



ToBRFV in irrigation water

Spread of virus

Tomato nurseries in particular nowadays take all possible hygiene measures. All these measures are aimed at keeping pathogens, in this case especially ToBRFV, out of the nursery.

These measures are very diverse and range from disinfecting shoes, keeping out anyone who has nothing to do in the greenhouse, to special clothing or sterilizing harvesting equipment.

Based on all these measures, it should be difficult for a virus to enter a greenhouse. The opposite seems to be the case. The virus is spreading faster than expected.

Apparently there are other causes that can cause ToBRFV to enter the greenhouse. The most obvious cause is via the irrigation water.

Drip irrigation

Many cubic meters of water are pumped into the greenhouse every day via drip irrigation. Normally this water is taken from the basin and passed through an UV disinfectant. There is no control of pathogens in the basin, so that pathogens occur in large quantities in the basin water.

Spread of pathogens, including viruses, from basin to basin can easily be done by ducks, birds and other smaller animals. It is not inconceivable that almost all pathogens occur in the basin water, but rather likely. If so, you have a large source of contamination close to the nursery and via drip irrigation throughout the greenhouse.

Viruses

Normally all irrigation water goes through an Ultra Violet (UV) disinfectant and/or hydrogen peroxide (H₂O₂) is added. However, this disinfection technologies cannot be relied on blindly. It is well known that Tobamo viruses such as ToBRFV are not damaged by an UV disinfectant or H₂O₂.

Fungi

Even for fungi, an UV disinfectant unit is not 100% effective.

Laboratories generally keep a margin. For example, if there are less than 25 colony forming units (CFU) per ml after the UV disinfectant, this disinfectant will be approved. 25 CFU per ml is 25 million CFU per cubic meter of irrigation water.

Assuming that the same numbers apply to viruses, this is also 25 million viruses per cubic meter. Tobamo viruses (ToBRFV) however, are not killed by UV at all.

FIGHT PATHOGENS WITH USAF™

Fight against:

- Bacteria
- Fungi
- Envelope viruses
- Non-envelope
- TMV
- ToBRFV
- ToMV
- Algae

High Power Ultrasound

Unique technique

Cavitation principle

Cell wall damage

Fast action

Combination with
UV
H₂O₂

Scientifically proven

Fight biofilm

Ten years of experience
in horticulture

Minimal maintenance

Patented NL2000797

With every cubic meter (m³) of water that enters the greenhouse, millions of fungi or viruses can come along. This is considered as safe. Anyone realize that this cannot be true. Pumping millions of ToBRFV viruses per m³ into the greenhouse cannot be safe. If the irrigation water in the greenhouse is contaminated, transfer to the plants is only a small step.

If such a situation only occurs once during a crop season, the entire greenhouse can be and will remain contaminated until all plants are removed and everything is disinfected. This will cause a financial disaster, especially when the ToBRFV attack is in the middle of the season.

Treating basin, drain and irrigation water

A good solution would be to permanently treat the water supplies in basin or silo with USAF™ equipment. USAF™ then permanently combats not only the pathogens present in the water supplies, but also algae and the biofilm. Two high-power USAF™ units must also be installed too. One in the drain water circuit and one in the supply to the greenhouse. Respectively in combination with the existing UV disinfectant or the H₂O₂ injector. Configuration does depend on the existing situation.

Combination with other techniques.

Practical tests in flower bulbs (tulips) show that combinations of USAF™ with other techniques such as UV disinfectant or hydrogen peroxide are almost always 100% effective. This can reduce the risk for a ToBRFV contamination almost to zero.

Operation combination

The technology to combine USAF™ with other techniques (UV or H₂O₂) is as follows.

Both, UV light and hydrogen peroxide, oxidize the membranes of the fungi and viruses.

If the membrane is partially permeable, the DNA is exposed and can be destroyed. This is the end of the pathogen. However, the dissolution of the membrane takes a relatively long time and consumes most of the UV light or H₂O₂. The dosages for fusarium were determined for H₂O₂ in a study by the Research Station for floristry and greenhouse vegetables. It turned out that a minimum of 400 ppm to 1000 ppm H₂O₂ is needed to destroy fusarium. An impossible dosage. <https://edepot.wur.nl/411860> (Dutch)

Pretreatment with USAF™ is the solution. With USAF™ the membranes rupture in a split second, after which a greatly reduced dose of H₂O₂ (-75%) or UV light, can destroy the DNA easily.

Experience

In addition to scientific evidence, practical tests have been conducted by Luijkx Ultrasound and Arcazen with H₂O₂ (jet5) and chlorine (Aquanox) on fusarium and PIAM V virus in combination with USAF™. This tests in flower bulbs shows that, only USAF™ gives a limited result. Also only the H₂O₂ or chlorine gives limited results. However, USAF™ in combination with a greatly reduced dose of H₂O₂ or chlorine is 100% effective in a very short time.

Cost

It is known that the financial damage can be enormous with a ToBRFV infection. But also lower production and increased waste due to fungi and bacteria is a cost item. The investment for USAF™ will be recouped quickly.

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