



Arkansas Plant Health Clinic Newsletter

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Tomato Fruit Abnormalities

Growers are sometimes bewildered when a tomato fruit grows a nose or horn, or even a pair of horns. Tomato horns or noses occur because of an error in cell division. A normal fruit has 4-6 locules when cut in half. When a few cells divide wrong they produce an extra locule. Since there is not enough room inside the fruit for the extra, a horn or nose protrudes from the fruit. Extended high temperatures (above 90°F during the day and 82-85°F during the night) predisposes the plant toward producing deformed fruit. Some of the older heirloom varieties are more susceptible. This does not affect the taste of the fruit.

Tomato Horn-Abiotic



Photo by Jennifer Sansom, University of Arkansas
Cooperative Extension

Tomato Horn-Abiotic



Photo by Colin Massey, University of Arkansas
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Tomato Horn-Abiotic



Photo by Jennifer Sansom, University of Arkansas
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Tomato Catfacing

Catfacing is caused by anything that damages the bloom. This can be cold injury, insect, herbicide, or storm injury. We typically see this most on fruit injured by frost when planted too early in the spring.

Catfacing-Abiotic



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Tomato Cracking

Cracking is usually associated with excess amounts of water. The plant tissue swells with the water faster than the skin can grow and cracking occurs. Some varieties are more prone to cracking than others.

Cracking-Abiotic



Photo by Rachel Bearden, University of Arkansas Cooperative Extension

Tomato Yellow Shoulder

Yellow Shoulder is caused by fruit exposed to high temperatures during maturation and ripening. Some cultivars are more prone to it than others.



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Yellow Shoulder-Abiotic



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Graywall-Abiotic



Photo by APS Image Library

Tomato Graywall

Graywall has been linked to potassium deficiency among other things. Black to dark brown necrotic tissue forms in the walls of tomato fruit infected with Graywall disease. In most cases only the outer walls are affected. Wall tissue may partially collapse, causing the outer skin of the tomato fruit to appear wrinkled. The area appears woody when cut, and the fruit is of poor quality. Graywall has been associated with Tobacco Mosaic Virus, low light conditions and cool weather as well as potassium deficiencies.

Graywall-Abiotic



Photo by APS Image Library



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Tomato Sunscald

Sunscald or sunburn occurs during hot temperatures when protective foliage has been lost due to disease or insect feeding.

Sunscald-Abiotic



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Sprouting Inside Tomato Fruit

Sprouting inside fruit occurs in overripe fruit when seeds have reached maturity and the natural hormone, abscisic acid (ABA), is reduced. The tomato fruit allows sprouting inside (vivipary) because the seeds do not desiccate (dry out) in the moist environment inside the fruit. Some causes of seeds sprouting in

tomatoes are long storage in cool temperatures (below 55 degrees), being overripe, potassium deficiency, and over fertilization with nitrogen.

Tomato Sprouting in fruit-Abiotic



Photo by Darrell Nesmith



Tomato Blossom End Rot

Both tomato leaves and fruit can suffer from Tomato Blossom End Rot, calcium deficiency, although it is relatively rare in the leaves themselves. Symptoms of calcium deficiency in the leaves appear at the top of the plant in the newest growth. Stunting, chlorosis, and interveinal necrosis are symptoms. Very similar symptoms may occur with magnesium deficiency. However, the symptoms will be on the oldest leaves instead of the newest leaves. Magnesium deficiency is usually the result of too much water. Calcium deficiency in tomato fruit is a localized deficiency in the distal end of the fruit. Most often with fruit, there is enough calcium in the soil, but fluctuations in water prevent the plant from supplying the fruit with the necessary amount of calcium for healthy fruit. The fruit develops a light, tan, water-soaked spot on the end of the fruit. These spots turn black and leathery. Occasionally, the rot occurs on the inside of the fruit instead of the outside. The best management for Blossom End Rot is good water management practices. Soil tests should be done at least every two years to make sure there is an adequate supply of calcium in the soil. Blossom End Rot can be alleviated during the growing season by applying a foliar spray of anhydrous calcium chloride. Several brands are available including Tomato Saver and End Rot.

