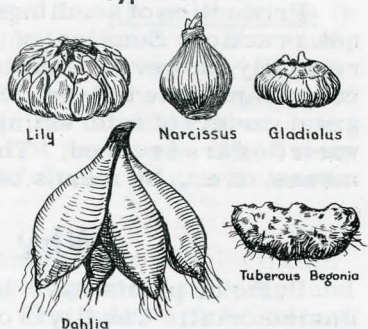
# Bulbs and Their Use

C. C. Wiggans

Bulbs are defined botanically as "modified underground stems" in which food is stored for the use of plants in the next generation. At the same time flower parts are also being developed. A bulb, in reality then, is a complete embryo plant in a dormant or resting state. Under proper conditions many bulbs can develop roots, leaves, and flowers without being in contact with or absorbing soil nutrients.

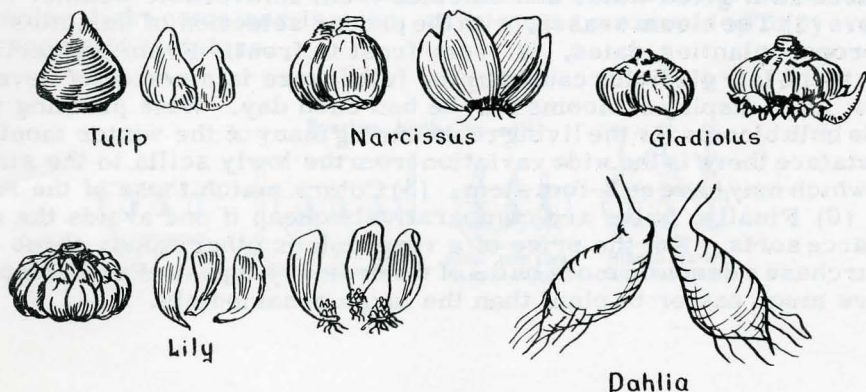
True bulbs may be placed in one of three general groups: (1) "Leafy" bulbs such as the narcissus, tulip, and hyacinth on which the scales or leaves extend more or less around the entire structure, (2) "Scaly" bulbs as in the lily on which the scales are very narrow and relatively thick, and (3) "Solid" bulbs or corms such as the gladiolus and crocus which consist of solid centers surrounded by a few paper-thin protective layers of scales. Various other species are also commonly referred to as "bulbs". These include the dahlia which is really a tuber, the canna which grows from an underground stem or rhizome, and tuberous rooted begonias. All these forms are considered together in this publication since the same suggestions apply rather generally.

Types of bulbs



The propagation of most bulbs is relatively simple. The mother bulb is planted at the proper season, makes its characteristic leaf development and then flowers. Before the old bulb dies, however, one or more new bulbs have formed at or near the base of the old one. These are inside the old bulb (hyacinth), beside the flower stem (tulip), above the old bulb (gladiolus), or in the scale axils (lily). Frequently, too, many small bulbs will form in the leaf axils of the lily or as adventitious

## Propagation methods for bulbous species



or "volunteer" growths, particularly on the base of the gladiolus corm. These small bulbs must be given special treatment and permitted to reach suitable size before they can be expected to bloom. Commercial propagators are experts in this field and by control of propagation methods and environmental conditions produce salable-sized bulbs in a relatively short time. Tubers and rhizomes also form propagative parts before the end of the growing season.

A very large proportion of the true bulbs planted annually in this country are imported from Holland, but domestic production of narcissus, lilies, and tulips is assuming importance in the Pacific Northwest and certain north central states. Domestic production has been stimulated by the widespread prevalence of certain virus diseases and injurious pests on imported stocks.

Production of seedlings is nearly always possible but in many cases is not practical because of the wide variation in the resultant crop. The regallily, however, can be easily grown from seed and generally remains very nearly true to type. Seedlings require special care, but will give a great variety of interesting materials. It is mainly from seeds that new varieties are secured. The new sorts must then be perpetuated by asexual means, i. e., by means other than seeds.

## **Why Grow Bulbous Plants?**

Bulbous plants have been used for ornamental purposes from time immemorial. The lily is often mentioned in early writings and its flower was frequently used in decorative motifs. Modern gardeners use bulbous sorts in great abundance, particularly where striking color effects are desired for short periods. As garden subjects the tulip, hyacinth, narcissus and crocus are most useful for spring effects and the various lily species will furnish blooms over a long period. The gladiolus stands high in the list of garden plants which furnish flowers for cutting. Many species serve both purposes.

