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Flowering Bulbs

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Flowering bulbs offer a multitude of opportunities for brightening the home landscape. Their range of color and bloom type and size, as well as their long sequence of bloom, are unequalled in any other class of flowers. Although most gardeners think of lilies, tulips, hyacinths, and narcissus whenever the term “bulb” is mentioned, there is an almost unending array of bulbs.

Bulbs require little garden area and can be planted in annual or perennial flower beds, among shrubs, under trees, and in practically every area of the landscape. By careful scheduling, a gardener can have flowering bulbs in bloom before the last snows in spring until the first snow in the fall. Besides variation in cost, bulbs’ permanence and rate of multiplication should also be considered when planning a garden.

This publication discusses when to plant bulbs and explains soil preparation methods and planting procedures. Also provided is a convenient table including information on various bulbs’ characteristics and requirements (Table 1). To simplify access to the table, an Index of Common Names is also provided. The term “bulb” is used in this publication to refer also to all corms, tubers, and rhizomes handled in the dormant condition.

Bulb Hardiness Dictates Planting Time

Bulbs are considered either hardy or tender. Hardy bulbs survive winters in the ground and may be left in place all year. Most of them should be planted early in the fall. Proper planting time is important not only for winter survival, but to insure adequate root development, which results in better flower production. Tender bulbs must be lifted after the growing season, stored indoors, and replanted the following year. Tender bulbs should be planted outdoors in spring only after all danger of frost is past, or they may be started indoors for later transplanting.

Hardy flowering bulbs forced in a pot for indoor, winter bloom may be planted permanently in the garden. However, such bulbs seldom bloom well the first year

after planting out. If they grow at all, they may take several years to flower again. They should be moved outdoors in spring after frost danger is past. Plant the entire contents of the pot.

While indoors, these plants should be placed in a well-lighted location and fertilized like any other indoor house plant. Be sure to allow the foliage to remain green until it naturally dies back (usually 5 to 6 weeks after flowering).

Buying Bulbs

The best bulbs come from reputable businesses, either local or catalog sources. Order bulbs early from catalogs, and make your selections at local sources as soon as the bulbs are offered for sale. Select large, firm, plump bulbs or roots. Do not purchase any that are bruised, blemished, or soft.

During their dormant season, tulip, narcissus, and most other bulbs with a protective covering of dry scales can be stored for several weeks prior to planting, if necessary. Some, such as fritillaria and snowdrops, deteriorate rapidly and should be replanted as soon as possible. Similarly, fleshy bulbs and roots like lilies should be planted immediately after purchase or delivery.

Using Bulbs in the Landscape

The most important environmental factor to consider in locating bulb plantings in the landscape is light level. Be sure you provide full sun or partial shade as the particular species requires (Table 1). Excellent soil drainage is also crucial for most species, but poor conditions can be altered with proper soil preparation.

Bulbs are typically planted as either formal or informal garden beds, or they may be naturalized. As a general rule, bedded bulbs look best in informal groups, unless the overall landscape character demands a formal treatment. Avoid small numbers of bulbs planted individually or in straight rows. Mass plantings are far superior, visually. An exception to this is the rock garden.

Flower color is an important element in bulb usage. A pleasing coordination of colors is the goal.

Naturalized plantings can be accomplished with any type of hardy bulb which will reproduce and multiply itself in its planted location. Avoid stiffly formal plant shapes such as Darwin tulips or crown imperial. However, species tulips or the checkered lily, for example, make good naturalizing candidates. Narcissus and crocus are, perhaps, the most commonly used bulbs for naturalistic plantings.

Bulbs planted for a "natural" effect should be located in drifts or informal masses. Try to work with the topography so that drifts gently climb a slope or wrap around a high point or landscape feature. One approach is to throw bulbs gently onto the ground and plant them where they land.

Remember that bulbs naturalized in a lawn require special attention. The grass cannot be cut for several weeks after flowering or until the foliage of the bulb plant is ready to die down naturally. If the foliage is cut off too soon, the bulb will not be regenerated for the next year.

Soil Preparation

Nothing will cause bulbs to deteriorate as quickly as poorly drained soil. Most bulbs prefer a well drained, sandy loam soil, ideally with moderate amounts of organic matter.

If the subsoil is highly impervious to water, some disruption by deep digging may be helpful. If the planting area is naturally low, raise the bed level 2 to 3 inches above the average surrounding soil. Sand is useful for this purpose. Incorporate it thoroughly and as deeply as practical into the existing soil.

Organic matter should be worked into the soil when the planting site is prepared. Use compost, leaf mold, undecomposed peat moss, or well-rotted manure (never fresh manure). Since most bulbs prefer a slightly acidic soil, decrease the pH with sulfur if your soils are highly alkaline. However, a soil test should precede any pH adjustments.

