

PIONEERING UNDERGROUND



Photo Guy Ackermans

In a former Cold War bunker in Arnhem, students are growing crops on Martian soil.

The underground bunker is the temporary setting for the Research Methodologies for Plant Sciences course. BSc student of Plant Sciences Mats Bours and his course mates have been working here for about three weeks. 'It's sexy research,' he says as he inspects the rye plants in his nursery 'greenhouse'. But he's a bit disappointed with the result. 'We expected more from the Martian soil with poo,' he explains, 'what with the extra nitrogen that is therefore present in the soil.' The greenhouse, an adapted Ikea cupboard, houses a few dozen pots containing rye growing in normal soil or a replica of Martian soil. The soil may or may not be fertilized with poo. Human

poo, that is, from WUR staff in the AFSG department.

The trials are the latest development in ecologist Wieger Wamelink's Mars research: growing crops in Martian soil enriched with faeces. The Wageningen researcher is renowned for his testing of Martian soil. He doesn't actually mix turds into the soil. The liquid fraction of fermented poo is used, explains Bours.

'Because of the radiation, you can't live on the surface of Mars'

'Fermented to kill any *E coli* bacteria.' At heart, then, this is all about circularity. According to Wamelink, recycling would be essential on Mars, because the soil there is poor in nutrients. In the bunker, the students experiment with soils enriched with pee and poo; they designed the experiment themselves. The bunker, an underground monster on

the former Saxony-Weimar military site, poses an added challenge.

Urban farming

The bunker is a remnant of the Cold War and served as a communication centre for military air traffic from 1974. It has been disused since 2000. Wamelink was offered the use of the bunker thanks to the Science Shop Wageningen, which is doing research for Stichting De Groene Bunker to find a long-term use for the bunker.

One promising option is urban farming and Wamelink's Mars experiments are the first demonstration of this kind of possible new use for the bunker. For 'Mars gardener' Wamelink, the bunker is heaven-sent. 'It's been clear to me from the start that if anyone lived on Mars it would have to be underground. Because of the radiation, you can't live on the surface. A bunker is the nearest approximation we have to that situation.' 'This is really great. In a bunker like this, you find out what you're up against when you go underground. There is no natural light, and it is cold and damp. So you have to cope with all that.' The Ikea cupboards are wrapped in white polystyrene. LED panels simulate a diurnal rhythm and emit heat as well. Despite the bunker's 12 degrees Celsius, the temperature in the greenhouse is 20 degrees and good for plant growth. A fan keeps the atmosphere right and a sensor measures and records CO₂ levels.

For the students, the trial is over after more than three weeks. Wamelink will carry on until the 'final harvest' of rye and peas. Sometime in the coming months, Covid measures permitting, there will be an open day for the neighbourhood. ^{RK}