

To germinate, or not to germinate, that is the question

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Scientists at the University of York have uncovered new insights into the way seeds use gene networks to control when they germinate in response to environmental signals.

Timing of [seed germination](#) is crucial for survival of plants in the wild and is also important for commercial seed production where there is a need to ensure uniform growth.

A cold environment can signal an imminent winter so the [mother plant](#) produces dormant seeds that will not grow until the following spring. A warmer environment can signal an early summer with the mother plant producing seeds that grow immediately allowing another generation to grow before winter. Researchers at the Centre for Novel Agricultural Products (CNAP) in the Department of Biology at York have found that a [regulator gene](#) called SPATULA can control the expression of five other regulatory genes that are known to effect when a seed germinates. The research, which was funded by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Garfield Weston Foundation, is published in the *Proceedings of the National Academy of Sciences (PNAS)*.

The CNAP research group, led by Professor Ian Graham, used the model oilseed plant called Arabidopsis to gain new insights into how the [gene networks](#) operate. They found that different varieties of Arabidopsis respond differently when this network of regulatory genes is disturbed. Some become more dormant and others less reflecting the different

environmental responses of varieties that have evolved in different parts of the world.

Professor Graham says: "Plants are clever in many ways. The complexity of the gene toolkit controlling seed germination is quite remarkable. During seed set, plants are able to respond to a variety of [environmental signals](#) from temperature to day-length, light quality and nutrient availability.

"Discoveries such as this should underpin the development of better quality seeds for farmers. Since seed dormancy is one of the first traits to be addressed when domesticating a crop, the work should also aid in the rapid domestication of wild species into novel crops for a range of different applications."

More information: The paper 'Differential control of seed primary dormancy in Arabidopsis ecotypes by the transcription factor SPATULA' is published in *PNAS* Online Early Edition: www.pnas.org/cgi/doi/10.1073/pnas.1301647110

Provided by University of York

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