

Arabidopsis is infected by a virus

Thanks to observant researchers, it came to light that thale cress, the universal model plant for genetic research, is infected by a virus. This could affect the plants in ways that are not clear yet. What are the implications for research?

TEXT RIK NIJLAND PHOTO SHUTTERSTOCK

The story begins about six years ago, when entomologist Karen Kloth stumbled upon something strange in the course of her research on resistance genes against aphids. In some of her test plants – thale cress, or *Arabidopsis thaliana* – 90 per cent of the RNA she found did not come from plant genes, but probably from a virus. Kloth got in touch with René van der Vlugt, special professor of Ecological Plant Virology, in the hope that he could shed some light on what was going on. To find out where the alien RNA came from, Van der Vlugt and recent graduate Ava Verhoeven compared it with RNA from a large international database. ‘Our conclusion was that it must indeed originate from an unidentified virus,’ says Verhoeven, now a postdoc at Utrecht University. ‘By chance, I found out that they’d had a similar case in Utrecht. When we compared the

unidentified RNA from Utrecht with that from Wageningen, it turned out to be the same unknown virus.’

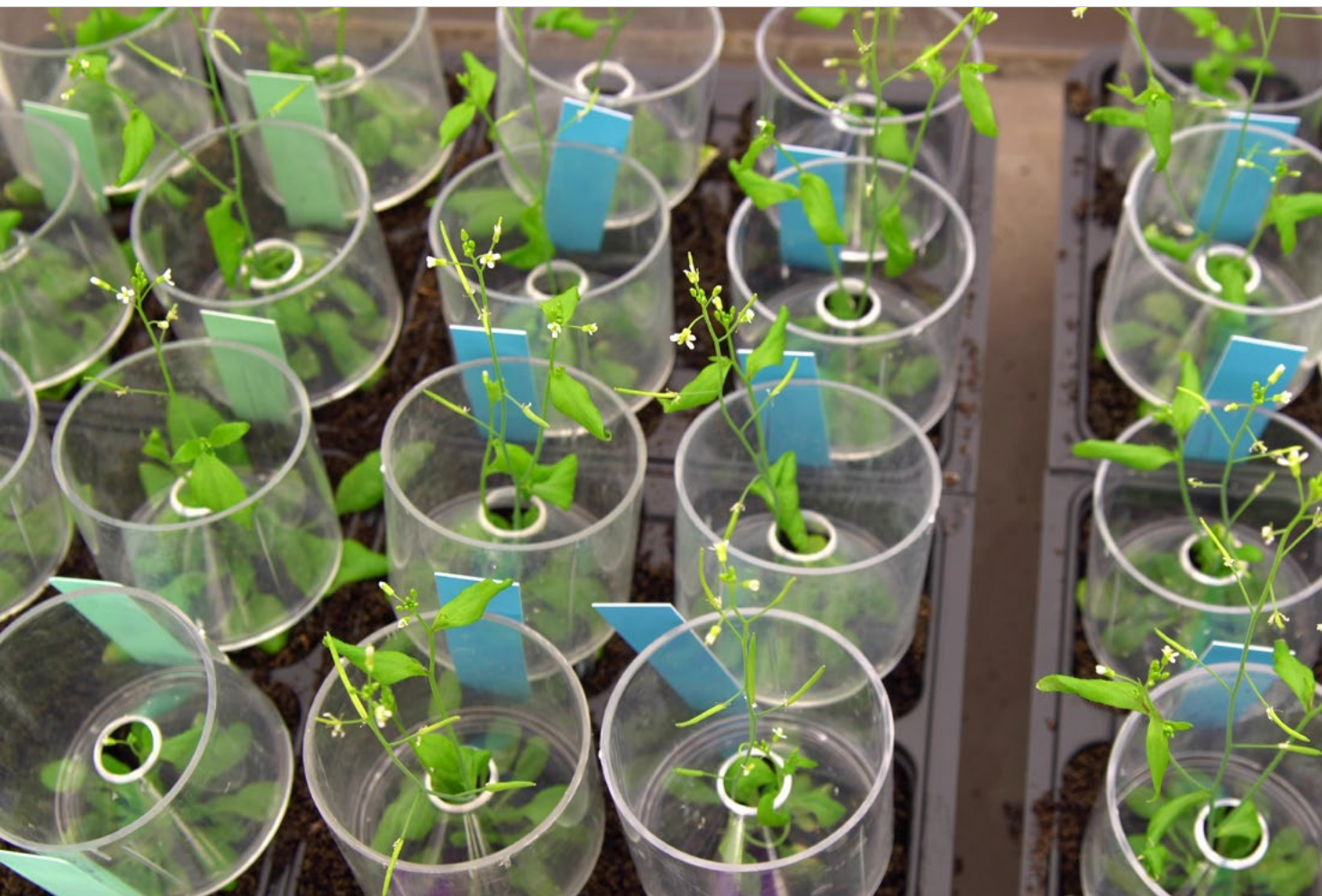
The researchers decided to see if they could also find the virus in RNA datasets published online by other *Arabidopsis* researchers. It turned out they could: the virus RNA appears in over 10 per cent of the 6500 datasets they studied. And the problem has probably arisen more often, because if researchers come across a lot of RNA that does not come from thale cress genes, the test is often deemed a failure and the dataset gets binned.

