Clock-work plants

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Researchers at the University of Cambridge found that the biological clock in plants increases photosynthesis, helping them grow faster. The biological clock, which allows individual plant cells to estimate the time of day, helps boost global productivity by providing cells with the facility to anticipate daily changes in the environment.

The findings were published in the scientific journal Science on Friday 22 July by a team of researchers from the Universities of Cambridge and Warwick, in association with the Hungarian Academy of Sciences.

Using the model experimental plant Arabidopsis thaliana (thale cress), the researchers measured growth and photosynthesis parameters in plants with a naturally occurring clock, plants where the biological clock ran fast or slow compared to the usual 24 hour rhythm, and plants where the clock had been stopped.

“Photosynthesis is the basis of virtually all life on the planet, and our experiments have demonstrated that the clock is an integral part of that. Therefore, the plant clock may play a vital role in ecosystem productivity and control of atmospheric CO2 (a key greenhouse gas),” said Dr Antony Dodd from the Department of Plant Sciences at the University of Cambridge, lead author of the study.

“We have shown that selective crop breeding to increase agricultural output must be conducted carefully, since inadvertent alterations to the clock can severely reduce productivity.”

For example, food production in space could require growth of plants under non-24 hour light dark cycles (eg planets that rotate with periods other than 24 hour). These findings indicate that agricultural output under these circumstances will be enhanced by alteration of the clock to match local day-length conditions.

“Building on this knowledge, we now need to understand the detailed mechanisms by which the clock controls and optimizes photosynthesis,” said Dr Dodd.

Source: University of Cambridge