Introduction
Whether you are in the middle of a production cycle or starting one soon, an irrigation system audit could greatly improve the efficiency of your water application. Despite whether you irrigate by boom, drip or by hand, there are a number of different things you can do to tighten up your system. First, find and make repairs. Second, check to see that applications are made uniformly.

Fertilizer Injector Calibration
For those watering by hand, especially if you are applying nutrients through your irrigation water, there are two management practices that are vital for increasing efficiency. First, make sure your fertilizer injector, regardless if it is an expensive displacement pump injector or a simple aspirator injector like a Hozon™, is calibrated or checked for consistency in fertilizer delivery. Knowing the rate at which fertilizer concentrate is to be mixed with irrigation water, you can then verify that rate by measuring the volume of your irrigation application and the volume of concentrated fertilizer solution being taken up by the injector. The ratio between the two volumes is your rate. If different than what you expected, adjust your fertilizer concentrations.

Watering Methods
Train your employees or yourself to irrigate as consistently as possible. Remember to check your containers after irrigation to see if the water you are applying is thoroughly wetting the substrate in your container. I cannot tell you how many times I see a dry root ball in a container, even after what seems to be a thorough hand watering. Try to keep the substrate moist, which may mean several irrigation events a day. The logic behind “cyclic irrigation” is that by keeping the substrate moist, it does not turn hydrophobic (resists moisture). A hydrophobic substrate takes over twice the volume of water for rewetting with most of the water channeling down the side of the pot or through the substrate which increases your leaching fraction and wastes fertilizer and water. Save water and time by frequent smaller applications.

Watering Using an Irrigation System
For irrigation systems, make sure that your pressures are at operating specifications. Your drip or spray emitters require specific pressures for applying water efficiently. An improper operating pressure due to pump wear, too small diameter pipeline (high friction and pressure loss), and worn or clogged emitters will cause water application to decrease. Uniform pressure will give uniform water discharge. Using too small a pipe or hose means high velocity water flow and a high pressure loss due to friction. Since you need to make sure all plants have enough water, this inconsistency will result in over application of water for many plants as you try to make up the difference for plants not getting enough water. Check your pressures throughout the system by installing fittings where you can place pressure gauges, either permanently or temporarily. Make sure that your pressures are consistent with the requirement of your emitters. Check your emitters for wear, clogging and consistency in output.
Uniformity Test
Application uniformity can be checked by performing a “Lower Quarter Uniformity Test”. This is a simple test by which you place “catch cans” or containers laid out in a “grid” pattern within your irrigation block to capture the water from your emitters during a test irrigation run.

Use at least sixteen containers placed either randomly throughout the system or within a specific block area.

Turn the irrigation on for a set amount of time.

Collect the water samples, measuring the volume applied in each of the containers, while noting where each container is located.

Draw a schematic of your bed or field, mapping where you placed your containers. You will need this to determine where you may be having problems down your irrigation line. On your map, label each container position and the volume of water in each container.

Write the volumes down in a list from highest to lowest.

Get an average of all the volumes.

At the bottom of the list, take last quarter (1/4) or those containers with the lowest volumes recorded. That is, if you have 16 containers, take the four (25%) with the lowest volumes and average those volumes. Divide the average of the lowest volumes by the average of all the volumes. If that divided value is less than 80%, then your “lowest quarter uniformity” is too low and your system is not functioning as efficiently as it should. You are probably overwatering too many of your plants just to get other plants irrigated.

Perform this test throughout your greenhouse to determine where you need to tighten your irrigation efficiency.