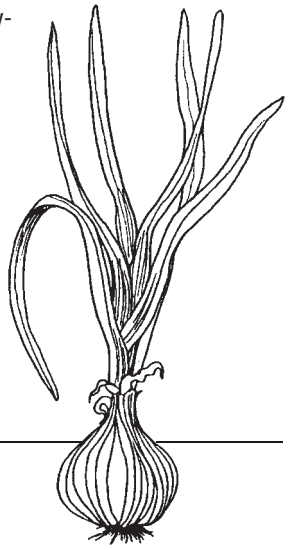
Culture and Varieties for the Home Gardener

Growing Bulb Crops
(Onions, Leeks, and Garlic)

Suggested Varieties and Desirable Characteristics

Variety	Days to Maturity	Disease Resistance	Suggested Uses	Comments
Garlic				
Elephant (jumbo type)	270	—	G	Truly a leek, mild and subtle flavor, up to four times larger than real garlic, cold sensitive, mulch heavily for overwinter protection
Softneck types				
Not suggested for planting in Pennsylvania				
Stiffneck types				
Rocambole	270	—	C, G	Early flower stalks twist like a tuba, then straighten up, purple-pink outer skin, easiest to peel, mild, has the plumpest cloves, up to eight, only fair storage
German Extra Hardy	270	—	C, G	About six to seven large red-skinned cloves, but has white outer bulb skin, very good flavor and stores well
Leeks				
Rikor	75	—	G	Mainly for summer, only as baby bunching “scallions”
Jolant*	90	—	G	For late summer harvest, no bulbing at base
Lancelot*	90	—	G	For late fall harvest, virus tolerance
Dawn Giant	98	—	G	Stems 15" x 2", harvest summer to fall
Tadorna	108	ALS, LS	G	8"-long stalks, for fall harvest
Leefall	130	—	G	Stalks very thick and short, best for storage or overwintering
Onions—Sets				
Ebenezer	90	—	C, G	Standard yellow, pungent, good for storage
Southport Red Globe	95	—	C, G	Dark red skin, pungent, stores well
Stuttgart type	105	—	G	Best variety from sets, excellent for storage
Onions—From Transplants				
Super Star*	80	—	G	Day-neutral, white, AAS, see “direct-seeded”
Candy*	85	—	G	Day-neutral, yellow, see “direct-seeded”
Sweet Spanish types	100	—	G	Relatively mild, large bulbs, fair for storage
Walla Walla	100	—	G	Large, truly sweet, poor storage
Onions—Direct-seeded				
Super Star*	100	PRR	G	White skin and flesh, sweet to moderately pungent, not for storage, day-neutral, AAS
Prince*	105	F	G	Long storage, high yields, hard, pungent
Copra*	107	F, PRR	G	Uniform round, high yields, pungent, good for storage
Candy*	110	—	G	Sweet to moderately pungent, short storage, day-neutral, yellow
Ailsa Craig	110	—	G	Very large, moderately sweet
Sweet Sandwich	110	—	G	Gets sweeter the longer it’s held in storage
Mars*	110	—	G	Bright red throughout, large bulbs, high yields, stores well, moderately pungent
Giant Red Hamburger	112	—	G	Semiflat, 4" bulbs, short storage
Sweet Spanish types	125	—	G	Fairly mild, large bulbs, fair storage

table continued



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Suggested Varieties and Desirable Characteristics, continued

Variety	Days to Maturity	Disease Resistance	Suggested Uses	Comments
Onions—Bunching				
Deep Purple	60	—	G	Deep red stems, sow spring and summer
Long White Bunching	60	F, PRR	G	Mild, for scallions, can be overwintered, thrips tolerant
White Sweet Spanish	60	—	G	Mild, sow close for scallions
Feast	68	ALS, DM	G	Long white stalks, heat tolerant
Shallots—From Sets				
Golden Shallot	95	—	G	Yellow skin, white flesh, fairly pungent
Holland Red	95	—	G	Copper-red skin, reddish purple flesh, mild
Shallots—From Seeds				
Ambition*	100	—	G	Copper skin, teardrop shaped, white flesh
Bonilla*	100	—	G	Golden amber skin, creamy yellow flesh
Prisma*	100	—	G	Red skin, globe shaped, purplish flesh

CODES

Variety: ***** = F1 hybrid

Disease Resistance: **ALS** = Alternaria Leaf Spot resistant/tolerant; **DM** = Downy Mildew resistant/tolerant; **F** = Fusarium Wilt resistant/tolerant; **LS** = Leaf Spot resistant/tolerant; **PRR** = Pink Root Rot resistant/tolerant

Suggested use: **C** = Canning; **G** = Use fresh from the garden

Comments: **AAS** = All-American Selection

Cultural Practices

Soil pH and Fertility

For all bulb crops, maintain soil pH between 6.2 and 6.8. Fertilizer and lime applications should be based on soil test results. (Kits may be purchased from county extension offices.)

