

**MISCANTHUS: IS COMPETITION BETWEEN
BIOMASS FEEDSTOCK AND FOOD PRODUCTION NO
LONGER A BOTTLENECK TO TACKLE GLOBAL
WARMING?**

Colin JURY

- 30 millions euros ; Funded in the frame of the ANR program « Investissement d'avenir »
- 2012-2019
- Objectives:
 - Develop local value chains for miscanthus and sorghum biomass
 - Develop new dedicated varieties and cropping systems that combine improved yield, limited environmental impacts and a composition tailored for industrial uses



- 16 partners



1. Evaluate the influence of different methodologies to estimate the dLUC:

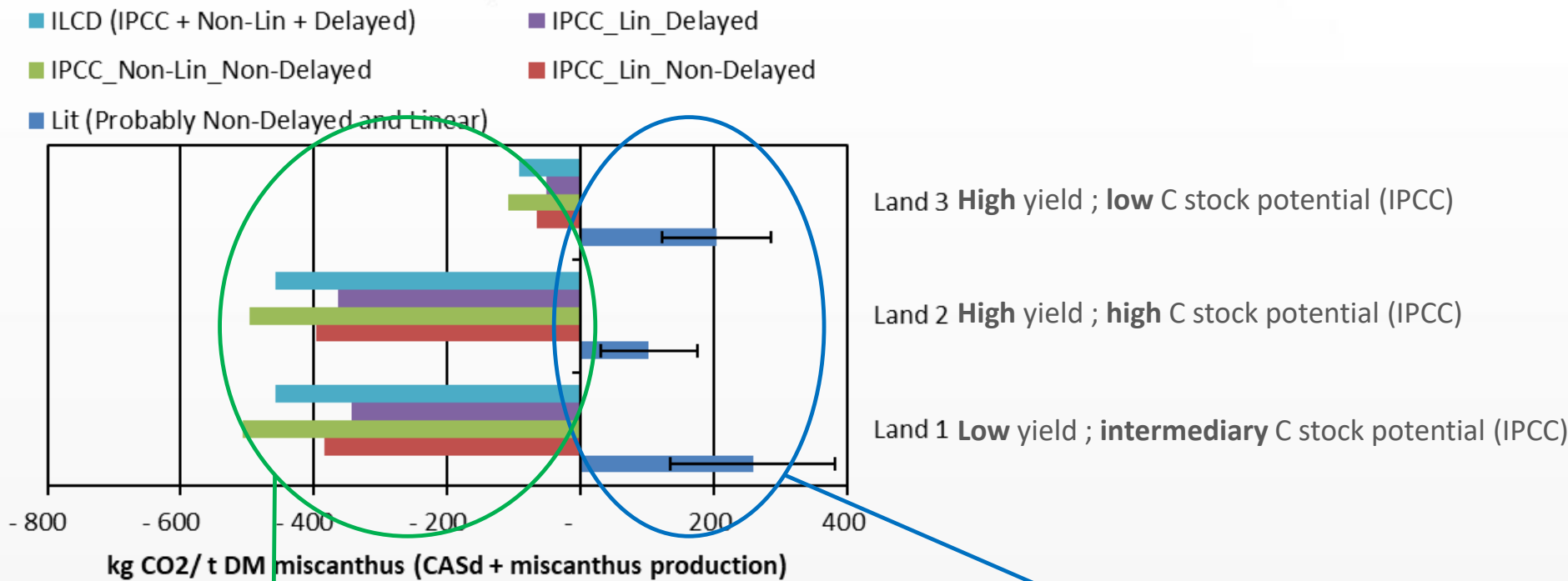
- Source (literature vs. calculation from IPCC methodology)
- Allocation over years (linear vs. non-linear as recommended by the ILCD)
- Consistency between the CO₂ characterization factor and the CC time frame (not delayed vs. delayed as recommended by the ILCD)

2. Estimate if the heat production from miscanthus is competitive to the conventional one if miscanthus is cultivated on:

- Marginal land (land not dedicated to conventional crop production)
- Non-marginal land (problematic of iLUC arises)

