

## **A tool devoted to recommend spatialised nitrogen rates at the field scale, based on a crop model and remote sensing observations assimilation.**

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In order to limit the consequences of nitrogen fertilisation on water and air quality, within-field variability should be taken into account to recommend spatialised nitrogen rates. To achieve this goal, we proposed a method based on a crop simulation model. (i) As a first step, two ways for characterising soil variability were compared: the first used a high spatial resolution soil map; the second used coarse soil information improved thanks to assimilation of information issued from remote sensing measurements. This latter enabled us to improve yield simulation RMSE from 1.81 to 0.73 t ha<sup>-1</sup>. (ii) In a second step we chose a criterion combining gross margin maximisation and the limitation of nitrogen balance that allows to recommend N rates under both economic and environmental constraints. The ability of the model to recommend pertinent rates according to this criterion was correct. (iii) The last step was to simulate N rate recommendation at the within-field scale, by applying the criterion chosen above on simulations combining weather and N scenarios. An experimental evaluation of this tool was made in 2003; its use, as compared to a standard recommendation tool, can lead to improve nitrogen balance by 30 kg ha<sup>-1</sup> while reducing yield by only 0.5 t ha<sup>-1</sup>.

Key-words: Precision agriculture ; crop model ; nitrogen rate recommendations ; data assimilation

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