Before applying chemical fertilizer, incorporate a 1- to 2-inch layer of compost into the soil. For onions, shallots, and leeks, in the absence of a soil test, apply to each 100 square feet either 4½ pounds of 5-10-10 fertilizer (where potash is thought to be low) or 4½ pounds of 5-10-5 (or equivalent) (where potash levels are expected to be fairly high; e.g., areas where wood ashes, manures, or high rates of complete fertilizers have been applied previously). For garlic, use 3½ pounds per 100 square feet of the above fertilizers. Broadcast all fertilizers, and work them into the soil before planting.

Fall-planted garlic should be side-dressed in March. Onions and leeks should be side-dressed about six weeks after planting. For garlic and pungent onions (or those for long-term storage), band 1/4 lb (4 oz) of ammonium sulfate per 100 linear feet of row. Place the fertilizer about 3 inches to either side of the plants and lightly work into the soil. For leeks and mild salad onions, use 1 lb of 5-10-10 (or equivalent that contains no sulfur) per 200 linear feet of row, again banding to the sides of the plants and working into the soil. To maintain the mild flavor of leeks and mild (short storage) onions, be sure that the fertilizer contains no sulfur! For best bulb development of shallots, a light soil high in potassium and phosphorous, but not too rich in nitrogen, is recommended.

Selecting Variety

GARLIC

Secure a strain of garlic from a local garlic grower, gardener, seed house, or garden center operator who has had success with fall-planted garlic. Farmers' markets are also a good source of locally grown garlic—start looking in mid- to late August. Unlike most strains now sold commercially, such a strain will be acclimated to Pennsylvania and will produce and overwinter very well. Never purchase garlic at a grocery store for planting, as the cloves may have been treated to reduce sprouting. Plant garlic in the fall for greatest clove size and yields.

There are two types of garlic—softneck and stiffneck. Softneck types are used for braiding and are commonly found in stores but do not do well in Pennsylvania. Stiffneck types send up a hard flowering stem and are more cold hardy than softnecks. Elephant garlic is not true garlic but instead is best described as a bulbing leek. It is the least cold hardy of the garlics and is cultivated in the same manner as stiffneck garlic. Elephant garlic has a milder flavor than true garlic.

ONIONS

Day neutral hybrids, such as Super Star* and Candy,* do extremely well in Pennsylvania, either direct-seeded or from transplants.

Sweet Spanish and Bermuda types are mild-flavored, large bulbs (diameter 3 to 5 inches) that generally do not keep as long as other onion types. They are usually started from young transplants.

Red onions have a deep red to purplish red skin, which makes them highly attractive in salads or wherever raw onion rings are used. Most varieties adapted to Pennsylvania conditions are fairly pungent and generally keep better than the Sweet Spanish types, but not as well as the yellow storage types.

Regular yellow onion varieties, when well cured with no defects, store well. Generally, the stronger the flavor of the onion, the longer it keeps.

SHALLOTS

The Welsh type of shallot is milder and more leek-flavored, has a light brown to tan skin, and keeps very well. The French-Italian type has a brownish red skin, a stronger flavor, and an aroma that resembles garlic. Traditionally planted as sets only, many new shallot hybrids are even better when direct-seeded in spring.

Sets, Transplants, or Direct-Seeding

Older, nonhybrid, long-storage onions are still started by sets in spring. For overwintering, plant shallot sets in late fall. In all but the warmest regions of Pennsylvania, leeks and certain onion types such as the very large Sweet Spanish types should usually be grown from transplants rather than seeds. Direct field seeding is very effective with Super Star* and Candy* and is sometimes possible for other types in the longest growing-season regions of southeast Pennsylvania. Transplants can be obtained from the South or by starting them indoors or in a hotbed 10 to 12 weeks before planting.