The soil should be of average fertility. High nitrogen level will promote excessive leaf growth with poor flower production and more bulb splitting. Color and size of foliage are good indications of fertility level. Large, bluish-green leaves indicate an excess of nitrogen, whereas small and light colored leaves indicate low fertility.

A good organic fertilizer for bulbs is bonemeal, with its high phosphorus content. Apply 3 to 4 pounds of bonemeal per 100 square feet of area. However, bonemeal alone may have inadequate nitrogen. Supplement bonemeal with one of the inorganic fertilizers or well-rotted manure.

Inorganic fertilizers are equally useful. On loam or clay soils, add a 6-12-6 or 5-10-5 fertilizer at the rate of 2 to 3 pounds per 100 square feet of area. On sandy soils, use a 5-10-10 mix. Numerous mixes specified for bulbs are now on the market. Be sure to mix all fertilizer and soil amendments thoroughly and deeply into the soil before planting.

Spacing

The size of the bulb, plant, and flower controls spacing; thus, small bulbs are planted more closely together than larger bulbs. Planting bulbs too closely together results in small leaves and flowers, and it prevents each flower from showing its intrinsic beauty. See the specific recommendations in Table 1.

Planting

After the site is prepared, place the bulbs on the exact spot where they are to be planted. Plant sequentially to avoid walking or kneeling on just-planted areas. All bulbs should be planted with the base down.

Plant small bulbs with a trowel or bulb planter. A trowel is preferred since it avoids compacting the soil immediately below the bulb. For larger bulbs, use a trowel or spade to make the larger holes. When planting large beds, consider excavating the entire bed to the proper depth, placing the bulbs, and then filling over the tops of the bulbs with soil.

Correct planting depth is important. Generally, plant to a depth equal to 2-1/2 to 3 times the bulb's largest diameter (see Table 1 & Figure 1).

General Culture

For hardy bulbs, annual application of fertilizer as a top dressing is needed. Apply at the manufacturer's recommended rates or one-half of the rates listed in "Soil Preparation." Do so as foliage growth begins in the spring. Do not allow the fertilizer to remain on leaves, or burning will result. Water it in immediately.

Foliage of bulbous plants must not be cut until it begins to yellow and die. Leaves furnish food to the bulb, permitting it to grow large enough to flower the following year.

On the larger species, spent flowers should be removed before seeds begin to form. This practice assists the developing bulbs to grow bigger.

Among hardy bulbs which remain undisturbed for many years, an abundance of foliage with few or no flowers is an indication that the bulbs have become crowded through natural division. When the foliage dies, the bulbs enter a dormant period. They can safely be lifted, sepa-

rated, and replanted at proper spacing during this time. Large bulbs may flower the following year; small bulbs will require a longer period to reach flowering size.

Insects and Other Bulb Pests

When present, aphids or plant lice are usually found on succulent young growing tips. They may transmit virus diseases. Grayish or powdery white aphids may occur on tulip bulbs. Spray with insecticidal soap, imidacloprid, cyfluthrin, permethrin, or malathion. Dust bulbs with a 1% lindane dust before planting or storage.

Spider mites affect summer-blooming bulbs or bulbs forced indoors. Tiny, light colored spots on leaves and webbing on the underside of leaves are evidence of infestation. Dust with sulfur, apply granular disulfoton, or spray with miticides, esfenvalerate, or insecticidal soap.

Bulb mites are minute white mites found in rotting bulbs. Scabby and pitted bulbs are signs of these pests. Discard all infested and rotten bulbs.

Narcissus bulb fly and lesser bulb fly come from plump yellow maggots, 1/2 to 3/4 inches long, which tunnel in rotting bulbs of narcissus and daffodils. Discard all soft and rotting bulbs. Drench soil around plants with dylox 80% SP, at label specified rates to prevent bulb fly problems.

Thrips cause leaves to have a silvery appearance and flowers to become deformed, spotted, and streaked. Gladiolus corms in storage become sticky and russeted. During the growing season, spray or dust plants with malathion. After harvest and prior to storage, dust the corms with a malathion or lindane dust.

Chipmunks and ground squirrels dig up newly planted bulbs and seeds. For small numbers of animals, use common rat-size snap traps. Bait the traps unset with oatmeal and/or peanut butter for 2 or 3 days, placing them next to the burrow entrances. Once bait is taken, set traps. For large infestations, poison baits are best, but such baits should only be applied by trained personnel.

Field mice (voles) eat bulbs and often follow mole tunnels to find them. Use mouse-size snap traps to control small numbers. Bait traps with peanut butter and place them with the long dimension perpendicular to the runways or within a mole tunnel. Repellents such as thiram may provide protection of bulbs up to 6 months. For severe infestations of voles, poison baits are most effective.

