



HAL
open science

SuMoToRI: a crop model to predict the effect of Sulfur nutrition on plant growth during the vegetative phase in Oilseed Rape (*Brassica napus* L.)

Sophie Brunel-Muguet, Alain Mollier, Emmanuelle Sénécal, Damien Goudier, Philippe Etienne

► To cite this version:

Sophie Brunel-Muguet, Alain Mollier, Emmanuelle Sénécal, Damien Goudier, Philippe Etienne. SuMoToRI: a crop model to predict the effect of Sulfur nutrition on plant growth during the vegetative phase in Oilseed Rape (*Brassica napus* L.). 9. International Workshop Sulfur Metabolism in Plants: Molecular Physiology and Ecophysiology of Sulfur, Apr 2014, Freiburg, Germany. hal-02740020

HAL Id: hal-02740020

<https://hal.inrae.fr/hal-02740020v1>

Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

SuMoToRI: a crop model to predict the effect of Sulfur nutrition on plant growth during the vegetative phase in Oilseed Rape (*Brassica napus* L.)

Sophie Brunel-Muguet¹, Alain Mollier², Emmanuelle Sénécal¹, Damien Goudier¹, Philippe Etienne¹

¹ UMR 950 EVA, INRA-UCBN, Esplanade de la Paix, F-14032 Caen cedex, France.

² UMR-1391 ISPA, INRA-Bordeaux Sciences Agro, 71 avenue Edouard Bourlaux, F-33882 Villenave d'Ornon cedex, France.

Background Oilseed rape (*Brassica napus* L.) is facing an increasing demand to meet worldwide needs for food and biofuel industries. Its high sulfur (S) requirements have led to consider S limitation before the onset of pod formation as a major concern to maintain high yield and to reach good oil quality (Postma et al., 1999). Therefore, the prediction of S contents in leaves which undergo sequential senescence during the vegetative phase might be of help to a better management of S fertilization by real time adjustments (Schnug and Evans, 1992).

Methods In this study we developed a predictive model of plant growth before the onset of pod formation in relation to S availability (SuMoToRI, Sulfur Model Towards Rapeseed Improvement). Effective organ growth is calculated by taking into account daily S availability, air temperature and photosynthetically active radiation. Our work aimed (i) to predict plant growth and leaf S contents and (ii) to highlight the most important carbon- (C) and S-related processes that drive growth according to S supply.

Results Simulation results showed that the output variables i.e. Leaf Area Index, Total Dry Weight, Leaf Dry Weight, Leaf S content were correctly predicted. When comparing contrasting S supplies, differences in formalisms were necessary to consider for C assimilation as a side effect of different Radiation Use Efficiency and for plant S uptake and leaf S demand as a direct consequence in S availability.

Discussion/ Conclusion The model allows S amounts in photosynthetic leaves and in fallen leaves to be estimated which can be a useful tool to correct S fertilization inputs throughout the vegetative phase by correlating threshold levels in leaves with final performances.

References

Postma R, Van Erp PJ, Saanen R . 1999. Quantifying the sulphur supply to agricultural crops. In: Sulphur in plants (Eds YP Abrol, A Ahmad) pp. 60-61.

Schnug E, Evans E. 1992. Monitoring the sulphur deficiency symptoms in *Brassica napus*. *Phyton* **32**: 53-56.