Leeks. Since leek seedlings grow very slowly they need to be sown 14 to 16 weeks before being planted outdoors. Transplant when the plants are 8 inches tall and about pencil thickness. Cut off half of the green leafy portion and be careful not to bend the roots (trim them if you must).

Onions: Generally, plant sets for the best cooking and long-storage types. Seed should be sparsely sown indoors or in a hot bed 10 to 12 weeks before planting outdoors, with the young plants not being set out until all danger of severe frost has passed.

Shallots: French types can be planted as sets in the spring or fall. Other types should be planted as sets only in the fall. Seeds are normally started indoors and transplanted outdoors in the spring in order to produce sets for later planting. Start seeds 10 to 12 weeks before the last expected hard frost date; transplant seedlings outdoors after all danger of hard frost.

Planting Dates

Onions and shallots should be transplanted, direct-seeded, or "set" about April 1 to 15 in central Pennsylvania. (Plant spring crops about three weeks earlier in the warmest regions of the state and about 10 days later in the coldest regions.) Hardy bunching onions can be seeded in the fall. Leeks should be seeded April 1 to 15 for late June to early July field transplanting. Garlic cloves should be set by October 15 (10 days earlier in colder, short-season areas and up to three weeks later in warm, long-season areas).

Depth of Seeding

Sow onion and leek seeds 1/2 inch deep; plant garlic cloves and onion sets about 1 to 2 inches deep. It is important that onion sets and garlic cloves be planted upright (point of the onion or clove up, flat part where roots form down). Set leek transplants in a trench about 6 inches deep and gradually fill the trench as the plants grow. Plant shallot seeds 1 inch deep. Plant shallot sets upright and at half their depth, making sure the tops remain uncovered.

Spacing

Between rows:

- Garlic—1 foot for stiffneck types, $1\frac{1}{2}$ feet for elephant garlic.
- Leeks—$1\frac{1}{2}$ to 2 feet.
- Onions—Transplants and direct-seeded, $1\frac{1}{2}$ to 2 feet; bunching and sets, 1 to 2 feet.
- Shallots—Sets, 9 inches.

Within rows:

- Garlic—6 inches.
- Leeks—5 to 6 inches.
- Onions—Set transplants 3 to 4 inches apart; thin direct-seeded plants to 3 to 4 inches. Bunching types are thinned as pulled. Sets are planted $1\frac{1}{2}$ to 2 inches apart and every other plant is pulled for early harvest.
- Shallots—4 to 6 inches.

Special Precautions

Garlic

Dormant cloves, divisions of the large bulb, or young garlic plants must be exposed to temperatures of 40ºF for 40 days to induce bulb formation. Planting cloves in the fall ensures proper cold exposure. Garlic yields tend to increase as the size of the mother clove increases. Therefore, the smallest cloves (those less than 1 gram in weight) should be used in cooking rather than planting. Make sure they are not planted so deep that the soil hampers their expansion or so shallow that birds pull them out or frost heaves them out of the soil. Mulching in early December with straw or other organic material protects the cloves from frost heaving and provides weed control the following spring.

Stiffneck garlic strains produce stems (scapes) that form heads with bulbils in late May or early June. Remove these scapes as soon as you first notice them to produce larger bulbs. The "rocambole" type of stiffneck garlic has scapes that are distinctly twisted or coiled, sometimes even double-coiled. This coiling is perfectly normal and is not the result of any poor cultural practice or herbicide contamination. If scapes are not removed, they tend to straighten by the time of harvest and can be 5 to 6 feet tall. Scapes should also be removed from both stiffneck and elephant garlic to improve clove size.

Leeks

As leeks begin to reach harvestable size, hill 3 to 4 inches of soil or organic mulch around the stems for maximum blanching. Hardy strains such as Leefall will overwinter well if covered with marsh hay or straw mulch or with nearly continuous snow cover. A general rule is that leeks with short, thick stalks and bluish leaves overwinter well, but that leeks with tall, thinner stalks and green leaves cannot survive our worst winters unless grown in high tunnels or cold frames.