Bulbs recommend themselves for serious consideration on six counts: (1) They give quick results. A tulip planted in the fall is at its best the next spring. The gladiolus will be in bloom in 60 to 90 days after spring planting. (2) Assurance of success is a second advantage. Each bulb, being a complete plant in itself, is capable of producing a flower stem and will do so if given water and shielded from unfavorable weather conditions. (3) The bloom season, with the proper selection of varieties and with proper planting dates, is from frost to frost. From the earliest crocus to the late gladiolus caught by the fall freeze is a period of several months, and a display of blooms may be had each day. Wise planning will provide bulb blooms for the living room during many of the winter months. (4) In stature there is the wide variation from the lowly scilla to the stately lily which may have an 8-foot stem. (5) Colors match those of the rainbow. (6) Finally, bulbs are comparatively cheap if one avoids the new and scarce sorts. For the price of a rosebush or other woody shrub one may purchase a dozen or more bulbs of the ordinary types. Furthermore, they are much easier to plant than the large ornamentals.



## Where Should Bulbs Be Used?

Bulbs can be found that are at home in almost any part of the garden, regardless of soil type, moisture supply or amount of shade. They lend themselves well to the tiniest area or the largest garden. They are valuable in formal beds, as spots of color in the shrubbery or perennial border, or for naturalizing purposes. They may often be used indoors as potted plants.

For formal beds, tulips and hyacinths are chosen because of their uniform type of growth. Such beds generally are used for annuals after the spring bulb blooms are gone. Best effects are obtained here if the bulbs are lifted each season after proper maturity and then bulbs of uniform size are planted at a uniform depth in the fall.

Almost any bulb or bulbous type can be used for group plantings in the border. The taller-growing types need protection from the wind. All sorts present a better appearance if a suitable background is provided. From five to fifteen bulbs, preferably of the same color, should be planted in a group with spacing dependent upon ultimate plant size. Many species such as narcissus and crocus do not need to be lifted very often, but others deteriorate rapidly in their usefulness or are so tender that they will not endure winter conditions.

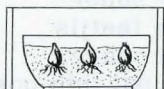
By naturalizing is meant the generous use of bulbs under circumstances simulating wild conditions. Narcissus, grape hyacinth, and crocus are frequently used for this purpose. The bulbs are broadcast and then planted where they fall. They are placed among shrubs, under trees or in the lawn. In the latter case the grass should not be cut until the bulb foliage has matured. In general, considerable space and a large number of bulbs are required to make this type of planting successful.

For indoor use bulbs may be forced to bloom on a predetermined date if proper measures are taken. Thus, the florist has Easter lilies, freezias, tulips, hyacinths, and narcissus for sale at appropriate seasons. The bulbs are planted at about the usual outdoor planting time, usually in shallow pots or flats of soil, coconut fiber, or peat moss. The container is then placed in a cool dark place and a good root system is allowed to develop before any top growth begins. A few pieces of charcoal in the container will help to keep things sweet. Water is added as needed but if a water-tight container is used, care must be exercised to prevent an oversupply of moisture.

### Forcing bulbs in soil



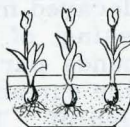
COVER TO TIPS  
OF BULBS.



KEEP COLD AND DARK  
TO FORCE ROOT GROWTH



BRING INTO COOL  
TEMPERATURE



HIGHER TEMP.  
FULL SUNLIGHT



Temperatures should be maintained at a low level until top growth is desired. Well drained outdoor cold frames or cool, dark storage rooms are suitable. It takes three to five weeks for the root system to develop to the point where the pots or bulb pans can be moved at intervals to a somewhat higher temperature (50° F.). As the leaves begin to push through the ground some light is given. In due time the bud appears and then the plant is ready for full light and still higher temperatures. Many failures are the direct result of too much heat and/or light in the early development stages. Leaf and flower stems become too long and are too weak to support themselves.

Better effects are secured if a number of bulbs are placed in a single pot -- thus in a 5- or 6-inch pot or pan, five ordinary-sized tulips may be planted. Plant the bulbs so that the tip is at soil level, which should be 1/2 inch below the pot rim.

In cases where moss, fiber or peat are used the bulb cannot rebuild itself for next year's bloom and hence should be thrown away after blooming. If soil is the potting medium, however, the bulb can be used again if it is kept watered and in the light for a time after blooming. It gradually matures and then after a period of rest can be repotted and allowed to grow again. Thus, after the Easter lily bloom falls, the plant is kept growing until the leaves turn yellow and the stem dies. If repotted and plunged into the soil to pot depth, after a time the bud starts growth again and will produce another cluster of flowers.

Hyacinths and paper white narcissus can be grown with only water as a medium. Colored pebbles or other stones are often used to hold the bulbs in place. Water is held at the level of the bulb base.

Striking window box effects can be had by planting bulbs in containers that are shaped to fit into the boxes and then giving them the treatment described. By bringing them out of "cold storage" at the right time they will be in bloom well ahead of the normal blooming season.

