extension
ALABAMA A&M & AUBURN UNIVERSITIES

Fruit Culture in Alabama
Soil & Site Selection & Freeze Protection

► Most fruit trees live and produce for 10 to 40 years. Berry and grape plants usually produce from 1 to 20 years. An orchard, therefore, requires long-range planning. Selection of the most desirable site and soil available is also important.

The orchard site itself can be the most limiting production factor. People in urban areas may have little choice and be unable to produce some fruits satisfactorily. Producers in rural areas may have more flexibility in choosing a superior site.

A home orchard is usually located near the house. Plantings may even be integrated into the landscaping plan. Many fruit plants have beautiful foliage, blossoms, fruits, and fall colors that will enhance the home grounds. Trees are especially effective as backgrounds. Blueberries may be used in foundation plantings. Blackberries and grapes make good screen plantings.

The following points should be considered when selecting a planting site:

- Select soil of at least medium fertility with good drainage. Avoid deep sands or soils with a hardpan. Also try to avoid heavy, mottled clay soils with poor drainage. Deep, fertile, well-drained sandy loam soils with high water-holding capacity produce the best results. Soils with 12 to 24 inches of sandy loam resting on a red, permeable (friable) clay loam or clay subsoil are ideal for most fruit crops.
- Test the soil before planting and apply lime if needed to adjust soil acidity. Most fruit crops produce best in soil with a pH of 6.0 to 7.0. Strawberries produce satisfactorily with a pH of 5.5 to 6.5; blueberries require an acidic soil of 4.0 to 5.5.
    - Use calcitic or dolomitic limestone for liming, depending on the need for additional calcium or magnesium. Dolomitic limestone provides higher magnesium levels and calcitic limestone provides higher calcium to the plants. Availability of different liming materials may vary. Thoroughly incorporate lime into the soil in early fall before establishing the planting during late fall and winter.
- Where possible, select a site at a high elevation compared to the surrounding terrain. A gently rolling to moderate slope with good air drainage is ideal (figure 1).

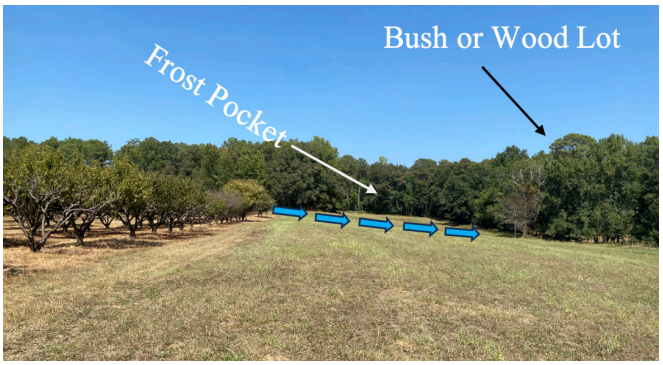

Figure 1. Orchard placement on a slope. Gently rolling to moderate slope; higher elevation than surrounding terrain. Blue arrows indicate the flow of cold air. Set trees on the upper part of a slope to avoid frost pockets. Dense woods should be removed from lower sections of slopes, or openings should be created to allow cold air flow. Tall pines on the north and northwest sides of orchards can reduce freezing wind. The orchard should slope away from native timber.

    - The direction of the slope is not critical. A southern slope is often described in textbooks as less desirable because of the slightly earlier flowering of some fruit types. In practice, however, tree fruits (especially stone fruits like peaches) growing on northern slopes are often lost to freezes, particularly in northern counties.
    - Avoid low areas or those next to woodlands, hedges, or buildings that could block airflow, causing a frost pocket and possible loss of blooms or fruit during late winter and early spring freezes. If dense woods block airflow, you can improve cold air movement by cutting swaths 75 feet wide every 100 yards through the woods. However, the wooded area must slope away from the orchard to allow cold air to move out of the orchard.
    - While trees that block airflow can be problematic, tall trees such as pines have a beneficial effect when positioned on the north and northwest sides of an orchard. They reduce the desiccating effect of freezing wind on flowers the first 1 or 2 nights of a freeze. For maximum benefit, the orchard needs to slope away from the native timber.

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Figure 2. Healthy blueberry blooms (left) and damaged blueberry bloom (center). Damaged and healthy blackberry blooms (right).

Figure 3. Healthy grape shoot (left) and damaged shoot (right).

Figure 4. Strawberry bloom undamaged by low temperatures (left) and damaged strawberry bloom (right).

