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Bioeconomy BW

Optimal Use of Resources from Nature

Tomatoes that resist pests and extreme weather while still tasting like tomatoes are among Professor Holger Puchtas long-term research goals. The molecular biologist develops techniques that will allow him to control inheritance in plants to selectively improve the properties of different species through nature's existing gene pool. For his fundamental research, Puchta now is awarded an Advanced Researcher Grant by the European Research Council (ERC).

A model to follow: Possible techniques to control inheritance will be first developed on the example of the common wall cress (Arabidopsis).

"Plant breeding, i.e., interbreeding of plants with the aim of achieving improved agronomic properties, has been practiced since the beginning of civilization," says Managing Director of KIT's Botanical Institute Professor Holger Puchta. Since good results, however, have always been a matter of mere random chance and trial and error, Professor Puchta and his team now want to establish

techniques by means of which genetic exchange (meiosis) can be controlled and influenced selectively. “We want to turn the arbitrary process into a controlled process of inheritance to finally be able to determine in advance the properties we will be transferring.” The ERC supports the project for five years with nearly 2.5 million Euros.

A huge gene pool is provided by the vast array of organisms that occur in nature. “To optimally use that pool for nutrition of humans, we must learn how to transfer properties such as resistances to diseases and pests from wild to cultivated plants,” Puchta explains and continues to point out that this would, for example, provide new possibilities for breeding crops. “Since large parts of the genome, or genetic information, of crops are not exchanged during inheritance, it is quite difficult to introduce new properties into the cultivated species.”

A model plant, the common wall cress (Arabidopsis), is used by the researchers to develop techniques that allow reprogramming of natural inheritance. “The products we obtain have nothing to do with the classic genetically modified organisms (GMO),” Puchta outlines. The preconditions for research are ideal: “During the recent years, techniques for genome sequencing have been enhanced enormously.” And they are completed by yet another recent development: Artificial “DNA scissors” by means of which genetic information in the parent stock can be cut at specific sites and be recombined.

The KIT botanists’ long-term goal is to optimally use our natural resources to improve cultivated plants. Puchta believes to be able to manipulate the model plant’s inheritance by use of different approaches within the next five years. “As a matter of fact, I feel quite confident that, by then, we will have found first solutions to controlling inheritance in cultivated plants such as the tomato.”

The European Research Council (ERC) awards Advanced Researcher Grants to excellent experienced researchers whose projects contribute to pioneering results of research in their specific fields. For more than two decades, Professor Holger Puchta has been engaged in studying DNA recombination. Since 2002, he has been holding the chair in molecular biology and biochemistry of plants at KIT’s Botanical Institute. Professor Puchta is the third researcher to have procured an ERC grant for KIT. The first high-value grant (Starting Grant, 2009) was awarded to Dr. Regina Hoffmann of Physikalisches Institut, the second one (Starting Grant, 2010) to Dr. Matthias Schneider, member of the Institute of Meteorology and Climate Research.

Press release

08-Jan-2011
Source: Karlsruhe Institute of Technology (KIT) (05.01.11)

Karlsruhe Institute of Technology