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## Evaluating economic and technical performances of sunflower-soybean intercrop in French farming systems

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# Sunflower-soybean intercropping

## An efficient solution for increasing natural resources use efficiency and yield production?

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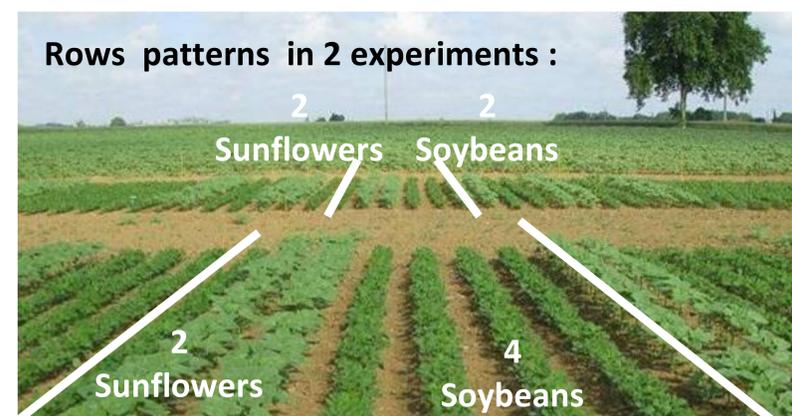


### OBJECTIVES

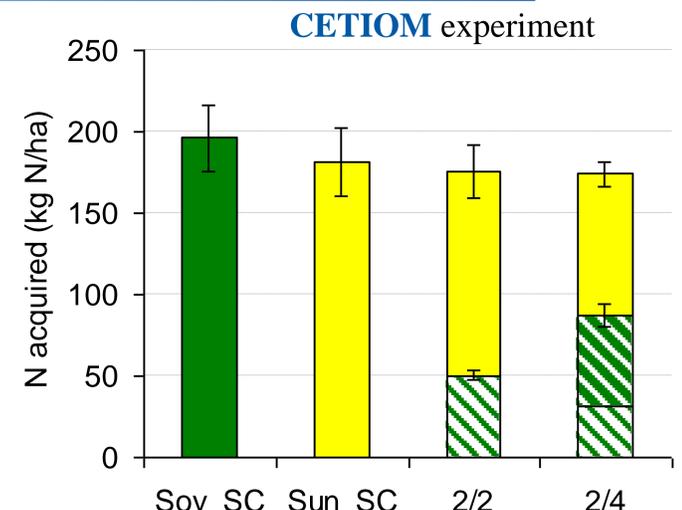
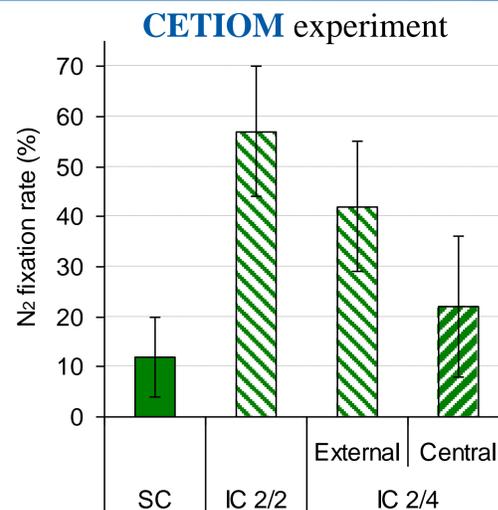
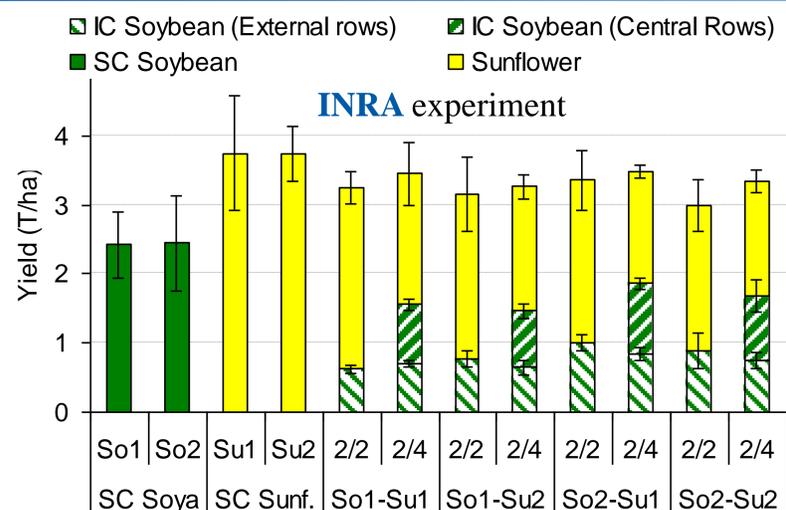
- **Intercropping (IC)** - the simultaneous growing of two or more species in the same field for a significant period - **can improve the use of environmental resources** (light, nutrients and water) resulting in yield and quality advantages compared to sole cropping (SC).
- Few papers - mainly coming from Africa and Asia – deals with **sunflower-soybean intercropping**.
- No reference in temperate climates despite these crops are **adapted to Southern Europe conditions**.
- **Aim of our study: analyze the dynamical functioning of sunflower-soybean intercrops and their performances in order to determine their efficiency and the conditions to maximize resources use.**

### MATERIAL AND METHODS

- Experiments were carried out in 2010 on **CETIOM** and **INRA** stations (SW France)
- The two species were **sown at the same time** (avril or may) but **harvested separately**
- **Three main treatments were compared:**
  - SC Soya:** cv. Isidor (So1) earlier than cv. Ecuror (So2) ;
  - SC Sunflower:** cv. Fabiola (Su1) earlier than cv. Melody (Su2) ;
  - Soya-Sunflower IC:** Each specie sown at the SC row density
- **Two spatial row structures:**
  - 2/2** (2 sunflower rows alternated with 2 soya rows)
  - 2/4** (2 sunflower rows alternated with 4 soya rows)
- **CETIOM** experiment was irrigated (50 mm) with no fertilizer (initial soil N content of 361 kg N/ha)
- **INRA** experiment was not irrigated and soybean rows were fertilized in order to compensate the inoculation inefficiency



### RESULTS



- Total IC yield > SC Soya but < than SC Sunflower
- Soya yield higher in 2/4 IC than in 2/2 IC
- **Sunflower more productive than Soya in IC**
- IC Soya N<sub>2</sub> fixation rate > SC Soya which was very low due to high initial soil N
- Sunflower competition for soil N increase N<sub>2</sub> fixation rate of neighboring soya rows
- N acquired in IC lower than sole crops and IC Soya N acquired highest in 2/4 IC

### CONCLUSIONS

- **Sunflower-soybean best performances** were obtained with : **i) low inputs conditions ; ii) 4 soybean – 2 sunflower rows structure and iii) the latest soybean cultivar intercropped with the earliest sunflower.**
- Intercropped **sunflower always presented a competitive advantage on the soybean** leading to low legume yields.
- **Further genotype-environment interactions researches are needed** for optimizing resources use such as exploring precocity, aerial architecture of genotypes and adapting row structure and management, by favoring complementarities.



### INSTITUTIONS



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ENVIRONNEMENT

