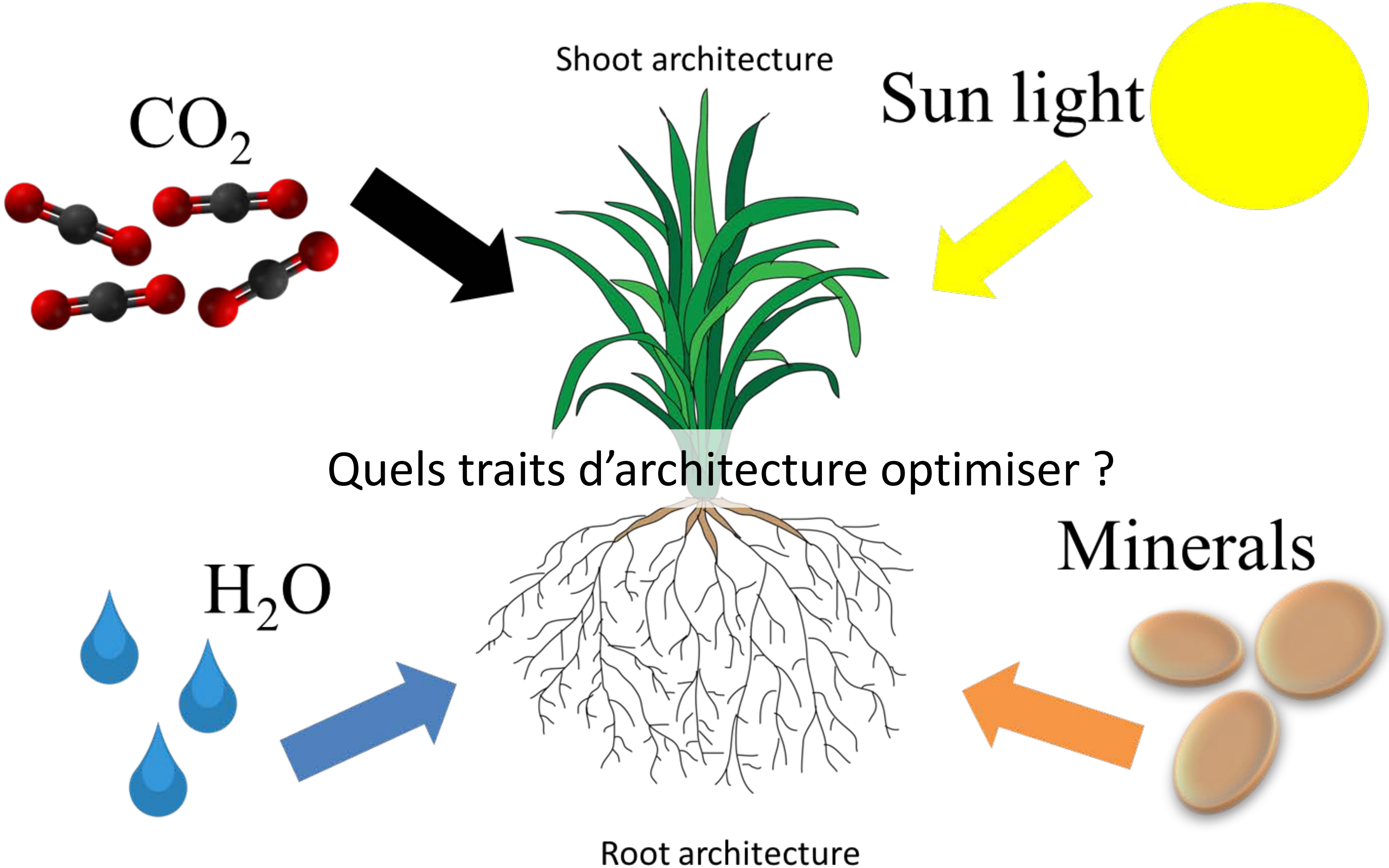
Recherche d'idéotypes architecturaux pour l'optimisation de l'acquisition des ressources



Improving plant productivity

Environment (E)

Management practices (M)

Resources management

Cultural practices

Plant breeding (G)

Interaction between environment, genetic and management (G x E x M)

