

When Pests Aren't to Blame

Your plants may be suffering from a non-infectious disease or a physiological disorder

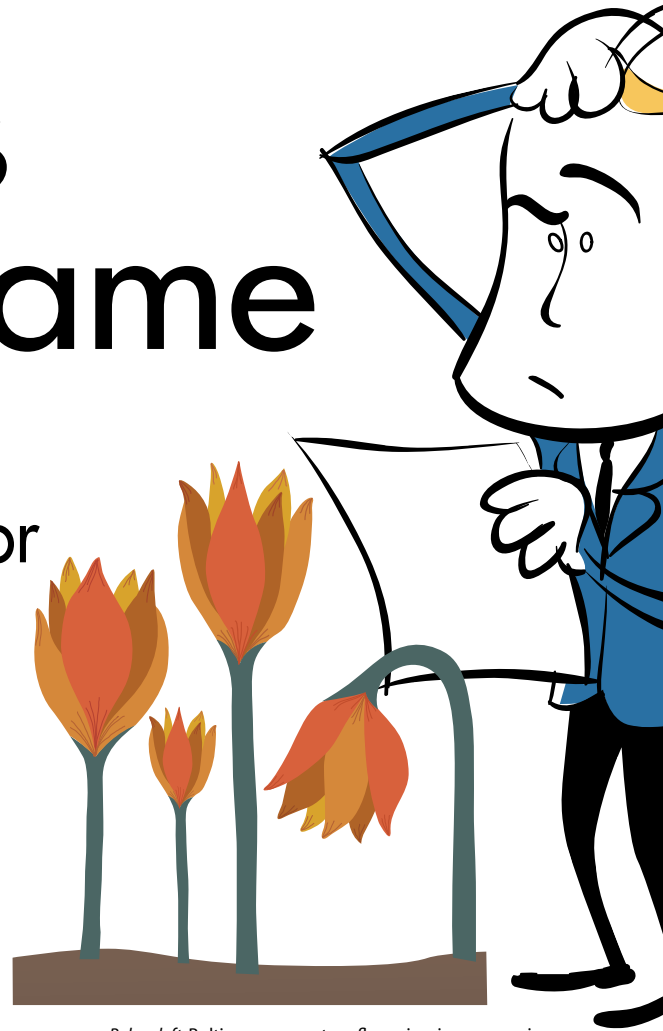
One frustrating problem that newer growers often encounter is inexplicable plant symptoms that don't seem related to any pest or disease outbreak.

Calcium transport disorders such as blossom end rot (BER) can affect tomatoes, peppers and other fruits. Tipburn is fairly common in hydroponics under certain growing conditions. It can be a problem in heading lettuce as well as strawberries, celery and cabbage.

BER and tipburn are induced calcium deficiencies, meaning that even though there is enough calcium in the nutrient, the plant is having difficulty in transporting it up to the very tips of leaves or ends of fruit, which are at the end of the water transpiration stream in the plant. Many people

associate BER and tipburn with a lack of calcium and assume their nutrient solution is deficient in this element. Usually, however, I find this is not the case. The majority of well formulated nutrient products have more than sufficient calcium levels.

Any environmental or other condition which restricts water uptake or transport up the plant also restricts how much calcium gets deposited in this newly developing tissue, so a localized deficiency in calcium can develop. When this occurs the new tissue breaks down. It might turn black, become mushy and begin to rot, which is why inexperienced growers tend to think this is a



Below left: Bolting, or premature flowering, is common in many cooler-season plants such as lettuce and spinach. In this case, the stem of the relatively young plant stretches upwards, elongating the plant and producing a flower head. *Below middle:* Flower dieback, or drop, is common in a number of hydroponic crops and can be caused by a number of physiological conditions including low light, excessive temperatures, chilling, heavy crop loading, nutrient deficiencies and others. *Below right:* "Crooking" in greenhouse cucumbers is a physiological problem induced by certain environmental conditions.





disease outbreak rather than a physiological condition.

