# #083

## Timing of variation in chilling intensity and its effects on winter rapeseed crops

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**Background:**

In the United Kingdom winter oilseed rape (WOSR) yields lag behind continental Europe and can vary according to the intensity of early winter chilling.

**Objective:**

This study aimed to investigate the role of autumn and winter chilling in WOSR phenology and yield potential.

**Methods:**

We grew WOSR in the field and in simulated whole growing seasons, with added realistic autumn and winter warming and recorded the effects on time to flowering, floral development and yield.

**Results:**

Warming in autumn delayed the timing of floral initiation did not affect flowering date the following spring. In contrast, warming the developing flower buds in winter strongly increased flowering time and caused floral organ abnormalities. This increase coincided with the failure to silence two winter-expressed *FLC* genes, increased synthesis of abscisic acid, and expression of genes known to induce bud dormancy in trees.

**Conclusions:**

We conclude that WOSR has two distinct seasonal responses to chilling. The first promotes floral initiation in autumn whereas the second takes place in developing flower buds and is necessary to break flower bud dormancy, and for normal flower development. These responses are facilitated by sub-functionalisation of *FLC* genes which differ in their seasonal temperature sensitivity.

**References:**

Lu X *et al.* (2022). Winter warming post floral initiation delays flowering via bud dormancy activation and affects yield in a winter annual crop. *PNAS*, doi: 10.1073/pnas.2204355119

Brown JKM, *et al.* (2019). Yield instability of winter oilseed rape modulated by early winter temperature. *Scientific Reports*, doi: 10.1038/s41598-019-43461-7