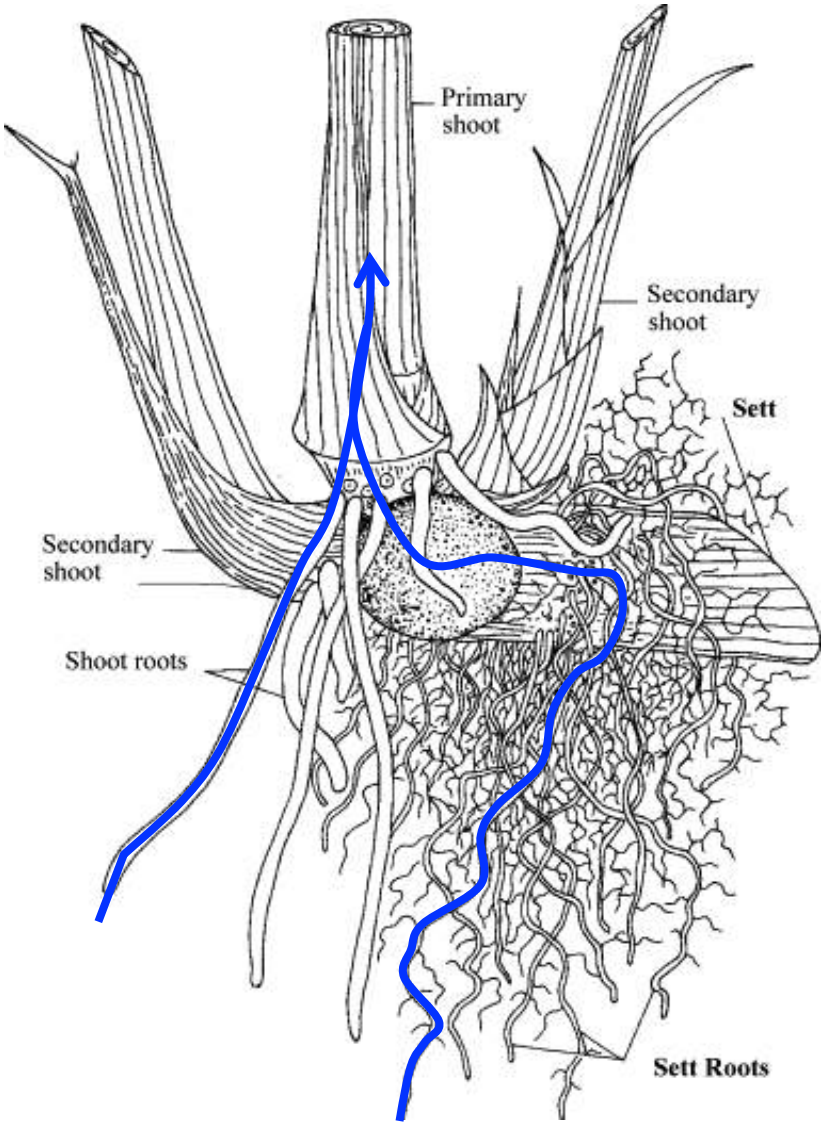
SUGARCANE ROOT GROWTH UNDER WATER DEFICIT

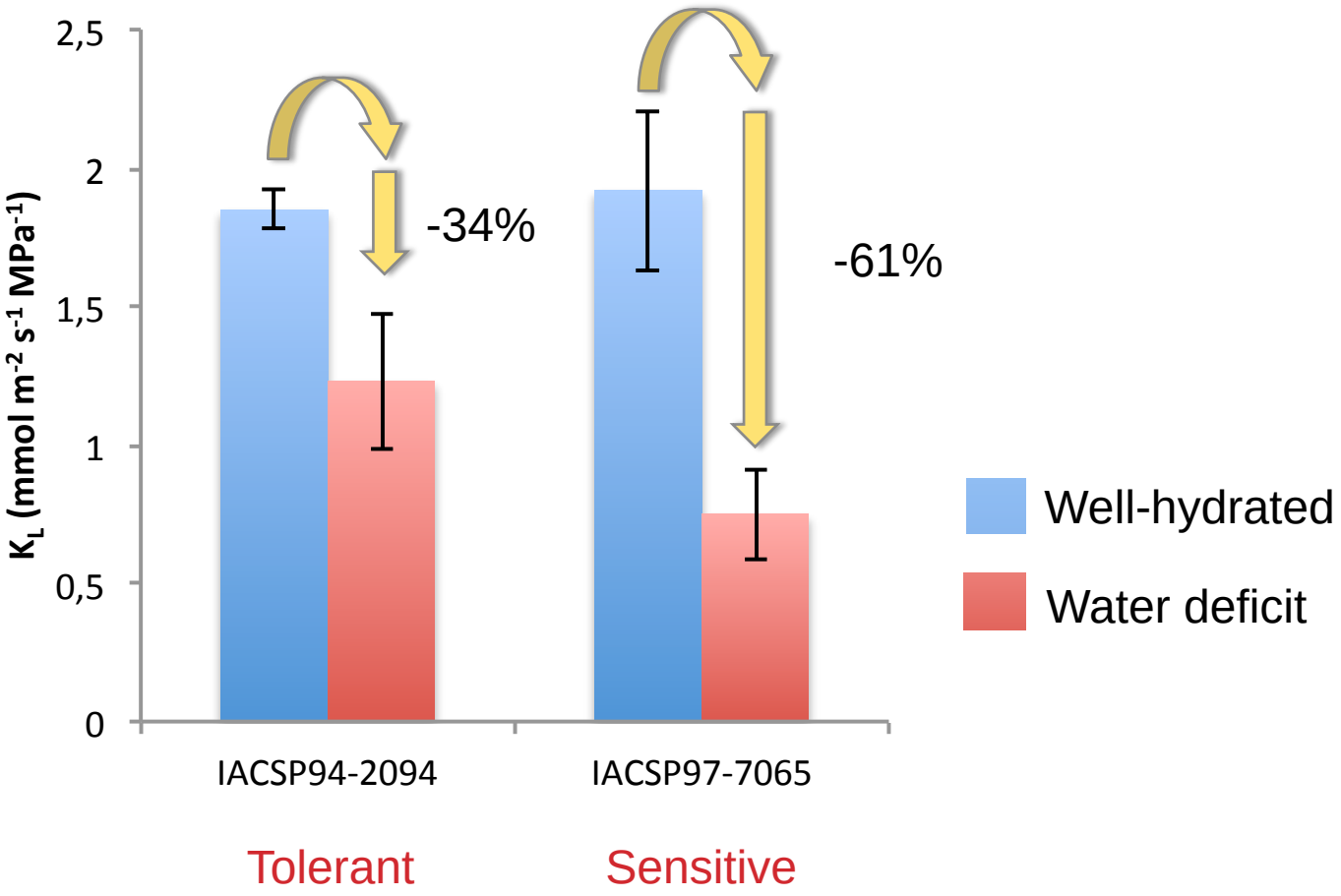
Root hydraulic conductance

- represents how easy is water flow through root tissues (inverse of hydraulic resistance)
- depends on xylem structure and also on aquaporin activity