Moles are insectivores and do not eat bulbs; however, they can destroy bulbs and plants by burrowing. The most effective control method is to set traps early in the spring or during fall. Both choker and harpoon traps are available. Moles rarely eat any poison "peanut-type" baits, and poisonous gases are equally ineffective. Chemical treatment of the soil to kill grubs and earthworms (and thus solve a mole problem by eliminating their food supply) may be effective. However, treatments must be thorough and repetitive, can be costly, and may provide only temporary control.

Bulb Diseases

Once established, bulb diseases are difficult to eradicate. Prevention is the key to maintaining a disease-free planting. A few simple precautions will help prevent extensive damage to highly prized home plantings.

1. Since the fungi which cause disease live on infected bulbs, the most important step in preventing trouble is to avoid planting diseased bulbs. When you plant bulbs in the fall, remove the outer brown scales and discard any bulbs showing symptoms of softness, decay, or yellowish lesions on the inner scales.
2. Bulb diseases most frequently occur when plants are grown in the same area year after year. If practical, move the bed each year and avoid planting bulbs in the same spot more often than every third year. Remove stems from tender bulbs right after digging, and store only disease-free bulbs in a cool, dry place during winter.
3. In the spring, it is important to keep plants under constant observation. Examine the sheathing leaves weekly, and immediately remove leaves showing spots which continue to increase in size. As soon as the plants have died to the ground, carefully remove all dead leaves and other plant debris from the beds.
4. Use fungicides as protectants to prevent disease. The fungicide Cleary's 3336 contains thiophanmethyl, a systemic fungicide which controls a variety of common bulb diseases. Use Cleary's 3336 at the label specified rate, soaking the cleaned bulbs for 15 to 30 minutes in warm solution (80 to 85°F), preferably within 48 hours after digging. After treatment, let bulbs air dry before storing. If bulbs are for forcing, treat bulbs that have been heat-cured. Use pesticides with caution, and follow all label instructions. Note: Cleary's 3336 does not control Pythium, Phytophthora, or bacterial diseases.

Index of Common Names*

Armenian Grape Hyacinth <i>Muscari armeniacum</i>	Foxtail Lily Eremurus spp.	Lily-of-the-Nile <i>Agapanthus orientalis</i>	Star-of-Bethlehem <i>Ornithogalum umbellatum</i>
Arum Lily <i>Zantedeschia aethiopica</i>	Garlic Chive <i>Allium tuberosum</i>	Magic Lily <i>Lycoris squamigera</i>	Stars-of-Persia <i>Allium christophii</i>
Autumn Crocus <i>Colchicum autumnale</i>	Giant Onion <i>Allium giganteum</i>	Mexican Shell Flower <i>Tigridia pavonia</i>	Summer Hyacinth <i>Galtonia candicans</i>
Calla Lily <i>Zantedeschia aethiopica</i>	Giant Snowdrop <i>Galanthus elwesii</i>	Montebretia Crocsmia spp.	Summer Snowflake <i>Leucojum aestivum</i>
Camassia, Eastern <i>Camassia scilloides</i>	Gladiolus <i>Gladiolus x hortulanus</i>	Narcissus Narcissus spp. and hybrids	Tiger Flower <i>Tigridia pavonia</i>
Canna <i>Canna x generalis</i>	Glory-of-the-Snow <i>Chionodoxa luciliae</i>	Netted Iris <i>Iris reticulata</i>	Trout Lily <i>Erythronium americanum</i>
Checkered Lily <i>Fritillaria meleagris</i>	Golden Garlic <i>Allium moly</i>	Nodding Star-of-Bethlehem <i>Ornithogalum nutans</i>	Tuberger Squill <i>Scilla tubergeniana</i>
Chinese Chive <i>Allium tuberosum</i>	Grape Hyacinth <i>Muscari botryoides</i>	Peacock Orchid <i>Acidanthera bicolor</i>	Tuberose <i>Polianthes tuberosa</i>
Crocus Crocus spp. and hybrids	Grecian Windflower <i>Anemone blanda</i>	Persian Fritillary <i>Fritillaria persica</i>	Tuberous Begonia <i>Begonia x tuberhybrida</i>
Crown Imperial <i>Fritillaria imperialis</i>	Guinea-hen Flower <i>Fritillaria meleagris</i>	Persian Onion <i>Allium christophii</i>	Tulip Tulipa spp. and hybrids
Daffodil Narcissus spp. and hybrids	Hardy Amaryllis <i>Lycoris squamigera</i>	Peruvian Daffodil <i>Hymenocallis narcissiflora</i>	Turkestan Onion <i>Allium karataviense</i>
Dahlia <i>Dahlia hybrids</i>	Hardy Begonia <i>Begonia grandis</i>	Poppy-flowered Anemone <i>Anemone coronaria</i>	Wild Hyacinth <i>Camassia scilloides</i>
Danford Iris <i>Iris danfordiae</i>	Hyacinth <i>Hyacinthus orientalis</i>	Resurrection Lily <i>Lycoris squamigera</i>	Winter Aconite <i>Eranthis hyemalis</i>
Dogtooth Violet <i>Erythronium dens-canis</i>	Jonquil Narcissus spp. and hybrids	Siberian Squill <i>Scilla siberica</i>	Wood Hyacinth <i>Hyacinthoides hispanicus</i>
Dutch Hyacinth <i>Hyacinthus orientalis</i>	Lebanon Squill <i>Puschkinia scilloides</i>	Snowdrop <i>Galanthus nivalis</i>	Wood Sorrel Oxalis spp.
Dutch Iris <i>Iris hybrids</i>	Lily Lilium spp. and hybrids	Spanish Bluebell <i>Hyacinthoides hispanicus</i>	Yellow Adder's Tongue <i>Erythronium americanum</i>
Elephant Ear <i>Colocasia esculenta</i>	Lily Leek <i>Allium moly</i>	Spider Lily <i>Hymenocallis narcissiflora</i>	
Fancy-leaved Caladium <i>Caladium x hortulanum</i>	Lily-of-the-Field <i>Sternbergia lutea</i>	Spring Starflower <i>Iphieion uniflorum</i>	

