Scientists show that plants have measure of the shortest day

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(PhysOrg.com) -- It is not only people who feel the effects of short winter days - new research by the University of Edinburgh and the University of Warwick has shed light on how plants calculate their own winter solstice.

A study led by the University of Edinburgh, which included researchers from the University of Warwick, used computer models of a plant known as mouse-ear cress to examine how the plant's internal clock - which regulates the plant's daily activities - is affected by changes in day length from winter to summer.

It is hoped that the findings will help scientists develop crops that can cope with climate change.

Scientists found a complex connection between the genes that create this internal rhythm - known as a circadian clock - and the genes that cause the plant to flower. The findings give researchers a greater understanding of how daylight affects the daily rhythms of the plant. The rhythms of gene activity shift as daylight changes with the seasons. This gene activity in turn affects seasonal changes in plants, such as flowering.

The study with researchers from the University of Warwick, which drew on data from labs in Europe, the US and Japan, was funded by the Biotechnology and Biological Sciences Research Council and published in the journal *Cell*.

Dr Isabelle Carre, from the University of Warwick's Department of Biological Sciences said:

"Computer models are helpful to understand properties of complex biological systems. For example, here, they help us understand how a group of genes interact with each other to determine the time of the year at which a plant is going to flower. Our computer models for flowering time may also with some modifications be used to predict the behaviour of crop species. This may be useful for example to predict the potential impact of climate change on crop behaviour. "

Professor Andrew Millar, of the University of Edinburgh's School of Biological Sciences, who led the study, said: "By understanding how flowering genes work together in a simple plant, we stand a much better chance of understanding how the same genes operate in more complex crops, such as barley and rice.

"Our systems biology approach, which combines mathematical modelling with experiments, gives a new way to explain how a plant's internal rhythms react and respond to a changing environment. The same approach could be applied to understand how seasonal variations affect breeding in animals, such as sheep."

"We're interested in whether all plants have evolved a similar way of sensing day length, and whether the strategy is the same in plants and animals."

Source: University of Warwick