# How come the plant hormone auxin functions one way in one location, and a different way elsewhere?

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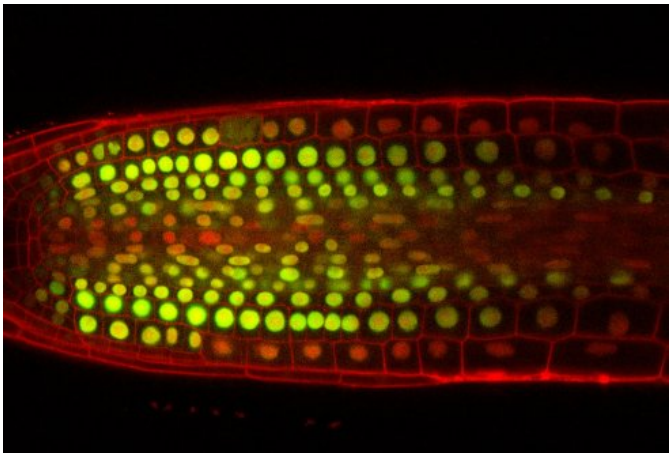
Auxin is a simple yet powerful hormone which, depending on where it accumulates, controls a large number of growth mechanisms in plants. Dolf Weijers, Professor in Biochemistry of Plant Development at Wageningen University, is trying to discover how this multifunctionality develops and how it works. He was awarded a Vici grant worth €1.5 million for his research.

**Multifunctional hormone unravelled**

The auxin hormone is a molecular master regulator, and Dolf Weijers has been fascinated by it for years. "This hormone does so many different things in plants. It determines whether and where a root or flower will grow or whether new vessels for the sap flow will be produced. This has been known for nearly hundred years. But one crucial question was never answered: how come auxin in plants functions one way in one location and a different way elsewhere?"

**Linking protein and DNA**

As soon as the hormone is identified by the plant, auxin sets various mechanisms in motion, says Weijers. "In the final step, proteins are activated that bind to the DNA of the plant. These proteins are known as transcription factors. If they are activated by auxin, the transcription factors determine which of the approximately 30,000 plant genes are switched on and off. Most plant species have over 20 different auxin-activated transcription factors. It is crucial which of these factors are present in a plant cell as this determines whether auxin activates one process or another."



**Function of transcription factors**

Weijers wants to understand how these various transcription factors switch on other genes. Eventually he hopes to gain insight in how the range of auxin functions developed in the evolution of plants. Thanks to the Vici grant he is now able to

put together a team of five scientists who are diving into the evolution of plants together. "First we will be compiling information from the 1000 Plant Genome Project. This data will help us figure out which transcription factors are present in which plant species, from single-celled algae to trees. In doing so we hope to trace what changes to these proteins have allowed auxin to acquire new functions in evolution. We will then go on to perform tests in the lab based on predictions. There we hope to unravel why auxin performs specific functions in key positions within plants."

**Dialogue with the industry**

The research project will run for five years, during which Weijers hopes to enter into close dialogue with people from the industry, including plant breeders. "You can imagine that it would be interesting to these companies to know more about the functioning of auxin in plants, especially if we discover how it can be controlled to a further extent. And it would be great news for breeders if the knowledge could help further improve existing breeding procedures."

Provided by Wageningen University