

Tomato Harvesting for Producers

Grading and Defect Troubleshooting



The key to a high-quality market tomato is developing proper harvesting techniques, with particular attention paid to grading requirements and visual appearance. Even though misshapen, tomato fruits that are non-uniform and insect-damaged may still pack all of the flavors and eating quality of an unblemished tomato. Growers should hold themselves to certain quality standards, and prospective buyers may also have grading and appearance requirements.

Tomato grading standards

According to the [USDA Agriculture Marketing Service](#), a U.S. No. 1 grade tomato must be free from decay, freezing injury, and sunscald; remain undamaged by any other cause; and meet the following basic requirements:

- Similar varietal characteristics
- Mature; not overripe or soft
- Clean
- Well-developed
- Fairly well-formed
- Fairly smooth

As the grading system moves to characteristics of a No. 3 grade, some qualitative requirements like “fairly well-formed” and “fairly smooth” are more lenient to interpretation. This flexibility gives the grower leeway in establishing tomato grading guidelines for their farming system and market.

How to grade tomatoes

Growers can use unique visual guidelines to help determine if tomatoes meet criteria for U.S. Grade No. 1 or No. 2, commonly known as “firsts and seconds.” An SOP (see **Appendix**) developed by University of Illinois Extension provides some flexibility with the clause from the USDA grading standard “not seriously damaged by any other cause.”

Guidelines in the SOP do not guarantee that a prospective buyer will accept delivery based on these visual fruit examples. The level of damage and what a grower’s market will accept is up to the grower to decide and establish with their prospective buyers.

Visual defects and growing techniques

Various growing techniques can help to reduce the level of visual defects in some circumstances, allowing growers to increase the likelihood of producing higher grade tomatoes for market. When appropriate and necessary, organic techniques will be highlighted.

Wet Splits and Top Splits

Wet splits, known as concentric cracking, and top splits, known as radial cracking, are typically related to rain events or irrigation periods. It most commonly occurs near the stem scar. It is a result of rapid fruit growth that occurs following a period of drought, then followed by heavy rain.

In the case of a high tunnel, if tomato plants are inconsistently irrigated and allowed to go through long dry then wet cycles, splitting or cracking is more likely to occur. Some varieties are more prone to this condition than others. As is the case with many tomato diseases, resistant varieties can be utilized to help combat excessive cracking and splitting.

Cat-Eye, Catfacing, and Zippering

This set of physiological issues typically revolves around poor pollination (catfacing) or possibly incomplete shedding of flower petals and the male anther remaining attached to the newly formed flower (zippering). There is a possibility that herbicide drift may play a role in catfacing. There is not much that can be done about these conditions. The exception is choosing varieties that do not seem prone to the condition.

Blossom-End Rot

Perhaps one of the most misunderstood physiological tomato fruit disorders, blossom-end rot is most commonly affiliated with inadequate movement of calcium through the plant during development. In many cases, a soil or media test will reveal that calcium is not deficient; therefore, this condition is technically caused by inadequate soil moisture not carrying calcium into the plant in a timely fashion.

Once the condition is established, it cannot be reversed. This physiological condition often gets confused with a biological disease, as a secondary infection of the affected area can often occur. One of the more common secondary infections is the anthracnose fungus. Management is possible in high tunnels where drip irrigation can be very closely monitored and controlled. There are many organic sources of calcium available if soil/media calcium deficiency is the culprit.

Yellow Shoulder, Grey Wall, White Core, and Blotchy Ripening

Finally, ripening disorders in tomatoes can manifest in many ways. Common management practices should be considered in these cases. Notably, inadequate potassium is often to blame. A soil test and a [Hartz Ratio calculator](#) will help determine the relative risk. Most certifiers should allow Potassium Sulfate (K₂SO₄, 40% K and 17% S) for organic growers. This screened raw fertilizer is typically banded in the root zone and incorporated, if possible. For organic fertilizers like K₂SO₄, it is essential to remember that they need good soil moisture to mineralize properly. Some certified organic soluble potassium sources may also be directly injected into the drip system via the process known as fertigation.

Temperature and inadequate ventilation in high tunnels can also cause fruit ripening disorders.

Growers should try to maintain high tunnel temperatures less than 100 °F, if possible. This can be partially achieved by active ventilation and the selective use of shade cloth. Notably, yellow shouldering is also linked to varieties with less foliage and a lack of uniform ripening gene.

Learning which fruits to harvest and why is essential in establishing an excellent tomato production program on the farm. Pay close attention to soil moisture, potassium levels, and high tunnel temperatures to reduce the number of defective fruits harvested. Finally, keep excellent production notes to establish which varieties are less prone to these physiological defects.

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Sources:

[An IPM Scouting Guide for Common Pests of Solanaceous Crops in Kentucky](#). UK Vegetable IPM Team. Timothy Coolong (ed.) and John Strang, Extension Horticulturists, Ric Bessin, Extension Entomologist, Kenneth Seebold, Extension Plant Pathologist. University of Kentucky Cooperative Extension Service. 2011

[Tomato, Physiological Ripening Disorders](#). UMass Extension Vegetable Program. University of Massachusetts Amherst.