Ideotype

- Concept of **ideotype** (Donald, 1968) « Modèle nouveau de plante qui, en conditions de culture (communauté de plantes), utilise mieux que les types actuellement connus les ressources du milieu (lumière, eau, éléments minéraux) et en supporte mieux les aléas (adversités climatiques, parasitisme) afin de prouver un meilleur revenu »
- Selection of specific plant architecture (in interaction with managment practices)

(a) Traditional plant type

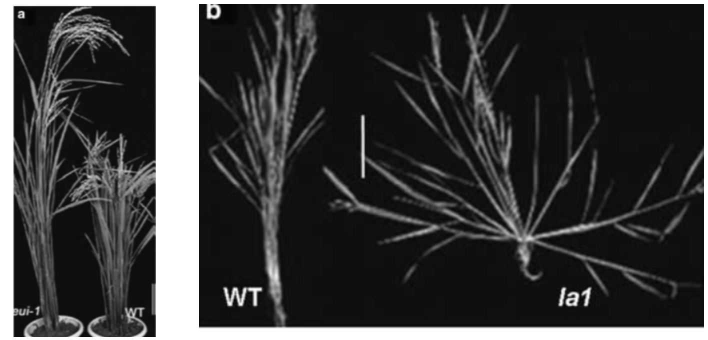
(b) Semi dwarf plant type

(c) New plant type 1990's

R. P. Rötter *et al.*, 2015

Genetic control of plant architecture

- Plant height
  - ➢ Plomion et al., 1996 (QTL), Yang and Hwa, 2008 (mutant)
- Branching pattern
  - ➢ Sakamoto and Matsuoka, 2004 (mutant); Segura et al., 2008 (*H^2*)
- Leaf geometry
  - ➢ Frary et al., 2004 (QTL) ; Li et al., 2015 (QTL)



Yang and Hwa, 2008


Frary *et al.*, 2004

But phenotyping architecture in relation with light interception is still a bottleneck

➢ Use of **Functional-structural plant models (FSPM)**

Variabilité de l’architecture

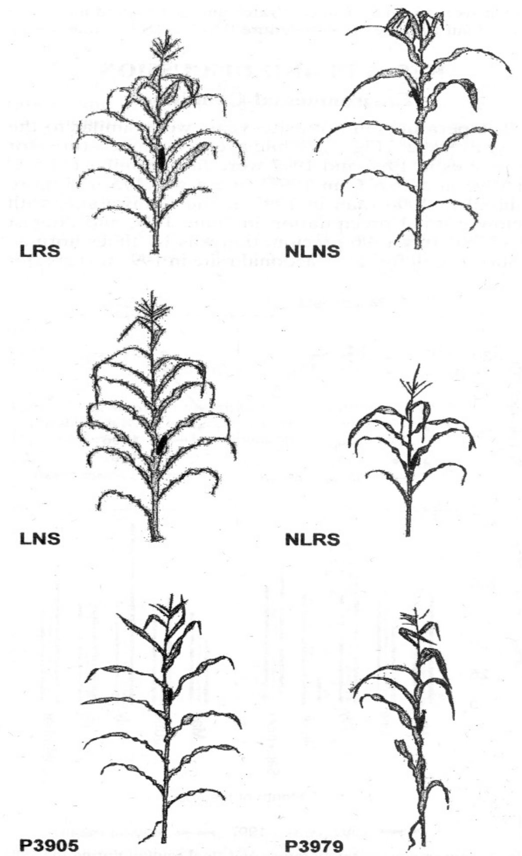
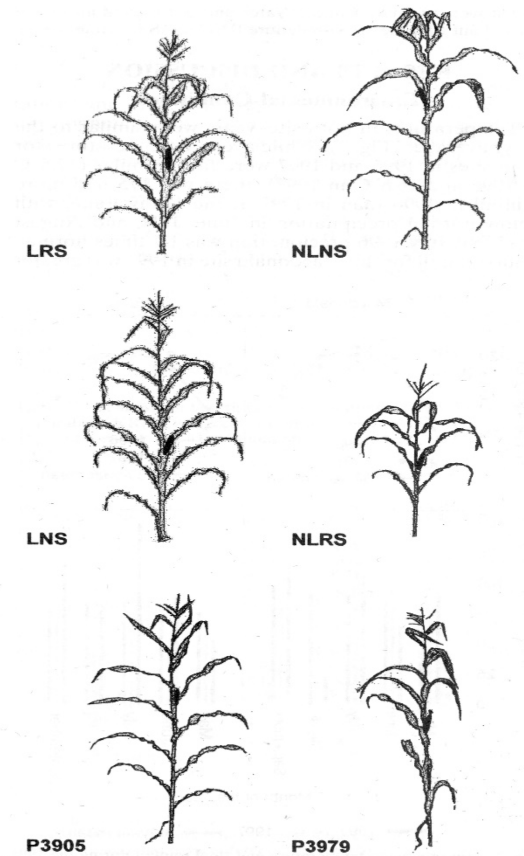


