Modelling the regional evolution of frost damage on a winter crop with warming in a temperate climate

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Context: The modalities of climate warming over Europe and France allow to distinguish two temperature periods: before and after 1987/1988 (Brulebois et al. 2015 J. Hydrol.). It offers the opportunity to assess climate warming on agrosystems.

Objectives & Methods

Impact of autumn and winter surface temperature warming on frost stress for an annual legume crop

Winter Pea (Pisum sativum L)

The results show that the account of the winter crop traits and the modalities of warming jointly matter to better understand how winter climate warming affects changes in the frost risk evolution. This is of primary importance to define new winter crop ideotypes.

Simulation results in Burgundy-Franche-Comté

In average, the number and the intensity of frost stress events evolve in opposition between both periods (1961-1987 and 1988-2015): the number of events increases, while their intensity decreases, especially for variety with a weak frost resistance and a prolonged acclimation rate. The resulting evolution of frost stress (number of events x intensity) is a decrease (Castel et al. 2017 OCL).

Perspectives

The interpolation climate data were used to feed a frost stress crop model validated for pea (Lecomte et al. 2003 Agronomie; Castel et al. 2017 OCL).