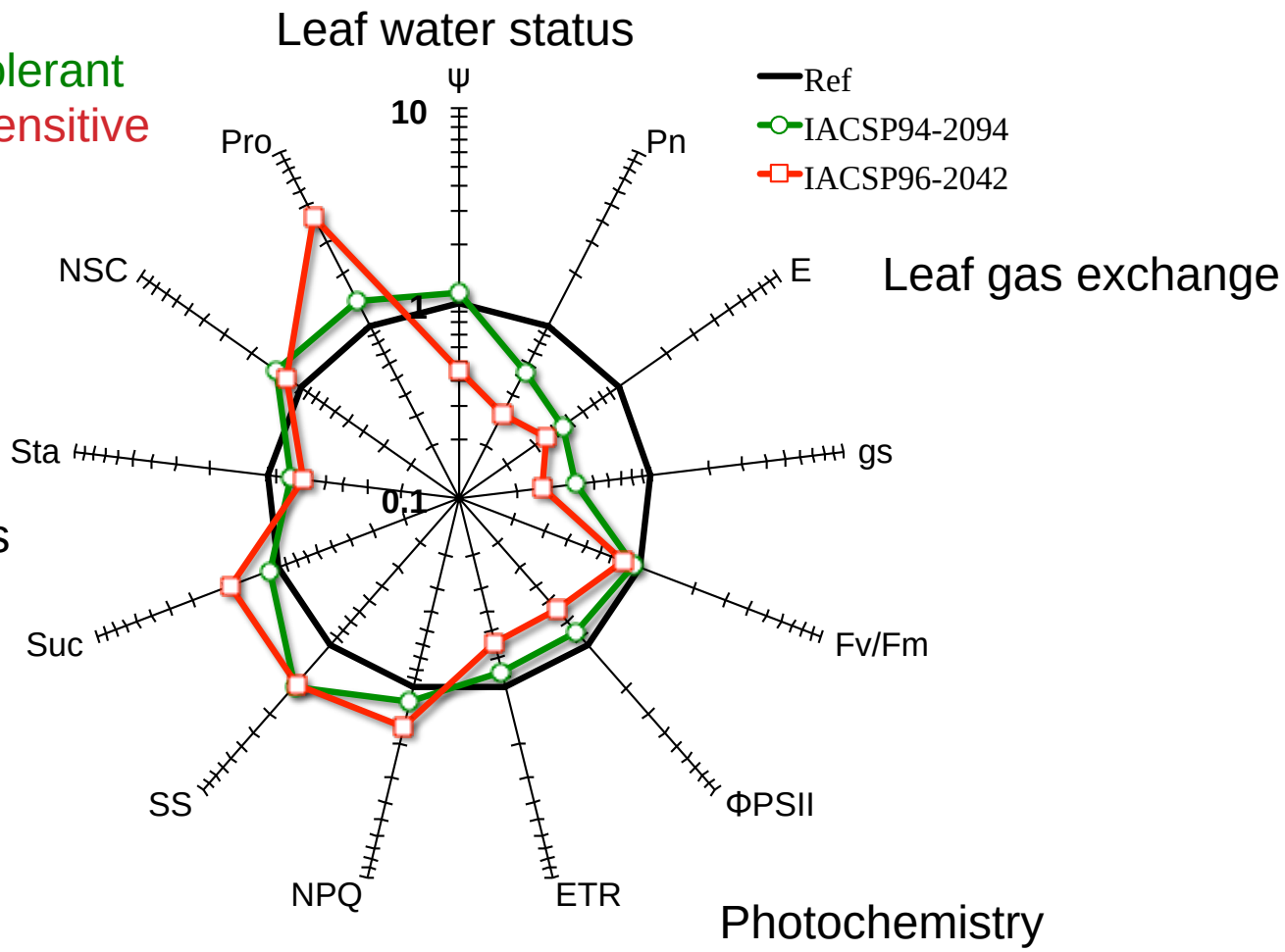
SUGARCANE ROOT GROWTH UNDER WATER DEFICIT

Root hydraulic conductance



SUGARCANE PERFORMANCE UNDER LIMITING CONDITIONS

IACSP94-2094: tolerant
IACSP96-2042: sensitive

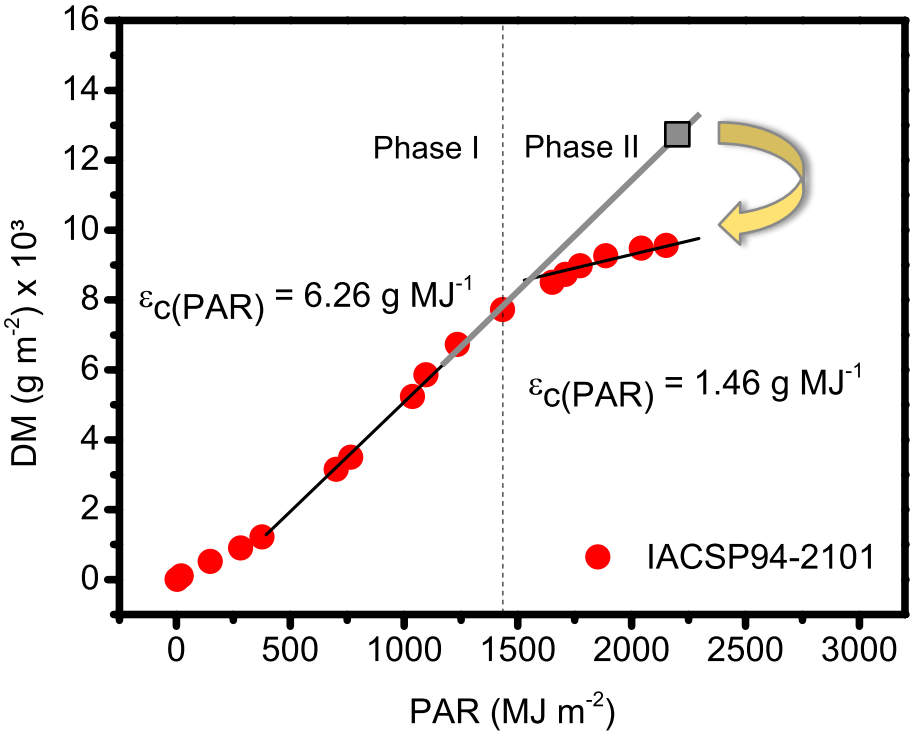


Ribeiro et al. (2013)