- **Three scenarios based on 3 different types of soil to evaluate the influence:**
 - Of the calculation of dLUC when estimated thanks to the IPCC methodology
 - Of the miscanthus yield per hectare
 - Of the agricultural practices (more or less fertilization, irrigation, ...)
- **Two land classification:**
 - Marginal:
 - dLUC calculated considering a switch from meadow to miscanthus
 - Non-marginal:
 - dLUC calculated considering a switch from intensive crop to miscanthus
 - iLUC is taken into account

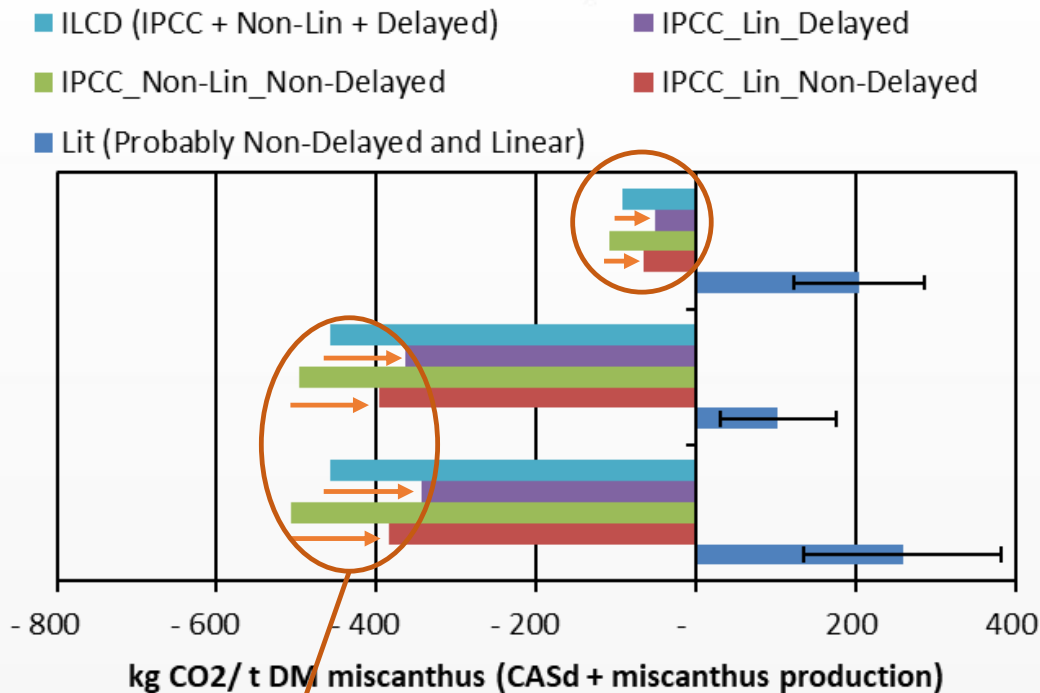
Miscanthus production on marginal land



dLUC based on IPCC (C storage)

dLUC based on literature (C emission)

- dLUC leads the climate change impact of miscanthus production
- Big discrepancy between dLUC estimation from IPCC (storage) and literature (emission)



Land 3 **High** yield ; **low** C stock potential (IPCC)

Land 2 **High** yield ; **high** C stock potential (IPCC)