Luckily, there are a few things that can be done to prevent BER and tipburn, and even smaller growers are advised to check out the range of tomato and lettuce cultivars that have been bred for resistance to these conditions. In most cases, lowering the EC slightly, shading the plants when it's warm, and getting some good airflow up and around the new foliage and fruit help to boost transpiration under humid conditions and improve the flow of calcium to the newly developing tissue.

Perhaps the second most common physiological disorder is caused by overwatering in the root zone. This creates a number of symptoms. New growers often assume the signs of overwatering damage are caused by a root rot pathogen, and the dreaded pythium usually gets the blame for this. However, it's often just a simple case of overwatering. Particularly under cooler conditions overwatering damages the root system which later allows opportunist pathogens such as pythium to invade when the damage has already started.

Trying to determine how much nutrient solution a plant needs can be challenging for new hydroponic growers, and overwa-



Above: Severe "crooking" of a seedless hydroponic Telegraph cucumber was caused by incorrect growing conditions. Right: Fruit drop is a physiological disorder similar to flower drop. In this case, it was caused by a lack of pollination due to cool temperatures.



tering is a common cause of plant losses in many systems. The symptoms of overwatering usually start with the plant looking a bit wilted, particularly during the warmest part of the day, although they usually regain some turgor at night.

This can induce a cycle of more overwatering as the grower assumes a wilted plant is not getting sufficient moisture. Pale green or yellowing on the youngest leaves also suggest overwatering, as iron is the first element that a water-damaged root system fails to take up in sufficient quantities. Poor growth, fruit or flower crop, abscission of the lower leaves and a general lack of vigor all indicate oversaturation in the root zone.

Luckily, growers who know they are rather heavy-handed with the watering or nutrient application can take advantage of hydroponic substrates which are virtually impossible to overwater, such as various "gro rocks," also known as chunky-grade perlite, and lightweight expanded clay aggregate (LECA). Growers can also check out select systems where watering and oxygenation of the roots take care of themselves such as aeroponics and self-watering systems. Root zone moisture meters are also available to help monitor water or nutrient application.

Other physiological conditions which indoor growers may encounter are directly linked to the environment. Plants placed too close to high intensity grow lamps may develop a white or pale tan papery bleached-like areas on the foliage due to scorch. Plants need time to adapt to increases in light levels, and taking a plant from a shaded propagation area into full intensity artificial light often results in such damage.

Temperatures, either too hot or too cold, are another commonly misdiagnosed physiological disorder which can confuse even the most experienced grower. A common scenario are warm-season crops such as basil in a greenhouse when unseasonable cold nights occur. Chilling damage appears as water-soaked areas at first. If mild, this may disappear once the plants warm up. However, it can progress onto a blackening of the leaves if chilling was

severe, and this is often mistaken for a fungal or bacterial infection.

Hot conditions can cause a number of other problems. Warmth and high light can cause plants to roll their leaves or point them directly upwards in an attempt to avoid the damaging effects of too much sun. Warm temperatures for cooler season crops can also induce bolting, or premature flowering, in many vegetables such as lettuce, some Asian greens and other salad plants, and many greenhouse growers battle this problem in warmer climates. Shading, good ventilation and air movement and even chilling of the nutrient solution all help battle the negative physiological effects of too much warmth and excess light.

There are a few other more unusual and often puzzling physiological conditions that hydroponic growers may experience. Edema, or water retention, shows as puffy swellings on leaves and stems under overly humid conditions.

Odd bumpy outgrowths on the base of tomato plants, actually stem root initials, can show in response to something the plants are experiencing in the root zone such as low oxygen levels or water-logging.

Taking an overview of the plant's environment and checking that all the factors for growth are within optimum ranges usually helps. 🌱

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Resources:

"Hydroponic Solutions," available for sale at www.growingedge.com/store.

Tomato Plant. Physiological Disorders: Causes, Prevention and Remedies. M.M. Peet.

www.ces.ncsu.edu/depts/hort/greenhouse_veg/pdf/physiol.pdf

Typical Symptoms of Nutrient Disorders in Greenhouse Crops

www.priva.ca/newsletter/news-science-nutdis.html