Tomato Calcium Deficiency (Blossom End Rot)-Abiotic



Photo by Sherrie Smith, University of Arkansas
Cooperative Extension

Tomato Calcium Deficiency (Blossom End Rot)-Abiotic



Photo by Sherrie Smith, University of Arkansas
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Tomato Magnesium Deficiency- Abiotic



Photo by John Gavin, University of Arkansas Cooperative Extension

Tomato Phosphorous Deficiency

Several times a season we receive tomato samples with Phosphorous deficiency. Tomatoes have high phosphorous requirements. Phosphorous encourages healthy root development in seedlings and strong stems and leaves in developing plants. Phosphorous promotes fruit development and boosts the nutritional content of ripening tomatoes. The most obvious sign of phosphorous deficiency is a purple discoloration first on the undersides of leaves and later the tops. In severe cases the entire plant becomes purple with curled leaves. Stunting and failure to thrive are common in phosphorous deficient plants. One of the most common causes of phosphorous deficiency is cool garden soil. Tomato plants require soil temperatures of 60°F or more to properly uptake phosphorous. Soils

that are too wet also prevent adequate phosphorous uptake. Having a soil pH either too acidic or too alkaline also prevents the plant capability to access available phosphorous. Soil pH for tomatoes should fall between 6.5 and 7.0. Soil testing should be done at least every two years and amendment recommendations followed. Arkansas has planting, care, and fertilization recommendations for tomato in our extension publication [FSA6017](http://www.uaex.edu/publications/PDF/FSA-6017.pdf)
<http://www.uaex.edu/publications/PDF/FSA-6017.pdf> :

Prior to planting, fertilize with a complete fertilizer at the rate of 1 pound per 100 square feet of row. Apply 8 ounces of a starter fertilizer solution (1 tablespoon of 20-20-20 per gallon) when transplanting. Hoe or cultivate shallowly to keep down weeds without damaging roots. If you wish to maintain your plants for full-season harvest, consider mulching with black plastic or organic materials. Water the plants thoroughly every two to four days during dry periods. Plants in containers need daily watering. Side-dress with nitrogen fertilizer at the rate of 1 pound per 100 feet of row or 1 tablespoon per plant after the first tomatoes have grown to the size of golf balls. Make two more applications three and six weeks later. If the weather is dry following these applications, water the plants thoroughly. Do not get fertilizer on the leaves.



Tomato Phosphorous Deficiency-Abiotic



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Tomato Phosphorous Deficiency-Abiotic



Photo by Janet Carsob

Tomato Stinkbug Damage

Tomato stinkbug damage. Adult stink bugs are shield-shaped insects with piercing sucking mouthparts. They get their common name "Stink bug," from the strong odor they emit when disturbed. Several species of stink bugs feed on tomato fruit as well as on many other vegetables, fruits, nuts, and field crops. Stink bug species in Arkansas include the Green stink bug, *Acrosternum hilare* (Say), the Southern green stink bug, *Nezara viridula* (Linnaeus), the Brown stink bug, *Euschistus servus* (Say) and the Rice stink bug, *Oebalus pugnax* (Fabricius). Stink bugs pierce tomato fruit and inject enzymes from their salivary glands to liquefy and pre-digest the plant material. Damage on green tomato fruit appears as dark pinpricks surrounded by a light discolored area. On ripe fruit the area around the feeding site usually turns yellow. If the skin of the fruit is peeled back, white spots may be observed on the flesh of the tomato. For stink bug control, homeowners may use Ortho Max Flower, Fruit, Citrus, and Vegetable Insect Control, or Bayer Advanced Insect Control, or Spectracide Insect Control, or permethrins. Scouting and handpicking can eliminate a few. Stinkbug traps are also available.



Tomato Stinkbug Damage-Family Pentatomidae



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Tomato Stinkbug Damage-Family Pentatomidae



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Green Stinkbug-*Acrostemum hilare*



Photo by Ricky Corder, formerly University of Arkansas Cooperative Extension

Tomato Fruitworms

The larvae of several species of moth attack tomato fruit, including the Corn earworm, *Helicoverpa zea* and the Yellowstriped armyworm, *Spodoptera ornithogalli*. Tomato Fruitworms, *Helicoverpa zea*, are destructive pests of tomato, corn, and other crops. The adults are medium-sized moths, pale tan to brown with a dark spot in the center of the fore wing. They lay eggs singly on both surfaces of the leaves. The eggs hatch as creamy white caterpillars with a dark head. They change color as they grow and can be shades of brown, pink, green, or black with alternating light and dark stripes running lengthwise on their bodies. The caterpillars begin feeding on the leaves but move to the fruit as soon as green tomatoes appear. First noticeable on the fruit is a black



