

Question-Answer — Monday Morning

Tom McGregor: Why did Twyford settle on Costa Rica?

Greg Lloyd: One of the things I didn't mention was that one of the weaknesses of off-shore production is that it tends to be unreliable in many cases. There are good labs and bad labs. The reason we chose Costa Rica was because it was close to Florida and we put a lab manager from the company down there. We couldn't see a lab further away (e.g., China). We could ship back and forth easily and we could get our management back and forth for training. Costa Rica has a relatively stable government and fairly decent electricity. Other places don't have these advantages.

Gary Matson: Does the change in density upon germination occur with all seeds? Does it happen suddenly at germination? Can you provide a little more detail how to take advantage of this?

David South: I can only speculate, but as seed gets bigger in size during the germination phase it gets lighter in terms of specific gravity. I don't have the data from a number of species to answer your question.

Steve Mullaney: Would you mind a couple more words on the day-night differential you mentioned, controlling it and preventing problems?

Roger Styer: So, we're talking about DIF. Going back to the concept of what DIF is, it's basically the difference between the day temperature and the night temperature, so under normal scenarios your day temperature is higher than your night temperature, you have a positive DIF. This causes stem elongation in a number of crops. If you can get it to a zero DIF where your daytime and nighttime temperatures are the same, you will slow down the stem elongation thereby slowing down stretch. If you go to a negative DIF where your nighttime temperatures are warmer than your daytime temperatures, you will slow it down even more. The difficulty is, can you do it? Do you have a greenhouse situation where you can control that? Work the Royal Heins' group has done shows that the first 2 h around sunrise is the most critical time or most influential time to do it. If you do it too much certain crops will start to yellow or develop chlorotic symptoms. *Salvia* is a good example where if you apply a -5 DIF it will turn chlorotic. If you remove it from the negative DIF and give it a positive DIF it greens back up again. So, there are also photosynthetic processes occurring here and you may also impact your root growth. Too much negative DIF you will tend to slow down growth dramatically and maybe produce undesirable results.

Kristin Yanker-Hansen: If I were doing this at home with just some seeds, about how much sugar should I put into the solution?

David South: That's a question I think you'll have to ask Chris Young. Prepare the sugar solution separate from the seed and then add this solution to the seed until they start floating. One of the things I should have mentioned is that they do have a test bag of seed and start testing 2-3 days earlier. When those seeds start to germinate then you have a good idea about the others that are about to germinate.

Kristin Yanker-Hansen: So, you don't add the sugar until you think the germination is occurring.

David South: That's right. Germination occurs in the water; the sugar is just used there for separation.

Bruce Briggs: John, on your research you were doing in containers, two questions: Did you try to raise the drainage holes in the container to hold a little volume of water in the base? Did that help in the conserving of water and the runoff? Did you try sealing off the top of the container to reduce or eliminate evaporation?

John Kabashima: The answer is no and no. With the idea of raising the drainage holes so you would have more moisture in the bottom, if you look at containers naturally, you will have most of the moisture in the bottom of the container. One of the things I have worked with quite a bit is the role *Phytophthora* and irrigations play in the production of plants. We have worked extensively in the detection of *Phytophthora* in different profiles in the pot. We find that most of it is in the bottom. I wouldn't encourage anyone to raise the drainage holes to increase the holding capacity of the soil in the bottom because then you will exacerbate the problem with *Phytophthora*. What you're trying to do is even-out the moisture within that whole profile. On the second question, the problem with putting something on the surface is that we haven't figured out how to do it economically. That would work wonderfully if the practical and economic concerns were solved. I have looked at mulches and they can have an effect. Now, with the computer and tensiometers we can really measure this. The computer logs the moisture tensions continuously over the whole period of the experiment so we have new tools to do that.

Bruce Briggs: If anyone in the room is conducting research in this area, it's one we can use because what we need is something that's easy to put on pots and something that will prevent the loss of moisture through that barrier, but will also allow something to go down into the container.

John Kabashima: We are looking at introducing some of these beneficial organisms into the pots. One of the carriers someone gave us was a clay that sealed the surface of the soil. We found we could not use it since it created an artificial layer on top that prevented water from moving into the container soil.