



A PUBLICATION OF THE SOUTHEAST REGION HORTICULTURE TEAM

The Home Fruit Planting: Getting Started

Home fruit gardening offers many benefits--exercise, enjoyment, a supply of delicious fruits, enhancement of the home landscape, and a truly educational experience. There is, however, more to growing fruit than simply planting the crop and harvesting the fruit. Backyard growers and hobbyists must consider cultural requirements and solve pest problems throughout the year.

Throughout the guide, the symbol ♦ will be used to indicate a method for reducing chemical inputs in fruit production. Some of these methods are as simple as choosing the right variety to plant, removing diseased fruit, or pruning the plants to allow better air circulation. To use such strategies, however, the grower must have a complete understanding of the fruit planting as an entire system. Information in this publication will help you prevent or minimize common cultural and pest problems and will enable you to harvest succulent, fresh fruit.

The Planting Site

Plenty of sunlight is a key to maximizing fruit production. While some fruit plants can survive in partial shade, most require direct sunlight to fuel the energy-intensive fruit-

production process. Choose a planting area in your yard that will be in the sun most or all of the day. ♦Rapid drying of the plant canopy reduces the need for fungicides and is important in preventing disease. The more quickly the plants dry off after rain or dew, the less chance they have of contracting disease. Early morning sunshine is particularly important for drying dew from the plants.

Choose an area that is large enough to permit adequate plant spacing within and between rows. Less crowded plants will dry more quickly.

Choose a location with good air and water drainage and some protection from prevailing winds. Northern exposures are less subject to late spring frosts and are likely to have the most snow cover, which protects plants from soil heaving caused by alternate freezing and thawing of the soil surface.

Avoid planting within the root zone of black walnut trees since these trees produce a natural herbicide (juglone) that inhibits the growth of other plants. Do not plant brambles or strawberries where any Solanaceous crop (tomatoes, peppers,

eggplant, potatoes) has been grown for the last five years. A soil fungus called *Verticillium* can inhabit plant debris from Solanaceous crops. If strawberries or brambles are infected, the entire planting may be lost within one season.

Lack of space in full sunlight often discourages the home gardener from planting fruit in the backyard. Fruit plants can be planted in ways that do not require large areas. The following list provides some suggestions for planting in smaller spaces.

- Use dwarfing rootstocks for apple trees. These reduce the apple tree size by as much as 60 percent and are readily available from most nurseries.
- Use the fruit plants as a property screen or divider. Fruit trees, grapes, and brambles are ideal for this.
- Grow espaliered apple or pear trees or vining plants such as grapes or thornless blackberries on a fence or against a wall.
- Grow strawberries in pots or as a pyramid.
- Grow currants or gooseberries in partial shade. (These are the only fruit crops that will tolerate some shade.)

Good internal water drainage in the soil is a more important consideration than soil fertility. Avoid soils and sites that are not well drained. If water stands for more than 24 hours after a spring rain, the soil is probably not drained well enough for fruit production. Wet soils result in oxygen-starved roots and a microenvironment conducive to disease development.

Pollination Requirements for Various Fruits: An Overview

Before you order plants for your orchard or vineyard, you should determine whether you will have to plant more than one variety to

provide for pollination. Generally, all fruit plants grown in Pennsylvania require pollination to produce fruit.

Pollination is the transfer of pollen from the male part (anther) of a flower to the female part (pistil) of the same flower or another flower of the same sort. A pollinizer is a plant that provides the pollen to the flowers of a different plant variety. In most instances, bees are the agents that transfer the pollen, thus referred to as the pollinators. Little or no pollination occurs as the result of wind movement. To be an effective pollinizer, a variety must

- have a bloom period that overlaps that of the variety to be pollinated,
- have a diploid chromosome makeup,
- produce viable pollen, and
- be grown in close proximity to the variety to be pollinated.