*spp = Multiple species

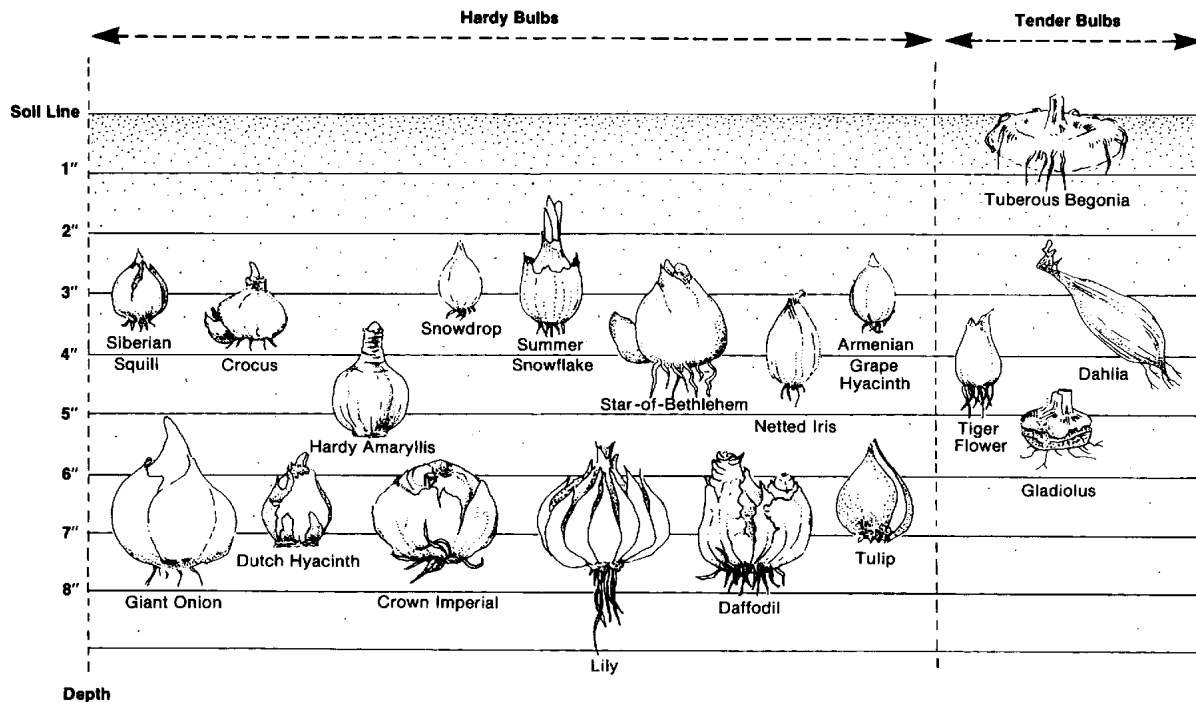


Figure 1. Planting Depth Chart for Some Commonly Planted Bulbs.

Table 1. Bulbs Suitable for Indiana Gardens.

