CULTURE AND VARIETIES FOR THE HOME GARDENER

Growing Bulb Crops
(Onions, Leeks, and Garlic)

SUGGESTED VARIETIES AND DESIRABLE CHARACTERISTICS

Variety (F1 hybrids)	*Days to maturity*	*Disease resistance*	*Suggested uses*	*Comments*
Onions (sets)				
Yellow Ebenezer	90		G	Standard yellow, pungent, good for storage
Southport Red Globe	95		G	Dark red skin, pungent, stores well
Stuttgart types	105		G	Best variety from sets, excellent for storage
Onions (transplants)				
Bermuda types	95		G	Very mild, more adapted to South, poor storage
Sweet Spanish types	110–115		G	Relatively mild, large bulbs, fair for storage
Walla-Walla	110		G	Yellow Spanish type, large, sweet, poor storage
Red Burgermaster	110		G	Red, mild, large bulbs, poor storage
Onions (direct-seeded)				
Purplette	60		G	Rich burgundy, 1-inch bulbs, for pickling
Barletta (White Pickling)	65		G	For pickling, sow thickly, harvest at ¾" diameter
Candy*	85		G	Sweet to moderately pungent, short storage, yellow, day neutral
Yellow Sweet Spanish*	100	PRR	G	Mild to moderately pungent, fair storage
Super Star*	100	PRR	G	White skin and flesh, sweet to moderately pungent, AAS, not for storage
Copra*	105	F, PRR	G	Hard, moderately pungent, good for storage
Alisa Craig Exhibition	105		G	Very large, sweet to moderately pungent, not for storage
Mars*	110		G	Red, high yields, 4-month storage
Sweet Sandwich	110		G	Gets sweeter the longer it's held in storage
Redwing*115		GRed, very hard, moderately pungent, good for storage		
Daytona*	120	F, PRR	G	Drought tolerant, good for storage
Onions (bunching)				
Deep Purple	60		G	Red-purple stems with good summer color
Long White Bunching	65	F, PRR	G	Mild, standard, look for improved selections
White Sweet Spanish	65		G	Mild; sow close for scallions
Evergreen Hardy White	65		G	Mild, can be overwintered
Feast	68	ALS, DM	G	Long, white stalks, heat tolerant
Leeks				
King Richard	75		G	Long stalks, for summer and fall harvest, also for bunching or "baby" leeks
Tadorna	108	ALS	G	Long stalks, for fall harvest
Laura	115		G	Medium stalks, for late fall and winter harvest, overwinters
Leefall or Leekool	130		G	Stalks very thick and short; best for storage or overwintering
Garlic				
Elephant (jumbo type)	270		G	Milder than regular garlic, up to four times larger, cold sensitive, mulch heavily in fall
Softneck types				Not suggested for planting in Pennsylvania
Hardneck types	270		G	6 to 10 cloves per bulb, cold-hardy, stores moderately well

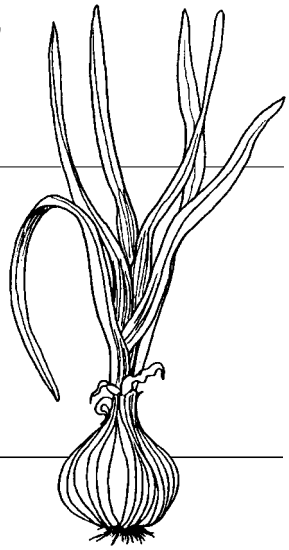
CODES

Variety: ***=** F1 Hybrid

Disease Resistance: **ALS** = Alternaria Leaf Spot, **DM** = Downey Mildew, **F** = Fusarium Wilt, **PRR** = Pink Root Rot

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

Comments: **AAS** = All-America Selection award winner



PENNSTATE

College of
Agricultural Sciences
Cooperative Extension

Cultural Practices

Soil pH and Fertility

Maintain soil pH between 6.2 and 6.8 for all the above crops. Add fertilizer and lime based on soil test results. (Kits can be purchased from Penn State Cooperative Extension county offices.)

Before applying chemical fertilizer, incorporate a 1- to 2-inch layer of compost into the soil. For onions 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; for example, areas where wood ashes, manures, or high rates of complete fertilizers have been applied previously). Use 3½ pounds per 100 square feet of the above fertilizers for garlic. Broadcast all fertilizers and work into the soil before planting.

Fall-planted garlic should be sidedressed in March. Onions and leeks should be sidedressed about 6 weeks after planting. For garlic and pungent onions (or those for long-term storage) band ¼ pound (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 pound of 5-10-10 (or equivalent) 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 these crops, be sure that the fertilizer contains no sulfur!

Selecting Varieties

GARLIC

Secure a strain of garlic from a local 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 therefore it will be productive and overwinter very well. Never purchase garlic at a grocery store for planting because the cloves may have been treated to reduce sprouting. Plant garlic in the fall for greatest yields and clove size.

There are two types of garlic: softneck and hardneck. Softneck types are used for braiding and are commonly found in stores, but do not do well in Pennsylvania. Hardneck types send up a hard-flowering stem and are more cold hardy than softnecks. Elephant garlic is not a 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 hardneck garlic. Elephant garlic has a milder flavor than true garlic.