Several environmental factors affect pollination. Temperatures below 55 to 60°F reduce bee flight and activity, as do windy conditions. Temperatures above 85 to 90°F dry the flower's stigmatic surface and prevent pollen grains from germinating. Because bees naturally seek out the best nectar-producing flowers, other blooming flowers in the area can attract bees away from fruit plants, which generally are poor nectar producers. In the early spring, dandelions in bloom can attract bees away from the flowers of fruit plants. Finally, applying insecticides during bloom can harm bees or other pollinating insects.

The best time to plan for pollination is when you order your plants. Most nurseries have charts or tables recommending varieties that will serve as pollinizers for each other. You should also be aware of your neighbors and what fruit plants they have. To be effective, a pollinizer does not have to be directly next

to your plant. Also remember that some ornamental plants, such as crab apples, flowering pears, and plums, can be effective pollen sources if their bloom overlaps that of the planted fruit.

Pollination Situation

The pollination characteristics of several fruit crops are listed below. Those fruits listed as "self-fertile" will set fruit with their own pollen, and therefore require you to plant only one variety or plant. In general, however, all plants produce more fruit when two or more varieties are planted close to each other. You should also consider closely related ornamental plants as good pollinizers. For example, crab apples can pollinate apples, and the ornamental Bradford pear can pollinate pears. For fruits that require cross-pollination, refer to the individual chapters covering those fruits.

Apple: Cross-pollination is always needed to produce an adequate fruit crop.

Apricot: All varieties are self-fertile, but cross-pollination is helpful.

Blackberry: Most are self-fertile, but a few require crosspollination.

Blueberry: Fruit set and crop size are improved by crosspollination.

Cherry, Sweet: Most older varieties are self-unfruitful. Recently, however, a number of new self-fertile varieties have been developed.

Cherry, Red Tart: The commercial varieties are self-fertile.

Currants: Self-fertile.

Gooseberry: Most varieties are self-fertile.

Grape: A variety of flower types (perfect, male only, and female only) exist. To assure good crops, consult an extension specialist to determine the proper variety mix to assure fruit set.

Nectarine: Self-fertile.

Peach: All commercial varieties, except J. H. Hale, are self-fertile.

Pear: Some varieties are partially self-fertile, but planting at least two varieties is best to ensure cross-pollination.

Plum: A wide diversity occurs in the plums; about half of the varieties are self-fertile and half are not. To be on the safe side, provide pollinizers.

Quince: All varieties are self-fertile.

Raspberry, Black: Most are self-fertile.

Raspberry, Purple: Self-fertile.

Raspberry, Red: Most are self-fertile, but crop size is improved by cross-pollination.

Strawberry: Some known varieties produce imperfect flowers, but most are self-fertile.

Plant Quality

Purchase well-grown, heavily rooted, one-year-old plants of all fruits except blueberries and brambles. Two-year-old blueberry plants are recommended. Nursery plants listed as "certified" (true to name) and "virus tested" or "virus indexed" are recommended. Brambles and stone fruit trees (peaches, nectarines, plums, cherries) are especially prone to virus infection in the nursery. Infected plants are not very vigorous and may produce little fruit, so it is worth the additional cost to buy virus-tested

plants. Micropropagated ("tissue-cultured") brambles should be multiplied and grown in a greenhouse in steam-sterilized soil. Any bramble plant that has been grown outside in a nursery may be infected with several diseases, all of which will result in poor plant growth and yield.

Spring Fruit Tree Planting Tips

The following suggestions will help you to successfully plant fruit trees.