Fig. 1. Examples of plant canopy architectures of field-grown maiz
genotypes at silking stage.



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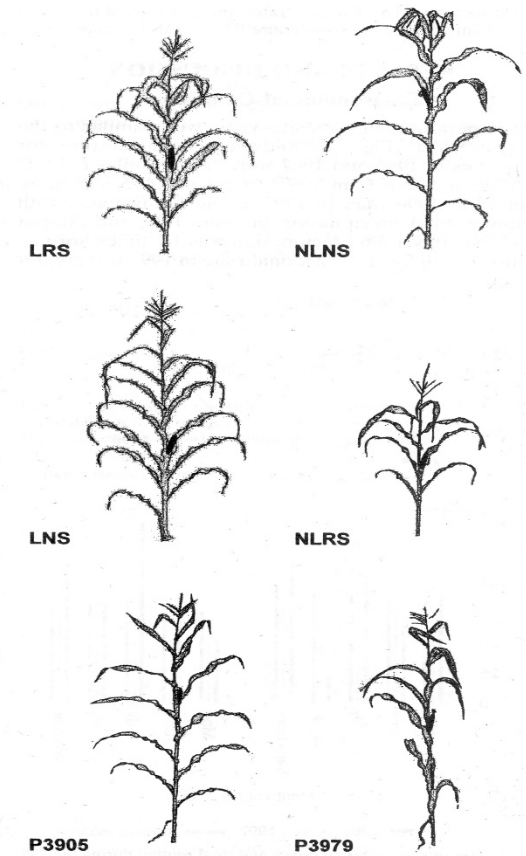

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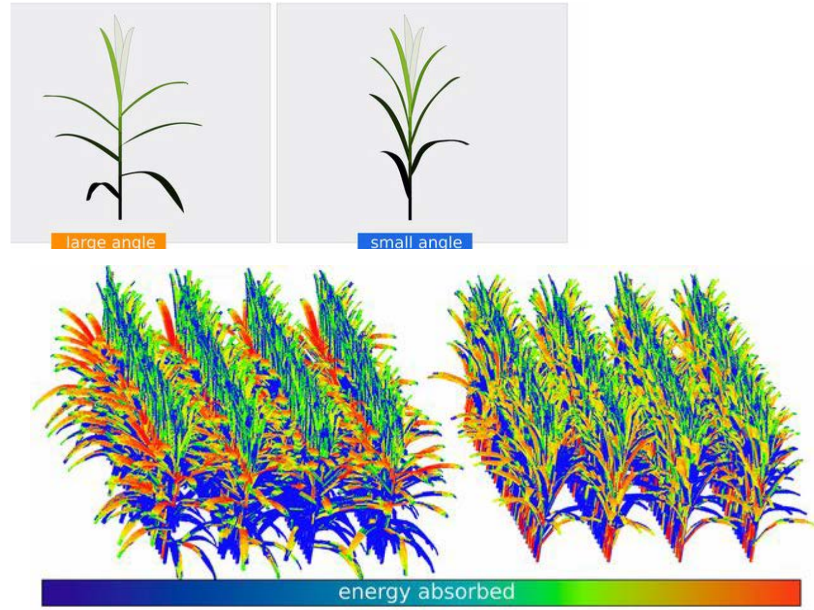
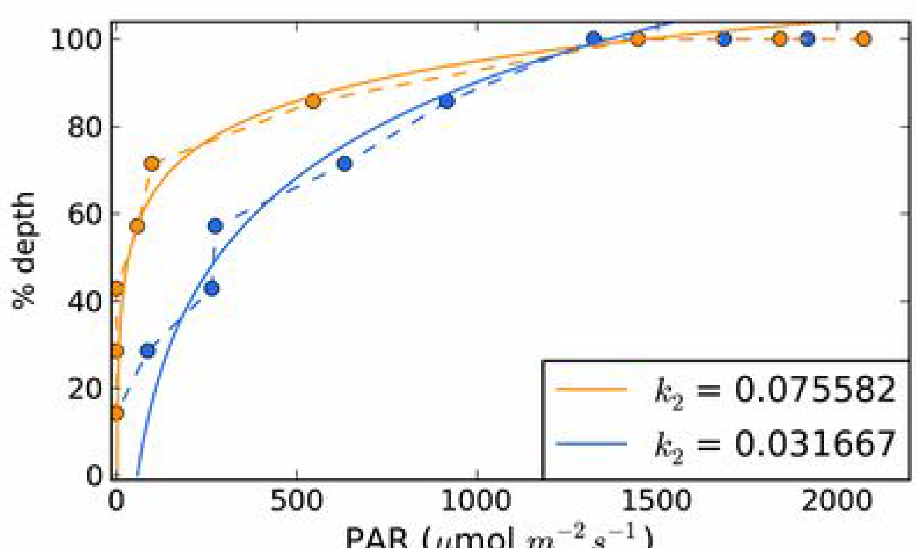
Plant architecture & Light interception