LIGHT CONVERSION EFFICIENCY BY SUGARCANE

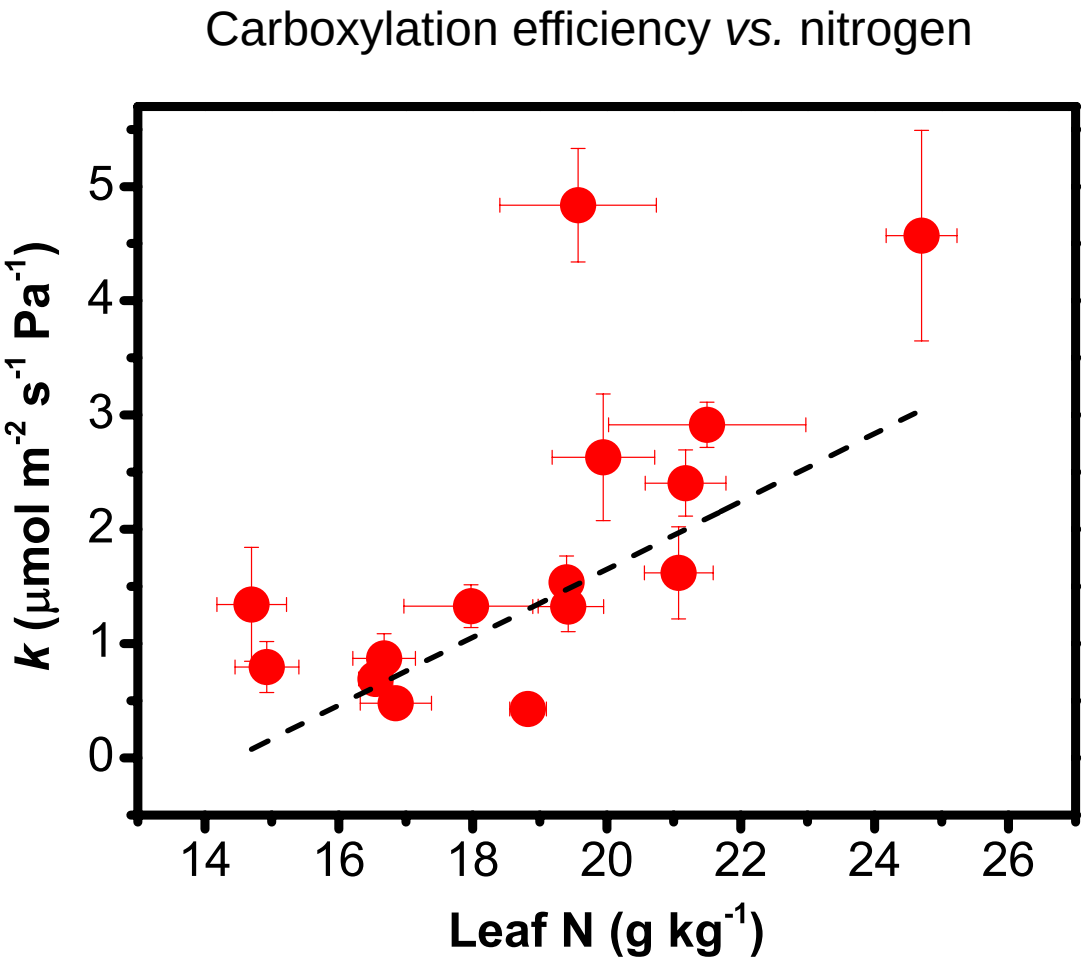
Why?

- Source-sink unbalance (down-regulation of photosynthesis due to sugar)
