



AGRONOMIC SPOTLIGHT



VARIETY SELECTION FOR FRESH MARKET TOMATO PRODUCTION

- » Variety selection can be crucial to profitability.
- » Market requirements, growing conditions, and disease pressures should be considered.
- » Relative maturity, desirable fruit types, and availability of disease resistance are important factors.

Selecting the correct varieties can be crucial to the success of a fresh market tomato production operation. It is important to select varieties that not only produce well in the geographic area but also satisfy the requirements and desires of the customer base. Factors such as marketable yield potential, fruit characteristics, adaptability to the local conditions, seasonal requirements (temperature and rain tolerance), and disease resistance should all be considered when choosing the varieties to be grown. The type of production system, field vs. high tunnel vs. greenhouse, will also be an important factor in variety selection, as a variety that does well in the field may not be well adapted for greenhouse production^{4,5}.

GROWTH AND MATURATION

There are two main types of tomatoes, those that are indeterminate in their growth habit and those that are determinate. Indeterminate tomato varieties continue to grow and produce flowers throughout the growing season. These types of tomatoes are often preferred for greenhouse production. Commercial varieties for open field production may have an indeterminate or a determinate growth habit. Determinate types of tomatoes grow to a certain size and have a specific period of flowering. The bushy, determinate types are well adapted for commercial production systems, such as the stake and weave system, as they have a compact size and produce most of their fruit at a uniform time, reducing the need for repeated harvests. Almost all commercial varieties are hybrids, produced by crossing two distinct parental varieties. Hybridization may result in greater uniformity, increased yield potential (hybrid vigor), and improvements of other characteristics, such as earlier maturity, disease resistance and environmental stress tolerance, over open pollinated varieties with similar genetic backgrounds^{3,4}.

Tomato varieties differ in terms of their relative maturity, measured as the amount of time needed to produce harvestable fruit. For example, in areas with relatively short growing seasons early maturing varieties, which can produce harvestable fruit in 80 to 90 days, may be the best choice for hitting the profitable early season market, where as later maturing varieties might fit best for mid- to late-season

production needs. Within maturity classes there can be variation in the duration of production, as some varieties produce most of their fruit simultaneously while others have a main flush of fruit production followed by a secondary flush a little later, extending the length of the season.

FRUIT CHARACTERISTICS

There is a lot of variation in fruit characteristics among tomato varieties, relating to size, shape, flavor, and shelf-life, and the type of market will often determine which characteristics are most important. For tomatoes grown for sale at farmer's markets or roadside stands, flavor and color are often the most important factors in customer acceptance, while tomatoes grown for supermarket distribution need to tolerate handling and shipping with minimal bruising and have adequate shelf-life for the retailer⁵.



Figure 1. The jointed tomato on the left has part of the fruit stem and calyx attached, while the jointless tomato on the right does not.

Tomatoes can also have jointed stems, where the pedicel (fruit stem) and calyx remain attached to the fruit, or they can be jointless, where the pedicel and calyx more easily detach from the fruit. Jointless tomato varieties are less susceptible to stem puncture damage in a bulk packing situation. Joint stemmed tomatoes harvested and sold as clusters of fruit can bring a premium price, but they require more time and effort to harvest, pack, and handle⁶.

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Other fruit quality factors, such as the amount of fruit cracking (cracks starting where the fruit attaches to the stem), cat-facing (distortion at the blossom end of the fruit), and zippering (a scar running from the stem down the side of the fruit) can all reduce the amount of marketable fruit, and varieties differ in their susceptibility to these conditions¹.

TOMATO DISEASES

Another factor that can greatly affect production is the presence of disease. There are a number of diseases that attack roots, stems, leaves, and/or fruit that can significantly reduce yield and fruit quality.

Common diseases that attack leaves and fruit include early blight, late blight, gray leaf spot, and several bacterial diseases such as bacterial spot, bacterial speck, and bacterial canker^{1,2}. Infections of leaf tissue reduce the amount of photosynthesis that contributes to fruit development. Premature defoliation can also expose previously shaded fruit to direct sunlight, leading to sunburn of the fruit. Infection of the fruit directly reduces fruit quality by causing spots and blemishes on the fruit and by opening the fruit to fruit rot organisms.

Soilborne diseases that affect roots and vascular systems slow the overall growth of the plant by reducing the plant's ability



Figure 2. Foliar symptoms of early blight, caused by the fungus *Alternaria solani*. Photograph by Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org

to extract water and nutrients from the soil. These diseases can impact yields and, in severe cases, result in plant death. Soilborne diseases include Verticillium wilt, Fusarium wilt, Fusarium root rot, and root knot, caused by the root knot nematode^{1,2}.

Viral diseases, including tomato spotted wilt, tobacco mosaic, and tomato yellow leaf curl, suppress plant growth and reduce fruit quality. These diseases spread systemically through the

plant, disrupting plant growth processes. Stunting; distortions of leaves, stems, and fruit; and mottling, mosaic and other color irregularities reduce marketable yield and lower fruit quality^{1,2}.

An effective method for managing such disease problems is the selection of varieties that are resistant to one or more of these diseases. It is important to know which diseases are commonly problematic in a production area, so that tomato varieties with resistance to those diseases can be selected. For some diseases, such as Fusarium wilt, there may be two or more different versions of the pathogen (known as races), and it is important to select a type of resistance that is effective against the races that are present in an area^{1,2}.

A variety with resistance to all of the diseases that are important in an area may not be available, or resistance to a particular disease may not be available in a variety with other desired horticultural characteristics. In such situations, selecting the variety with resistance to the disease that is most problematic or for which there are few alternative management strategies may be the best option.

Selecting tomato varieties that meet the many, sometimes conflicting, requirements of marketability, production potential, and disease resistance does require careful consideration of variety characteristics and evaluation of the specific operation and growing conditions. However, selecting the correct varieties can be an important factor in determining the success and profitability of an operation.

Sources:

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