Team discovers how plants avoid sunburn

August 6 2013

A Dartmouth-led team has discovered a group of stress-related proteins that explains how plants avoid sunburn in intense light, a finding that one day could help biotechnologists to develop crops that can better cope with hotter, drier conditions occurring in climate change.

Their findings appear this week in the journal *PNAS*. The study, titled "Subset of heat-shock transcription factors required for the early response of *Arabidopsis* to excess light," was led by researchers from Dartmouth, the Salk Institute for Biological Studies and Australian National University.

Too much or too little sunlight or rapidly fluctuating light conditions cause stress to plants, which have sophisticated control systems to utilize light energy for photosynthesis and simultaneously protect themselves from sunburn from very bright sunlight. Plants perform these regulations mainly by regulating nuclear gene expression and multiple intracellular signaling pathways have been shown to play a role in the genomic response of plants to stress, but the processes are not well understood.

In this study, Professor Hou-Sung Jung and his colleagues showed that a group of transcription factors called Heat Shock Transcription Factors are responsible for fast responses of plants to changes in light intensity —from light conditions that are optimal for photosynthesis to bright light that causes sunburn. The transcription factors, which are proteins that control the flow of genetic information, generate an enzyme responsible for detoxifying harmful molecules, which accumulate under very bright light.

Currently in his laboratory, Jung is characterizing factors involved in plants' responses to prolonged bright light. Studying these short-term and long-term response factors may make it possible to generate plants with increased protection from bright light with enhanced photosynthesis rates.

Provided by Dartmouth College