Bulb	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Acidantha bicolor</i> (Peacock Orchid)	T	creamy with chocolate blotch	summer	24-42 (60-1m)	3-4 (8-10)	12-18 (30-45)	Full sun or light shade; rich, well-drained soil. Store corms dry at 60- 70°F.	Very fragrant; two week bloom period; successive plantings will extend season.
<i>Agapanthus orientalis</i> (Lily-of-the-Nile)	T	blue, white	summer	24-36 (60-90)	barely covered	24 (60)	Full sun to light shade. Best planted in large pots or boxes; water frequently. Move boxes indoors for winter, and grow quite dry at 40-50°F.	Ideal for patio plantings. Use as interior plant in winter.
<i>Allium christophii</i> (Stars-of-Persia,	H	silvery- violet	early summer	15-24 (40-60)	4 (10)	12-18 (30-45)	Full sun; average soil with good drainage.	Often bears 10-inch diameter flower heads. Also sold as <i>A. albopilosum</i> .
<i>Allium giganteum</i> (Giant Onion)	H	pink-purple	early summer	36-48 (90-1.2m)	6 (15)	12-18 (30-45)	Full sun; well-drained soil. Give space to grow.	4-inch diameter flower heads are showy.
<i>Allium karataviense</i> (Turkestan Onion)	H	lilac-pink	late spring	8-10 (20-25)	4 (10)	12-18 (30-45)	Full sun; well-drained soil.	Large flower heads on short stature plant make this an interesting pot or border plant.
<i>Allium moly</i> (Golden Garlic, Lily Leek)	H	bright yellow	late spring	10-14 (25-35)	3 (8)	6-18 (15-45)	Full sun to partial shade; most soils tolerated. Vig- orous, spreading habit requires restraint; replant when flowering declines.	Bears bright yellow, star- like 2- to 3-inch flower heads.
<i>Allium tuberosum</i> (Chinese Chive, Garlic Chive)	H	white	late summer	20 (50)	3 (8)	6-18 (15-45)	Full sun or light shade; most soils tolerated. Will self-sow unless seed heads are removed.	Forms dense clusters of fragrant flowers; attracts butterflies.
<i>Anemone blanda</i> (Grecian Windflower)	H	blue, rose, pink, white	early to mid spring	3-6 (8-15)	2 (5)	4-6 (10-15)	Sun or partial shade; rich, well-drained soil. Soak tubers before planting.	Blossoms remain closed at night and when cloudy; open in sunlight.

Table 1. Continued

Bulb	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Anemone coronaria</i> (Poppy-flowered Anemone)	T	blue, purple, red, pink, white	spring	12-18 (30-45)	2 (5)	8-12 (20-30)	Full sun; water regularly. Best handled as pot crop or set outside in late spring. Store tubers at 55-60°F.	Common commercially grown bouquet flower.
<i>Begonia grandis</i> (Hardy Begonia)	H	flesh-pink	late summer to frost	24-36 (60-90)	1-2 (2-5)	12 (30)	Shade; rich, organic soil. Plants are slow to begin growth in spring.	Propagated by tiny bulbils produced in leaf axils; often becomes effective ground cover; also sold as <i>B. evansiana</i> .
<i>Begonia x tuberhybrida</i> (Tuberous Begonia)	T	yellow, orange, red, pink, white	summer to frost	10-20 (25-50)	barely covered	12-15 (30-40)	Partial shade; highly organic soil. Start tubers indoors during February or March; plant with leaves pointing toward viewer; provide even moisture. Store tubers at 45-50°F.	Pendulous forms excellent in hanging baskets; flower buds drop in extreme heat.
<i>Caladium x hortulanum</i> (Fancy-leaved Caladium)	T	seldom flow- ers in Indi- ana climate; variegated green, white, pink or red foliage	foliage killed by frost	12-18 (30-45)	1 (2)	12-18 (30-45)	Full sun to partial shade; rich soil; avoid windy spots. Can start indoors early; pro- vide even moisture. Store tubers dry at 55-60°F.	Grown for foliage, not flowers; useful in con- tainers.
<i>Camassia scilloides</i> (Eastern Camassia, Wild Hyacinth)	H	light blue, blue-violet, white	late spring	18-24 (45-60)	4 (10)	4 (10)	Full sun or light shade; normal to very moist soil.	Bears many 1-1/4 inch flowers; native in Indiana. American Indian name is quamash.
<i>Canna x generalis</i> (Garden Canna)	T	cream, yel- low, orange, pink, red, bicolors	early summer until frost	18-72 (45-1.8m)	3-6 (8-15)	18 (45)	Full sun; fertile, moist soil. Start growth indoors and transplant. Store roots dry at 50-60°F.	Leaves may be bright green, blue-green, or shiny bronze; tolerates hot weather.