- Environmental constrains (water deficit and low temperature)
- **Nutritional limitation (nitrogen)**



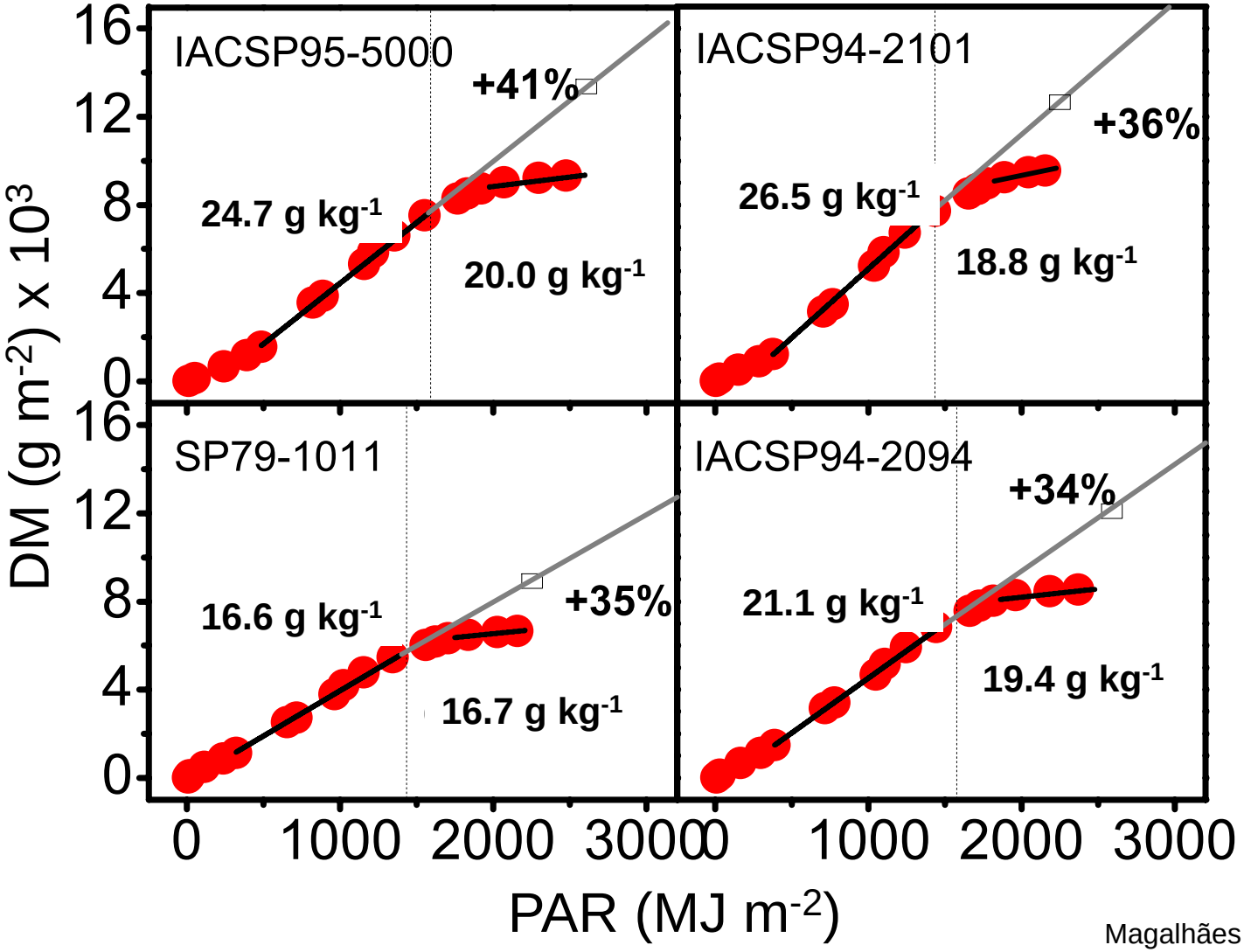
Why does ε_C sensitivity vary among sugarcane varieties?

