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Death of a Seedling: Tip Burn, Abortion and Stunted Growth

By Roger C. Styer

This year, because of rising input costs, more plug growers are focusing efforts on getting maximum yields from every plug tray. Buying good seed, sowing it accurately and providing good germination conditions are just half the battle. There is a considerable difference between germination and usable seedlings. Losing seedlings after germination is finished costs a lot more money! If you are having problems consistently with losing seedlings of certain crops, then you are doing something consistently wrong. However, if you lose seedlings every once in a while and don't understand why, then you need to look at the influences of your growing environment and culture on your techniques.

Plug growers around the country lose seedlings after germination for a number of reasons, including tip or leaf burn, tip abortion and stunted seedlings. These problems don't show up all the time, but they do rear their ugly heads every year. Understanding which crops are sensitive to these problems, when they are sensitive, what causes the problems and how to prevent them can save every plug grower a lot of money and sleepless nights.

Tip Burn

This problem can show up on very young growing tips or leaves. Generally, sometime after the cotyledons have opened and the first or second true leaves are unfolding, plug growers can burn these sensitive tissues. The roots are not affected, just the newer shoot growth. Crops that are most

sensitive to this type of problem include *Salvia farinacea*, *Salvia splendens*, *ageratum*, *coleus* and snapdragons. The frustrating part about tip or leaf burn is that it shows up infrequently and can affect the whole crop.

There can be several causes for this problem, along with mitigating circumstances. The most common cause is not rinsing off fertilizer after feeding on sunny days. Fertilizer left on the growing tip acts like a salt and, when drying occurs quickly, can remain on the leaf surfaces, causing a burn. This burning typically shows up after several days of low light and humid conditions, which cause the new tissues to be very soft. Then you feed on the first sunny day when the plugs are drying out, and leaf damage occurs the next day. So, get into the habit of always rinsing off the fertilizer with a quick pass of clear water.

Another cause of this tip or leaf burn could be high salts in your regular water source, not from added fertilizer. If you are using water with an EC of 1.0 or higher, you could cause the same problem as added fertilizer. And imagine what would happen if you did add fertilizer on that very soft tissue!

Sometimes, an interaction between your fertilizers and the heavy metals of various fungicides and pesticides can cause a quick burn. Be careful about putting too many chemicals together or applying them too close together. You can also run into problems when using copper fungicides if they stay wet on leaves for a long time, as more phytotoxicity or burn can occur. Copper fungicides should dry quickly on young plugs.

Interaction of salts, whether from fertilizers, EC of the water, or heavy metals in fungicides and pesticides, are definitely promoted with quick environmental changes because of light levels. Plug growers in the northern parts of the country have more difficulties with tip burn because there are more cloudy days. But Southern growers will need to close the shade curtains during sunny days to take heat stress off the plugs before feeding or spraying them, as tip or leaf burn could occur from high leaf temperatures as well.

Tip Abortion

One problem I see show up every year in all parts of the country — during cold weather, even in California and Florida — is tip abortion of impatiens. Impatiens tip abortion can show up anytime after germination, resulting in bald seedlings if it occurs before first pair of true leaves is out. If tip abortion occurs later, then side branches will still come out, but growth will be behind seedlings not affected, resulting in variable growth after transplanting and uneven flowering. When tip abortion does show up, it usually occurs on some varieties first or on certain parts of the bench first. I have even seen snapdragons affected by tip abortion, not just tip burn.

The primary cause of tip abortion is cold water sitting on the growing tip through the night, causing the plant to produce ethylene, which aborts the newest growing tissue. This problem gets aggravated when soil temperature is not warm enough (less than 65° F), watering is done after lunch, water temperature is very cold and there's not enough air movement or dehumidifying of the greenhouse.

I always tell plug growers that they need to water impatiens before lunch, preferably before morning break, when weather is cold and days are short. The plugs need to be dry going into the night. Feel the plugs before you go home for the day. If they feel wet and cold, check them first thing next morning. If they still feel wet and cold, you will have tip abortion.

