

## **Crop Modelling for Agriculture and Food Security under Global Change**

### **International scientists at the iCROP2016 Symposium report recent advances in crop modelling and identify challenges and new opportunities**

*(4 April 2016, K. Brüser, F Ewert)*

With more than 300 scientists from 47 nations, the iCROP2016 Symposium in Berlin brought together the major part of the international crop modellers' scene to exchange ideas on improvement and application of crop simulation models to better support agricultural production and food security under global change. The 3-day symposium, 15-17 March, 2016, hosted by the Leibniz Centre for Agricultural Landscape Research (ZALF), was jointly organised by MACSUR (Modelling European Agriculture with Climate Change for Food Security) with Frank Ewert (University of Bonn and ZALF, Germany) and Reimund Rötter (Luke, Finland) and AgMIP (Agricultural Model Intercomparison and Improvement Project) with Kenneth Boote (University of Florida, US) and Peter Thorburn (CSIRO-Australia) as symposium organisers. Researchers from both networks also used the chance to meet during side-events after and prior to the meeting. Regarding the good spirit of collaboration and sharing ideas during iCROP2016, Dr. Claas Nendel (ZALF) observed that "The personal exchanges, the many discussions motivate researchers further who otherwise often only communicate over great distances. Numerous ideas for new developments arise during such symposia."

A total of 85 oral and 130 poster presentations addressed the focus topics of the symposium, which were well introduced through the inspiring plenary keynotes by James Jones (Univ. of Florida, USA; *Next Generation of Crop Models*), Graeme Hammer (Univ. of Queensland, Australia; *Modelling and Genetics*), Andy Challinor (Univ. of Leeds, UK; *Crop-Climate Modelling*) and Serge Savary (INRA, France, *Models for Crop Diseases*). Oral and poster presentations centred on recent scientific work related to model improvement, generation and use of experimental data, and on advancements in model applications considering new methods of model intercomparison, uncertainty propagation and scaling. While the main emphasis was on crops, progress in modelling in related fields, like grassland and vegetation modelling, was also addressed as well as new approaches of model implementation making use of recent software developments. Improvements in crop and cropping system modelling referred to models from field to global level and included efforts to link crop modelling to genetics. Studies to improve modelling of relationships between plant production, pest damage, resource use and management including effects on water and nutrient cycles were also presented.

The final day of the symposium cast a spotlight on new opportunities and key challenges for crop modelling. In his keynote, Brian Keating (CSIRO, Australia) depicted the evolvement of purposes and practice of crop modelling. To stimulate thinking of how crop modelling can have an impact on the transformation of the agro-food system towards sustainable intensification Achim Dobermann (Director of Rothamsted Research, UK) in his keynote encouraged modellers to be open to make use of new technology and data and to change their mode of working to better link up with other scientist and stakeholders. Martin Kropff (Director General of CIMMYT, Mexico), followed up on this in his plenary talk by promoting closer collaboration with breeders and their data at CG centres, while highlighting the importance of models as tools for deriving breeding goals and alternative farming practices as adaptations to climate change.

The main observations of the symposium and key challenges to crop model improvement and applications were summarized in a lively closing panel discussion, moderated by Frank Ewert, Scientific Director of ZALF. “It becomes clear that we are increasingly capable of estimating the extent to which climate change and policy decisions can affect crop productivity and food security”, he concluded. In summary, the Symposium highlighted the enormous potential for the use of modelling in tackling societal challenges related to agriculture, food security and the environment in Europe and beyond if novelties in technology and data generation are embraced and if the interaction with related disciplines and stakeholders is further strengthened while keeping up good scientific standards. These demands also pose a continuous challenge to the organisation of the crop modelling community. Networks like MACSUR and AgMIP will play a key part in this as well as opportunities for personal exchange beyond established circles. Many iCROP participants were keen to see a follow-up Symposium in another two years with the additional aspiration to give a bigger voice to young and to female scientists.