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hole at the base of the fruit stem. Inside the fruit, tunneling, frass and the worm may be found when the fruit is cut open. When the larvae reach full size, they migrate out of the fruit, fall to the ground, and pupate. Adults emerge from the soil in 10-14 days and begin the cycle again. Caterpillars of the Yellowstriped armyworm are up to 2 inches long and may be green when small to almost black. They have two cream yellow to orangish stripes along the back, and a prominent dark spot on the sides of the fourth body segment behind the head (the first legless abdominal segment). Partially grown larvae appear to have pairs of triangular dark markings along the back of each body segment inside of the light-colored stripes. Adult moths have a wingspan of 1-1/2 to 1-3/4 inches. Control of both the Tomato Fruitworm and Yellowstriped armyworm consists of scouting for the larvae and handpicking along with chemical controls if necessary. *Bacillus thuringiensis* (Bt) is a naturally occurring bacterium that is fatal to caterpillars when ingested by them, but harmless to pets, people, and other types of insects. Other insecticides may be used including Baythroid, or Brigade, or Sevin, or Excel, or Coragen, or Voliam Xpress, or Asana, or Belt, or Synapse, or Lannate, or Intrepid, or SpinTor, or Confirm, or Mustang Maxx, or Hero. Homeowners may use Bt, or Ortho Flower, Fruit, & Vegetable Insect Killer, or Ortho Bug-B-Gon Insect Killer for Lawns and Gardens, Sevin, or Spectracide Insect Control for Gardens, or permethrins, or spinosad. Chemical control is ineffective once the fruitworm enters the fruit.

Tomato fruit with Yellowstriped armyworm-*Spodoptera ornithogalli*



Photo by Janet Udouj

Tomato fruit with Yellowstriped armyworm-*Spodoptera ornithogalli*



Photo by Janet Udouj

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Tomato Fruitworm-*Helicoverpa zea*



Photo by of Shane Ferguson, Blackcat Barnyard

Tomato Hornworm

Two species of Hornworm attack tomato and other solanaceous crops. The Tomato hornworm, *Manduca quinquemaculata* and the Tobacco hornworm, *Manduca sexta*. The adult of both species is a large, robust-bodied moth, commonly known as a hawk moth or sphinx moth. The adult moth feeds on the nectar of flowers and, is most active from dusk until dawn. Although very similar in appearance the caterpillars can be identified by small differences. The tomato hornworm has V-shaped yellow-white markings on the body and the tobacco hornworm has white diagonal lines. Additionally, the horn, that gives the hornworm its name, is darker on the tomato hornworm. The caterpillars are voracious eaters and can strip a tomato plant in just a few days. That said, they are not difficult to control. Handpicking is

effective but spotting them can be difficult as they blend so well with stems and foliage. Another effective control is the application of a Bt (*Bacillus thuringiensis*) product. This is a biological that the caterpillars must ingest so it must be applied when they are present and reapplied per label as it breaks down in sunlight and can also be washed off by rain.

Tobacco Hornworm-*Manduca sexta*



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Tomato Spider Mites

Tomato Spider mite damage. Spider mites attack many species of plants, including vegetables and ornamentals. Several species of spider mites attack tomato, notably *Tetranychus urticae* and *T. evansii*. Spider mites are typically found feeding and reproducing on the undersides of leaves. They are sap feeds, feeding off the contents of individual plant cells. Their feeding activity produces a white to yellow stippling across the



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surface of the plant tissues that eventually takes on a bronze appearance. Leaves become dry and brown. Heavy feeding on fruit causes yellowish speckling across the surface of the fruit. Serious infestations can kill leaves and eventually the plant. In heavy infestations, small webs may be observed. It's important to recognize the problem before leaves start dying. Commercial growers may use Agri-Mek 0.15 EC, or Brigade 2 EC, or Dicofol 4E, or Oberon 2 SC. Homeowners may use Malathion, or insecticidal soaps. Depending on the product used, applications should be made every 2 to 3 days.

Tomato Spider Mite Damage- *Tetranychus* sp.



Photo by Don Plunkett, formerly University of Arkansas Cooperative Extension

Tomato Spider Mite Damage- *Tetranychus* sp.



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Tomato Herbicide Damage

Every year the Plant Health Clinic receives samples suffering from herbicide damage. Vegetables, fruits, and ornamentals are all quite sensitive to both phenoxy based herbicides such as 2-4-d, and to glyphosate damage (Roundup). Roundup is not your friend in the garden. It will drift up to 1500 ft across the yard when there is a breeze. Symptoms of roundup damage to tomato are bleached white to yellow areas at the base of leaflets. Strap-like leaves, witches' brooms, and leaf curling are some of the symptoms on other species. Roundup is systemic, so perennial plants not killed outright will have damage symptoms again the following season.

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Large doses of the herbicide will of course kill the plant. Phenoxy based herbicides such as 2-4-d and Grazon causes extreme twisting, distortion, and leaf curl.

Tomato Roundup Herbicide Damage-Abiotic



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

Tomato Phenoxy Herbicide Damage-Abiotic



Photo by David Freeze, University of Arkansas Cooperative Extension

Tomato Phenoxy Herbicide Damage-Abiotic



Photo by Sherrie Smith, University of Arkansas Cooperative Extension

This bulletin from the Cooperative Extension Plant Health Clinic (Plant Disease Clinic) is an electronic update about diseases and other problems observed in our lab each month. Input from everybody interested in plants is welcome and appreciated.

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