

A bit more on Biofilm

Hygiene is a hot item.... This was noticeable after I wrote several articles that were published in online Horticultural magazines. Following my last penmanship, I received a large number of phone calls and emails from people wanting to know more and not seeing the forest because of all the trees... or was it the other way around! But actually the good bit was that everybody was really nice and wanted more info and nobody wanted to come round and put a brick through my window! One guy actually said he believed everything I said... I should send him round to have a word with my bank manager.

Amongst all the emails, there were also lots of questions ranging from: could you please write an article on X or Y, to: I grow this and need to do that, what should I do? As well as: the regulations have changed and I need to change what I am doing as it's no longer good enough so what should I do?

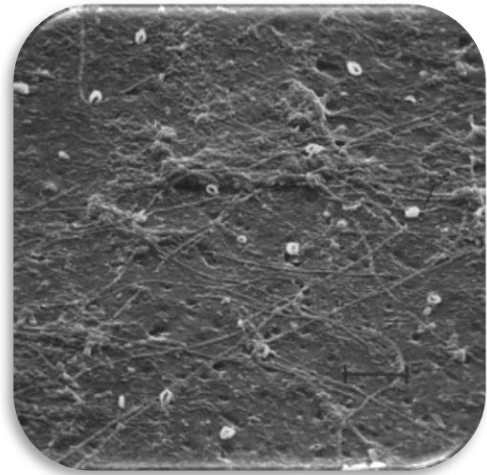
To be honest, I never expected to receive the "fan mail", but please remember, I'm just writing from my own personal 25+ years of experience in solving all kinds of (hygiene) problems, many of them water and biofilm related. It is practically impossible for me to solve someone's problems when I don't see the situation and know all the facts.

One of the words I wrote about was "biofilm". Many farmers are still trying to get round this word and wondering why it is so important and is it really costing them money. For many Biofilm is still as far removed as the east is from the west (which is not meant to be politically incorrect, only geographically accurate). Yet we deal with biofilm every day in numerous ways without even realising it and your dentist makes a fortune from it! Probably the easiest way of explaining what a Biofilm is, is to refer to that layer you feel on your teeth at the end of a long day when you haven't had time to brush your teeth. It's the reason why your dentist advises you to brush twice to three times a day, but because many people don't they end up getting teeth or gum problems. This layer is produced by micro-organisms (M.O.) to protect them from harmful external influences and allows them to reproduce safely. M.O. may be unicellular, but obviously smart enough to build a biofilm which sets their base to colonisation of other areas within that water system.

When you put your finger in a new unused water pipe it feels rough, yet once you have used the pipe for only a few days it will feel slimy. That's because biofilm has colonised the internal walls of the water pipe and built a Biofilm and the slime layer that you feel is the outer layer. Colonisation happens with seconds of you putting water for the first time in your new pipe.

Biofilms are measured in micron -represented by: μ – which is 1000 of a millimetre or for our US friends $1\mu = 0.000039370$ inches. So basically you can't see it with the naked eye. Yet in 1cm^2 (0.155in^2) there are ± 5 million M.O.'s, and an irrigation system can easily contain 20-50 μ up to several cm – the bigger the pipe the thicker the biofilm generally when left untreated.

In an irrigation system that is not treated with a biocide that is effective against M.O. & biofilm, biofilm will have a free hand and will grow and multiply at will. The numerous types of M.O.'s that are present in an irrigation system will include the so called beneficial M.O.'s as well as the ones that are constantly causing you problems, like Fusarium, mildew, Agrobacteria, but also Legionella etc..



Biofilm is any group of microorganisms in which cells stick to each other and adhere to a surface.

The other problem with biofilm is that it produces M.O.'s which are many times more resistant and aggressive than their same kind which do not originate from a biofilm. This basically means that you need much less M.O.'s to get an infection and that the infection will be harder to get rid of because the M.O.'s that caused it are highly resistant. This in a way explains why many pesticides don't work as well in practise as they do in the lab.

Micro-organisms reproduce under favourable conditions every 20-40 minutes – favourable conditions are temperature – 12°C to 40°C or 54°F to 104°F, nutrients (fertiliser) and oxygen (are all present in the water). Once an M.O. type has reached a certain population – it will continually release tens of thousands of its strains into the water stream to populate the biofilm in other areas. This is a continual process because M.O.'s don't stop for lunch, sleep or go on holiday.

So imagine how many of these resistant and aggressive micro-organisms are present in the water you give to plants after the system has not been used for several hours or overnight... Its millions and millions! So every time you turn on the water, millions of these aggressive and resistant M.O.'s are brought into contact with plants. These plants have to spend considerable energy to continually fight off these constant attacks, and you have to regularly spray them to prevent disease. It's a never ending battle!

Now imagine if plants didn't need to do that. Imagine that plants could use all that energy for growth and production, because ultimately that's why you are growing them. Well the result would simply be a significant saving in spraying costs, better and even growth and reduction of disease by around 80%.... yes I did say 80% because that's basically how much disease biofilm is responsible for. So I'd say it is seriously worth considering using a treatment product that will control M.O. and prevent/remove biofilm.

At the end of the day, it is imperative for the wellbeing of any plant that is irrigated – may it be by drip irrigation or other system in which water distribution pipes are involved – that growers understand the impact of biofilm on their crops. Tackling biofilm is a continual battle and must be done preferably with an environment friendly biocide that is effective and does not become resistant with use. Controlling microbial levels and biofilm growth will absolutely save you money, improve your production, reduce and prevent disease as well as save you a lot of headaches... and perhaps now an extra trip to the dentist!