



HAL
open science

Modelling nitrogen partitioning to filling seeds in pea (*Pisum sativum* L.): a tool to predict seed N concentration

Annabelle Larmure, Caroline Surleau, Nathalie G. Munier-Jolain, Vincent
Faloya

► **To cite this version:**

Annabelle Larmure, Caroline Surleau, Nathalie G. Munier-Jolain, Vincent Faloya. Modelling nitrogen partitioning to filling seeds in pea (*Pisum sativum* L.): a tool to predict seed N concentration. 5th European Conference on Grain Legumes and ICLGG, Jun 2004, Dijon, France. 85, 2004, Legumes for the benefits of agriculture nutrition and the environment: their genomics, their products, and their improvement. hal-01874604

HAL Id: hal-01874604

<https://hal.science/hal-01874604>

Submitted on 14 Sep 2018

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.

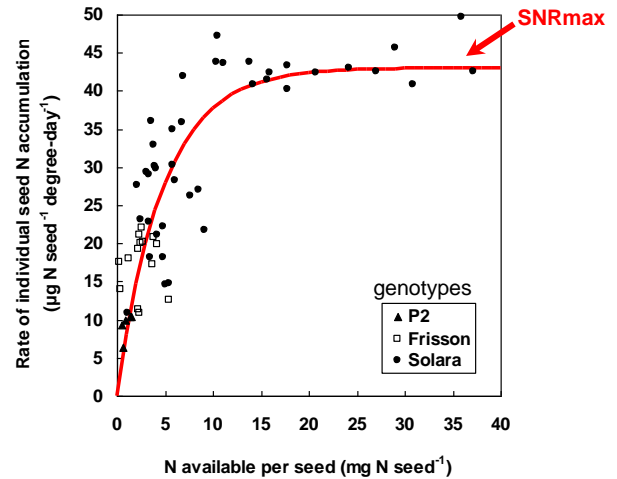
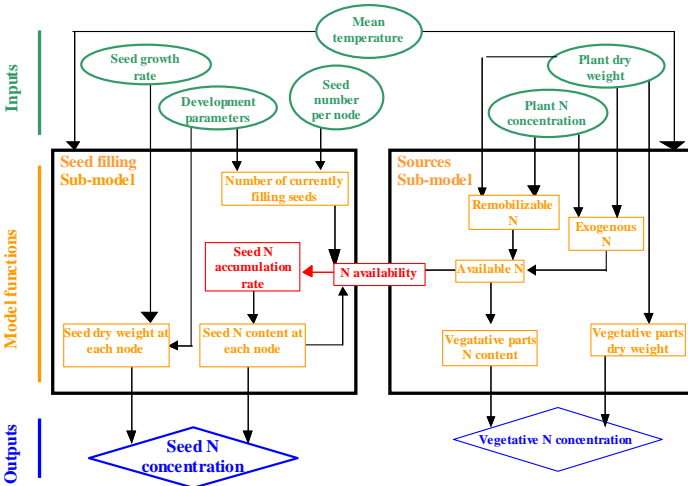
L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Modelling nitrogen partitioning to filling seeds in pea : a tool to predict seed N concentration

Annabelle LARMURE, Caroline SURLEAU, Vincent FALOYA and Nathalie MUNIER-JOLAIN
Unité de Génétique et d'Ecophysiologie des Légumineuses, INRA Dijon, FRANCE

Seed nitrogen concentration is one of the main quality criteria in grain legume crops.

How can be seed N concentration at harvest simulated in pea (*Pisum sativum* L.) ?



A dynamic *crop model component* simulating N partitioning was developed in order to predict seed N concentration at harvest.

Calculations are done for a mean stem for a one day period during the seed filling period (1)

The rate of seed N accumulation is estimated as a function of the plant N available per seed (2).

The parameter "maximum rate of seed N accumulation" (SNRmax), has been demonstrated to vary among genotypes (1)

Evaluation of the crop model component

23 independent field situations

✓ four genotypes

Baccara, Solara, Frisson
P2 (a non-nodulating mutant of Frisson)

✓ various N nutrition levels

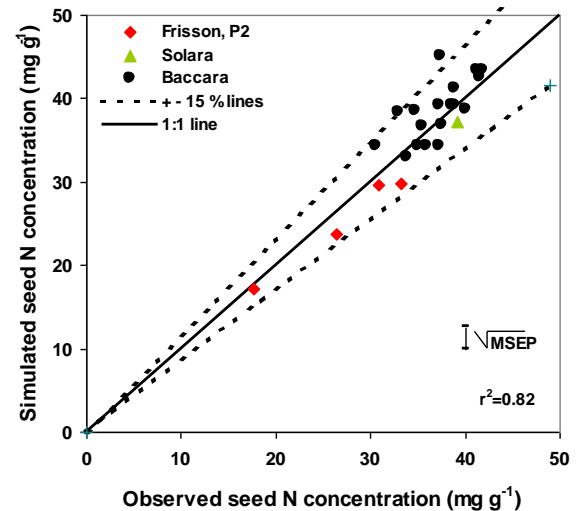
✓ 3 years in 3 locations in France
Dijon, Roupy and Epehy



The estimation of seed N concentration by the crop model component is good ...

- high coefficient of determination ($r^2 = 0.82$)
- low root of the mean squared error of prediction ($\sqrt{\text{MSEP}} = 2.7 \text{ mg g}^{-1}$)

... but need precise input variables ;
it could also be further improved by integrating stresses effects.



(1) Larmure A., Munier-Jolain N. G. (2004) *Field Crops R.* 85, 135-148.

(2) Lhuillier-Soundélé A., Munier-Jolain N.G., Ney B. (1999) *Crop Sci.* 39, 1741-1748.

(3) Sinclair T.R. and De Witt C.T. (1976) *Agron. J.* 68,319-324.

What the crop model component simulating N partitioning offers :

- A tool to improve the understanding of "self destruction" processes during the seed filling period in pea (3)
- A valuable part of a larger model simulating pea yield and seed quality