

Proc. 429: Fertigation - State of the Art

by Joseph Hagin and Anat Lowengart-Aycicegi.

Discussion following presentation of the Paper:

Geraid Demets, *Kemira SA, Wavre, Belgium*:

You talked a lot about drip irrigation systems which have been about 30 years in development and have a considerable position in the market-place. Do you see any new developments in terms of other efficient irrigation equipment? What will be the next generation after drip? What is your view on this?

Joseph Hagin:

I do not know what will be the next generation after drippers. Micro irrigation systems are not just drippers; other popular systems include micro sprinklers. I am sorry that I cannot predict what will be the next generation after drippers!

(Unfortunately at this point the recording system failed temporarily, and some discussion of the effect of fertigation on the efficiency of nutrient recoveries was lost. It was stated by Avi Shaviv that much work in Israel is currently investigating nutrient and water use efficiency.)

Joseph Hagin:

... matching irrigation to uptake so that fertigation minimises the leaching of nitrate. However there can be leaching of nitrate where the water is used or evaporated but the nitrate is not all taken up by the plant. Leaching of nitrate is a very important question and a lot of work has been done on that. Fertigation is one of the ways to minimise the leaching of nitrate.

Avi Shaviv, *Technion IIT, Israel*:

I am involved now in the fertigation of detached beds or 'growing media' as are used in some other countries in Europe, like in Holland, England, Spain, France. In this case one would expect the fertigation to be the most environmentally friendly system. Actually in my opinion it is the system which contaminates our water more than any other because in the detached bed we have to use very high leaching fraction because the plants are growing in a very small volume. There is high salinisation of the medium and we have very strong evapotranspiration and high radiation. The leaching is done with fertiliser solution, and as a result 50% of the nutrient, especially nitrogen, is leached into drainage water. In Holland I know that they take measures to reduce it. We don't do this yet in our country so it's a paradox that the most polluting system right now is from using fertigation. We are trying to find different approaches how to reduce it. One of them would be the recycling of the water, which complicates the system. However we'll probably have to use recycling in the future with fertigation, at least in intensive greenhouse production.

Mirielle Vanoverstraeten, *Kemira SA, Wavre, Belgium*:

The technique you were referring to is applied onto soils or detached beds?

Avi Shaviv, *Technion IIT, Israel*:

In our case the most common detached substrate is from volcanic tufa aggregate which is sterilised and turned to rockwool. We don't use soil as due to its water-holding capacity it's not efficient in our system.

Mirielle Vanoverstraeten, *Kemira SA, Wavre, Belgium*:

Concerning the monitoring systems you were talking about, could you explain what kind of monitoring systems are most used in research and development?

Avi Shaviv, *Technion IIT, Israel*:

Two approaches are taken. One is to look at what you get in your soil - and I refer to soils rather than to greenhouses or detached beds because these are very intensively taken care of. In the soils people are looking at different suction devices from which you can tell the EC and the composition. In terms of water use efficiency, people would use devices which can measure the transport of water in trees, or approaches like this, so you can also determine water consumption.

Joseph Hagin:

I would just like to add about fertigation and pollution. I don't argue with what my good friend Avi said about the situation with detached culture, but fertigation is used quite widely, for example in avocado as you have seen in the picture I showed, and in bananas and other soil-grown crops. In these cases I still believe that fertigation is minimising the pollution because you don't add more water and more fertiliser than is needed. Obviously in the volume that is wetted there is a high salinity and it has to be leached out but still you apply less nitrate. The application is much more exactly according to plant requirements in field crops, like cotton, avocado, bananas or any other fruit tree that receives fertigation. So the application is much more on time and according to plant requirements and so less is applied than would be in any other system, and therefore there is less leaching and less pollution.

Mirielle Vanoverstraeten, *Kemira SA, Wavre, Belgium*:

To continue this discussion, isn't it the monitoring of the actual consumption of nutrients that is rather difficult? In soils for example it has been shown that the use of fertigation can release some phosphate. Do you have any information on research around this topic?

Joseph Hagin:

I don't have any personal research; Avi Shaviv has done more on that.

Avi Shaviv, *Technion IIT, Israel*.

As you mention, we are working with calcareous soils and the leaching of phosphorus from calcareous soils is negligible. Our industry has been telling farmers 'don't worry about leaching of phosphorus, you need to use more phosphorus - it has to be supplied to the plants due to the fixation you have with calcareous soils'. At the moment I'm not aware of any problems that we are facing with phosphorus accumulation. I am involved in some projects in other countries, for instance in the United States where they use heavy dressings of manures and organic materials and the soils are of low acidity. Then you can see phosphorous accumulation, but we don't have evidence now that phosphorous is a problem in Israel. Maybe it's going to be a problem where we intend to use recycled effluent, where the water will contain some BOD or dissolved organic material. However that's part of our Israeli agriculture; it's not typical to the systems you will see in Europe or in the US so it's less relevant.

The Chairman thanked the speaker for the paper and the discussion.