## How and When Should Bulbs Be Planted?

Bulbs require reasonably fertile, well drained soil. Heavy soils should be lightened by adding sand or ashes. A sandy soil can be greatly improved by bringing in sod soil or by mixing in leaf mold or peat. In all cases a good supply of humus is essential for both good drainage and water holding capacity.

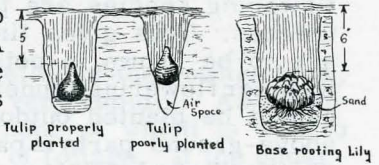
One good way to prepare for a bed of tulips is to take off the upper 5 inches of soil and then work some well decayed manure into the next 6 inches. A dressing of bonemeal or superphosphate (10 pounds per 1,000 square feet) is often mixed into the surface of this lower layer which is then leveled off. The bulbs are put into position and the surface soil is replaced. Watering will then settle the soil firmly around each bulb. Care must be taken to see that the bulbs are not in direct contact with manure.



Tulip bulbs planted for bedding

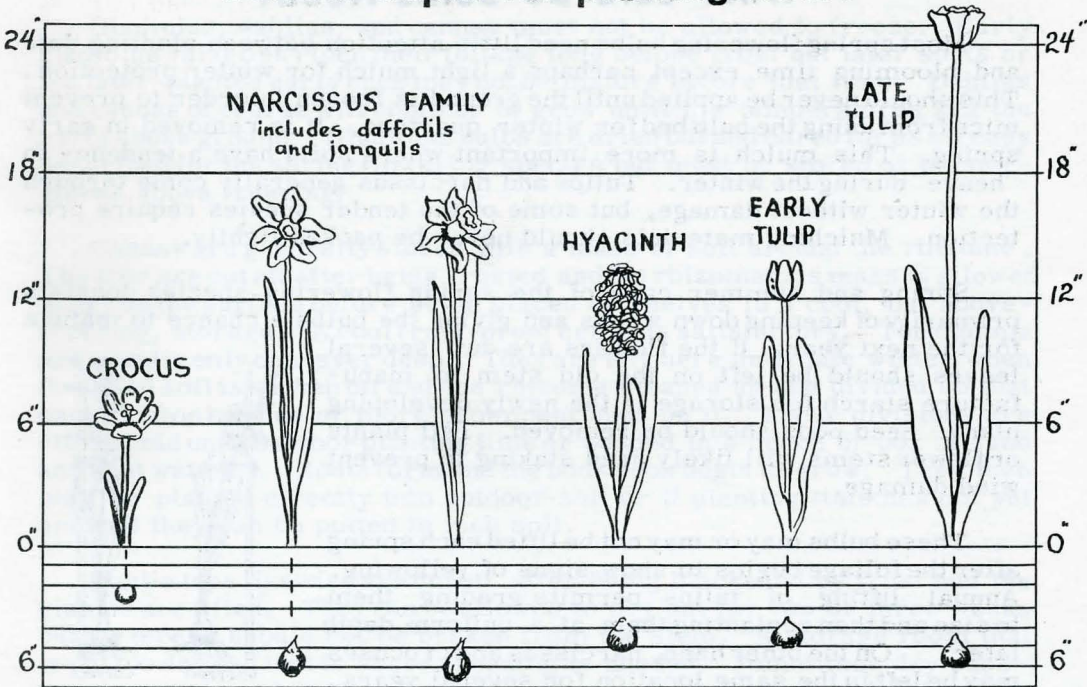
When individual bulbs or small groups are planted, the accepted practice is to dig a hole for each bulb to the required depth. Seat the bulb base firmly in the bottom of this opening. A handful of coarse sand in the bottom of each hole insures better soil contact and also provides additional drainage if that is needed.

### Methods of planting bulbs



Bulbs generally should be covered with a soil layer three times as thick as the largest bulb diameter. This varies from about 2 inches for crocus to 10 or 12 inches for certain lilies. Lilies forming roots on the stem are set deeper than those rooting mainly from the bulb base. The sketch below indicates planting depth for several of the most common types. In the light soil the depth of planting should be somewhat greater than where the soil is heavy. Deep planting of tulips may delay their splitting up into smaller bulbs.

### Correct depth for planting bulbs



Tulips are usually set 5 to 6 inches apart and crocuses 2 to 3 inches. The large growing lilies need much more space. Gladiolus 6 inches apart in rows 2 feet apart should have ample room. Dahlias may be 2 or more feet apart.



