

Summer and hydroponics

By Noucetta Kehdi

Summer, especially when it is a hot one, may be a difficult season for hydroponic growers. Every year we receive a stack of questions from clients asking what to do during the hot days, when one is growing hydroponically?

And this is an important question, knowing that a successful hydroponic operation relies on good oxygenation of the root mass, and that oxygenation and temperature are closely linked...

Indeed, good hydroponics is a growing method that mainly relies upon a dynamic flow of water saturated with oxygen. But the higher the temperature, the less oxygen will remain in your solution and in summer, when outside – and room - temperatures climb up to 30 and 40°C, then it is time to start worrying.

With high temperature and little oxygen, your roots will start to deteriorate, and soon pathogens will develop. These are the basic conditions for insects and fungi to thrive on weakened individuals with no or hardly any defences left. If you are not careful, or if you don't know how to do it, you may lose some plants or even a whole crop.

So what do you do in summer?

If you are very rich, or if you live in a country where electricity is very cheap (or free like in a few petrol producing countries), you can hook your grow room to the air conditioning! That's an excellent climate control!

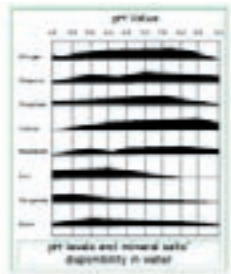
But in Europe electricity is still an expensive resource, and you may have to find a more affordable alternative. Water chillers may seem to be an option. They are easily available in pet shops where they are sold to keep aquarium waters at the right temperatures. But we tested them and found

them non-efficient in the case of flowing water.

The drop in temperature that you obtain is hardly noticeable because water, while circulating, will keep picking up the surrounding warm air.

To be really efficient, you must buy a very big model, which uses so

As you can see from the chart attached, the difference in ratio is not important enough to justify by itself the degradation of a root system. Indeed, when under stress, the plant's needs change as it will demand much more energy - thus more oxygen - to keep growing properly. So when working with hydroponics in summer, there are several more parameters to keep in mind.



much energy that you are still better off with the expensive, but way more efficient, air conditioner.

Don't panic yet! If there are no easy or affordable ways to avoid heat, there are a few useful "tricks" to be applied:

- First of all, it is important to know which are the temperature limits your plant can bare, as different plants will require different life environments. For most of them the ideal will fluctuate between 20 to 25° C. If you are using indoor hydroponics in summer, it is good to know that although unhappy and weakened, most plants will survive in hotter conditions, and you can allow your room to go up to 30 or 32°C - but with care and attention.
- Choose a highly oxygenated growing system. The higher the oxygenation, the better are your chances to keep a good temperature to oxygen ratio.
- Use a Bio Filter. This is a new instrument that allows you to add extra oxygen in your water while purifying it from most pathogens.
- In slower systems, if you don't want to invest in the Bio Filter, you may add an air stone or a stronger pump, to increase your oxygen content a little more.
- It is a good idea to start the new crop with reverse light cycles: shut your lights during the day and put them on only at night, to take advantage of the cooler air.
- During that period you must take regular care of your plants.
 - Keep your environment as clean as possible.
 - Of course install 24/24 hour ventilation. If possible bring the air in from the northern face of your building, or better still when available, bring it up from the cellar. As much as you can keep humidity level as high as possible, trying to reach 75 or 80%.
 - Keep a good eye on the roots. Use silicate powders to prevent fungi infestation.
 - Of course, check for pests. Don't allow the smallest spider mite or aphid. If a plant looks bad check the roots; when it is sick don't keep it.
 - Check the pH level every day and try to keep it as stable as possible. Don't overdo it though. It is better to let your pH drift between 5.5 and 6.2 than to add unneeded acids. All tests show that plants will continue thriving at pHs along that spectrum, and higher.
 - Keep your EC low to avoid too much salt intake: indeed, as it is hot and they transpire a lot, your plants will be

drinking a lot and absorbing enough mineral salts from the nutritive solution.

- Change your water as regularly as possible.
- At the end of the cycle, if your crop looks weakened, use a forcing solution to make sure your plants will release all their potential before dying.

This may seem a lot to do, and indeed it is. But for a dedicated grower, most of the time it is a pleasure, especially when the harvest is plentiful!

If you follow these few suggestions summer should become less of a problem in no time. Professional growers who keep their grow rooms running during the summer obtain beautiful crops.

But when the summer is really too hot like in Andalusia, Sicily, or Greece, then our general advice is: shut your operation and wait for more beneficial days. In the meantime, you can of course take a holiday or do anything else you wish to do. But before going anywhere, take advantage of this window in time to thoroughly clean your growing area and your systems, and get them ready for the next cycle.

To avoid throwing too much water and nutrients away choose a day when your nutritive solution is very low in the system, then stop your pump. Empty your reservoir. (*Don't throw the solution away if you can, but dilute it with tap water, check its pH and give it to your potted plants, they'll look great in no time! Some companies will give you pH and EC levels for soil applications on their labels*). Take apart your growing system and wash all parts. Unclog each sprayer, tubing, connector, etc. Clean the pump.

Rinse your system thoroughly. If you had a disease or any kind of pest in your room this is the best time to disinfect your system. You may use Chlorox water or pH down in very acidic dilutions (pH 3.0). If you use Chlorox, don't forget to rinse very well.

Separate the root mass from the substrate. Depending on the substrate you use, you can wash it and use it again. Some substrates, like clay pellets and coconut fibre can be used several crops in a row, and then may be recycled and disposed of in the soil. They will help lighten it and enrich it.

