

THE PRESS - FOR PLUG TESTING SUCCESS!

by Holly L. Scoggins, Douglas A. Bailey, and Paul V. Nelson



Editor's Note: This article was adapted from *Greenhouse Grower*, 2000, 8(11):28-31, we appreciate the editorial cooperation from Meister Publishing. It is also note worthy, that this is Holly Scoggins first contribution to SEF.

Holly is a "true" product of Southeastern floriculture training...She entered into academia as an undergrad and continued as a Master's student at UGA, under the influence of (to be read as "surviving") Harry Mills, Allan Armitage and Paul Thomas. She obtained her Ph. D. from North Carolina State University with Doug Bailey and Paul Nelson, and now is earning her keep at Virginia Tech with teaching and research responsibilities. When asked about Virginia, Holly reported everything was fine except a distressing lack of barbecue restaurants. (Holly, that is exactly why God invented round-trip bus tickets!!!).

Holly, Welcome to the cadre of SEF writers!

Plug growing has been described as more art than science. But monitoring plug media can be an important management tool. For years, researchers and media companies have implored you to test plug pH and electrical conductivity (EC). But how? What if there was a method that could be performed right on the greenhouse bench, with no special equipment, no waiting around, and produced reliable results?

From Paul Nelson at NC State University, came the breakthrough technique developed specifically for plug testing - the "Squeeze" method. Plugs were removed from the tray, wrapped in cheesecloth, and the root zone solution was squeezed out.

We've refined this process even further. Knowing that growers are more likely to use techniques that are simpler and quicker, we devised the Press Extraction Method (PEM) or "Press" for short. The Press couldn't be easier; just follow these three steps:

1. One hour after applying liquid feed, select plug trays from within the same species and stage of development,
2. Holding the tray over a receptacle, simply press the top of the plug to expel the root-zone solution
3. Test the extracted solution's pH and EC.

The Method Explained

Let's discuss the reasoning behind the above steps.

Timing. NCSU research showed the truest "snapshot" of the plug root-zone solution occurs around one hour after liquid fertilizer is applied. If you wait much longer, plugs will rapidly take up available nutrients. Too soon and the solution has not come into "equilibrium" or stasis with residual fertilizer - you might as well be measuring the fertilizer solution as it comes out of the hose.

Plug Selection. Selecting the right plugs to test is important. Plug pH and EC can vary significantly between cells, but that is a very real variation that you need to be aware of. This variation can be smoothed out by combining the extract of at least 20 plugs (but all from the same tray). We compared sample sizes of 20 plugs versus 60 plugs, both from 288 trays, and found no difference in the pH and EC of the extract. Also, cells around the edge of the tray dry out quickly; this can cause a concentration of soluble salts. Expect the EC to be higher for these plugs, or better yet, sample mostly from the interior portion of the tray.

The Press Extraction Method

The Press just requires the use of one digit (your choice: thumb or index finger). The amount of pressure used to expel the solution doesn't matter: our research found that pH, EC, and nutrient content was not influenced by varying pressures within the range that a normal hand could apply (unless you happen to be Arnold Schwarzenegger). If the Press is done at one hour after fertilizing, light pressure is all that is needed. Push too hard and you may force media out of the plug tray bottom.

One of the benefits of the Press is growers can test the extracted solution's pH and EC immediately. You can also measure solution nitrate-nitrogen using a specific ion meter - a little device about the size of a pocket calculator. If you'd like to have a complete nutrient analysis performed, it's a good idea to filter out media particles with a few layers of cheesecloth before sending it to the lab. If results indicate excessively high levels of calcium and magnesium, chances are some particles of lime were present in the solution and were disassociating before testing.

The Press is a destructive method (though a few plugs may survive). The best way to reduce losses due to testing is to continue sampling from the same trays throughout the crop cycle, returning them to the same position on the bench each time.

Interpretation of Results

Now for the challenging part. What do these pH and EC numbers mean? After testing and comparing the Press to the SME and 2:1 methods, we have established some relationships.

pH

Media pH seems less susceptible to variation due to testing method than soluble salts levels. All three methods produce results within the same "ballpark", give or take one or two tenths of a unit. When measuring the pH of Press-extracted solution, expect 0.1 to 0.2 units less than you would with the 2:1. For example, if you've been using the 2:1 and your target pH range has been 5.6-6.2, Press readings between 5.4-6.1 would be comparable to those of the 2:1 method. Growers with prior SME experience can expect very similar to slightly lower pH values.

Because different crops perform best at different pH levels, we recommend the following target values when using the Press extraction method:

pH-tolerant crops:	5.3-6.4
Best performance at higher pH:	5.8-6.4
Best performance at lower pH:	5.3-5.6

EC

Soluble salts are where growers will notice a real difference between the Press and alternative methods, since 2:1 media samples are diluted by twice as much water. Published 2:1 recommendations for plugs and seedlings are 0.25-0.75 milliSiemens per centimeter (mS/cm; equal to dS/m which is the same as mmhos/cm; the units are interchangeable). Because there is no dilution with the Press method, root-zone EC values of 0.8-2.3 mS/cm would be the equivalent. You are seeing virtually the same level of soluble salts as the plug roots! Press EC values will also seem slightly higher when compared to past SME results: usually 0.2-0.5 mS/cm higher.

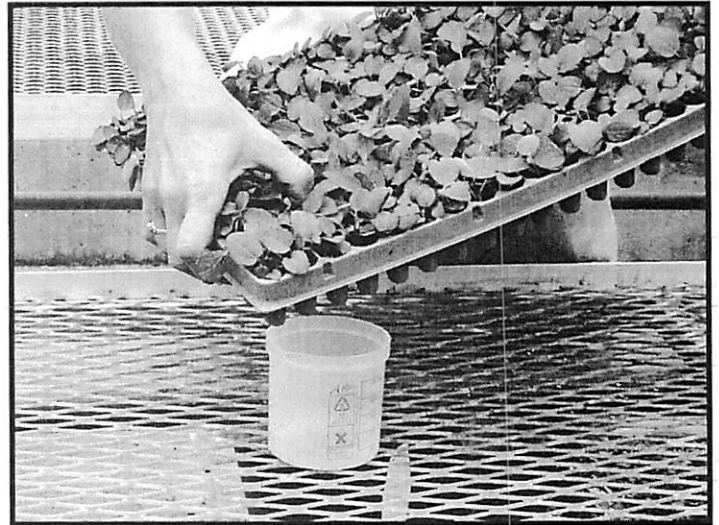
As with any type of media testing, there is no substitute for experience - with the myriad combinations of different media and fertilizers in use, repeated testing will yield the range of pH and EC that grows the best plugs for you. The Press method has just made it easier.

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