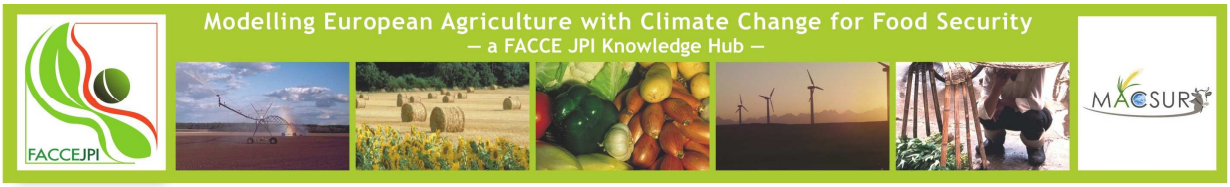

Title of Abstract : **A Comparison of Optimal Nitrogen Fertilisation Strategies Using Current and Future Stochastically Generated Climatic Conditions.**

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Body of Abstract :

In the context of nitrogen (N) management, since 2002, the Belgian Government transposed the European Nitrate Directive 91/676/EEC in the Belgian law, with the aim to maintain the productivity of Belgian's farmers while reducing the environmental impacts associated to excessive N management. The current Belgian's farmer practice consists to fertilise 180kgN.ha-1, split in three equal doses, applied respectively at tillering, stem extension and flag leaf stages.

A feasible approach to cope with climatic uncertainty in crop modelling is to quantify the risk associated to historical climate records, which, however, are often not numerous. Therefore, the main purpose of this research is to use a high number of stochastically generated climatic conditions to supply weather inputs and perform probabilistic risk assessment on the corresponding finely discretised yield distributions.

In particular, this research aims to determine the optimal N strategies under current and future climatic conditions. Different N protocols, that consist to maintain 60kgN.ha^{-1} at tiller and stem extension while applying increasing level of N at flag leaf, were evaluated and intercompared. Actual and, as an anticipation to climatic changes, hypothetic future climatic conditions corresponding to IPCC's A1B scenario were derived. Finally, in front of the European environmental requirements, two types of farmer's behaviour were analysed with the objective to find the N strategy that respectively maximises the expected yields or that optimises the revenue while limiting the potentially leachable soil N after harvest.

The LARS-WG and STICS models were respectively used to generate the synthetic time-series and simulate yield elaboration.

Keywords Crop model – Strategic N management – Decision rule – Probability risk assessment.