

Cucumbers can't be tamed

Cucumber leaves grow up the plant in a spiral. That is a problem for cucumber-picking robots because the leaves get in the way. Might it be possible to modify the plants so that the leaves are neatly aligned along the stem? PhD candidate Merijn Kerstens now has the answer to that particular question. Namely, no.

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In nature, growth often tends towards the spiral. The pattern of repeated leaves or flowers up a stalk is often at a rotation of exactly 137.5 degrees clockwise or anticlockwise. Thale cress, often studied as a model plant, also obeys the rule of the 'golden angle'. But not always. 'Occasionally there are mutants with an angle of 90 or 180 degrees,' says Kerstens.

He decided to investigate why mutants sometimes deviate from the normal spiral pattern, and to then attempt to introduce that property in cultivated cucumbers. He focused on the role of transcription factors in the mutated thale cress plants (with changes to the genes). Transcription factors are proteins that act as switches in the genome. When they bind to a gene, it can be activated or inhibited. Kerstens studied what are termed PLETHORAs, transcription factors that play a role in growth, pattern formation and cell division.

Utrecht

The first study of deviating angles in mutant thale cress plants took place in Utrecht. When those trials were repeated in Wageningen, the effect was much less clear. Kerstens: 'There was more variation in the angles, but I didn't find a clear pattern of 90-degree or 180-degree angles.' The mystery was solved in the end.

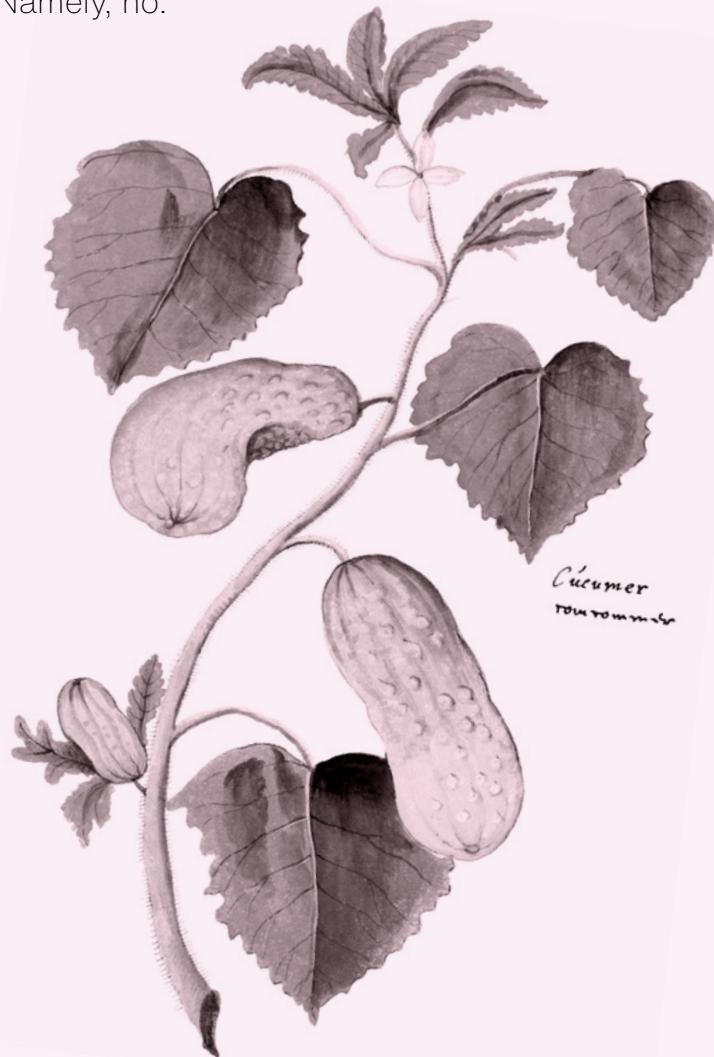
'As the thale cress grows, the stem twists anticlockwise slightly,' explains Kerstens. 'In addition, the mutant stems grow relatively slightly faster than the non-mutant plant. That means the distance between two successive flowers is slightly longer, and therefore the angle is slightly bigger for a stem that twists

anticlockwise, or smaller if the stem twists clockwise.'

The twisting stems lead to greater variation in the measured angles, but not in the same way as in Utrecht where this phenomenon was discovered. 'Apparently, the growth chambers in Utrecht

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have a different effect on the plants than ours in Radix,' concludes Kerstens. 'That might be due to differences in the lighting or air humidity.'



So training cucumbers to grow more conveniently seems to be a pipedream. 'Cucumber plants grow a metre per week, there is a big distance between two leaves and the stems twist a lot,' says Kerstens. In other words, it's a hopeless venture. 'That too is science. The chance that you will be able to transfer the property of one plant to another is quite small.' But he does now know an awful lot more about the role of PLETHORA transcription factors and how they work. To function, they need to bind to specific genes. Kerstens found the sites where they bind. The associated genetic code also seems to be the same for a lot of plants. 'That's why I think their function is also similar for many plants.'