- **Time of planting:** Dormant fruit trees can be planted in the spring as soon as the ground can be worked without fear of damaging the soil structure. In most parts of Pennsylvania this can occur anytime from March through mid-May. The later the trees are planted, however, the slower they will begin to grow.
- **Handling the trees:** As soon as the plants arrive, open the package. Report any signs of damage or poor handling to the nursery immediately.
- **Holding the trees until planted:** Trees to be held for several days should be heeled-in, or placed in cold storage with the roots covered with moist soil, sawdust, or sand. Never permit the roots to become dry.
- **On the day before planting,** place the trees in water so that all of the roots are covered. Allow the trees to absorb water for up to 4 hours.
- **The hole** in which each tree is to be planted should be wide enough to accommodate all of the tree's root system without excessive bending or bunching of the roots. It should be deep enough so that the bud union will be no more than 2 to 3 inches above the ground after the soil settles. Grafted or budded trees should always be planted so their union is above the soil line.
- **Clonal rootstock trees:** Observe which side of the root system has the most roots. Set the tree so that the side of the root system with the most roots is pointed into the direction from which the prevailing winds come. This will afford added anchorage.
- **Planting the tree:** Add 4 to 6 inches of soil to the hole, while at the same time gently jiggling the tree up and down. This will cut down on the possibility of air pockets and help the soil to surround all of the roots.
- **Fill the hole** to within 3 to 4 inches of the ground line. Tramp the soil firmly, then add the remaining soil up to the ground line.
- **Apply 5 gallons of water** to each tree after planting. It is important to use at least 5 gallons to ensure complete wetting of all soil and roots in the hole.
- In the absence of a **soil test**, a reliable rule of thumb is to use the equivalent of 1/2 pound of 10-10-10 fertilizer per tree *except for pears*, in which case 1/4 pound per tree will be adequate. Sprinkle the fertilizer in a 12-inch-wide band. Keep the fertilizer at least 6 inches away from the tree trunk. Do *not* apply any dry granular fertilizer near the tree until after the ground has settled and no cracks in the soil are evident.
- After the water has moved into the soil, add a **tree guard**. A 15-by-18-inch piece of 3/8-inch hardware cloth (formed into a circle using the 18-inch dimension as the circumference) makes an excellent guard. Bury the bottom of the guard 1 to 2 inches into the soil or into finely crushed stone, which helps to reduce weeds and rodent damage when it is spread around the base of the tree.
- When planting **bare-root trees**, remember that approximately one-quarter of the root system was removed when the tree was dug. To compensate,

remove about one-quarter of the top part of the plant to reestablish a 1:1 shoot-to-root ratio. Trees that come *balled and burlapped* do not need as much pruning; remove only broken or low-hanging branches.

- **Watering** the young tree in late June may be desirable depending on the rainfall up to that time.
- If less than 4 to 5 inches of rain have fallen since the trees were planted, apply 5 gallons around the base of each tree. You might have to hoe a small ridge of soil around each tree to prevent the water from running off.

Soil Fertility and pH

The soil in which our plants grow is a complex material. Its consistency and makeup have a marked influence upon plants. Soil provides support for the plant and is also the storehouse for plant nutrients, water, and oxygen for root growth.

Not all soils have the same ability to produce plant growth. The productive capacity of a soil must be considered in terms of both its fertility and physical condition. Even if the correct nutrients are present, they must be released in a form readily available to the plant. Soil fertility should then be considered as the soil's nutrient-supplying capacity, and not strictly as the amount of any one nutrient. Therefore, maintaining soil fertility involves adjusting the supply of available nutrients to levels conducive to the desired growth.

To determine the fertility of your soil, collect samples on which to have a soil test performed. Obtain a soil test kit from your county extension office. There is a small cost for the kit, which includes soil analysis and fertilizer/lime recommendations for your particular soil. When you submit the soil for

analysis, be sure to specify the crop that you intend to grow since nutritional and pH requirements vary somewhat among fruit types.

You will receive a soil test report back from the laboratory. The Penn State report shows phosphate, potassium (also called potash), magnesium, and calcium levels, as well as soil pH. Suggested fertilizer application rates are provided along with the levels. The report has three sections. First, the pH adjustment shows the amount of calcitic limestone (0 to 3 percent Mg) needed to raise the soil pH to the desired level for your particular crop. Second, the magnesium and calcium section shows the amount of Epsom salts (magnesium sulfate) and gypsum (calcium sulfate) needed by the crop. Finally, the plant nutrient needs section indicates the amount of other fertilizer materials to be used. Before planting, fertilize and lime the soil (or acidify it for blueberries) according to the soil test results.

