Plants' internal clock can improve climate-change models

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The ability of plants to tell the time, a mechanism common to all living beings, enables them to survive, grow and reproduce. In a study published in the latest issue of the prestigious journal Ecology Letters, an international team has studied this circadian clock from a molecular viewpoint and has found an ecological implication: it makes climate change scenarios and CO2 level figures more accurate.

The international team of researchers led by the University of Castilla-La-Mancha (UCLM) has compiled the research carried out to date on this topic in order to understand the implications of the so-called "circadian clock" as regards the survival and ecology of a wide range of plant species. The plants of the model species Arabidopsis thaliana, created in a laboratory environment without this ability, found it difficult to survive and reproduced less frequently.

"One hour before the sun comes out, a plant with a circadian clock already knows that it is time to wake up and all the genes associated to photosynthesis begin to activate," Víctor Resco de Dios, main author of the study and a researcher in the Environmental Science Department of the UCLM explained to SINC.

The study, which has been published in the latest issue of *Ecology Letters,* reveals the ecological implications of plants' ability to "tell the time". Researchers have studied the genes involved in photosynthesis and adapting to the climate.

As much as 90% of a plant's genes are regulated by the circadian clock. "The clock coordinates when a plant should flower and also when it should germinate a seed," Resco de Dios adds. According to the scientist, the circadian clock has a great capacity to adapt to its physical environment.

The Key to Surviving an Increase in Temperatures?

Plants take up CO2 by means of photosynthesis and can potentially mitigate climate change. However, "in studies performed by ecologists to ascertain the level of CO2 in the models, circadian regulation was not taken into account," the researcher underlines.

The team of scientists suggests this regulation should be included in climate models based on the study of plant life in order to obtain better and more accurate results. "A normal climate change model would forecast photosynthesis to be uniform between 6am and 10am in a tropical forest if environmental conditions (light, humidity, temperature, etc) are constant. However, as plants have a circadian clock, photosynthesis is seen to increase during that time of the day", the ecologist states.

According to the scientists, the circadian clock may well be the key for plants to survive a rise in temperatures. Plants without optimised circadian regulation will have "more difficulty to adjust to climate changes and survive the stress". The team now encourages further research from an ecological viewpoint, as "the value of this topic has been underestimated."

More information: Resco, Víctor; Hartwell, James; Hall, Anthony. "Ecological implications of plants' ability to tell the time" Ecology Letters 12(6): 583-592 junio de 2009.

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