25 PER CENT CONTAMINATED

In a publication in late September in the journal *New Phytologist*, the Wageningen-Utrecht team states that the virus got into the lab at some point via wild plants. The virus appears to be very easily transmitted

via the seeds of infected plants, so the virus could spread rapidly as researchers all over the world exchange seeds. Globally, nearly 25 per cent of *Arabidopsis* lines could be infected, say the researchers.

So how could this stowaway stay under the radar in such a well-researched plant? Mainly because the infected plants do not get sick or show any visible symptoms. Its secret life is also behind the new virus’s name: Arabidopsis latent virus 1 (ArLV1). Nor does ArLV1 disturb the gene expression of the plant very much, if at all. Only occasionally is the virus RNA present in large quantities, as it was in the experiments in Wageningen and Utrecht. Why this only happens occasionally is still a mystery. But research has revealed that plants infected with ArLV1 contain slightly less chlorophyll and can withstand drought better.



Thale cress is the universal model plant for genetic research.

In the article in *New Phytologist*, the researchers call for infected thale cress plants to be banned from laboratories. Verhoeven: 'Obviously, you don't want to let the virus have unforeseen effects on your research. Not only because that could give you unusable datasets, but also because the virus could affect plants in currently unknown ways.' Theoretically, this can be done quite simply by using only healthy plants for seed production. In their article, the researchers also describe a simple test that gives a conclusive result within a day.

REPEAT RESEARCH

But what should be done with previous research that used *Arabidopsis*? How reliable are results from past experiments? 'Up to now, we haven't seen the virus seriously disrupting the plant's metabolism,' says Van der Vlugt. 'It is of course impossible

'You don't want to let the virus have unforeseen effects on your research'

to do all the previous research worldwide all over again. Thanks to this publication, researchers are now aware of the existence of the virus and can bear it in mind when they conduct their experiments.' 'We have not had any problems yet with compromised RNA datasets,' says

Wageningen professor of Genetics Mark Aarts, who works a lot with *Arabidopsis* as a model plant. 'Because the virus doesn't appear to affect the plants, this isn't something that has caused great alarm,' says Aarts. 'We are being vigilant now, but we are very reluctant to purge our plant collection completely because that is a lot of work and it would probably be a losing battle. Any line that goes unchecked could cause the virus to spread again. A clean-up would be most effective if it was part of a community effort, perhaps coordinated by the *Arabidopsis* Stock Centres in the UK and the US. But I haven't seen any initiatives for that yet. Meanwhile, it seems sensible to use virus-free plants for all RNA experiments.' ■

www.wur.eu/thale-cress