



CHAPTER 2 Strawberries

General

Strawberries are attacked by a variety of pests. Many cultural practices can help in managing these pests. The single most important factor in controlling pathogens is the maintenance of vigorously growing plants. Weeds compete with strawberries for essential water and nutrients. Weeds also promote pest injury by acting as alternate homes for pathogens and insects, by inhibiting spray penetration, and by maintaining a high humidity in the canopy.

Good soil and air drainage are essential. Roots quickly rot in waterlogged soils, and fruit rots are more prevalent when the soil surface does not dry quickly. Well-drained loams are the most suitable soil types for good root penetration. Sites where cold air can drain away to lower levels will decrease the possibility of frost damage to the plants and fruits. A southern, sloping site is the ideal location, providing quick-drying soil and earlier maturing berries.

For good root penetration, aeration, and drainage, organic materials should be added to the soil. Disk farm manures and/or green manure crops (cover crops) thoroughly into the soil before planting. (Poultry manure is least desirable, as it tends to promote too much vegetative growth and soft berries; both conditions encourage disease.) Have the soil pH determined at your Extension office and apply the necessary lime to adjust the pH in the range of 5.8 to 6.5 (see Table 9-1 on page 222). The calcium level should be above 1,000 pounds per acre. Some soils that are low in magnesium may benefit from the use of dolomitic (Hi-Mag) lime or magnesium sulfate (Epsom salts).

In new plantings, a soil test should be taken to determine the rate and type of fertilizer that should be applied. Fertilizer, such as phosphorus and potassium, should be applied in a broad band and incorporated before planting.

Minor elements, boron and zinc, can be blended or mixed with phosphorus and/or potassium and incorporated into the soil. Correcting the elements

in the soil by applying the recommended amounts as described by a soil test is the most efficient means of providing optimal nutrition to the planting. In most cases, only annual applications of nitrogen may be necessary for strawberries, which are managed for three or four harvest seasons.

Nitrogen should be applied at the broadcast rate of 25 to 40 pounds of actual nitrogen (N) within seven days after transplanting. Apply lower rates to silt loam soils with organic matter of 2% to 4% and higher amounts to sandy loam soils with low organic matter. In mid-August to early September, broadcast 25 to 40 pounds of actual nitrogen to aid flower bud formation in the transplanting year. Use similar amounts at renovation and in mid-August during the bearing years. Reduce the nitrogen to one half or less when leaf test results are excessive or when applying nitrogen as a side dress or applying nitrogen in sprinkler or microirrigation systems.

Heavy nitrogen fertilizer applications should be avoided in the spring on established beds; too much nitrogen will promote abundant vegetative growth that encourages disease by inhibiting good air circulation needed to dry plant surfaces. The longer moisture films remain on fruit and leaves from irrigation, rain, dew, or high humidity, the greater the chance of fungal spores germinating and disease outbreaks occurring. Berries also may become soft as a result of too much nitrogen which can reduce yields and storage life. Light applications of fertilizer may be made in the spring (8 to 12 lbs of actual N per acre) to promote early plant growth and fruit development on sandy soils. One or two foliar sprays of nitrogen may be more beneficial than soil-applied fertilizer.

Leaf-tissue analysis is a good way to determine nutrient levels actually in the plant. Sometimes the nutrients in the soil are not available to the plant due to pH, organic matter content, or some other reason. Leaf-tissue analysis tells you what elements the plant is getting and what the plant is lacking. The samples are taken after renovation from the



first fully expanded new leaves. At least 50 complete leaves per planting should be collected, rinsed, and allowed to dry completely before processing. Contact your regional or state fruit specialists for the exact procedure, processing instructions, and fees. Standards are available for comparison to determine if your results indicate the need for corrective measures.

Strawberries are a cool weather crop, producing most of their growth in the spring and fall. Growth is greatly slowed during the hot, dry summer months, resulting in a shallow root system. During the growing season (April, May, August, September, and October), applying 1-1/2 in. of water every seven to 10 days will aid in growth and fruit bud development. During fruiting, adequate moisture (1/2 to 3/4 in. of water every two to three days) will maintain fruit size and production.

Irrigation also can eliminate losses due to freezing temperatures during the early bloom periods. If sprinklers are turned on before the temperature at ground level drops to 32°F and continued until air temperature is above freezing and all ice has melted off the plants, the blossoms will be protected. Remember, the first blossoms to open will bear the largest berries. The sensitive, actively growing tissue in the crown needs to be protected from freezing injury that would make it more susceptible to pathogen attack. When temperatures drop too low or wind speed increases, the irrigation system may not be able to give maximum protection.

Integrated Management of Strawberry Diseases

The objective of an integrated disease-management program is to provide a commercially acceptable level of disease control on a consistent (year-to-year) basis. This is accomplished by developing a program that integrates all available control methods into one program. An effective disease-management program for strawberries must emphasize the integrated use of specific cultural practices, knowledge of the pathogen and disease biology, disease-resistant cultivars, and timely applications of approved fungicides or biological control agents, when needed. In order to reduce the use of fungicides to an absolute minimum, the use of disease-resistant cultivars and various

cultural practices must be strongly emphasized. Many strawberry cultivars adapted to the Midwest have good resistance to a number of important diseases. (See Table 2-1 on page 27.) This is generally not the case with other small fruit crops.

Identifying and Understanding the Major Strawberry Diseases

It is important for growers to be able to recognize the major strawberry diseases. Proper disease identification is critical to making the correct disease management decisions. In addition, growers should develop a basic understanding of pathogen biology and disease cycles for the major strawberry diseases. The more you know about the disease, the better equipped you will be to make sound and effective management decisions. Color photographs of disease symptoms on strawberries, as well as information on pathogen biology and disease development, can be found in the following literature:

Strawberry Production Guide — This is a very comprehensive book covering most phases of strawberry production. It can be purchased from the Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cooperative Extension, Ithaca, NY 14853. Phone: 607-255-7654.

Compendium of Strawberry Diseases — Published by the American Phytopathological Society, 3340 Pilot Knob Rd., St. Paul, Minnesota 55121. Phone: 612-454-7250, 1-800-328-7560. This is the most comprehensive book on strawberry diseases available. All commercial growers should have a copy.

A description of symptoms, causal organisms, and control of the most common strawberry diseases in the Midwest is presented here.

Foliar Diseases

There are three major leaf diseases of strawberries in the Midwest. They are leaf spot, leaf scorch, and leaf blight (Figure 4). All three diseases can occur singly or together on the same plant or even on the same leaf. All three are caused by fungi. Under favorable environmental conditions, these three diseases can cause serious reductions in strawberry yields. They damage the strawberry plant by causing premature leaf death, reduction in fruit quality, a general

