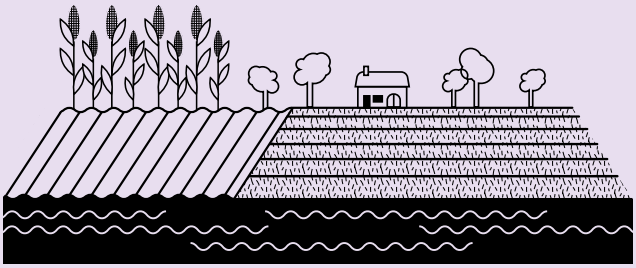
Field tests provided insight into the interactions between soil and irrigation water.

Aim

To develop knowledge concerning the reuse of purified residual water in agriculture.



CLOSED CYCLES

Purified residual water for agriculture

Irrigation helps combat drought in agriculture. Instead of scarce groundwater, an alternative water source can be used: the purified effluent from water treatment plants. However, this water still contains contaminants. This project investigated two aspects of reuse via ‘reverse drainage’: the dispersal of contamination in the soil and subsoil, and the purifying effect of the soil.

Re-USe of Treated effluent for agriculture (RUST)

Project leader
Dr. ir. Ruud Bartholomeus

Research institutes
Wageningen University & Research
Utrecht University

Number of consortium partners
2

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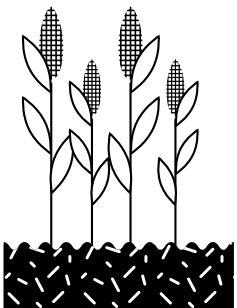
‘What happens if **contaminants end up in slower water system**, namely in the soil and in the groundwater?’

What was the project focus?

‘Much of the Netherlands’ agricultural land is drained via a system of underground pipes’, says Ruud Bartholomeus, hydrologist at the water research institute KWR and affiliated with Wageningen University. ‘These can also serve a reverse purpose: subsurface irrigation. This kind of irrigation prevents evaporation loss and puts scarce water resources to more efficient use.’

Even more efficient is the use of water that would normally remain unused. ‘For example, the purified effluent from sewage treatment plants or factories’, says Bartholomeus. ‘We studied what happens if you add this residual water to the water system beneath the surface. Would this benefit the crops? And if this residual water passes through the soil and the groundwater to the surface water, will it be purified by the soil?’

Effluent may be discharged into surface water in the Netherlands, because it meets a number of agreed standards. But this does not mean that it is clean – on the contrary, the researcher emphasises. ‘It still contains quite some micro-pollutants, including certain persistent substances and medicine residues’, he says. ‘Water management is currently focused on discharging these contaminants as quickly as possible via surface water. But what happens if they end up in this slower water system, namely in the soil and in the groundwater? How will they behave there? Will they end up in the crops? We investigated this in a test field, in the lab and using computer models.’



What are the project outcomes?

The message is twofold, concluded Bartholomeus and his colleagues. ‘If you want to use this effluent, then applying it underground is a good idea’, he says, ‘because there is indeed a purifying effect and you limit direct contact between crop (or farmer) and effluent. However, the effects on the environment are very diverse. These depend on many local factors, such as soil type, geohydrological properties, but also weather conditions. Predicting the overall effect for each individual situation is very complex.’

Concerns about contamination will disappear with stricter purification of the effluent, the researchers conclude. ‘In other words, treated residual water would need further purification before being released into the soil’, emphasises Bartholomeus. ‘That is perhaps the most important conclusion of this project. Everything we learned feeds into that discussion: which quality requirements should this effluent meet? Which additional purification steps are needed? But also: should we still be irrigating fields above-ground with surface water that is affected by effluent, which is in fact current practice?’

Many of those questions remain unanswered. ‘Fortunately, this theme is now also being addressed in a wider context’, says Bartholomeus. ‘For example, in the KWR programme Water in the Circular Economy, which was initiated by water companies and involves various water managers and the Dutch Delta Programme on Freshwater, among others. That is a great development: it means that this subject is getting the attention it deserves. There is still a lot to be gained when it comes to closing cycles in the water sector.’