SUGARCANE PHOTOSYNTHESIS AND NITROGEN USE EFFICIENCY



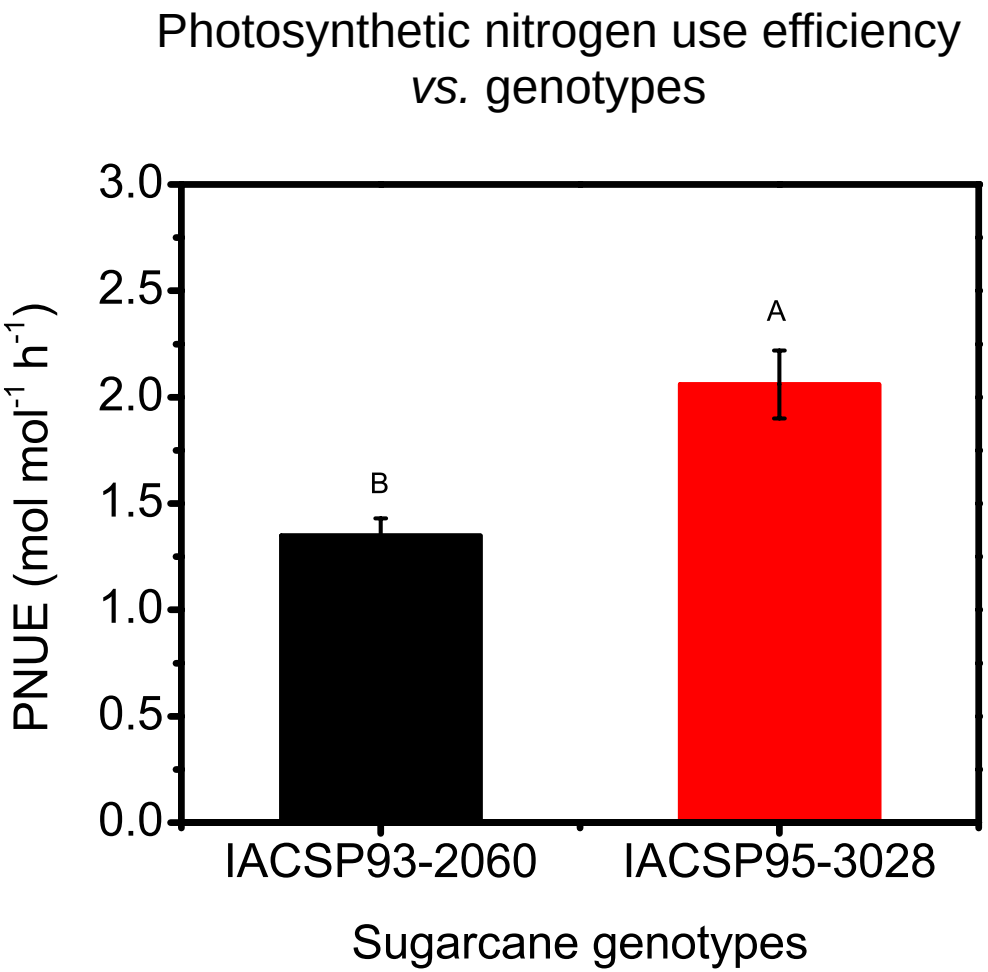
Magalhães Filho et al. (2014)

