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Tom Beyers: "You really don't want surprises when you grow specialities. So the level of unwanted salts in the nutrient supply has to be kept as low as possible."

Closed irrigation system at tomato specialist Den Berk

Low-sodium potassium fertiliser makes endless recirculation easier

The Belgian tomato grower Den Berk has brought all its creativity to bear to enable it to constantly recirculate its irrigation water. Cultivation manager Tom Beyers explains the elements of the system: good input water, disinfection, use of low-sodium fertilisers, emptying drain silos on time, and managing the nutrient supply using plant sap analyses.

The Flemish horticulture sector currently faces stricter rules on discharging water with added nutrients than its Dutch counterpart. Whereas zero discharge will only come into force in the Netherlands in ten years' time, it is something Belgian growers are already having to contend with. Moreover, enforcement is strict: there are very large numbers of sampling points in ditches. This means that a great deal of experience is being built up, which may also benefit growers across the border and elsewhere.

Spreading drain water

"The Flemish Fertiliser Action Plan (MAP) bans any discharge of nutrient-rich water," says Guy Pluym, advisor with fertiliser suppliers Sanac. "There is only one alternative: spreading the drain water over grassland. But for the owners of the grassland, it means that it will be deducted from their fertiliser quotas." "That's not an option for us," counters Tom Beyers of Den Berk. "You have to get someone to come and empty the drain silos and you have to find a farmer who will take it. We are concentrating our efforts on full recirculation, which means that we have to pay attention to every part of the system."

Den Berk, which is based in the Hoogstraten horticultural area, now has 24.7 hectares under glass plus a large processing hall with three Flowpack lines and a multihead weigher. The nursery is part of the Den Berk Délice group, to which three other nurseries also belong. Together they have about 42 hectares of glass, almost half of which is lit. They concentrate on specialities, mainly within

their four own brands, Miss Perfect, Bellino, Party Mix and Kumato.

Sodium content

Full recirculation requires two potential problems to be tackled: diseases in the water and rising salt contents. It all starts with good quality input water. Den Berk uses as much rainwater as possible, but sometimes there isn't enough, as was the case two years ago.

Because the groundwater in this region has a relatively high sodium content, it needs to be added in gradually. "But the sodium content increases towards the end of the cycle anyway, even when you're only using rainwater," says Beyers. "That's why we empty the drain silos as far as possible before we plant the next crop. That leaves the excess sodium in the old slabs, which we then recycle. We do this by pumping rainwater into the drain silo during the last week of the crop. There is hardly any drain left by then anyway. This way the salt that is still in the water is diluted as much as possible. We can easily reuse the highly diluted drain water in large volumes during the last week of the cycle, via the mixing tank unit. Then we pump the little that's left of the diluted drain water at the bottom of the silo across to the crop that's growing at that time." They can do this because the lit and unlit crops are never cleared at the same time.

To prevent diseases, they disinfect the water for the unlit and lit crops separately, using a heater and an ECA unit which actively makes chlorine on site.

Discharge rules

Supported by his advisor Pluym, the grower has been giving a lot of thought to low-sodium fertilisers. Levels can be relatively high in some types, such as certain types of calcium chloride or iron. For this reason he uses 6% DTPA chelated iron, which is low in salt. The potassium nitrate fertiliser he uses is Multi-K Reci, which contains much less sodium than

Pluym (left) and Molenaar: "The discharge ban is increasing demand for low-sodium potassium nitrate."

With tailor-made big bags, the tanks can be filled in one go.

"standard" Multi-K GG. "The maximum content is 300 ppm, and we guarantee that," says Marco Molenaar of Haifa. "It's even lower in practice, about 150 to 200 ppm. As potassium producers we have reviewed our production processes in response to market demand for cleaner fertilisers. We get rid of the sodium by giving it a longer run through the factory."

Pluym is seeing demand for this low-sodium potassium nitrate rise every year. Belgium is at the forefront of this transition but a major shift is also under way in the Netherlands, says Molenaar, due to the gradual tightening of the discharge rules. This is less of an issue in other countries.

"We are very happy with this method," Beyers says. "It helps us manage our sodium levels and fits in well with the big bag system we use. The big bags are put together to our own specification and this enables us to fill up the tanks very quickly in one go."

Plant sap analyses

Beyers manages his fertilisation based on the nutrient levels in the irrigation and drain water and on plant sap analyses. Molenaar: "In the past, everyone only ever monitored the levels in the drain water and adjusted their phosphate or potassium supply based on that. But when you have more management tools you can make more efficient use of fertilisers. On balance, that means you'll be using less potassium and you'll therefore have a lower sodium load as well."

In plant sap analyses, the concentrations of nutrients in young and older leaves are compared with the norm. A particularly important variable is the development of levels over time. Beyers: "You shouldn't wait until the levels in the plant sap get too low as you'll be too late by then. We also keep a critical eye on the drain water levels. We used to focus mainly on that, but these days we take more gradual steps."

Uptake problems

Nowadays tomato is widely known as a crop that is not particularly sensitive to salt and actually takes up a fair amount of sodium, preventing it from accumulating in the drain water. So why use a low-sodium potassium fertiliser? Molenaar again: "Sodium prevents the plant from taking up other positively charged ions (cations). This not only applies to potassium but to calcium as well, for example. You don't want any uptake problems with calcium because of the increased risk of blossom-end rot."

The grower adds that they already work with a high slab EC because it improves the flavour of their specialities. Surprises are therefore most unwelcome, and to keep them at bay the level of unwanted salts has to be kept as low as possible, as a high EC increases the risk of blossom-end rot – although this depends very much on the variety.

Summary

Belgian horticultural businesses can no longer discharge any fertilisers. The tomato grower Den Berk has therefore optimised its entire water distribution chain: clean input water, disinfection, fertilisation based on a combination of drain and dripper levels and plant sap analyses, using low-sodium fertilisers, and eliminating salts at crop changeover. Cultivation manager Tom Beyers has had good results with low-sodium potassium nitrate.