Regional crop yield forecasting: a probabilistic approach

A. De Wit, K. van Diepen, and H. Boogaard

Alterra, Wageningen UR, Wageningen, PO Box 47, 6700AA Wageningen, The Netherlands (allard.dewit@wur.nl)

Information on the outlook on yield and production of crops over large regions is essential for government services dealing with import and export of food crops, for agencies with a role in food relief, for international organizations with a mandate in monitoring the world food production and trade, and for commodity traders. Process-based mechanistic crop models are an important tool for providing such information, because they can integrate the effect of crop management, weather and soil on crop growth. When properly integrated in a yield forecasting system, the aggregated model output can be used to predict crop yield and production at regional, national and continental scales.

Nevertheless, given the scales at which these models operate, the results are subject to large uncertainties due to poorly known weather conditions and crop management. Current yield forecasting systems are generally deterministic in nature and provide no information about the uncertainty bounds on their output. To improve on this situation we present an ensemble-based approach where uncertainty bounds can be derived from the dispersion of results in the ensemble. The probabilistic information provided by this ensemble-based system can be used to quantify uncertainties (risk) on regional crop yield forecasts and can therefore be an important support to quantitative risk analysis in a decision making process.