Table 1. Continued

	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Chionodoxa luciliae</i> (Glory-of-the-Snow)	H	blue, pale pink, white	early spring	3-6 (8-15)	2-3 (5-8)	3 (8)	Full sun; well-drained soil. Lift & divide when over-crowded.	For rock gardens, borders, edgings, drifts, and indoor forcing; a good companion to forsythia.
<i>Colchicum autumnale</i> (Autumn Crocus)	H	lavender- pink, rose, white	early or mid fall	4-6 (10-15)	4 (10)	6 (15)	Full sun or partial shade; well-drained soil. Time planting for mid summer or early fall.	Foliage grows in spring, then dies; flowers appear in fall without foliage.
<i>Colocasia esculenta</i> (Elephant Ear)	T	seldom flowers in Indiana cli- mate; huge, uniformly green foliage.	foliage killed by frost	36-72 (90-1.8m)	2-3 (5-8)	36 (1m)	Full sun; average soil. Allow ample space. Store rhizomes dry at 59°F.	Produces large, coarse, tropical looking foliage; suitable for containers.
<i>Crocasmia</i> spp. (Montebretia)	T	red, orange yellow	late summer, early fall	24-36 (60-90)	2-3 (5-8)	6-8 (15-20)	Full sun; rich soil. Store corms dry at 55-60°F, or mulch heavily in ground.	Has small flowers and stiff foliage; similar to gladiolus.
<i>Crocus</i> spp. & hybrids (Crocus)	H	golden yel- low, blue, lavender, purple, white purple striped	early spring; a few species flower in autumn	2-6 (5-15)	2-4 (5-10)	3-5 (8-12)	Full sun to partial shade; moist soils with good drainage.	Excellent for early color. Large-flowered "Dutch Hybrids" bloom later than most spring-flowering types; <i>C. sativus</i> and <i>C.</i> <i>speciosa</i> bloom in fall, but are short-lived. Vary species and microclimates to extend bloom season.
<i>Dahlia</i> hybrids (Garden Dahlia)	T	all but blue or green	mid sum- mer to frost	12-72 (30-1.8m)	2-3 (5-8)	15-30 (40-75)	Full sun; well-drained soil. Store at 40-50°F in dry medium.	Many variations in flower color, type, and size, borne on plants of many dif- fering heights.

Table 1. Continued

Bulb	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Eranthis hyemalis</i> (Winter Aconite)	H	yellow	early spring	3-4 (8-10)	2-3 (5-8)	3-4 (8-10)	Sun or light shade; well-drained soil. Soak tubers before planting if shriveled; plant as soon as available.	Buttercup-like flowers bloom very early; good rock garden plant; locate small stature plants carefully for easy viewing.
<i>Erenurus</i> spp. (Foxtail Lily)	H	cream, orange, yellow, rose peach-pink	late spring to early summer	42-72 (1M-1.8m)	6 (15)	18-36 (45-90)	Full sun; moist, well-drained; soil. Mulch in winter; avoid transplanting.	Impressive against tall evergreens or at the back of a perennial border.
<i>Erythronium americanum</i> (Yellow Adder's Tongue, Trout Lily)	H	yellow	early spring	6-9 (15-23)	3 (8)	6 (15)	Shade or partial shade; moist, well-drained soil rich in organic matter.	Dainty plant with delicately scented flowers; looks most natural in clumps, wild gardens, rock gardens, or woody sites; mottled foliage.
<i>Erythronium dens-canis</i> (Dogtooth Violet)	H	rose-purple, violet, white	spring	6-12 (15-30)	3 (8)	6 (15)	Shade or partial shade; well-drained soil rich in organic matter.	Plant in wild gardens, rock gardens, or wooded sites; mottled foliage.
<i>Fritillaria imperialis</i> (Crown Imperial)	H	red, yellow, orange	spring	24-36 (60-90)	6 (15)	12-18 (30-45)	Sun or light shade; deep, rich, moist soil. Plant as soon as available; use winter mulch; avoid disturbing once established.	Very showy old-fashioned plant, but odor may be offensive.
<i>Fritillaria meleagris</i> (Checkered Lily, Guinea-hen Flower)	H	checkered- purple, white	spring	8-12 (20-30)	2-4 (5-10)	4 (10)	Sun or light shade; moist soil. Plant in early fall. Do not disturb; use winter mulch.	Fragile appearance; makes an interesting rock garden plant.
<i>Fritillaria persica</i> (Persian Fritillary)	H	maroon- purple	spring	10-30 (25-75)	3-4 (8-10)	3-4 (8-10)	Full sun; well-drained soil. Plant bulbs as soon as available.	Flowers have a slight skunk odor.