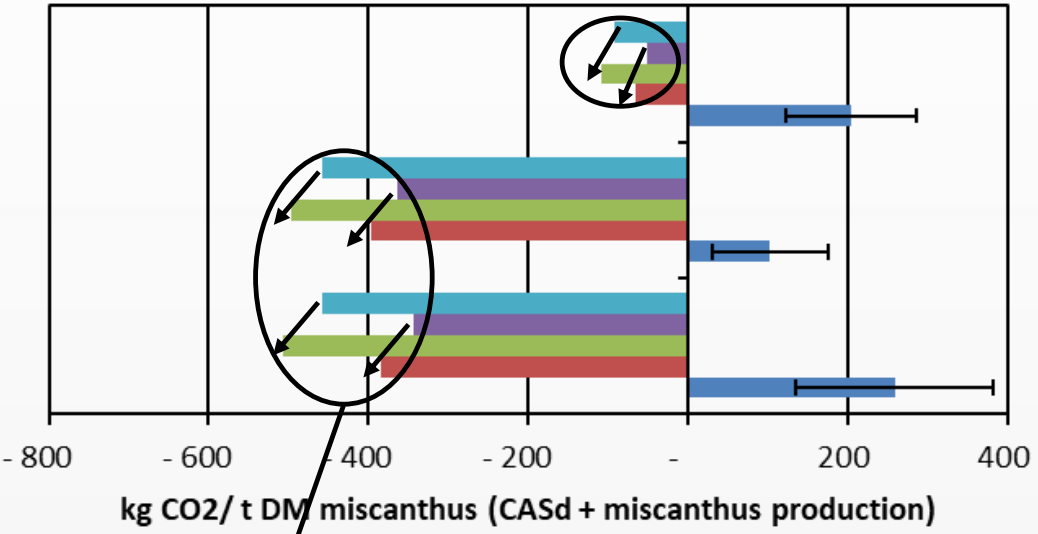
Land 1 **Low** yield ; **intermediary** C stock potential (IPCC)

Influence of the C stock allocation method

- **Linear allocation reduces the influence of dLUC by 30%**

Miscanthus production on marginal land

- ILCD (IPCC + Non-Lin + Delayed)
- IPCC_Non-Lin_Non-Delayed
- Lit (Probably Non-Delayed and Linear)
- IPCC_Lin_Delayed
- IPCC_Lin_Non-Delayed



Land 3 **High** yield ; **low** C stock potential (IPCC)

Land 2 **High** yield ; **high** C stock potential (IPCC)

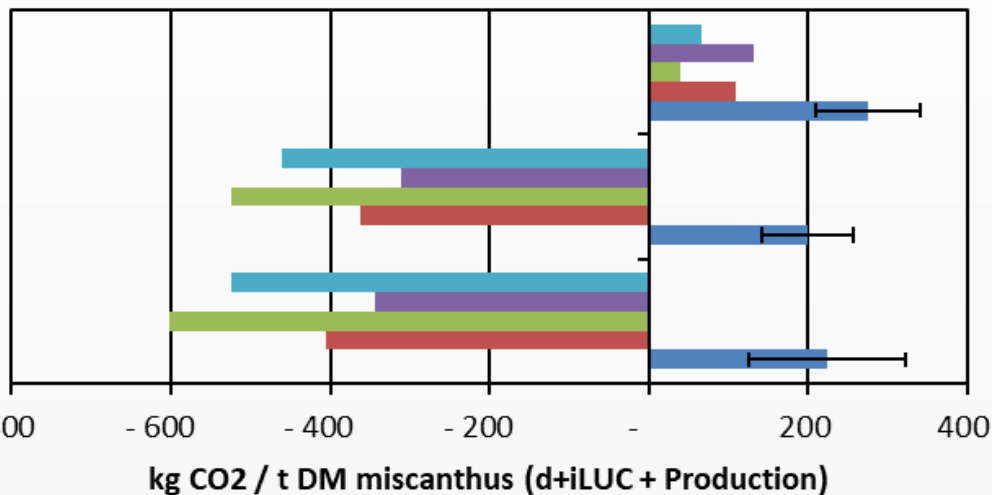
Land 1 **Low** yield ; **intermediary** C stock potential (IPCC)

Influence of considering delayed C stock variation or not

- Non-delayed variation increases the influence of the dLUC by 10%

Miscanthus production on non-marginal land

- ILCD (IPCC + Non-Linear + Delayed)
- IPCC_Non-Linear_Non-Delayed
- Lit (Probably Non-Delayed and Linear)
- IPCC_Lin_Delayed
- IPCC_Lin_Non-Delayed