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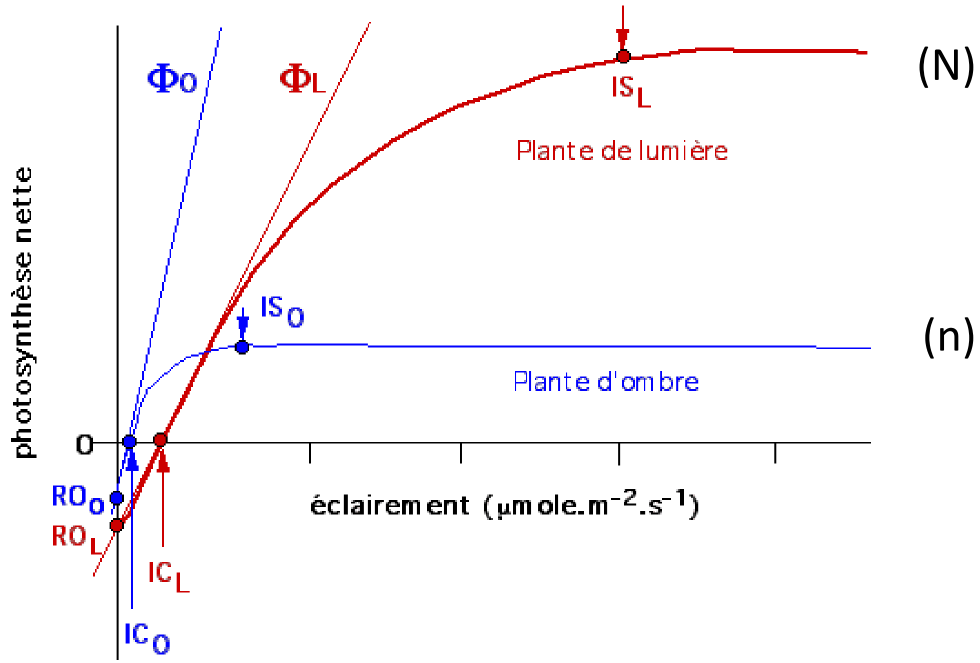
Light interception et photosynthese