Table 1. Continued

	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Galanthus elwesii</i> (Giant Snowdrop)	H	white	early spring	6-9 (15-23)	2-4 (5-10)	3-4 (8-10)	Full sun or light shade; well-drained soil. Plant in early fall as soon as available. Do not disturb.	Good for borders and rock gardens.
<i>Galanthus nivalis</i> (Common Snowdrop)	H	white	early spring	4-6 (10-15)	2-3 (5-8)	3-4 (8-10)	Partial shade; wide tolerance for soils. Plant as soon as available. Lift and divide only if flowering diminishes.	One of the earliest spring bulbs for rock gardens, borders, naturalizing; easy to grow; increases rapidly.
<i>Galtonia candicans</i> (Summer Hyacinth)	T	greenish- white	mid summer	36-48 (90-1.2m)	6 (15)	15 (40)	Full sun; well-drained soil. Store dry at 40-50°F, or mulch heavily in place.	Best planted in groups to rear of planting; useful as a cut flower.
<i>Gladiolus x hortulanus</i> (Garden Gladiolus)	T	all colors	mid to late summer	12-60 (30-1.5m)	4-6 (10-15)	6-8 (15-20)	Full sun; rich soil. Plant at deeper planting depth only with large corms. Store dry at 40-50°F.	Wide array of colors and sizes available; excellent cut flowers.
<i>Hyacinthoides hispanicus</i> (Spanish bluebell, Wood Hyacinth)	H	blue, pink, rose, white	mid to late spring	10-16 (25-40)	2-4 (5-10)	6-8 (15-20)	Light shade; well-drained soil.	Effective in rock gardens, massed under trees, or with spring blooming shrubs; also sold as <i>Scilla campanulata</i> .
<i>Hyacinthus orientalis</i> (Dutch Hyacinth, Common Hyacinth)	H	blue, pink, red, yellow, salmon, purple, white	spring	6-15 (15-40)	4-8 (10-20)	6-8 (15-20)	Full sun; deep, fertile, well-drained, sandy loam soil.	Blooms with daffodils; excellent for solid beds, colorful clumps in mixed borders, or indoor forcing; mix colors sparingly.
<i>Hymenocallis narcissiflora</i> (Peruvian Daffodil, Spider Lily)	T	white	mid summer	24 (60)	3-5 (8-12)	12-15 (30-40)	Full sun or light shade; well-drained soil. Store at at 70°F.	Produces large, fragrant flowers; also sold as <i>Ismene calathina</i> .
<i>Iphæion uniflorum</i> (Spring Starflower)	H	bluish-white	spring	6-8 (15-20)	2-3 (5-8)	6 (15)	Full sun; well-drained soil. Requires winter mulch protection.	Good as edging, in the rock garden, or in drifts between shrubs; blooms for almost a month; also sold as <i>Triteleia uniflora</i> .

Table 1. Continued

	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Iris danfordiae</i> (Danford Iris)	H	lemon- yellow	very early spring	4-6 (10-15)	2-3 (5-8)	3 (8)	Full sun; gritty, fertile well-drained soil.	Discard old bulbs and plant new ones when flowering decreases in 3-4 years.
<i>Iris</i> hybrids (Dutch Iris)	T	blue, purple yellow	late spring	4-9 (10-23)	3-4 (8-10)	3 (8)	Full sun; light, sandy soil. Mulch heavily in garden, or store dry at 40-45°F.	Many cultivars available. available. Blooms with bearded irises.
<i>Iris reticulata</i> (Netted Iris)	H	blue, violet- purple, with yellow or white markings	very early spring	6-9 (15-23)	2-3 (5-8)	3 (8)	Full sun; well-drained soil. Lift and re-set every 3 or 4 years.	Combines well with snowdrops, crocuses, and winter aconites; has violet scent.
<i>Leucocjum aestivum</i> (Summer Snowflake)	H	white with green spots	late spring	12-18 (30-45)	2-3 (5-8)	3-4 (8-10)	Light shade or full sun; rich to average soil. When trans- planting, replant promptly.	Bulbs multiply rapidly but can be left undisturbed; a reliable performer in a shady location.
<i>Lilium</i> spp. & hybrids (Lily)	H	yellow, orange, red, white, pink,	late spring to early fall	24-96 (60-2.4m)	4-8 (10-15) (1/2 for <i>L. candidum</i>)	9-18 (25-45)	Full sun or light shade; well-drained, humusy soil. Plant in fall or early spring.	An excellent accent for any garden, with many colors, heights, and bloom times.
<i>Lycoris squamigera</i> (Hardy Amaryllis, Magic Lily, Resurrection Lily)	H	lavender- pink	late summer	12-18 (30-45)	4-5 (10-12)	6-8 (15-20)	Sun or light shade; well- drained soil.	Foliage dies in early summer; flowers appear in August on leafless flower stalks.
<i>Muscari armeniacum</i> (Armenian Grape Hyacinth)	H	blue	early spring	6-8 (15-20)	2-3 (5-8)	2-3 (5-8)	Full sun to partial shade; well-drained soil. Foliage emerges in fall, so plant in early fall.	Multiples rapidly; excel- lent for edging or indoor forcing; fragrant.
<i>Muscari botryoides</i> (Grape Hyacinth)	H	blue, white	early spring	6-8 (15-20)	2-3 (5-8)	2-3 (5-8)	Sun or partial shade; well- drained soil. Leaves appear in fall.	Produces clusters of tiny flowers. Double flowers hold color longer.