ONION

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 started from young transplants.

Red onions have a deep red to purplish-red skin that 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 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.

Sets, Transplants, or Direct-Seeding

In all but the warmest regions of Pennsylvania, leeks and certain onion types such as the very large Sweet Spanish types should be grown from transplants rather than seeds. Direct field seeding is sometimes possible for these types in the longest growing-season regions of southeast Pennsylvania. Transplants can be obtained from the South or started indoors or in a hotbed.

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

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

Planting Dates

Onions 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 the colder, short-season areas and up to three weeks later in the warm, long-season areas of the state).

Depth of Seeding

Onion and leek seeds should be sown ½ inch deep. Garlic cloves and onion sets are planted about 1 to 2 inches deep. It is important to plant onion sets and garlic cloves upright (point of the onion or clove up, flat part where roots form down). Leek transplants are set in a trench about 6 inches deep, and the trench is gradually filled as the plants grow.

Spacing

Between rows:

Onions—Transplants and direct-seeded, 1½ to 2 feet; bunching and sets, 1 to 2 feet.

Leeks—1½ to 2 feet

Garlic—1 foot for hardneck types, 1½ feet for elephant garlic.

Within rows:

Onions—Set transplants 3 to 4 inches apart; thin direct-seeded plants to 3 to 4 inches. Bunching types are thinned as pulled. Plant sets 1½ to 2 inches apart and pull every other plant for early harvest.

Leeks—5 to 6 inches

Garlic—6 inches

Special Precautions

Onions

Medium-sized onion sets, ½ to ¾ inch in diameter, are best for producing mature onions. If large sets (over ¾ inch) are planted, many of them 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 will not keep well and are undesirable for storage. Double, thick-necked bulbs are slow to cure and frequently succumb to neck-rot.

Leeks

As they 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 *Laura*, *Leefall*, and *Leekool* will over-winter well with some marsh hay or straw mulch covering or with nearly continuous snow cover. A general rule is that leeks with short, thick stalks and bluish leaves will overwinter well, but leeks with tall, thinner stalks and green leaves cannot survive winter's cold.

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 assures 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. Care should be taken to ensure that they are not planted so deep that the soil will hamper their expansion or so shallow that birds will pull them out or frost will heave them out of the soil. Mulch in early December with straw or other organic material to protect the cloves from frost heaving as well as provide weed control the following spring.

Hardneck garlic strains will produce stems (scapes) that will form heads with bulbils in late May or early June. Remove scapes as soon as first noticed to produce larger bulbs. The "rocambole" type of hardneck 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 harvest time and can be 3 to 4 feet tall. Remove scapes from elephant garlic to improve clove size.

Harvest and Storing Suggestions

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 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 such as 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.

Leeks should be harvested when they reach an edible size. Those transplanted in early July are ready for harvest by October. If over-wintered, harvest in early spring before seed stalk formation (bolting) occurs.

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 garlic and dry in a well-ventilated, shaded area at 70–80ºF. After drying, remove the outer loose portions of the sheath and trim the roots and tops 1 inch from the bulb.

Weed Control

Dense weeds in the garden not only rob vegetable crops of moisture, light, and nutrients but also 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 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 (example: annual ryegrass or spring oats mixed with hairy vetch). Turn the cover crop under about one month before spring planting.

As a general rule, avoid using herbicides for weed control in the home garden for several reasons. First, there is no one herbicide 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. In most cases some areas will receive too little herbicide for effective weed control and other areas may receive such heavy rates that the crop will be 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 will 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 on your bulb crops. 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, pesticide dose, and the 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 ($\frac{1}{25}$ inch long), slender, and light yellow to brown. They overwinter on plants or debris in fields, fencerows, and weedy areas. Thrips puncture the

outer layer of the leaves with their rasp-like 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) For the most effective control, 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. Apply insecticide 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, do not wait until you see crop damage. 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 onion (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 will often rot in the field or in storage.

The adult is a long-legged fly a little smaller than a housefly. The maggots are white and $\frac{1}{3}$ 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 3 to 4 days and the maggots immediately bore into the plants. They feed and grow for about 3 weeks before changing to pupae. Adult flies emerge about 2 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 2 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, apply fungicide before the disease is well established. Leaf spots and blights can be a problem when heavy dew or rainfall frequently occurs 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 4 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.

Prepared by T. E. Elkner, Lancaster County extension agent; P. A. Ferretti, professor of vegetable crops; A. A. MacNab, professor of plant pathology; S. J. Fleischer, professor of entomology; and Toni Bilik, master gardener coordinator.

Visit Penn State's College of Agricultural Sciences on the Web: **http://www.cas.psu.edu**

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.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Cooperative Extension is implied.

Issued in furtherance of Cooperative Extension Work, Acts of Congress May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and the Pennsylvania Legislature. T. R. Alter, Director of Cooperative Extension, The Pennsylvania State University.

This publication is available in alternative media on request.

The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Discrimination or harassment against faculty, staff, or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 201 Willard Building, University Park, PA 16802-2801, Tel 814-865-4700/V, 814-863-1150/TTY.

© The Pennsylvania State University 2001

CAT UJ228 Rev3M6/01ps3967