LIGHT CONVERSION EFFICIENCY AND NITROGEN



Magalhães Filho et al. (2014)

SUGARCANE PHOTOSYNTHESIS AND NITROGEN USE EFFICIENCY

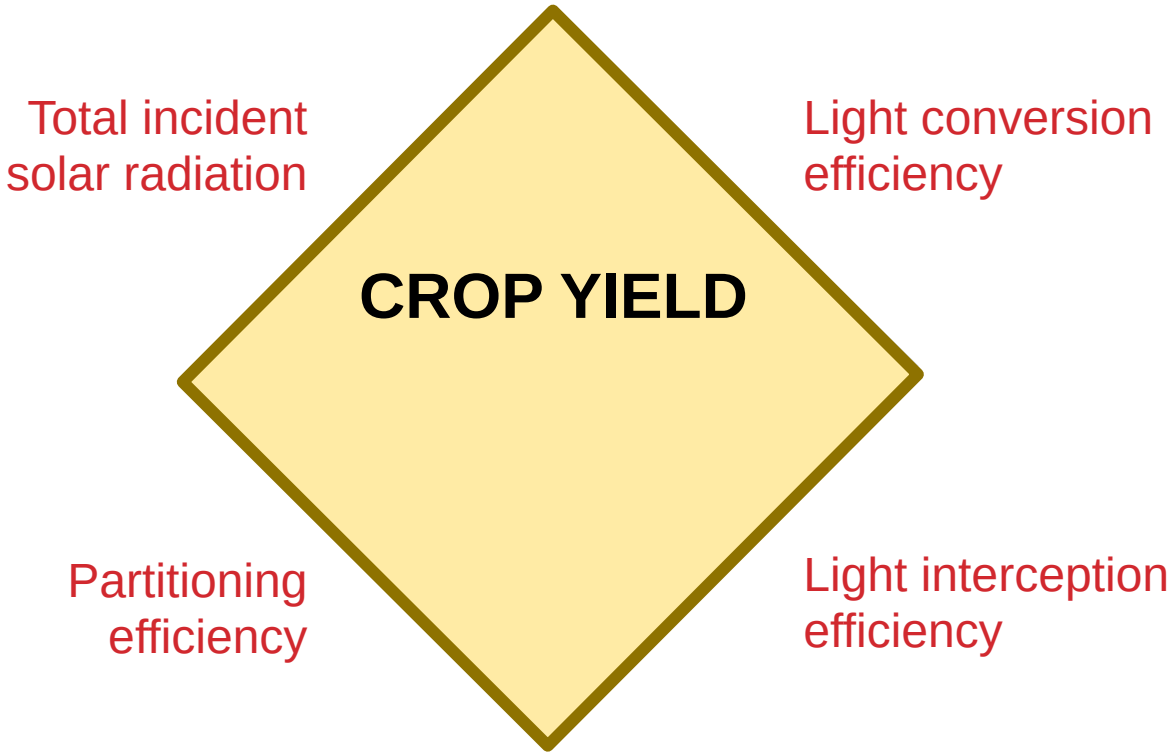


Marchiori et al. (2014)

ARE WE ABLE TO IMPROVE SUGARCANE YIELD? HOW?

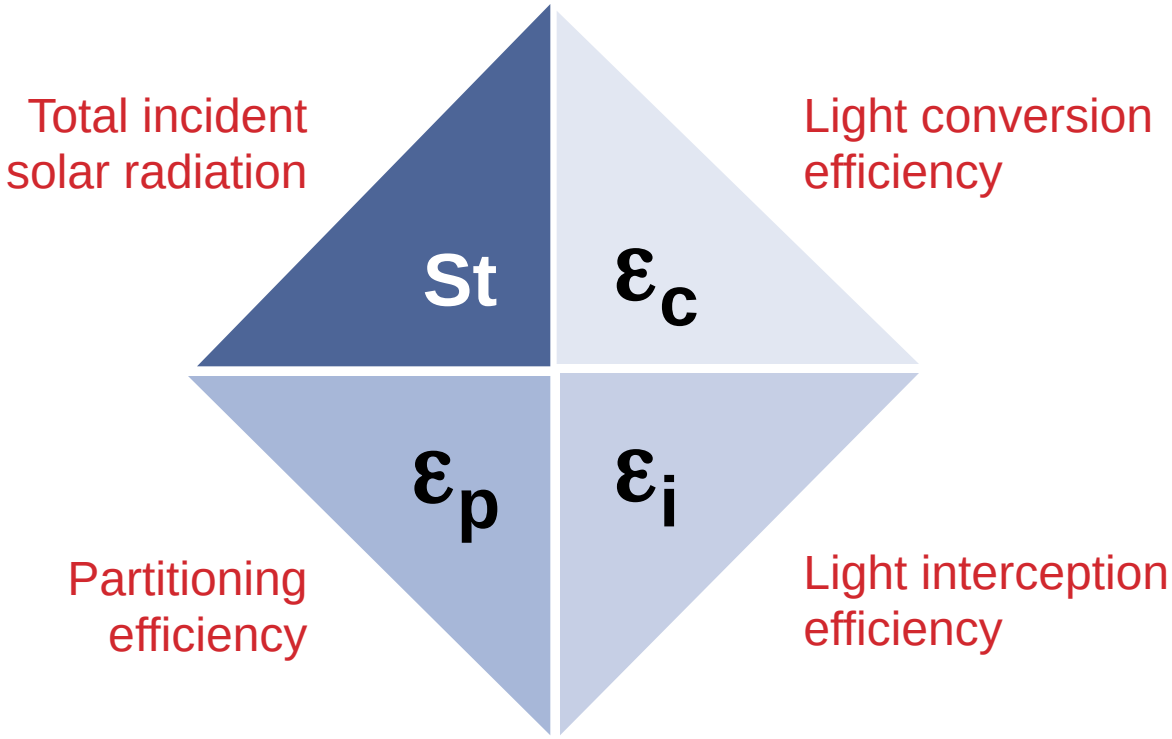
- **Using genotypes with improved performance under limiting conditions**
- **Varietal management (the best variety grown in the best area)**
- **Nutritional management**

