GROWERTALKS

Features

1/31/2015

Test Takers

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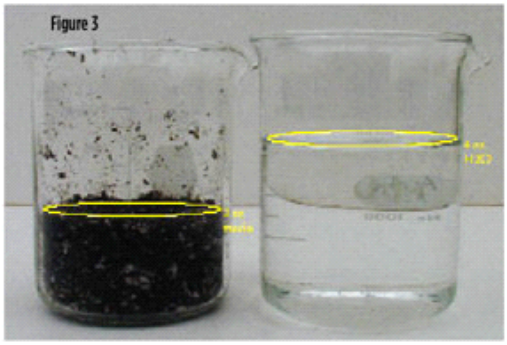
A basic strategy to avoid plant nutritional problems that can lead to crop loss is regular testing of pH and electrical conductivity (EC) of your root substrate. If you have a good quality root substrate and a sound fertilizer program that provides all the essential nutrients, then most nutritional issues come down to five problems. These are:

- The substrate pH is too high, leading to deficiency of iron or other micronutrients.
- The substrate pH is too low, leading to iron/manganese toxicity.
- The substrate EC is too high, either because too much fertilizer was applied or there's a high level of contaminants, such as dissolved sodium and chloride in the irrigation water.
- The substrate EC is too low because not enough fertilizer was applied or too much water is being applied and nutrients are being leached out.
- Plant roots aren't healthy because of high EC or overwatering. With diseased roots, the "plumbing" of the plant won't function to take nutrients up, even if plenty of fertilizer was applied.

Occasionally, less common toxicity or deficiency issues arise that require more in-depth testing to properly diagnose. In these cases, you'll need to send tissue and substrate samples to a horticultural laboratory for testing. However, the most common problems can be diagnosed using much more cost-effective and rapid onsite substrate pH and EC testing as a routine practice.

We've posted step-by-step protocols for onsite testing on Back Pocket Grower in both English and Spanish. To access the information on your smartphone, tablet or desktop, go to backpocketgrower.org. Click on "Training" at the top right of the screen, "Root substrates" and then "Substrate pH and EC" (Figure 1).

Figure 1



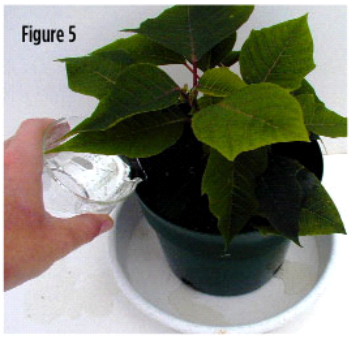
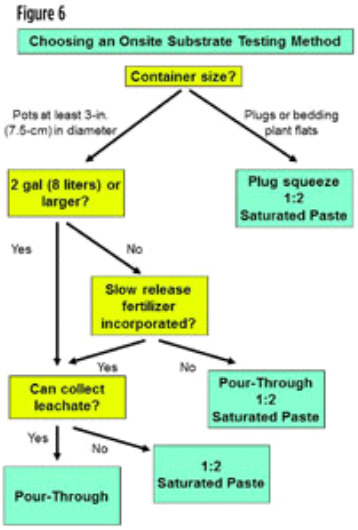


Figure 1. Access soil-testing protocols from backpocketgrower.com in both English and Spanish.
Figure 2. Plug squeeze method for small plants.
Figure 3. The 1 substrate: 2 water method.
Figure 4. Water is added to a saturated paste extract sample to create a glistening slurry.
Figure 5. In the pour-through test, enough water is added to displace a leachate sample.
Figure 6. Decide on an appropriate soil testing method for your crop type.

Figure 6



There are four main testing methods used by most growers:

Plug squeeze. Suitable for pushing out soil solution from plugs in trays (Figure 2). Plugs aren't destroyed by this method. It's important to sample from a well-irrigated substrate that was recently irrigated, in order to have a consistent amount of dilution of nutrients in the plug. Combine samples from several plugs per crop for one reading.

1 substrate: 2 water. This method is quick to prepare. Collect samples from the bottom two-thirds of several containers per crop (to avoid the salt crust at the top of the root substrate) and combine them for one reading. Compress the substrate sample similar to compaction in the greenhouse container, measure out twice the volume of the solution, then combine with the substrate (Figure 3).

Saturated paste extract. Also called the SPE or SME (saturated medium extract). Sample is collected as for the 1:2 method, but only enough water is added to produce a glistening slurry (Figure 4). This method results in the most consistent amount of dilution of the soil sample because less water is added if the collected root substrate sample is already wet. The SPE is used by most soil-testing laboratories.

Pour-through or leachate. A sample is collected by adding enough solution into the top of a well-irrigated container to displace a small amount of leachate from the drain holes in the container (Figure 5). Combine

samples from several containers for one measurement. This test method is especially suited to large containers and where controlled-release fertilizer has been added that may be broken open during a 1:2 or SPE test. The method is also effective if you're sampling stock plants where it's important to avoid touching the foliage and potentially spreading disease. A similar test is used by hydroponic growers where drainage solution is collected from a granular rock or perlite substrate, or from rockwool slabs.

To help choose between the methods, use Figure 6 as a guide. The differences between methods relate to how the sample is collected or diluted and the optimum range for EC. To obtain reliable data, you'll need a good quality pH and EC meter. Calibrate the meter before use and have a consistent protocol.

Once you've decided on the appropriate testing method, use Back Pocket Grower to train your staff on how to consistently test and interpret pH and EC.

Thanks to our industry partners in the Floriculture Research Alliance (FloricultureAlliance.org) for funding development of these training resources. **GT**

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