New Breakthrough in Global Warming Plant Production

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Arabidopsis thaliana plants grown at 22oC (left) and 28oC (right).

Researchers at the universities of Leicester and Oxford have made a discovery about plant growth which could potentially have an enormous impact on crop production as global warming increases.

Dr Kerry Franklin, from the University of Leicester Department of Biology led the study which has identified a single gene responsible for controlling plant growth responses to elevated temperature.

Dr Franklin said: “Exposure of plants to high temperature results in the rapid elongation of stems and a dramatic upwards elevation of leaves”.

“These responses are accompanied by a significant reduction in plant biomass, thereby severely reducing harvest yield. Our study has revealed

that a single gene product regulates all these architectural adaptations in the model plant species, Arabidopsis thaliana."

The work has been published in Current Biology and was funded by the Royal Society and the BBSRC.

Dr Franklin added: "This study provides the first major advance in understanding how plants regulate growth responses to elevated temperature at the molecular level. This discovery will prove fundamental in understanding the effects of global climate change on crop productivity".

"Identification of the mechanisms by which plants sense changes in ambient temperature remains a Holy Grail in plant biology research. Although the identity of such 'temperature sensors' remains elusive, the discovery of a key downstream regulator brings us closer to addressing this important question."

The study has shown that mutant plants, deficient in the regulatory protein PHYTOCHROME INTERACTING FACTOR 4 (PIF4) do not display the dramatic stem elongation and leaf elevation responses observed in wild type plants upon exposure to elevated temperature. The study has further shown PIF4 to regulate a pathway involving the plant hormone auxin. The PIF4 gene product was previously identified as a co-regulator of light-mediated elongation growth, suggesting plants integrate light and temperature signalling pathways through converged regulation of the same target proteins.

Provided by University of Leicester