Planting time depends upon the species and sometimes even upon when the bulbs are available from the producer. Tulips and other spring flowering species are planted after October 1, and before the ground freezes. This gives time for good fall root development. If the plants are to be grown in pots the planting date may be somewhat earlier. Summerflowering tender types such as the gladiolus, canna, and dahlia cannot be planted outdoors until the danger of spring frost damage to above-ground parts is past. Dahlias and cannas are often started under glass and may be quite well developed before being put out of doors. The flowering season of gladiolus may be greatly extended by (1) planting varieties with different maturity dates at the same time, or (2) making succession plantings of the same variety at ten-day intervals.

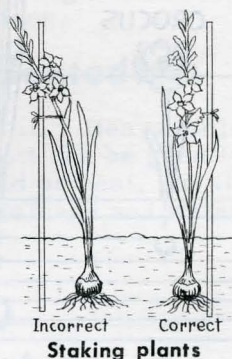
Bulb size determines whether the bulb will bloom, and to some extent its blooming date. Small bulbels or cormels planted in a garden row may reach blooming size after one season. The large bulbs generally give larger flowers or a larger number of flowers per bulb, but medium-sized bulbs are quite satisfactory and are much less expensive.

## What Care Do Bulbs Need?

Most springflowering bulbs need little attention between planting date and blooming time except perhaps a light mulch for winter protection. This should never be applied until the ground is frozen in order to prevent mice from using the bulb bed for winter quarters. It is removed in early spring. This mulch is more important where soils have a tendency to "heave" during the winter. Tulips and narcissus generally come through the winter without damage, but some of the tender species require protection. Mulching materials should never be packed tightly.

Spring and summer care of the spring flowering species consists primarily of keeping down weeds and giving the bulbs a chance to mature for the next year. If the flowers are cut, several leaves should be left on the old stem to manufacture starch for storage in the newly developing plant. Seed pods should be removed. Tall plants or flower stems will likely need staking to prevent wind damage.

These bulbs may or may not be lifted each spring after the foliage begins to show signs of yellowing. Annual lifting of tulips permits grading them to size and then replanting them at a uniform depth later. On the other hand, narcissus and crocuses may be left in the same location for several years. Since foliage of these spring blooming species dries up and disappears in early summer, other ornamentals are needed to fill in the vacancies. It is not uncommon to combine annuals and bulbs - the annuals being planted among the bulbs even during the bulb blooming season. If the ground must be cleared immediately, however, tulips may be lifted just after flowering and the entire plants lined out in spare ground until the tops ripen. The stems are very brittle at this time and care is needed to prevent breakage. Lifted bulbs are allowed to dry out



Staking plants



thoroughly and then are stored in a dry, airy location. Manila paper bags or divided ventilated crates are satisfactory. Different varieties should be properly labeled and kept in separate containers or compartments.

The frequent lifting of tulips, especially varieties of the cottage type, is necessary since this type tends to multiply very rapidly. As a consequence there are soon many small bulbs, none of which is able to flower, and the only development is a mass of foliage. If the under-size bulbs are planted in the garden and given good cultural care for one season many of them will reach flowering size.

Summer flowering bulbs, aside from many of the lilies, are tender to low temperatures. Hence, they are planted each spring and then dug in the fall for storage in a frost-free space. The season can be lengthened a bit by starting gladiolus in pots or by using greenhouse or hotbed space to start the growth of dahlia tubers or canna divisions. Then instead of planting a dormant bulb or tuber in early May the start is made with a partially developed plant. Dividends in the form of earlier blooms are the result.

Gladiolus, dahlias, and cannas must not be allowed to freeze. Early gladiolus varieties ripen their foliage long before frost but later sorts or the later-planted early ones may not be mature before that time. Dahlias and cannas of course will continue to grow until low temperatures kill the parts above ground. Gladiolus bulbs are dried out and cared for as already described for the spring flowering species but must be stored at temperatures above freezing.

Cannas are generally stored with a mass of soil around the rhizome. The tops are cut off after being frosted and the rhizomatous mass is allowed to dry on the surface before being placed on shelves in a cool, but above-freezing, storage. A cool frost-proof cellar is satisfactory. The clumps are usually only one layer deep. They are left here until late winter when the dried soil is shaken off and the rhizome cleaned up and divided so that each section has one or more prominent buds on it. These divisions are either held until outdoor planting time or bedded in a bench or box of sand and kept watered. Roots form and the buds soon begin to grow. They then may be planted directly into outdoor soil or if planting time has not yet arrived they can be potted in rich soil.

