

# After six years: IKT researchers dig up their test stand for tree roots



After six years of growth: IKT researchers dig up their tree root test stand in Almere (Netherlands)

How to keep roots away from sewage pipes? IKT investigates protection systems in a long-term project. Researchers want to find out which protective measures are suitable. They have now dug up their worldwide unique in-situ test rig. The initial results are surprising.

At the start of the project, IKT laid wastewater pipes with various protection systems underground. They then planted trees on top.

The researchers left the roots to grow in peace for six years. They only checked on them from time to time. In August 2024, the time had come: they dug everything up to see how the roots had developed and how well the pipes were protected from them.



IKT researchers pull protective matting out of a sewer pipe trench that they installed six years ago to protect against root ingrowth.

### **Roots obstruct drains**

Sewage network operators are constantly struggling with root ingrowth in sewage pipes. Obstacles to drainage can form and even cause complete blockages. These then have to be laboriously milled out. In the worst case, the only solution is expensive excavation. Structural protection measures are designed to prevent precisely this, so that trees and pipes can coexist in harmony in cramped urban spaces.

### **Material mix in the experimental setup**

IKT researchers therefore want to find out which passive measures are suitable for protecting pipes. Six years ago, they set up a worldwide unique in-situ test stand for this purpose. At a depth of 1.20 metres, they laid two 30-metre-long DN 150 and DN 300 sewer pipes in parallel. On top they planted five fast-growing poplars, each five metres apart.



Root protection mat installed in the ground is removed.

To see how roots interact with different pipe systems, they chose pipes made of concrete, PVC, PP and GRP. The total of 15 pipe connections are standard push-in joints, shrink sleeves, transition sleeves and an experimental bentonite tape.

#### **What works against root ingrowth?**

In the bedding area around the trees, the IKT researchers installed eight root barriers, such as foils and vertical panels from various manufacturers, as well as two mineral encapsulations.

That was six years ago. The poplars are now ten metres tall and in great shape. Time to see how the roots have grown and whether the protective measures are working.



With archaeological care: root excavation in the IKT test stand

## **Digging like archaeologists**

The IKT researchers took archaeological care when excavating the roots of their trees so as not to damage the roots.

They meticulously documented how the roots had grown. Their painstaking work took a whole week with the help of hand shovels, suction excavators and compressed air lances.

## **Roots surprise researchers**

Visually alone, there was something unexpected: even thick roots branched out like an ancient Roman trident when they encountered resistance. They followed the relatively loose soil space around the sewage pipes. They looked for their way and found it. They bypassed the built-in obstacles – successfully at first glance.



Despite protective mats: Roots continued to grow merrily

Some roots penetrated deeper into the earth along the vertical protective plates, only to grow upwards again behind the obstacle. Others bypassed the protection systems sideways. All of them grew towards the bedding zone of the pipes, probably because the soil is less compacted there and they can advance more easily than in the natural soil space.

Of the 15 pipe connections, 13 withstood the roots, two did not. The connections between the vertical protective plates were also not impenetrable in all cases. The roots snaked through here too.

## **Back to the lab**

Now it's back to the lab, where the researchers will investigate exactly what the roots have done. The final results of this research project are expected in early 2025 – we will report back.



IKT root expert Dr Mirko Salomon and biologist Prof Dr Thomas Stützel from Ruhr University Bochum (right)

### **Thanks to the Netherlands**

The IKT root test stand is located in a new development area in the city of Almere, near Amsterdam. It was set up in the winter of 2018/2019 and has now been dismantled.

We would like to thank the city of Almere and the Dutch foundation RIONED for funding the project to the tune of 205,000 euros. Prof Dr Thomas Stützel, Director Emeritus of the Biological Garden at Ruhr University Bochum, supported us with his impressive wealth of knowledge as a biologist and root expert.

### **Photo gallery: Excavation of the IKT tree root test field in Almere/Netherlands**

Click on pictures for full view





The IKT test field with poplar trees in a new housing estate in Almere/Nethe rlands



Researchers in the field: Prof Dr Thomas Stützel from Ruhr University Bochum and Kilian Möllers, M.Eng. from IKT (r.)



Protective mat to stop roots



Tree roots are cleared with suction excavators, shovels and by hand.



Horizontal root ingrowth in the pipe trench



Root mats excavated from the IKT test stand



Protective mat, roots and sewage pipe



Almost like an ancient Roman trident: tree roots grow towards the sewage pipe



Looking vertically down into the pipe trench: The black protective mat against roots is clearly visible



Suction excavator carefully removes soil around sewer pipes without damaging tree roots



Roots and sewage pipes are excavated with great patience and sensitivity.



Information board at the IKT test field in Almere/Netherlands