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Volume 14 Number 16 March 2025

What would cause this? Unexpected fertilizer injector problems

“If it’s not one thing, it’s another” could be a motto in the greenhouse. But taking a systematic approach to solving problems will lead you to the cause!

This Boston fern crop (Fig. 1; *Nephrolepis exaltata* ‘Bostoniensis’) wasn’t looking right. In looking at the foliage, the chlorosis clearly indicated something wasn’t right with the crop. In reviewing the environmental data, the air temperatures and light intensities were all within normal ranges and meeting the target setpoints, which ruled out problems with the growing environment. Nothing had been sprayed on the crop, so phytotoxicity from a plant insecticide, fungicide, or plant growth regulator could also be ruled out.



Figure 1. This Boston fern (*Nephrolepis exaltata* ‘Bostoniensis’) appeared chlorotic. After the greenhouse environment and chemical applications were ruled out, mineral nutrition and fertilizer seemed to likely be the root cause of the issue.

With the greenhouse environment and chemical applications ruled out as causes of the chlorosis, the other “usual suspect” remaining as a causal factor was fertilization. To determine what may be causing this, there are several steps to be taken to see if sufficient fertilizer was being applied to the crop, including testing the substrate electrical conductivity (EC), reviewing recent changes in fertilizer stock solutions, and inspecting the injector for correct functioning- and this is how the grower proceeded.

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The first thing the grower did was measure the substrate (EC). To do this they used the PourThru method, which is a non-invasive and simple method of measuring substrate pH and EC. When the leachate of several different baskets were measured, it was clear the EC was low, likely causing the chlorosis on the Boston fern foliage. This crop is fed regularly with each irrigation Monday through Friday, with clear water applied on weekends, so it seemed surprising that the substrate EC was low. This meant there were problems with the fertilizer stock solution or the fertilizer injector.

With respect to the fertilizer stock solutions, the grower was confident this was not the source of the problems- they had just mixed new stock solutions themselves! Two concentrations are blended, one from 21-5-17 and the other from 15-5-15. One barrel was completely empty, so it was a simple addition of one bag of fertilizer to 50 gallons of water. The other stock solution had 10 gallons left, so they added one bag of fertilizer and an additional 50 gallons of water, resulting in 60 gallons of stock solution. Since it was measured correctly, they took a sample of the fertilizer coming out of the hose, and the EC was low. This left the fertilizer injector to be the cause of the problem.

The injector itself seemed ok, but after looking at different parts, the grower found a piece of wood that was blocking sufficient uptake of fertilizer stock solution. Where in the world did this piece of wood come from? Although it seems unlikely to find wood in an injector, the grower realized the “mixing stick” they use when mixing stock solutions (Figs. 2 and 3). Once the wood was removed, the EC of the fertilizer solution was spot-on, and with the Boston ferns started receiving the correct amount of feed, the grower had time to look for a new stick (Fig. 4)!



Figure 2. This is the “mixing stick” used to blend fertilizer stock solutions. Seemingly innocuous enough, it turned out to be the cause of the injector malfunction.



Figure 3. Upon closer inspection, the “mixing stick” is showing some wear and tear. You can see pieces of wood splintering off from the stick, and this turned out to be the source of wood that clogged the injector.



Figure 4. Here is a different grower with a very similar set up. While the injector is different, it has the same two-stock tank set-up, along with a mixing stick. Note that this “mixing stick” is showing much less wear and tear, reducing the chances it will inhibit proper functioning of injectors.

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