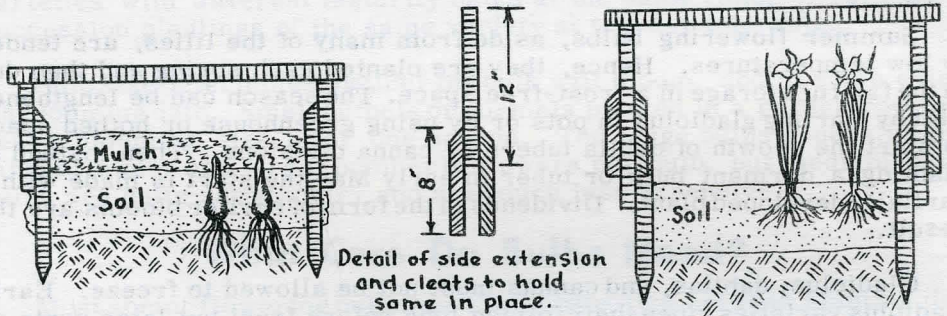
Dahlia tops likewise are cut off after being blackened by frost and the clumps are lifted. They can be allowed to dry out for two or three weeks but the tubers should not be broken from the stem. A storage room that is not too dry and that is above freezing is needed. Sometimes dry packing material such as sand, sawdust, or excelsior is used to keep the clumps separated and also to prevent excessive shriveling. At the proper time the clumps are divided and started on another season of growth. If desired, the entire clump may be placed in a box of sand and given water. Bud development begins on the basal portion of the fleshy stem, thus showing clearly where the dividing cuts should be made. There are no buds on the tubers themselves so all development must come from the stem buds.



Other bulbous sorts such as tuberous begonias, caladiums, and callas may be given treatment like that described for cannas and dahlias except that a warmer storage temperature (45-50° F.) is recommended.

Half-hardy types may be treated like the tender sorts except that they are planted as soon as the soil can be worked. Good winter protection, however, will bring these types (such as montbretias and tritomas) through outdoor conditions in good shape.

## An overwintering method for half-hardy bulbs



Pest control on most bulbous species is comparatively easy since serious diseases and insect pests are found rather infrequently. Most commercially produced bulbs can be planted with the assurance that steps have already been taken to control injurious pests and diseases. Home-grown bulbs, however, will sometimes require preplanting treatment and in general all bulbous plants require some attention during the growing season if the foliage and flowers are to remain free of insect and disease damage.

Typical preplanting treatments are: (1) Coating gladiolus corms with 5% DDT dust by shaking them in a paper sack with the material. A peck of corms will require about 1/4 ounce of DDT. This treatment is given at the time of storage and is for the control of thrips. (2) Soaking gladiolus corms in Improved Ceresan (1 ounce to 3 gallons of water) for 30 minutes or in Lysol (1 1/2 tablespoonfuls per gallon of water) for three hours. This is effective in the control of gladiolus scab. The addition of 3 teaspoonfuls of soap powder will increase the wetting ability of the mixture.

Summer control of thrips is accomplished by dusting the plant at weekly intervals after the third leaf is formed with the 5% DDT dust or spraying it with the 50% wettable material, 2 tablespoonfuls per gallon of water. Leaf spots and other fungous troubles may be held in check by spraying the foliage with Bordeaux mixture at intervals of ten days or two weeks. Many suitable combination sprays containing both insecticides and fungicides are available and may offer the simplest solution to the disease and insect problem. The destruction of badly infected plants is always an effective way to reduce disease damage.



## Which Bulbs Shall I Plant?

The species selected for planting will vary with the desires of the individual and the conditions under which they must be grown. No attempt is made here to give varietal details. Instead attention is focused upon the various genera or groups within a genus, and some suggestions are given as to peculiarities which need consideration.

### HARDY BULB TYPES

Tulips are grown more generally than almost any other bulb. They require full sunshine. They have been known for centuries and during the "tulipomania" period (1634-1637) single bulbs of the so-called "broken" types were sold for fabulous prices. It is known now that the streaking and splotching sometimes found, which incidentally caused the great interest in the seventeenth century, are the results of certain virus troubles.

Tulip varieties now offered are the result of repeated hybridizing and thus the distinct differences which once existed between the various groups are not now so evident. The following, however, are still rather distinct groups.

Single Early - one of the first to flower - has short stems - often used in bedding work - good for indoor forcing.

Double Early - a peonyflowered type with very short stems - flowers long lasting - good for forcing - persists for a considerable period in one location. Late doubles greatly extend the flowering season.

Cottage - follows the Single Earlys in season of bloom - stems somewhat longer - wide color range - splits up so badly that replacement at least every second year is imperative.

Darwin - long-stemmed, long keeping sorts - flowers are egg or cup shaped with a wide color range - usually self colored except for the petal bases.

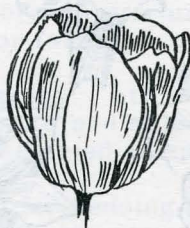
### Tulip types



Cottage



Double Early



Darwin



Parrot



Lily

Breeders - the brown and bronzy colored sorts similar to Darwins.