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Determining Tomato Firsts and Seconds

Visual guide for identifying U.S. Grade No. 1 and No. 2 tomatoes



Funky Bottoms

- Minor (**first**): Small deformity, quarter-sized or less.
- Major (**second**): Deformity larger than a quarter (pictured, also shows zippering).



Wet Splits

- Wet splits will rot prior to market and cause those tomatoes around it to rot.
- Always a **second**.



Top Splits

- Minor (**first**): Small splits at the top of the fruit, which do not extend down the sides.
- Major (**second**): Large and/or wet splits at the top of the fruit, which extend down the sides (pictured).



Cat eye

- Large cat-eyes covering a portion of the tomato (pictured). May or may not be dry as shown.
- Always a **second**.



Zippering

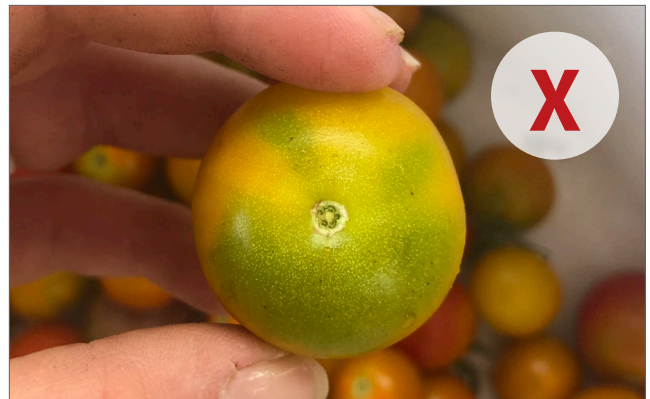
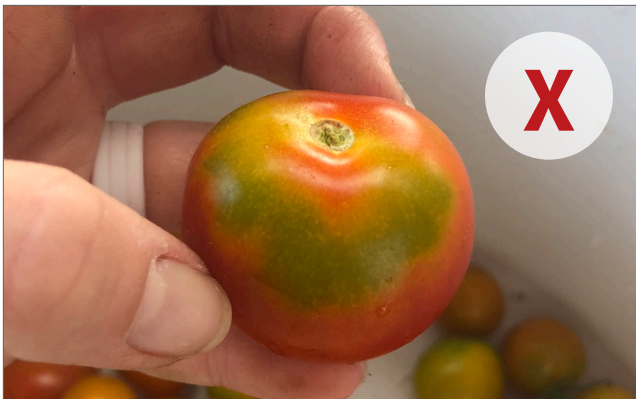
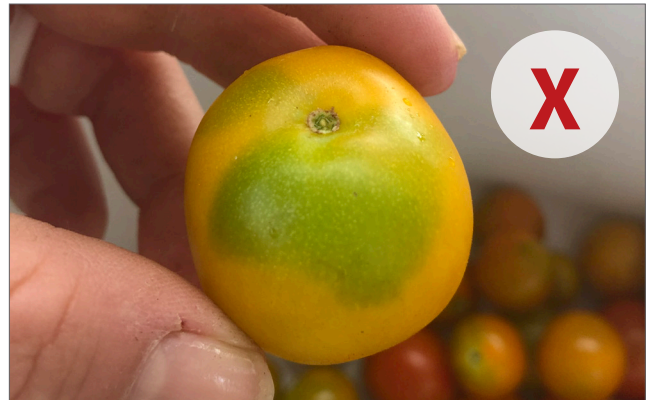
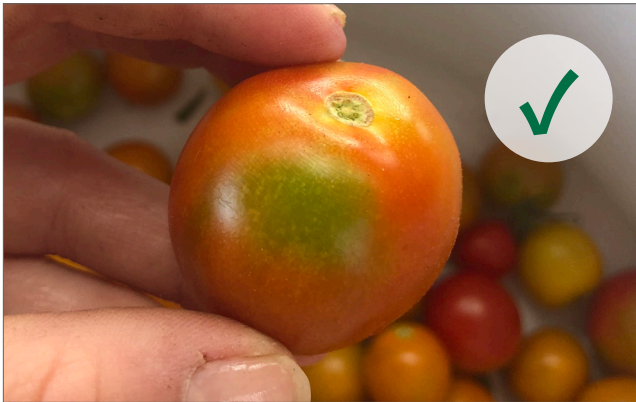
- Minor (**first**): 1 to 2 zippers on fruit (pictured).
- Major (**second**): More than 2 zippers on fruit (see top splits photo for example of multiple zippers).



Blossom-End-Rot

- Small to large rotting holes in the bottom of the tomato.
- Always a **second**.

Continuation of Appendix



Shouldering

- Unripe section at the top of the fruit will never ripen.
- **First:** if less than half of the top of the fruit and/or less than a third down the side of the fruit.
- **Second:** if more than half of the top of the fruit and/or more than a third down the side of the fruit.

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