Fertilization and Fertilizers

Although the total amount of nutrients in the soil is important, the balance among them can be even more critical. Too much of a nutrient can be just as bad as too little. Excess magnesium may lead to calcium deficiencies, for example. Fertilization, or the addition of nutrients to the soil and plant, is the main method of adjusting the available nutrients. The degree of fertilization will depend upon the type of growth desired. Fertilization often is thought of in terms of greatest response, which might not always be the optimum response. Generally, in commercial crops, when the cost of fertilization is equal to or greater than the value of increased growth, there is little reason for continued fertilization.

When a fertilizer material contains nitrogen, phosphorus, and potassium, it is known as a

complete fertilizer. The fertilizer analysis is the percent by weight of these three elements in the final preparation. For historical reasons, the nitrogen is expressed as elemental, phosphorus as P_2O_5 and potassium as K_2O . A fertilizer analysis makes it easy to determine the exact amount of each element in a given quantity of complete fertilizer.

Since the needs of various crops differ, the plant requirements are expressed as a specific fertilizer ratio. If a plant needs twice the amount of phosphorus as it does nitrogen and potassium, using a material with a 5-10-5 analysis would be advisable since this fertilizer would have the needed 1-2-1 ratio. According to the analysis, 5 percent of the material by weight is nitrogen, 10 percent is phosphorus, and 5 percent is potassium. Therefore, when you apply 1 pound of the material to the soil you are applying 0.05 pounds of nitrogen, 0.10 pounds of phosphorus (as P_2O_5), and 0.05 pounds of potassium (as K_2O).

Gardeners have the option of using two major groups of fertilizers: natural organic and synthetic chemical. Natural organics include dried blood, manure, fish scraps, and cottonseed meal. These compounds are derived from living organisms. The nutrients in most organic fertilizers generally undergo gradual chemical transformations into plant-available forms after they have been applied to the soil; thus nutrients from them are more slowly available to the plant than from chemical fertilizer sources. When applying most organic fertilizers to the soil, timing must be adjusted to account for the slower release of nutrients. For example, June-bearing strawberries have a high nutrient demand in the fall as they produce flower buds for the crop the following season. When using compost, it may need to be applied in the late summer so it will have sufficient time to decompose and release

nutrients in time to meet plant needs in the fall. Chemical fertilizers such as ammonium sulfate or superphosphate are prepared from inorganic minerals. The nutrients in most of the natural organic fertilizers generally undergo gradual chemical transformations into available forms after they have been applied to the soil. Most chemical preparations, on the other hand, are available for the plant as soon as they are applied to soils containing adequate moisture levels.

For this publication, organic gardening is defined as gardening based on the production practices in the National Organic Standard (NOS) and pursued by noncommercial growers. If you plan on selling what you grow as organic, you must strictly adhere to the National Organic Standard, which can be viewed in English, Spanish, Japanese, and French. Information for commercial fruit production can be found in the *Tree Fruit Production Guide* or the *Mid-Atlantic Berry Guide*, which are guides produced for commercial growers. Nutrients from most chemical fertilizers are available to the plant as soon as they are applied to soils containing adequate moisture levels. Various combinations of organic and chemical fertilizers can be prepared depending upon your needs. With such a mixture, some nutrients are available to the plant immediately while the remainder is released slowly to meet the extended needs of the plant. When opting to use chemical or organic fertilizers, make sure that adequate nutrients are being applied.

Chemical and organic fertilizers can be purchased at local garden centers or through gardening catalogs. To locate organic fertilizers in garden centers, ask personnel which products are used in organic production. Gardening catalogs will typically identify a product as allowable in organic production.

