

## Homegrown Tomatoes

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One of life's simple pleasures: home-grown tomatoes. Anyone who loves tomatoes knows that homegrown or at least locally grown tomatoes have superior flavor to those that travel hundreds or thousands of miles to supermarket shelves. But have you ever wondered, what components give tomatoes their distinct flavor?

Tomato flavor is a combination of two major and one minor factor. The two big players in tomato flavor are sugars and acids. They are considered to be major factors in flavor because they occur in the largest quantity. There are two primary sugars produced in tomatoes: fructose and glucose. Obviously, sugars are the source of sweetness in tomatoes. The acids in tomatoes are mainly citric and malic acids. These are the source of tart flavors in tomatoes.

Looking at the possible combinations of sugar and acid levels in tomatoes, researchers have been able to make some generalizations. Tomatoes with high sugar and high acid levels are generally considered to have "good flavor". People tend to categorize tomatoes with low sugar and low acid levels as "bland". A tomato with high sugar but low acid content would most likely be called "sweet", and one with low sugar but high acid content would be considered "tart" by most.

The minor factor involved in tomato flavor is volatile compounds. These occur in minute amounts, but researchers have found that they are the factor that contributes most to what we label as "tomato" flavor. Volatiles are the key factor that helps us distinguish flavor differences among varieties with similar sugar and acid content.

These volatile compounds are not detected by the tongue, but by the olfactory nerve in the nose, otherwise known as the sense of smell. We usually forget that the sense of smell contributes to tasting the flavor of foods until we are congested and can't smell anything. Then it seems like many things taste more bland than usual. This is because our olfactory nerve cannot detect the volatiles in the food we're eating.

More than 400 different volatile compounds have been quantified by researchers in the tomato. Of these, only 30 occur in quantities greater than one part per billion. Only 16 of these compounds have been associated with significant contribution to tomato flavor. How does this all relate to the difference in flavor between homegrown and artificially ripened tomatoes? The different condition in which each group is grown has significant effects on the levels of sugar, acid, and volatile compounds in the tomatoes produced.

Flavor is not necessarily the first consideration when breeding or choosing a commercial variety to produce. Generally speaking, traits like disease and pest resistance usually rank higher in importance. Also, a commercial producer must consider how well a variety can survive harvesting and shipping to market. This is one reason why commercial tomatoes are typically picked very under ripe, at a stage called "mature green" meaning in another 24 hours or so it will show some pink coloring, and be at the "breaker" stage.

Tomatoes that are still green will store a lot longer, and travel better than ripe tomatoes. Before they travel to market, they are artificially ripened using ethylene gas. Ethylene is naturally produced by ripening fruits of all kinds. Exposing the mature green tomatoes to ethylene will trigger the ripening process, so red tomatoes are delivered to market. Those tomatoes that were picked at the breaker stage do not need the ethylene to ripen, since they have already begun the process. Interestingly enough, these breaker tomatoes are the ones sold in stores as "vine-ripened".

Tomatoes destined for processing into canned products are allowed to ripen fully on the vine, yet must be tough enough to not break during harvest and transport to the canning facility. They are generally drier and have thicker skin and flesh than varieties intended for fresh consumption. They are definitely not the tender juicy homegrown tomatoes we savor each summer.

Exposure to sunlight is crucial for sugar production in tomatoes. Picking mature green or breaker stage tomatoes reduces their time in the sun, and reduces the levels of sugar in the tomatoes. Some studies have related the amount of potassium to acid levels in tomatoes. Fertilizing with greater amounts of potassium resulted in higher acid content in most varieties.

Without question, research has shown that artificially ripened tomatoes have significantly lower levels of volatile compounds than homegrown fully ripe tomatoes. So, the next time you enjoy a great tasting homegrown tomato, consider not only how wonderful the flavor is, but also how wonderful and amazing it is that such a small, common fruit houses incredibly complex processes to produce that flavor.

For more information on tomatoes, contact the Barren County Cooperative Extension Service at (270) 651-3818 or by email at [kristin.goodin@uky.edu](mailto:kristin.goodin@uky.edu).

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