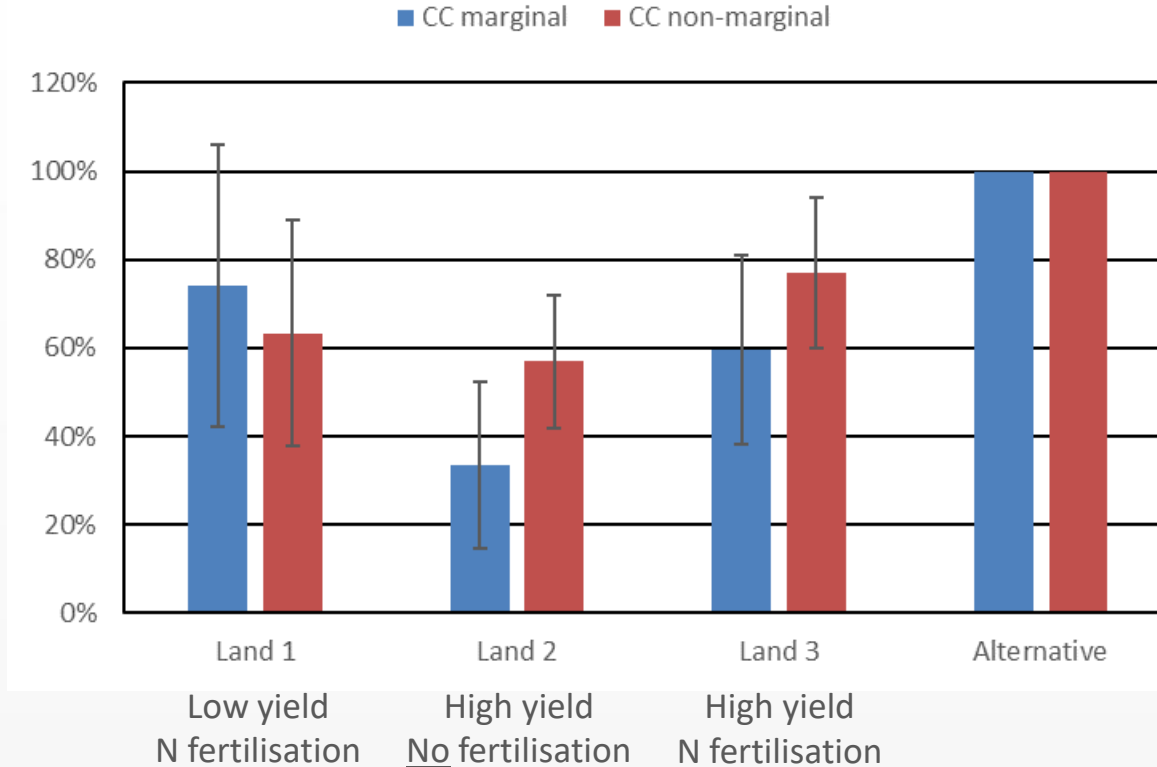
Land 3 **High** yield ; **low** C stock potential (IPCC)

Land 2 **High** yield ; **high** C stock potential (IPCC)

Land 1 **Low** yield ; **intermediary** C stock potential (IPCC)

- More or less the same conclusion as for marginal land
- For both IPCC and literature, the switch from conventional crop to miscanthus leads to a carbon storage $dLUC < 0$ that compensates the $iLUC$

- **The conventional heat production is estimated for France from the IEA statistics**
 - 54% wood
 - 41% natural gas
 - 19% coal
 - 18% oil
 - 8% geothermal
 - 1% others



dLUC is estimated on the basis of the literature data

- Almost all results show improved climate change impact for miscanthus production
- But, to ensure significant improvement on non-marginal land, high yields and no N fertilisation are required

- **dLUC evaluation:**

- IPCC land used factors do not seem to be a good proxy
- Literature estimation are probably better but it should be adapted considering that:
 - dLUC is by far the main contributor to CC
 - Linear allocation reduces the dLUC influence of about -30%
 - Non-delayed stock variation increases the dLUC influence of about +10%

- **Heat production from miscanthus vs. conventional:**

- Marginal land: Almost all scenarios lead to a significative reduction of the climate change impact (-30%)
- Non-marginal land: better results can be obtained if there are high yield and no nitrogen fertilization

- **Next steps:**

- Refine the numbers to validate the results (esp. iLUC, dLUC & C stock in rhizome)
- Perform the analysis over all of the impact categories...

...see you next year ;)

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