Broken - Breeders or Darwins in which the color has been broken - "striping" and "feathering" are frequently found - sometimes called "Bybloemens", "Bizarres", and "Rembrandts".

Parrot - generally of the Darwin type but with weak stems and lacinated petals - useful for cutting since the stiffness of other types is not present - make a comparatively weak growth.

Lily-flowered - hybridization products with pointed lily-like petals.

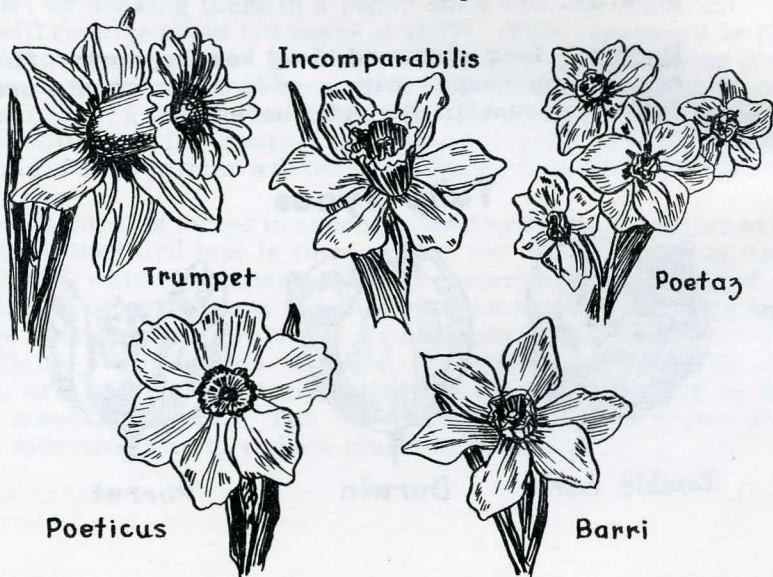
Multiflowered - producing several flowers on each stem - they need rich soil.

Mendel and Triumph - hybrids between the Darwins and other types - which bloom between the Earlies and the May flower - ing groups.

Tulip Species - several sorts with various characteristics which are useful mainly in the rock garden.

Narcissus. These species are among the most satisfactory that can be planted. Once established they maintain themselves well for rather long periods and can be depended upon year after year to produce good blooms. They are especially valuable for naturalizing because they can be planted and then forgotten. Foliage must always be allowed to mature fully before being cut off. Most species produce one flower per stem.

### Narcissus types





The terms daffodil and jonquil are often used but in reality they designate only specific types of the narcissus genus.

The main types are:

Trumpet - in which the upright or trumpet part of the flower is as long or longer than the perianth or saucer segments - colors, all yellow, all white, or a combination of yellow and white. King Alfred, introduced in 1899, is still the most heavily planted variety.

Incomparabilis or large cupped - the cup is from  $\frac{1}{3}$  to almost as long as the petals - petals either white or yellow - cup generally yellow but may be tinged with other colors.

Barri or short cupped - with the cup or crown less than  $\frac{1}{3}$  the length of the perianth segments - colors yellow and white but red coloration appears on the cups of certain varieties.

Double Narcissi - distinguished by having a multiplicity of petals in each flower.

Triandrus and Triandrus Hybrids - small trumpet flowers with reflexed petals on 6-inch stems.

Jonquilla and Jonquil Hybrids - narrow upstanding foliage - flowers long-stemmed and fragrant - often used for forcing - generally yellow in color - some types produce double flowers - others have several flowers per stem.

Poetaz -- four to eight fragrant flowers per stem - crown short, usually light yellow but may have other colors - the popular Paper White and Chinese Sacred Lily varieties are often forced in water - much used by florists for cut flowers.

Poeticus or Poet's Narcissus - with snow white petals and short conspicuous crown - does well for naturalizing purposes.

Doubles - doubling occurs to variable degrees in different varieties - color varies from lemon to gold and primrose - used mainly for forcing - not often seen in gardens.

Narcissus species - all sorts not included above - often miniature in size and suitable mostly for the rock garden or especially selected and protected spots.

Hyacinths are very useful for bedding because of their short, stocky, uniform and formal type of flower stem. Both double and single forms are available. Small groups in the border are very useful and may be left for years. The enormous flower stalks of the first few years revert

to slender spikes of a form useful for cutting. The fragrance is very rich and sometimes almost overpowering. Colors vary from white and yellow through pink and red to blue and purple.

Hyacinths are often listed according to bulb size as Exhibition, Bedding and Miniature or Dutch Roman Bulbs. The exhibition size - 2 1/2 inches or more in diameter - are most often used for forcing. The 2 1/4 - inch bulbs are generally used for bedding purposes. The miniatures are 2 inches or less in diameter and are not very valuable until they make further development.