Freeze Protection

The major cause of crop loss to fruit plants in the state is from freezing temperatures during late winter and early spring when plants are in the flowering to early fruiting stages. Damage during this developmental period may cause rapid loss of flowers and fruits or result in partial damage to fruits, which can be equally devastating.

Commercial and home producers can use a number of cultural and variety options to minimize the problem:

- Select an appropriate site, as discussed in the previous section.
- Choose varieties appropriate for the number of chill hours the location regularly receives. See Alabama Extension publication “Fruit Culture in Alabama: Winter Chilling Requirement (ANR-0053-D) at www.aces.edu.
- Select varieties that are likely to receive enough chilling to break dormancy but avoid varieties that have chilling requirements too low for the location. If varieties require too few chilling hours, they are likely to begin flowering too early in the late winter when temperature fluctuations occur.
- Prune peaches and plums less severely and delay the time of pruning until late winter or spring to reduce freeze damage.
- Preparing a fruit planting by maintaining weed-free strips along the sides of tree rows and wetting the orchard floor 24 to 72 hours before a freeze to reduce freeze losses.
- Provide some form of protection during a freeze event to effectively minimize losses from freezes. Historically, growers have used many methods to afford some level of protection for their crops. One of the most common forms of protection has been using heat. Heaters, such as the return stack and jumbo cone that usually burn diesel or other petroleum products, can be quite effective but are costly to operate and are no longer extensively used. Other products including wood and coal can be burned but may also be costly and must be approved before use in many areas.

Figure 5. Undamaged (left) and freeze-damaged (right) peach blooms.

The use of water for flooding the orchard floor (as practiced in California), overhead irrigation (as practiced on some tree fruits and small fruits such as strawberries and blueberries), and under-canopy trunk/scaffold-type irrigation (as practiced on citrus in Florida and Louisiana) also afford effective protection when used properly and where freeze conditions are not extreme. However, installation can be expensive, and an adequate water supply must be available for several nights.

Wind displacement by helicopters or wind machines can provide effective freeze protection on calm nights when an inversion occurs (the presence of warmer air 50 to 60 feet above the ground). Either helicopters or wind machines can provide several degrees of warmth by mixing warmer air aloft with the colder air at the surface.

The latest form of freeze protection for low-growing crops, such as strawberries, is the use of freeze covers, mostly made of polypropylene and similar fabrics. These covers are also being used for nursery stock and vegetable crops. Covers are manufactured in different weights (in ounces per square yard) which afford varying levels of protection. Covers that are ½ ounce/yard² can provide 4 degrees F above ambient temperatures while 0.9 ounce/yard² and 1½ ounce/yard² can provide 6 degrees F and 8 degrees F above ambient temperatures, respectively.

Although larger fruit plants, such as blueberries and satsuma mandarin trees, are more difficult to cover with these special fabrics, enough work has been done to demonstrate that the covers are very effective in reducing freeze damage. However, covering large acreages of bush and tree fruits is not considered practical at this time, but home gardeners may easily use these covers on a limited number of bush and tree fruits as well as strawberries with very good success. The use of frames (such as PVC) over the plants during the winter helps support, cover, and uncover plants as needed.

In large operations, overhead irrigation provides frost protection. This strategy uses a property known as *latent heat of fusion*, which means that heat is released as water freezes. Water has to be consistently supplied so the freezing process continues throughout the threat of cold damage. Water must be supplied through overhead irrigation at a rate of 0.18 inches per hour. Irrigation must be initiated when the wet bulb temperature falls to 34 degrees F before a predicted freeze. The wet bulb temperature is the temperature that results when water evaporates from the surface of the plant, which is usually a few degrees below the temperature of the air. Initiating the process below these temperatures will result in damaging plants. Irrigation must continue throughout the freeze event and can be turned off when ice begins to melt. Overhead irrigation must be timed precisely, and the recommended volume of water must

be used. Additionally, high winds are likely to move water being supplied by overhead irrigation, resulting in a lack of continual water coverage and damaged plants. Considering the difficulty in meeting all of the requirements mentioned above, the use of overhead irrigation in most operations or home gardening situations is not recommended.

Interest in low tunnels has increased over the years primarily to protect plants from significant weather events, such as low temperatures, rain, and high winds. Low tunnels have also been used to extend the growing season of strawberries, but they can also provide some protection from cold temperatures. Low tunnels will provide additional heat units and prolong the growing period in the fall, resulting in a larger plant before dormancy begins.

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