Onions

Medium-sized onion sets, 1/2 to 3/4 inch in diameter, are best for producing mature onions. If large sets (over 3/4 inch) are planted, many will send up seed stalks. Pinch off seed stalks as soon as they develop or else thick, double-neck onions will likely be produced. Thick, double-neck onions should be used as immature green onions since they do not keep well and are undesirable for storage. Double, thick-necked bulbs are slow to cure and frequently succumb to neck rot.

Shallots

After five or six shoots have developed, mulch with straw, peat moss, leaves, or dry compost. Mulching too heavily encourages onion maggots and root rot, but using no mulch necessitates frequent watering and cultivation.

Harvest and Storing Suggestions

Garlic

Fall-planted garlic in central Pennsylvania is ready to harvest about the second week in July. When the leaves start to brown, pull a sample. There are only about 10 to 14 days for optimum garlic harvest. Before then the garlic is unsegmented like an onion: after that period, the cloves will have grown and expanded to the point that the outer sheath will be split, exposing part of the naked clove. Bulbs with split sheaths are difficult to harvest and have a shorter storage life. Picked at the proper time, each bulb should be fully segmented and yet fully covered by a tight outer skin. Pull the garlic and allow it to dry in a well-ventilated, shaded area at 70–80ºF; hotter areas and/or direct sun can caramelize garlic. After drying, remove the outer loose portions of the sheath and trim the roots and tops 1 inch from the bulb.

Leeks

Harvest leeks when they reach an edible size. Those transplanted in early July are ready for harvest by October. If overwintered, harvest in early spring before seed stalk formation (bolting) occurs.

Onions

When about half or more of the onion tops have fallen and started to turn brown, bend all of the tops over. When the tops are completely brown, pull the bulbs and spread them to dry in a well-ventilated, shaded area. Either braid (bunch) the tops or trim to about 1 inch from the bulb and store in a slatted container. Breakdown in storage may result if the tops are cut too close to the bulb. Close cutting allows decay organisms to have easy access to the bulb. Neck rot fungus only attacks onions that have been injured, wounded, or not properly cured.

Onions can also be stored in a mesh bag or by tying them into panty hose. Place one onion in the panty hose and knot it, then place the next one in and knot; do this until filled. To use throughout the winter, cut the desired number of onions from the chain.

Shallots

Like onions, shallots are mature when their tops have fallen over. Maturity can be accelerated by bending all the tops over as soon as the first few bend. Before storing, cut the necks to within 2 inches of the bulb and thoroughly dry. Store shallots in a cool location with good air circulation.

Weed Control

Dense weeds in the garden not only rob vegetable crops of moisture, light, and nutrients but can also harbor insects and create an ideal environment for the development of many diseases. Eliminate young weed seedlings with shallow hoeing or cultivating. Never allow weeds to become too big. Always pull or mow weeds around your garden area before they form seeds. Place mulch such as straw around plants and between rows to reduce weeds and conserve moisture. Perennial weeds near and in gardens provide a location for diseases (viruses and mycoplasmas) to overwinter and should be eliminated whenever possible.

To help keep weeds and weed seeds out of the garden during the fall and winter months, sow a cover crop in late summer or fall (e.g., annual ryegrass or spring oats mixed with hairy vetch). Turn the cover crop under about one month before planting in the spring.

As a general rule, avoid using herbicides for weed control in the home garden because there are several potential problems. First, no one herbicide is available that can be safely used on all kinds of vegetables growing in the garden. Second, herbicides are difficult to apply at proper rates in small areas with hand sprayers. Some areas usually receive too little herbicide for effective weed control and other areas may receive such heavy rates that the crop is damaged or killed. Finally, you risk damaging or killing your plants from spray drift.

All members of the *Allium* (onion) family discussed in this publication do not compete well with weeds. *Alliums* do not have large amounts of leaf area to capture sunlight and are shallow-rooted. Large weeds drastically reduce yields in these crops. Therefore, it is very important to keep your crops weed free. To reduce the amount of time needed to cultivate and pull weeds throughout the season, use some type of organic mulch or very reflective poly mulch that cools soils. The mulch will conserve moisture, reduce or eliminate weed growth, and help keep the soil cooler.

Diseases and Insects

Pest control programs for home garden vegetables can use both cultural and chemical control measures. Nonchemical methods should be used to prevent plant injury. Resistant varieties, proper cultural practices, and sanitation are important in an effective pest control program.