Table 1. Continued

	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Narcissus</i> spp. & hybrids (Daffodil, Jonquil, Narcissus)	H	yellow, white, pink; cups yellow, white, pink, orange, or nearly red	early to mid spring	3-14 (8-35)	4-6 (10-15)	3-8 (8-20)	Full sun or light shade; well-drained soil. Lift and divide when flowering diminishes.	Use in borders, shrub beds, or naturalized; good for cut flowers; reliable; clumps increase in size each year.
<i>Ornithogalum nutans</i> (Nodding Star-of- Bethlehem)	H	silvery-white, outside of petals gray- green.	spring	9-12 (23-30)	2-3 (5-8)	3-4 (8-10)	Light shade or full sun; well-drained soil; mulch for winter protection.	May naturalize in protected locations.
<i>Ornithogalum umbellatum</i> (Star-of-Bethlehem)	H	white, outside of petals green striped	spring	10-12 (25-30)	2-3 (5-8)	3-4 (8-10)	Partial shade or full sun; wide soil tolerance.	Naturalizes easily in meadows; spreading seed- lings often become weeds.
<i>Oxalis</i> spp. (Wood Sorrel)	T	yellow, pink, red, lilac, white	late spring to mid summer	4-8 (10-20)	2-3 (5-8)	4 (10)	Full sun or light shade; rich, well-drained soil. May be started early indoors. Store bulbs dry at 60°F.	Attractive rock garden, greenhouse, or indoor plant; quick to bloom; clover-like leaves are decorative.
<i>Polianthes tuberosa</i> (Tuberose)	T	white	late summer, fall	15-30 (40-75)	2-3 (5-8)	6-8 (15-20)	Full sun. Start indoors or after frost outdoors. Store dry at 60°F.	Very fragrant; requires long growing season; make successive plantings to extend bloom period.
<i>Puschkinia scilloides</i> (Lebanon Squill)	H	blue stripes on white background, white	early spring	6 (15)	2-3 (5-8)	2-3 (5-8)	Full sun or partial shade; well-drained soil. Do not disturb unless flowering diminishes.	Unusual color; multiplies readily; useful for rock gardens, naturalizing, and for pot culture; also sold as <i>P. libanotica</i> .
<i>Scilla siberica</i> (Siberian Squill)	H	blue, white	early spring	4-6 (10-15)	2-3 (5-8)	2-3 (5-8)	Full sun or partial shade; well-drained soil. Plant in early fall.	Blue color combines well with yellow daffodils; use in rock gardens or naturalized.

Table 1. Continued

Bulb	Tender ¹ or Hardy	Flower Color	Bloom Period	Height in. (cm.)	Planting ² Depth in. (cm.)	Distance Apart in. (cm.)	Light, Soil, Cultural Requirements, Storage Conditions	Comments
<i>Scilla tubergeniana</i> (Tubergen Squill)	H	silvery- white	early spring	4-6 (10-15)	2-3 (5-8)	2-3 (5-8)	Full sun or partial shade; well-drained soil. Plant in early fall.	Abundant flowers; blooms with early crocuses.
<i>Stembergia lutea</i> (Lily-of-the-Field)	H	yellow	early fall	6-12 (15-30)	4 (10)	6-8 (15-20)	Full sun; well-drained soil. Mulch heavily for winter protection.	Foliage appears after flowers in fall and persists until spring.
<i>Tigridia pavonia</i> (Tiger Flower, Mexican Shell Flower)	T	yellow, orange, red, white	summer	18-30 (45-75)	3-4 (8-10)	4-8 (10-20)	Full sun; light, well- drained soil. Plant in late spring. Store dry at 50°F, or mulch heavily in garden.	Each bloom lasts only one day, but stalks bear several flowers; make successive plantings to extend bloom period.
<i>Tulipa</i> spp. & hybrids (Tulip)	H	all colors except true blue	spring	3-30 (8-75)	4-10 (10-25)	4-8 (10-20)	Full sun; well-drained soil.	Great variety of colors, shapes and blooming times for all uses; may use annuals to cover ground above bulbs in summer.
<i>Zantedeschia aethiopica</i> (Calla Lily, Arum Lily)	T	white	spring, early summer	24-36 (60-90)	3-4 (8-10)	12-24 (30-60)	Full sun or partial shade; rich, moist soil. Water and fertilize regularly. Start indoors to achieve bloom. Store dry in or out of pot at 40-50°F.	Often best handled as pot plant since bulbs stored out of the soil can dry out.

¹For definitions of hardy and tender bulbs, see text.

²Depth indicated is to shoulder (top) of bulb.

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