

Rat droppings in the post

Wageningen scientists have enlisted the help of the Dutch public to find out which rat populations are resistant to rat poison. Anyone who finds droppings from the brown rat can send them in.

TEXT NIENKE BEINTEMA

Theo van der Lee had stopped getting post as everything comes by e-mail nowadays. But this year the scientist at Plant Research International, part of Wageningen UR (PRI), has been checking his pigeonhole every day. And nearly always finding something. Envelopes containing rat droppings are flooding in from all over the Netherlands. 'It's fantastic that people are making the effort to send them to us,' says Van der Lee. 'We'd never be able to do this study without their help.' Van der Lee is working with Bastiaan Meerburg of Wageningen UR Livestock Research on a project aimed at charting the resistance of Dutch brown rats to rat poison. Increasing numbers of rats are turning out not to be sensitive to the poison, and further information on this is required for rat control to be effective. And rat control really is needed, the re-

searchers emphasize. Rats can pass on diseases such as Weil's disease to poultry and sometimes even people. They feed on food stocks, which then have to be destroyed, and can cause damage to electrical wiring. 'Rats and humans are not a good mix,' says Van der Lee in summary. 'The damage is considerable.'

INTERNAL BLEEDING

PRI was drawn into the project despite being a plant institute as it has a great deal of experience in inventing tests for showing specific genetic properties. Van der Lee explains that resistance to rat poison is programmed in the DNA. Rat poison acts on one particular protein that is necessary for blood clotting. The poison stops that protein from functioning properly and the rat dies from internal bleeding. But the protein has mutated in some rats due to a sim-

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ple change in the DNA; the protein still does its job but is no longer sensitive to rat poison. If only the resistant rats in a rat population get the chance to reproduce, it is not long before the entire group is resistant.

'We developed a test to show this change in DNA in a relatively simple manner,' explains Van der Lee. 'You don't have to sequence the entire DNA, which saves a lot of time and money.' The test PRI developed is based on what is known as the TaqMan method, in which a preselected genetic mutation – in this case the mutated gene for the blood clotting protein – is revealed by means of a fluorescent signal.

PULVERIZED

The Wageningen researchers extract the rat DNA from the droppings that arrive by post. They use the latest technology for

this: a lab robot isolates the DNA from a purified 'extract' of the pulverized droppings. 'We have had 160 packages up to now,' says Van der Lee. 'There is still a lot of interest so I'm expecting us to reach twice that number by the end of the year.' Is that enough to be able to draw conclusions? 'Definitely. Of course we'd like to process as many samples as possible but we are already seeing patterns.' For instance, it is now clear that resistant rats can be found in large parts of the Netherlands. Especially in the east of the country, there are areas where all the droppings are from resistant rats. It also appears that the two different mutations of the gene have arisen, with each variant displaying different sensitivity to certain toxic compounds.

Van der Lee: 'This information is extremely important in determining a rat control

strategy.' If rats in a particular region are known not to be sensitive to a specific toxic compound, different toxic compounds could be used, or a combination. 'And if the rats are resistant to everything, then we will have to use traps. Actually, they are always the first-choice strategy, but it's good to know when poison is not an option anyway.'

In principle the project runs until the end of the year but Van der Lee says there are already concrete plans for an extension. 'We want to add more detail to our map,' he says, 'but we also want to do more tests on the DNA we already have. We may find other mutations which contribute to the resistance too.' ■

Information about the project's progress and results can be found at www.bruinerat.nl (Dutch only).