# Modelling climate change adaptation in European agriculture: challenges and priorities

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Climate change presents major challenges for European agriculture, and the speed, nature and extent of the responses to such challenges will have far-reaching social, economic and environmental consequences. Agricultural modelling has an important role in helping decision makers better understand the costs and benefits of different adaptation strategies, as well as trade-offs and win-wins between those strategies, mitigation measures and other economic, social and environmental goals. Incorporating adaptation strategies into biophysical, bio-economic and economic model is essential to gaining a more holistic understanding of their impacts, beyond the context of specific changes and purposes. Here, the ability and potential of agricultural models to characterise different adaptation strategies was explored, using the expertise represented within the Modelling European Agriculture with Climate Change for Food Security (MACSUR) project. In two workshops, modellers identified adaptation strategies, modelling challenges and knowledge gaps. A survey was conducted to understand current

modelling capacity. Challenges centred on knowledge gaps, data availability, technical issues, and stakeholder interaction (e.g. communication with, relevance for). For operational and tactical strategies (changes in practice in response to daily, monthly, or seasonal variation in conditions) most challenges were technical, relating to limitations in the processes and mechanisms represented in models. For longer term strategic climate change adaptation, uncertainty about future socio-economic context (e.g. prices and regulation) and the impact of new adaptation options (e.g. appearance of new technologies) were highlighted. Progressively novel and far-reaching strategies increasingly challenge the scope of existing models. Whilst models vary in capacity, most modellers reported a potential to better characterise adaptation. However, costs (e.g. trade-offs with processing speed) and the fact that adaptation lies beyond the initial remit of many models mean that strategic prioritisation of adaptation as a focus for modelling is key to facilitating model development to support effective stakeholder choices.