Diseases or insects may cause a serious reduction in the vigor, quality, and productivity of plants. The success or failure of a fungicide or an insecticide is related to correct identification of the pest problem, the method of application, weather conditions, correct timing, dosage of pesticides, and selection of the correct pesticide.

Always follow the directions on the container package when mixing and applying pesticides. Never increase the amount of pesticide or decrease the amount of water you mix with the pesticide.

Insect Identification and Control

Onion Thrips

Onion thrips occur in all areas. Adults are small (1/25 inch long), slender, and light yellow to brown in color. They overwinter on plants or debris in fields, fence rows, and weedy areas. Thrips puncture the outer layer of the leaves with their rasplike mouthparts and feed on sap and bits of leaf tissue. They produce several generations each summer. Hot, dry weather is favorable for increased insect activity and plant injury. Small whitish blotches on the leaves are characteristic symptoms of thrips injury. Thrips are hard to control since they feed between the leaves.

Control: Maintain plant vigor. Limited control can be achieved by hosing down the plants (early in the day) on a regular basis when injury is first noticed. Some control will also result from using insecticidal soap (more effective on larvae than adults) The most effective control measure is to use an insecticide labeled for thrips control in vegetables, being careful to observe the days-to-harvest interval. Insecticide resistance has been a problem with onion thrips. Since the insects feed between leaves near the base of the plant, they are hard to reach with insecticides. Insecticides should be applied with sufficient water to ensure thorough coverage.

Red onions tend to be more susceptible to thrips than white onions, with yellow onions intermediate. Resistance to thrips infestation occurs in some varieties of Sweet Spanish onions. All varieties can tolerate populations of 25 thrips per plant. In well-managed, irrigated onion crops, plants can tolerate high populations of thrips without reducing yields. Bulb size can be reduced if populations greater than 50 thrips per plant are allowed to develop and persist. In onions, waiting until you see crop damage is not recommended. Sprays need to be based on high populations but before feeding damage is readily apparent. Early crops can sometimes be harvested before damaging populations develop.

Onion Maggots

Onion maggot problems vary from year to year. Maggots are more of a problem during and after a series of wet springs. They rarely attack any crop except onions (other related species attack other crops). As maggots infest young onions, the plants wilt and often die. Larger onions may survive an attack but the injured bulbs often rot in the field or in storage.

The adult is a long-legged fly a little smaller than a house fly. The maggots are whitish in color and 1/3 inch long when fully grown. Onion maggots overwinter in a resting stage known as pupae. Adult flies emerge in early spring and begin to lay their eggs in the soil near onions. Eggs hatch in three to four days and the maggots immediately bore into the plants. They feed and grow for about three weeks before changing to pupae. Adult flies emerge about two weeks later. There are three to four generations each year depending on the weather. The first brood is always more injurious to plants.

Control: Do not plant onion bulbs in the same location as the previous year. Remove and destroy infested plants. Plants can be protected from the first generation of adults by using a floating row cover held at least 6 inches from the plant stems.

Disease Identification and Control

Leaf Spots and Blights

Symptoms: Spots appear on leaves and the leaves die prematurely.

Control: Grow bulb crops in a sunny, well-drained area. Allow at least two years without onion-related crops within the rotation. If needed for onions, spray with fungicides as directed on labels; fungicide materials should contain chlorothalonil, mancozeb, or a fixed copper. To be effective, fungicide applications should be started before disease is well established. Leaf spots and blights can be a problem where heavy dew or rainfall occurs frequently during the growing season. When possible, grow a variety that has resistance to the disease of concern.

Root Rots, Wilts, and Bulb Rots

Symptoms: Rots can develop on the roots and the base of bulbs. When rots are severe, plants can wilt in the garden, and many bulbs may rot during storage.

Control: Grow bulb crops in a sunny, well-drained area. Where root rots and wilts have been a problem, allow at least
four years between onion-related crops. For storage onions, plant early enough to permit bulb maturation and drying before long, cold, wet periods in the fall. When necessary, dry onions inside before storage. When possible, grow a variety that has resistance to the disease of concern.

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Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

This publication is available from the Publications Distribution Center, The Pennsylvania State University, 112 Agricultural Administration Building, University Park, PA 16802. For information telephone 814-865-6713.

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Produced by Information and Communication Technologies in the College of Agricultural Sciences

CAT UJ228 Rv5M4/04ps3967