Make sure your soil temperature is where you want it. If you're not using bottom heat, soil temperature will be about 5° F lower than air temperature. Some parts of the greenhouse are going to be cooler than other parts, so know where your cool areas are and avoid putting impatiens plugs there. Well water in Northern areas will be in the 40s, and it takes a long time to warm up and dry off. Imagine what happens when you water impatiens plugs with that cold water! The best way to avoid this problem is to use tempered water (70° F), usually by running through a water heater.

The problem with drying off impatiens plugs gets aggravated when Mother Nature does not want to cooperate. Several dark, wet, cool or cold days in a row will make it hard to dry off impatiens plugs, even if you water first thing in the morning. It will be difficult to dehumidify the greenhouse just by doing half-hour purges at the beginning and end of the day, as the outside air is just as moist. Air movement within the greenhouse with HAF fans can help, but you still need to exhaust that humid air. I suggest using a leaf blower when these conditions exist. Growers laugh when I suggest this, but those who use this technique swear by it. Use it toward the end of the day simply to get the water off the growing tip. Water on the leaves will not cause tip abortion; you will have problems only if water covers the growing tip.

Varietal susceptibility seems to play a role in tip abortion in impatiens as well. You may notice the problem shows up on weaker varieties first, then on to other varieties if the conditions still exist. Not all seedlings in the plug trays will show tip abortion at the same time. This makes it more difficult to ship or transplant the plugs, as you either need to grade out the seedlings before shipping or on the transplant line. You can feed the affected seedlings more to get the side branches to grow out faster, thereby still making a crop. But this won't work if you have a mixture of aborted and non-aborted seedlings in the same plug tray or finished flat.

Stunted Seedlings

A different impatiens problem that growers confuse with tip abortion is

stunted seedlings. This problem shows up only in certain varieties or seed lots. It expresses itself after germination is finished and cotyledons are expanded. You notice a difference by the time first true leaves start to come out. Some seedlings seem to curl down, have darker and smaller cotyledons, and do not grow as fast as neighboring seedlings. Tip abortion may show up later, but it is not the cause of this problem.

Stunted impatiens seedlings are due to poor seed quality. This commonly occurs with impatiens seed left over from last year, whether the storage conditions were good or not. I always tell plug growers to avoid carrying over impatiens seeds from one year to the next. If you have to do so, sow more trays early to get rid of the seed while not losing numbers. Be sure to buy in high-quality impatiens seeds every year. If some seed lots show the problem consistently, get rid of that lot, report the problem to your seed supplier and request a new lot or credit right away. The problem will not get better with additional sowings from that same seed lot! Sometimes, high EC in the water and low media pH may aggravate the lower seed quality, producing more stunted seedlings.

The difficulty with stunted seedlings is that they will not make usable plugs by the time of transplant. So, you either need to grade them out before transplanting or during the transplanting process. Every year, growers will see this problem to some degree or another, but generally only on a few seed lots here and there. Work with your seed suppliers to minimize your chances of getting lower-quality impatiens seed lots.

The Take-Home

Focus on maintaining proper soil temperatures, practice good moisture management, understand interaction between feeding and light levels, buy high-quality impatiens seed every year, rinse off fertilizer every time and dry off impatiens going into the night. Paying attention to the details will help prevent these infrequent problems from showing up and causing loss of seedlings at critical times of production.

PDF: Death of a Seedling: Tip Burn, Abortion and Stunted Growth

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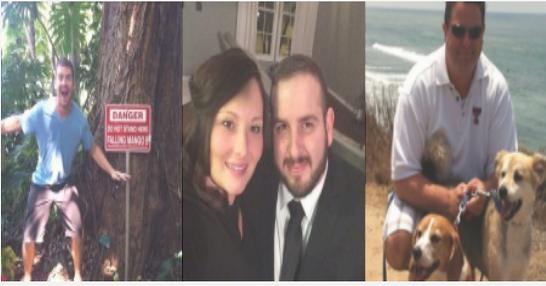
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