Composts can be obtained through various sources. Many local municipalities have composting facilities where composts can be obtained for a nominal fee or, in some locations, for free. Composts can also be purchased from garden centers. Making your own compost is a great option because you control what the compost is made from in addition to reducing the amount of waste sent to landfills.

The nutrient content in compost varies depending on what materials make up the compost and on the composting protocols used. Therefore, it is recommended that composts are tested, particularly those that you make or obtain from local municipalities, to determine the amount of nutrients they contain (kits for doing this are available through local extension offices). Finished compost typically contains 0.5 to 2.5 percent total nitrogen. As a general rule, about 10 percent of the nitrogen will be available to the plant each year. Compost generally contains very little phosphorus for plant use, so phosphorus from alternate sources is typically needed to meet plant requirements. Potassium in composts is in a form that is readily available for plant use, but this form is also water soluble and, therefore, can leach out of compost piles. Placing a cover over a compost pile can help reduce the amount of potassium lost to leaching. In addition to determining the nutrient content of compost, the pH of the compost should be measured because it can be unsuitably high for fruit production, particularly for blueberries, which grow optimally in low-pH soils. When using compost to fertilize brambles, be aware that primocanes have difficulty emerging through large clumps; therefore, breaking up large clumps is necessary when applying compost.

The type and amount of fertilizer to use in a given situation has been the topic of study

for many years. Present recommendations are based upon correlations between plant response and chemical tests on the soil or plant tissue itself. The nutrient availability is not a direct function of the total nutrient content of the soil. The available nutrients are related to the exchangeable cations, soil pH, and organic nature of the given soil. Over the years, quick tests have been attempted, but most are inaccurate.

Harvest

One of the great benefits of growing fruit in the home garden is the ability to harvest the fruit according to individual taste. One grower might consider a fruit to be ripe, whereas another believes it to be immature. The time to harvest is when it tastes good! As the fruits enlarge, change color, or simply begin to look ripe, try one--if it suits your taste, it's ready to be harvested. It's best, however, to be a little discriminating--don't pick too soon. Immature fruit spoils quickly and never develops full flavor. Pears should be picked at a green-ripe stage and "ripened" at a temperature of 72°F for approximately one week. A particularly effective way to ripen fruit is to place it in a brown paper bag on top of your counter at room temperature. The bag helps to seal in some of the naturally occurring ripening volatiles to promote faster ripening. In some instances this process can be enhanced by including a ripe banana in the bag.

Fruit should be harvested regularly throughout the harvest season. Most fruits will rot in the garden when overripe. In addition to causing the loss of the rotten fruit, the rots can spread to unripe fruit before it is harvested. Regular harvesting can be used to reduce the buildup of insects and disease organisms that cause fruit loss through molds and rots.

In addition to eating fruit fresh, you also can preserve it in one of several ways. Recipes and processing directions are available through your county extension office. Plans for constructing and maintaining fruit storage cellars and drying equipment, as well as methods for bird control in fruit plantings are also available from county extension offices.

Sources of Nursery Stock

Lists of tree and small fruit nurseries are available online at the following website: <http://ssfruit.cas.psu.edu/GettingStarted.htm>
They are not intended as an endorsement of any nursery, but are provided as a convenience for those wishing to purchase fruit plants.

An **OUTREACH** program of the College of Agricultural Sciences

Reference:

This handout has been adapted from *Fruit Production for the Home Gardener*; published by Penn State University in 2006.

This publication can also be viewed on-line at <http://ssfruit.cas.psu.edu/default.htm>.

This publication is available in alternative media upon request.

Penn State encourages persons with disabilities to participate in its programs and activities. If you anticipate needing any type of accommodation or have questions about the physical access provided, contact Penn State Extension, at 334-6271, in advance of your participation or visit.

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, 328 Boucke Building, University Park, PA 16802-5901, Tel 814-865-4700/V, 814-863-1150/TTY.

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