Making plants fit for climate change

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Breeding barley that provides good yields even in a hot and dry climate - a research team of the University of Würzburg is currently busy with this task. The project is part of the new Bavarian alliance "BayKlimaFit" aimed at finding strategies to adapt crops to climate change.

As climate changes, very hot and very dry periods will occur more frequently. As a result, farmers will be threatened by yield loss or even total crop failure. The problem could be solved by breeding crop varieties that manage water more efficiently, making them less sensitive to drought and heat.

The plant scientists Professor Rainer Hedrich and Dr. Peter Ache from Julius-Maximilians-Universität Würzburg (JMU) in Bavaria, Germany, are working to achieve this using barley. In a first step, they want to determine which molecular switches in the plant are responsible for water management during hot and dry weather based on a reference variety.

Field tests including some 100 breeding lines

Simultaneous field test are launched in Freising in cooperation with the Bavarian State Research Center for Agriculture (LfL) domiciled there. Other participants include the work group of Professor Uwe Sonnewald (biochemistry, University Erlangen-Nuremberg) and various seed breeding companies.

The first field tests are set to single out barley varieties that are

particularly tolerant and sensitive to stress from among some 100 crop lines. By comparing these lines with the reference crop, the researchers then plan to identify possible marker genes for heat and drought tolerance and make them available to the participating companies for breed selection. "Our goal is not to genetically modify plants; rather we want to help breeders to selectively identify the desired properties in their existing varieties using the marker genes," Peter Ache explains.

260,000 euros provided by BayKlimaFit

The project is part of the new Bavarian research alliance "BayKlimaFit" aimed at finding strategies to adapt crops to climate change. The alliance started operation in February 2016. It brings together specialist research teams and work groups from all over Bavaria.

BayKlimaFit is financed by the Bavarian State Ministry of the Environment and Consumer Protection; 260,000 euros have been allocated to the JMU project. Among others, the money is used to pay for a PhD position and a part-time technical assistance position.

How plants can save water

For several years, Hedrich's team has studied the molecular mechanisms that allow plants to regulate their water balance. Among other findings, his research activities have given insight into how plants open and close their so-called stomata. Stomata are tiny openings in the leaves that allow plants to limit the loss of water.

Under hot and dry conditions the plant faces a dilemma: When temperatures are high, the plant wants to open the stomata in order to cool its leaves by evaporation. But when it is dry, the plant prefers to close its stomata to keep in as much water as possible. The researchers

are looking for a way out of this dilemma.

Provided by University of Würzburg