Anarchistic proteins could hide secret to develop crops with high stress resistance

February 8 2016

The researchers undertake their initial investigation using the model plant Arabidopsis, but at a later stage they will also include proteins from commercially important crop species. Credit: Dept. of Plant and Environmental Sciences

Some proteins behave rather anarchistic. Unraveling their unusual behavior might hold the secret to develop crops with a higher tolerance to stress. A group of researchers at the University of Copenhagen will unveil the mysteries of these disordered proteins thanks to a 7 million kr grant from the Villum Foundation Young Investigator Program.

Plants with less stress

Usually the structure of a protein determines its function. However, due to yet unknown mechanisms some proteins carry out their functions without having such deterministic structures.

Meike Burow, Associate Professor at DynaMo Center, Dept. of Plant and Environmental Sciences, University of Copenhagen, will head an ambitious project that aims at disclosing the true nature of a special group of anarchistic plant proteins.

Meike Burow explains, "We will undertake basic science and hope to uncover the mechanisms that regulate the plants' defence against stress factors, such as attacks by bacteria or drought. However, we expect that in a foreseeable future our results will lead to the development of new crop species that are better at coping with external stress."

Fluctuating structure

Currently Meike Burow and her colleagues investigate proteins in the model plant Arabidopsis, but they plan to also study proteins from commercially interesting crop species at a later stage.

Meike Burow is especially interested in a group of six proteins, which switch the production of the plant's defence compounds on and off. These six proteins do not have a well-defined structure, but seem to change shape depending on cues from the environment.

"Our aim is to find out how the fluctuating structure of these proteins is related to their function. We are also very interested in how this relationship developed", Meike Burow explains. She continues,

"We have studied regulation of plant metabolism for many years, but we have realized that there is a gap in the knowledge about proteins involved in the synthesis of defence compounds. A major part of the proteins that

switch specific pathways on and off have these variable structures, but nobody can explain how it works. Our experiments suggest that it is the unstructured part of these proteins that is essential for them to carry out the right function at the right time."

Human disease control

Even though her project primarily focuses on mechanisms in plants, Meike Burow hopes that someday her results will also lead to prevention or cure of diseases in human beings.

"The group of proteins we are scrutinizing are not only present in plants. They are also found in most animals, including ourselves and it is well known that when essential proteins malfunction, it may lead to severe diseases," says Meike Burow and elaborates,

"Once we understand the full mechanisms of the relationship between structure and function of a given disordered protein, we can use this knowledge to prevent - or maybe even cure - certain human diseases caused by malfunctioning proteins."

Provided by University of Copenhagen

Citation: Anarchistic proteins could hide secret to develop crops with high stress resistance (2016, February 8) retrieved 26 April 2024 from https://phys.org/news/2016-02-anarchistic-proteins-secret-crops-high.html