CROP YIELD AND EFFICIENCIES



Adapted from Zhu et al. (2010)

CROP YIELD AND EFFICIENCIES



Adapted from Zhu et al. (2010)

AND ABOUT THE LIGHT INTERCEPTION EFFICIENCY?

Factors affecting this trait:

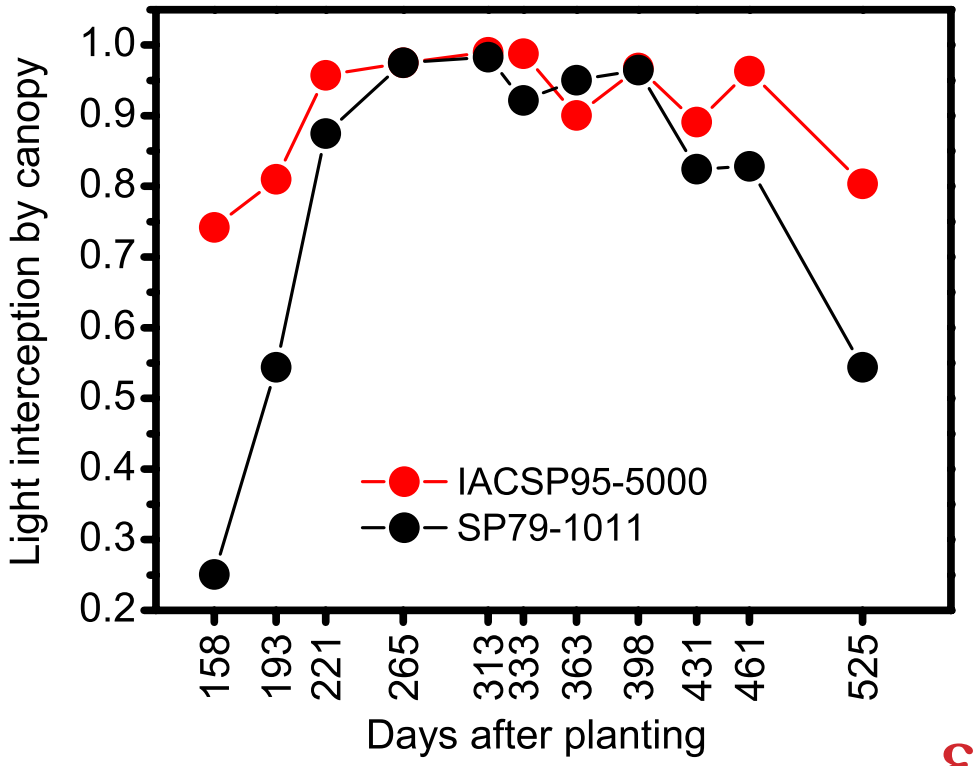
- **Speed of canopy development and closure**
- **Leaf absorbance**
- **Canopy longevity**
- **Canopy size**
- **Canopy architecture**

