

Geneticists shed light on flowering plants

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In winter or early spring, *Arabidopsis* plants without an active DNF gene are already flowering (right). Those with the DNF gene will delay flowering until later in the year when days are longer and conditions are more favorable for survival of their seedlings (left). Credit: Dr Steve Jackson

A team of researchers from Warwick have isolated a gene responsible for regulating the expression of *CONSTANS*, an important inducer of flowering, in *Arabidopsis*.

'Being able to understand and ultimately control seasonal flowering will enable more predictable flowering, better scheduling and reduced wastage of crops', explained Dr Jackson.

Whilst the relationship between *CONSTANS* and flowering time in response to day length is well established, the mechanism controlling the expression of *CONSTANS* is still not fully understood.

The scientists present their work at the Society for Experimental Biology Annual Meeting in Prague on Wednesday 30th June 2010.

Many plants control when they flower to coincide with particular seasons by responding to the length of the day, a process known as photoperiodism. A flowering mutant of *Arabidopsis*, which had an altered response to photoperiod, was used in the study led by Dr Stephen Jackson.

In the study funded by the BBSRC, the team identified the [defective gene](#) in the mutant plant that caused its abnormal flowering time.

They then cloned a working version of the gene, known as DAY NEUTRAL FLOWERING (DNF), from a normal *Arabidopsis* plant and introduced it into the mutant plant to restore its normal flowering response to day length.

The role of DNF in normal plant flowering is to regulate the CONSTANS gene. CONSTANS is activated only in the light and the plant is triggered to flower when CONSTANS levels rise above a certain threshold level during the daytime.

In normal plants, DNF represses the levels of CONSTANS until the day length is long enough and conditions are favourable for the survival of their seedlings. In mutant plants without an active DNF gene, CONSTANS is not repressed and they are able to flower earlier in the year, when days are still short.

The presence of the DNF gene has not yet been identified in species other than *Arabidopsis* but the scientists believe their on-going work may prove to have a wider significance for other species.

Scientists can override complex pathways that control flowering by

artificially inducing or inhibiting key flowering [genes](#) such as DNF and CONSTANS. This can already be done in the laboratory by spraying an 'inducing agent' onto plants, stimulating them to flower early.

This could be used to extend the length of the harvesting season or to coordinate flowering or fruit production to a specific time. Growers already regulate the flowering of a few [plants](#) such as Chrysanthemum and Poinsettia, the latter specifically for Christmas and Easter.

Unravelling the complex pathways that control plant flowering will help scientists to understand and influence flowering patterns more effectively and in many different species.

Provided by Society for Experimental Biology

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