Xiaogang Yin

Research interests:

1. N & C cycling in cropping system
2. Climate Smart Agriculture
3. Crop modelling

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AgreenSkills project: Modelling root turnover and SOC storage using STICS

➢ Introduction

- How to optimize carbon balance and increase soil organic carbon (SOC) storage is crucial for mitigating greenhouse gas emissions from agriculture, and the contribution of the belowground plant materials still remains uncertain.

- It is still a challenge to predict SOC storage in a wide range of conditions and to simulate management options such as crop diversity in the rotation.

- The new STICS soil-crop model (v10) with the improved root growth module , which has been successfully parameterized for miscanthus, switchgrass, triticale and alfalfa, and deserves to be tested for other crops.

➢ Objectives

- Parameterize the new STICS root module for typical perennial/annual crops.

- Assess the impacts of root traits on SOC storage in crop rotations for typical long term experiments in France

Materials and methods

- 34-year crop rotations in Fagnieres (Crop rotations, CC treatments, Bare soil)

- 12-year crop rotations in B & E long term experiment

  Fescue-alfalfa (N^-, N^+); Sorghum-triticale (N^-, N^+); Roots measurements (2010); SOC

  measurements (2006, 2011, 2012, 2018)
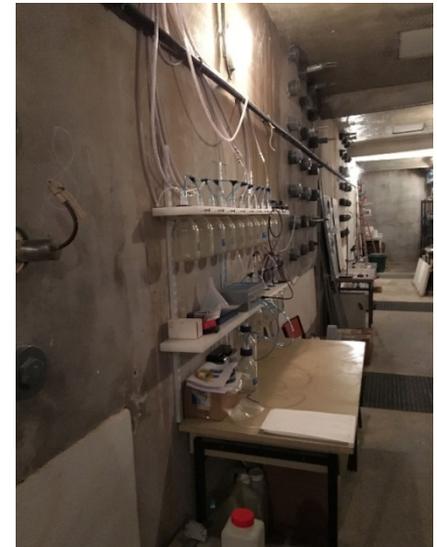
Expected outputs:

- The evaluated and improved STICS root module will be a quantitative tool for predicting SOC, SMN, SWC and biomass (grain yield) for various crops and cropping systems.

- The results of the project will provide better understanding of the drivers of SOC storage in crop rotations, and help designing optimized management techniques and systems. They will contribute to rank cropping systems according to their capacity in achieving the "4 per mille" target and mitigating GHG.

Preliminary results
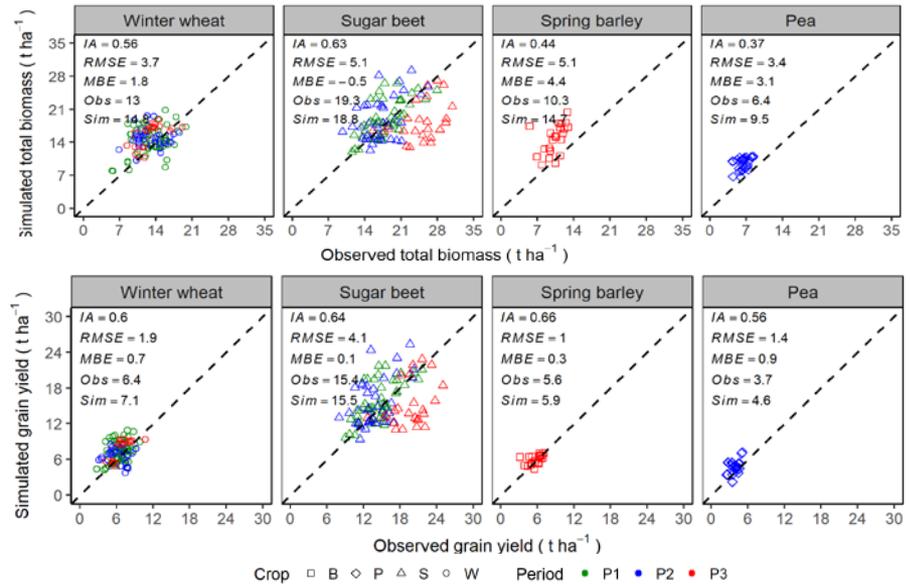
Simulated vs. Observed biomass & yield in Fagnieres
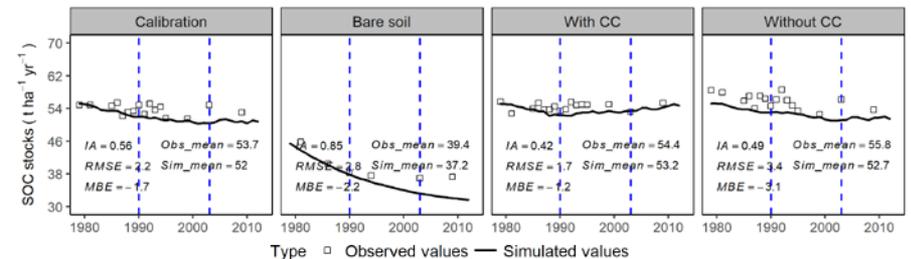
Simulated vs. Observed SOC in Fagnieres

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Thank you all!