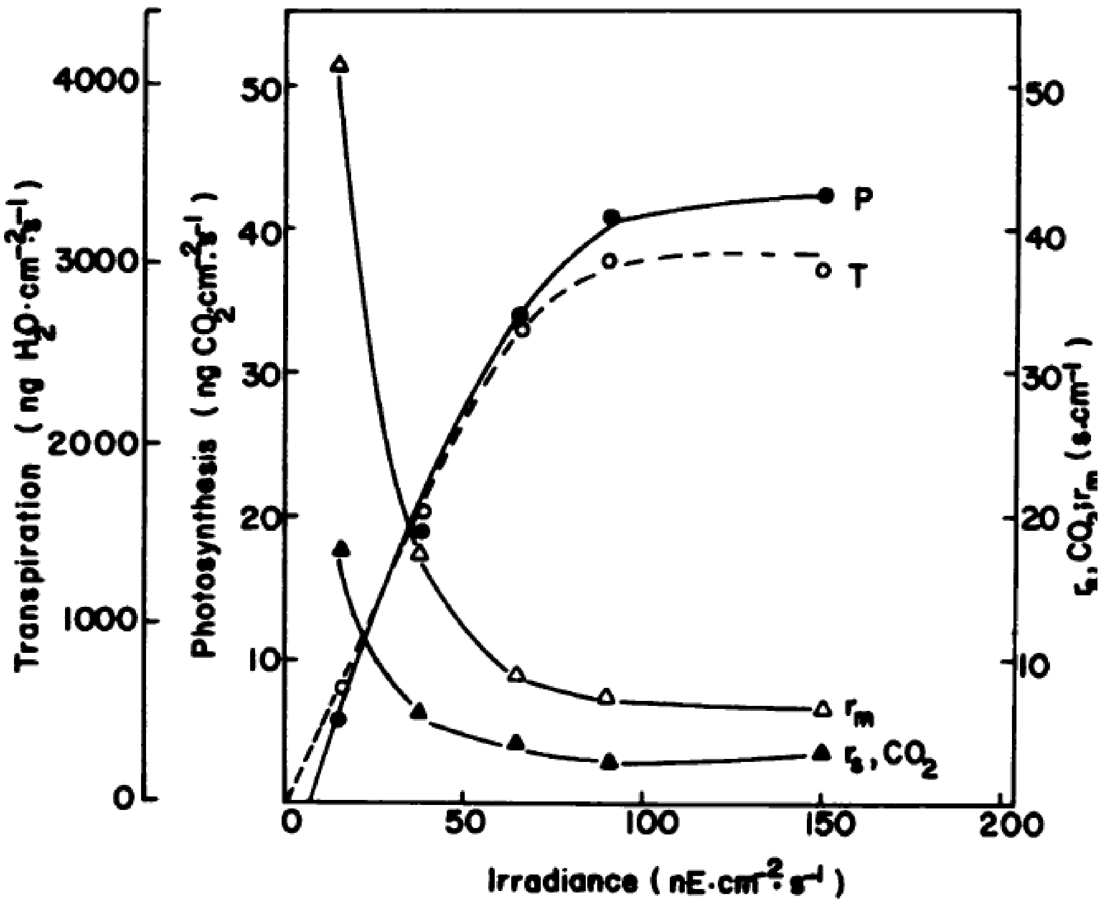
2 - Comparaison de la photosynthèse de plantes de lumière et de plantes d'ombre.

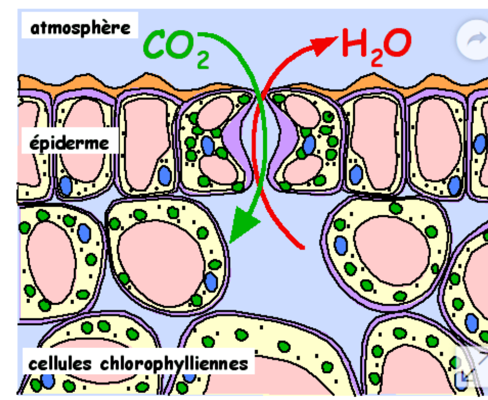


Courbes de saturation de la photosynthèse en fonction de la densité du flux de photons chez une plante de lumière et une plante d'ombre. *Les autres facteurs (concentration en CO_2 atmosphérique, température 25°C) sont maintenus constants. IC, intensité de compensation, ; IS, intensité saturante ; Φ, Rendement quantique foliaire. En bleu : plantes d'ombre ; en rouge : plantes de lumière.*

RN4bio, Université Pierre et Marie Curie

Light interception et transpiration





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