

Dear Paul Fisher,

Thank you for the response to the Aqua-Hort discussion.

I assume you have been copied on the writings I have made to prof. Heins, so here I will just add some points which I think are useful in this connection.

Your explanation of the copper in nutrition solutions is OK to me, but you are jumping one point, and that is, the Cu plus 2 ion is complexed bound in most nutrition solutions, in or out of the root zone. Is it easy to test that by applying a free copper test to an ordinary nutrition water where the copper, chelated or not, has been added to the feed some time back. If you take the same water to the laboratory you will find copper but tested as total copper. Complex binding is normally no problem for nutrition purposes, because in the root hair zone are the complexes released through the electro-chemical processes going on there, with the pH level around one. In Aqua-Hort water you can normally find the free copper available on the dosed levels. It stays free over some time, long enough to do the task asked for.

Aqua-Hort is an fertilizer machine, but the main focus is on the positive side effects. Namely killing of spores, which can be performed at nutritional levels of Cu, leading to a number of positive follow up effects. The system has thus two effects: the direct and the indirect effect. The direct effect is the spore killing which prevents and combat ongoing attacks. The indirect effect is more white root hairs, bigger roots, more plants growth and better resistance against other calamities like Spider Mites and Fusarium. When a grower starts to use Aqua-Hort he must adapt some of his growing practices to gain the full benefit.

To come back to the copper sulfate discussion. Let me repeat how Aqua-Hort got started. At the Aarslev research station Kirsten Thinggaard and others had shown that copper ions could kill Phytophthora spores. Based on this finding all the growers were advised to apply more copper sulfate their feed. There was no positive effect of this action. I had in the meantime left the growers association DEG, and started to work with water treatment. Some key growers asked me to find an alternative method of applying copper. I tried electrolysis, combined with electromagnetism. We had a 100% kill from day one. This was in pot Gerbera. Since that day is Aqua-Hort a must in pot Gerbera. Gerbera grower Larry Hartmann in Kansas can confirm that statement. Based on this background is the talk about copper sulfate not fruitful to me. If you make high concentrations, some small portion will be free copper, but the environmental considerations will prevent that.

Within two years Aqua-Hort had spread to many different crops. Around five hundred units are now in operation worldwide. Alone this last week seven more units were ordered. If copper sulfate could have done the job, we would not have been in this situation. Another aspect is that silver, copper and chlor is now prohibited as plant protection agents in the EU. Chlor is not prohibited for cleaning purposes, but protection of the employees is an issue. Copper remains as an essential nutrient.

Aqua-Hort is now been researched in several places. There are two basic approaches. One is: Is this true, can we trust this argument. The observations among the first growers. The work of Lene Petersen and Prof. Wohanka did enough for me on the question. The Wohanka findings belongs to me. We are discussing if they should be published.

The other type of research is: How to apply Aqua-hort. This is more fruitful to me. There are hundred questions coming up on the application side. The Horticultural development Council in the UK has for example just finished their findings on Aqua-Hort application for sustainable cropping in hardy nursery stocks. I will send you a summary of their findings. It seems the report will be released in Feb./March. I should also like to mention the intensive trial

work which Lisbeth Riis carried out in Kenya on cut roses. Lisbeth has worked for many years in research. On my homepage you will have access to most of the research/trials available.

You mentioned the cost side to Lars. I include here the summary of the report made to the Swedish government, in connection with their enforcement of recirculation in the nurseries. The EUR figure is total cost per cubic meter including depreciation.

Aqua-Hort®

Cost of Treatment Recirculation Water

EUR per 1 m³

Slow sand filter	Vegetables	0,62
“	Pot Plants	0,25
Bio Filter	Vegetables	0,99
“	Pot Plants	0,47
UV Treatment	Vegetables	1,41
Heat Treatment	Vegetables	1,64
Aqua-Hort Cu	Pot plants	0.08

Swedish Gov. Report 2007, Jordbrugsinformation 4-2007
For Vegetables based on 20000 m² with inactive growing media.
For Pot Plants 16000 m² with ebb/flood benches

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From the table you will see that Aqua-Hort is by far the cheapest form to use. In addition Aqua-Hort is an active method working in the root zone, where the problems often reside. The other methods are passive treatments providing on the spot treatment only.

I wish you a nice weekend, and hope to hear from you.

Aksel de Lasson

9-1-10