Crocuses. These are among the earliest spring flowers - available in a wide range of colors. The corm should be planted rather deeply - may be used anywhere - often planted among perennials or shrubs or even in the grass.

Fall blooming types are available but are not used very frequently. These flower after their foliage is gone and hence should be planted among species having fall foliage. The spring foliage is not very desirable in appearance and persists for a rather long time. Bulbs are planted in July or August.

Lilies. In the lily group are some of the most widely grown of all bulbous species. The old fashioned Tiger lily was a favorite in our grandmothers' gardens and it is still frequently seen. It has been replaced to some extent in recent years by new sorts such as the Regal or by hybrids which show improvement over the older sorts.

Lilies vary widely with respect to environment, but all species demand good drainage. Making the lily bed a few inches higher than the surrounding soil provides improved drainage and keeps the soil from packing so much. It is always good practice to use sand around the lily bulb, not only to provide drainage but also to protect the bulb from contact with manure or strong fertilizers of other sorts. It is also useful in disease prevention.

Some species do well in shaded or partially shaded locations but others require full sun. "Keep the head warm and the feet cool" is a good motto for the lily grower. Thus, a lily group may often do well if planted among other species which provide shade for the soil.

Lily bulbs should be planted as soon as they are available and before the roots dry out completely. They may be held in ordinary cool storage for some time without loss of vigor. If lily bulbs are considered and handled as live plants, success is more nearly assured with them.

The various species are not discussed here. Much information concerning them is available from other sources, particularly dealers' catalogues which now include descriptions and planting directions for many varieties within the species. Information concerning some of the more commonly planted sorts is given in the tabulation below but this list will be greatly extended by any lily enthusiast who is willing to give the necessary attention to lily production.



# REFERENCE CHART FOR GARDEN LILIES

Name	Blossom Shape	Color	Height (feet)	Require- ments	Cover depth (inches)	Bloom date
Auratum	Bowl	White	4-6	Part shade	5-6	Aug. -Sept.
Batemanniae	Star	Orange	3-4	Sun	4-5	July-Aug.
Candidum (Madonna)	Funnel	White	4-6	Sun	1-2	June
Concolor	Star	Red	2-3	Sun	3	June-July
Davidi	Recurved	Red	4-5	Sun	5	July
Hansonii	Recurved	Yellow	3-4	Shade	5	June
Henryi	Recurved	Orange	5-6	Part shade	5-6	August
Martagon	Recurved	Varies	2-3	Part shade	3	June
Regale	Trumpet	White	3-4	Sun	5	June
Sargentiae	Trumpet	White	4-5	Sun	5	July-Aug.
Speciosum	Recurved	Varies	3-4	Part shade	5	August
Tenuifolium	Recurved	Varies	2-3	Sun	3	June
Testaceum	Recurved	Apricot	3-4	Sun	3	June
Trigrinum	Recurved	Salmon	3-4	Sun	5	July-Aug.
Umbellatum	Erect	Varies	2-3	Sun	4	June

Lilies of the Valley. "Valley Lilies", as the florist calls them, have been much used in the past, particularly as a ground cover even in considerable shade. They are quite persistent even when neglected but need to be divided when they become overcrowded. They respond to fertilizers, too, by developing larger flower clusters.

The roots, known also as pips, do well when forced indoors. Cold-storage pips are planted first in loam, sand or sphagnum moss and kept in a dark place until they begin to sprout. They are then given more light and in about four weeks from planting time should be in bloom.

Minor spring flowering species. A number of species, though of minor importance because of their small size, are worth consideration because of the earliness of their blossoms and the spots of color they furnish. Among these may be mentioned the Muscari or grape hyacinths, Snowdrops, Scillas or Squills, Chionodoxas, Erythroniums, and Dutch, Spanish and English Irises. Each one needs its own particular treatment but to the plant lover who wants to grow these species the returns are most satisfying.

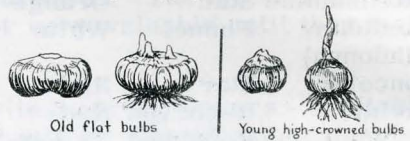
## TENDER BULB TYPES

Gladiolus. The gladiolus enjoys a just reputation for being one of our finest cut flowers for summer use. The tall, beautifully colored spikes are available in a wide range of colors from early summer until the fall frost catches the late ones. The old-fashioned sorts have been greatly improved by hybridization and more new sorts are introduced each season. Varieties are now available with ruffled petals, with serrated petals, etc.