Canopy morphology

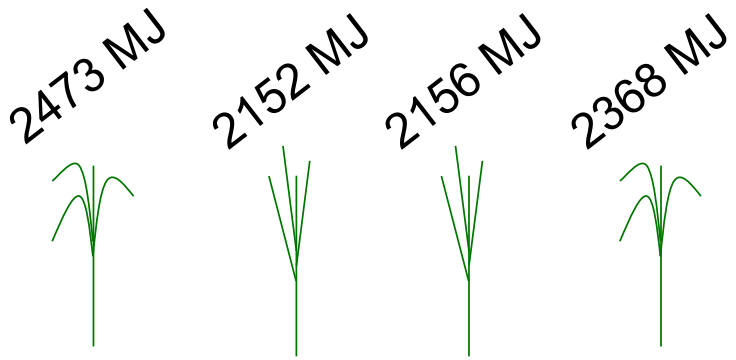
IACSP95-5000 SP79-1011

LIGHT INTERCEPTION EFFICIENCY:

genotypic variation & canopy architecture



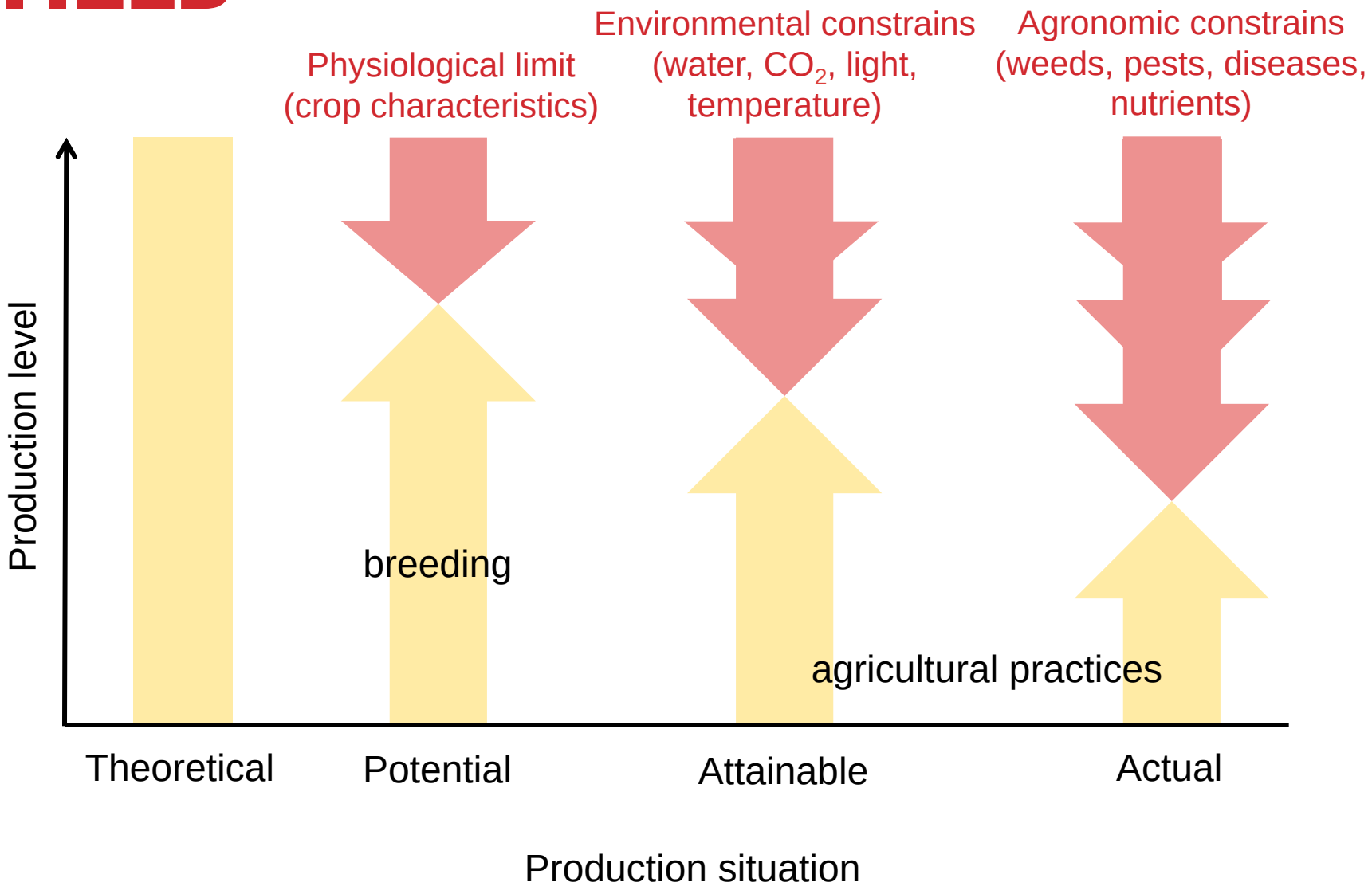
2746 MJ



ε_i 0.90 0.78 0.79 0.86

Magalhães Filho et al. (2014)

WAYS TO IMPROVE SUGARCANE YIELD



Adapted from Moore (2005)

TAKE HOME MESSAGE

By exploring our genetic richness and improving agricultural practices, we will be able to increase sugarcane yield.

THANK YOU FOR YOUR TIME!

Rafael V. Ribeiro | rvr@unicamp.br