If using rockwool, it is important to look for the best way to



A good gardener can grow plants in extreme temperatures, following a few basic directions. Here temperature is 49°C and humidity level is 47%, and yet the crop was perfect!

dispose of it because it is not biodegradable and represents an environmental problem.

Wash your substrate as well as possible and let it dry. For clay pellets, especially if you are working in Aero-hydroponics and you don't have much, boil them on the kitchen stove.

Once your system and instruments are clean, wash your growing area to leave it dirt and disease-free, and let it rest until September, when the cooler days start coming back.

You still can, in the meantime, and if you have an enclosed space small enough to easily control your temperature, prepare the cuttings or sprout the seeds for your next crop!

Questions and Answers Section

Q1 - Can a root mat in an NFT system become too big? I've noticed my plants at the top end of the system where the nutrient solution comes in are really healthy, but the plants at the other end don't seem to be doing so well.

A1 - It is not the root mat that is too big, it is something in your circulation that is not adapted. NFT has its limitations, especially when it comes to grow large plants. One of the problems with NFT is that the roots tend to be crushed under the plants, making the technology more suited for small plants such as greens, herbs, strawberries and the likes.

There are however different steps to solve your problem:

First support your plants from above, in order to raise them a few centimetres above the root mat. Then you can work on the slope of your table. Incline it a little more so that the nutrient solution will flow a little bit faster. If you work on a cycle, you can also reduce the time between watering. Those simple steps should help you regulate the flow and help all plants get the same amount of circulation.

Q2 - I want to transfer some cuttings that are presently rooting in rock wool into a flood and drain system with clay pebble medium, are there any specific things that I should or shouldn't do and how long should I leave it before I transfer them?

A2 - Most plants are ready to be transplanted when they have 2 sets of true leaves well developed. This is the earliest time when the transplant can be done safely. After that, it should be done as soon as possible, in order to minimize the shock of the transplant. When the roots grow too much, they do not adapt well to the new substrate. The plants have to grow new roots while most of the old ones are dying. There is a time when the needs of the foliage

are not satisfied any more, resulting also in the loss of leaves, sometimes entire branches. If you transplant too late, you may even lose the whole top of the plant.

In your case, you may experience a (small) transplant problem because you are going from a very moist substrate, rock wool, to a well-drained one, clay pebbles. It would be best, if you want to transplant in clay pebbles anyway, to start your cutting in a substrate that is easy to wash from the roots. For instance vermiculite, mixed with about one third of perlite makes a great substrate for rooting. You could also use peat moss, but keep it outside of your grow room because it may bring you insects like fungus gnats.

If your plants are already in a rock wool plug, the plug might keep a humidity zone around the stem that can be a source of problems ranging from harmless algae growth to more serious damping off or other fungi infestation. Try to peel off some of the rock wool especially the top of the plug. Be careful not to take out all the rock wool, especially around the young growing roots, where you would do more harm than good.

Q3 – I have been told that in order to make some plants flower more, they need to be stressed a couple of weeks before harvest, is this true? And if so, how do you stress your plants?

A3 – This is an extremely controversial issue. There is in fact a school in favour of stressing the plant. I do not belong to it. It is a lore that goes far back in time, and you can read in many books that you can achieve a better harvest by running a rusty nail through the stem of the plant. This and all similar practices have accumulated over the years in many grow books, but there is little or no research to sustain it, and it belongs more to our folklore than to gardening.

I believe that, in order to give the best of its potential a plant needs to have as little stress as possible. A good crop is the result of a "happy plant life". In that regard, the quality of the vegetative stage is of the greatest importance for the final harvest. This is the time when the plant builds the structure on which the flower will develop as well as the root mat to feed for the rest of its life. If you succeed well in that first phase, you are already a long way toward a beautiful, plentiful flowering.

Now you have products on the market, such as Ripen from General Hydroponics, which do just that: they increase flowering during the last days of the plant's life and they work partly by stressing the plant. It is done by playing on the plant's nutrition and involves more than a simple stress. And it is limited to plants that you do not

mind to loose after they flower. I suggest that you treat your plant the best you can, and if you want a little extra flowering, use Ripen or a similar product.

Q4 – I have been hearing different reports from hobby growers I know with regards to the best lighting to use, some favour Philips bulbs, others Sylvania or Osram. Could you please shed some light on the matter (excuse the pun).

A4 – There is not simple rule to choose a bulb. It would be too easy. Basically plants need light at the 2 ends of the spectrum, in the red and in the blue. Very broadly, the blue part is used for growth, and the red is more important for maturation and fruiting. Ideally you need 2 bulbs: one for each stage of the plant growth. Metal Halide provides a blue spectrum more fitted to the growth stage and High Pressure Sodium provides more output in the red/yellow end: they are more suited for flowering and fruiting. Now to differentiate between manufacturers, it is another story! Most times, light emissions are measured in Lumen, lux or foot candles. All these scales were made to measure the light as it is perceived by the human eye. They are not very useful when it comes to plants.

To measure what a plant "sees", we use PAR (Photosynthetically Active Radiation). It is the part of the spectrum roughly between 400 and 700 nanometres. The measurement is expressed in PAR Watts. Another way of measuring the light is by taking into consideration the actual amount of photons emitted. In that case, we talk about PPF PAR (Photosynthetic Photon Flux). Another measurement gives more weight to red photons, since they are the most active. We then talk about YPF PAR (Yield Photon Flux).

All this is just to give you an idea of the difficulty to find a reference scale on which everybody would agree. PAR meters are expensive and difficult to find, rarely used outside of a lab. But even if you are willing to spend the time and money to get one, it will be still only an indication, since not all photons are equal.