Primulinus hybrids are numerous and some varieties are of the "cut and come again" type, i. e., they will produce more than one spike per season from a given corm.

Gladiolus corms are graded according to diameter: No. 1's are 1 1/2 inches and up; No. 2's, 1 1/4 to 1 1/2; No. 3's, 1 to 1 1/4, and so on. Bulb value, however, does not depend upon size alone. The older bulbs are larger but have flattened out or even become concave on top. The "high-crowned" bulb is more desirable despite its smaller size because it produces an earlier, more vigorous type of growth than does the older, larger flat corm. The larger bulbs often produce two or more spikes but these are likely to be smaller than the single spike from the high-crowned bulb.

Types of development from old and young gladiolus bulbs



A rich deep soil gives the finest spikes, but gladiolus will bloom under adverse conditions if a strong bulb is planted. Four plantings made in April, May, June, and July with early, midseason and late sorts included in each planting will give almost four months of continuous bloom.

Much confusion exists concerning the proper pronunciation and plural form of the word gladiolus. The American Gladiolus Society accepts glad-i-oh'-lus as the proper pronunciation, and the plural is the same.

Dahlias. The dahlia is a native of Mexico and the story of its introduction and acceptance as a garden flower is a very interesting one. One European grower nearly a century ago boasted of three thousand varieties. Many descriptive terms such as double, single, Tom Thumb, cactus, pompon (never more than 2 inches across), peony-flowered,

### Dahlia types



Cactus



Decorative



Ball



Single



Peony Flowered



Collarette



collarette, anemone-flowered, and decorative are now applied to dahlia flowers in an effort to describe their peculiarities. Some varieties produce flowers 12 inches in diameter, and others have many small blossoms. In order to produce the large blooms, only one or two stems are permitted to develop on each tuber and disbudding may further reduce the blossom number.

Tuber crowns are set 4 to 6 inches deep. They need to be planted in very fertile soil and kept well supplied with water throughout the season.

Several bedding types - both double and single sorts - are grown from seed and treated as annuals. They are suitable for cutting, make effective masses for the garden and can be very easily grown. These tubers are never saved for further use.

Cannas. The canna can be used to give a tropical effect to the garden scene. The broad leaves and brilliant-colored flowers make quite a show during the hot part of the summer. The tall sorts may serve for a screen but produce flowers of little consequence. The dwarf, large-flowered types are good bedding species. Each flower stem produces numerous flowers in a single cluster but blooms open over a long period. The old flower stalk should be cut off above the foliage after flowering, to prevent seed formation and to improve the general appearance of the bed. New flower stems continue to form from the rhizome, however, and the canna bed will usually be in flower until frost.

Tuberous Begonias. The tuberous begonia is a good plant for shady gardens. The tubers are started in pots or flats in the greenhouse or other warm place about April 1. When the shoots are 1 inch in length, transplant to pots and keep in a warm room or cold frame but out of direct sunlight. As soon as frost danger is past, plant them outside in 6 inches of very rich soil. Leaf mold or old stable manure fortified with bonemeal makes a good medium.

When frost nips the foliage the tubers are dug and allowed to dry in the soil mass before they are packed in dry peat moss or sand for winter storage. Keep them away from freezing temperatures if they are desired for use next season.

Tuberose. This tuber-forming member of the amaryllis family is sometimes grown to impart a strong evening fragrance to the flower planting. Tuberose should be started in pots at two-week intervals in April and May and moved outdoors after the frost-free date. They are usually interplanted with other species in groups of three or more and at some distance from porches and windows because their penetrating fragrance is not always appreciated.

Caladiums. These are decorative pot plants with very colorful leaves and can be used in the house for winter as well as summer bedding plants. The characteristic coloring begins to develop after five or six leaves have formed. They need some shade and a plentiful supply of moisture. Sometimes liquid manure applications are very helpful since the plants

usually are grown in rather small pots. They are started indoors at 75° F. in flats of sphagnum moss but must be potted as soon as they sprout. As the foliage begins to drop in the fall, the pot is watered only lightly until the leaves disappear. Store the bulbs in a warm, dry place during the winter but do not allow them to dry out too thoroughly.

The "Elephant's Ear", sometimes used in public parks and elsewhere, is not a true Caladium. The large tubers are planted after danger of frost is past and are spaced about 4 feet apart. The starchy tubers are used as food in the tropics.

Amaryllis. Amaryllis bulbs are placed in mid-October in a medium-sized pot of good soil with two-thirds of the bulb above the soil. A south window sill in a warm room makes a good location for this bulb. It requires considerable water but the soil must never be soaked. There is great variation in the bloom coloration. After the blooming season the bulb must be allowed a period of rest during which little water is needed. The pot may be turned on its side to bring about the ripening of the bulb.