

# Identification of promising dessert banana cultivars for cropping systems without chemical input



## Context : agroecological transition of banana cultivation

Alternative cultivation practices to the use of chemical inputs can reduce the yield :

The severe deleaving used to control black Sigatoka can reduce photosynthetic production. Planting live mulch soil cover for weed management and replacing mineral fertilizers by organic ones can reduce soil nitrogen (N) availability.

The aim is to find banana cultivars that maintain their yield under those suboptimal cropping conditions.

## Mat & Methods

12 cultivars from Vitropic brochure to explore the Cavendish group diversity (Figure 1)

2 Trials to assess the yield stability in different suboptimal conditions :

- **Trial 1:** Measuring the effect of seasonal variation of photosynthetic production on the bunch weight. We assessed the photosynthetic production with the global radiation (Rg) and the active leaf area (ALA) (Figure 2A).
- **Trial 2:** Measuring the yield in suboptimal cropping conditions (L- : constant severe deleaving ; N- : low N) and comparing with a control (Figure 3A, 3B).

## Effect of photosynthetic production variations on the bunch weight

- The photosynthetic production during the bunch growth was higher in the 1<sup>st</sup> cycle than in the 2<sup>nd</sup> one (Figure 2A), due to short day period (low Rg) and a higher Black Sigatoka pressure (small ALA) in the 2<sup>nd</sup> cycle .
- This variation decreased the fruit weight, and thus the bunch weight of most of the cultivars (Figure 2B). **Poyo was the cultivar with the most stable bunch weight, whereas DC01 exhibited the higher bunch weight decrease.**

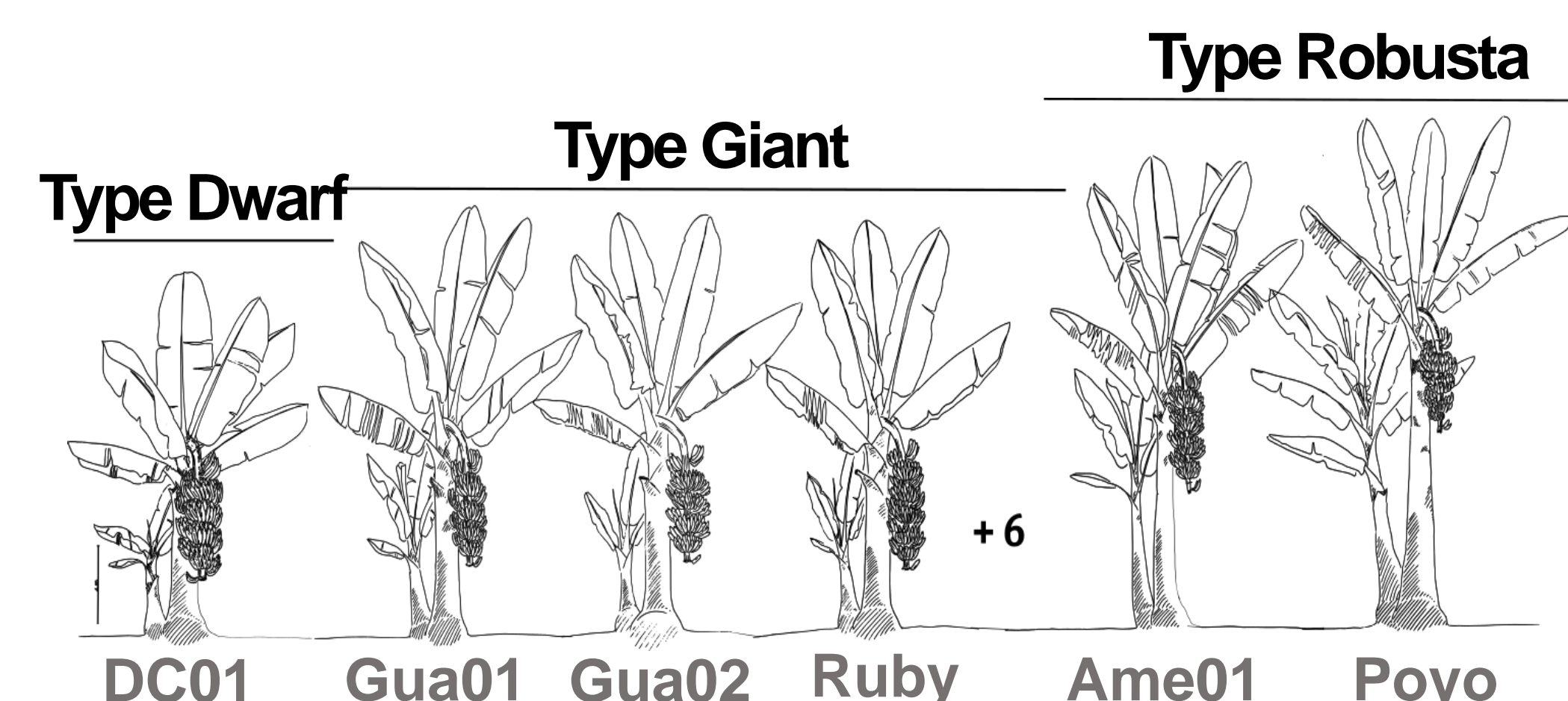


Fig. 1 Main cultivars studied, classed by types with the Simmonds (1956) classification

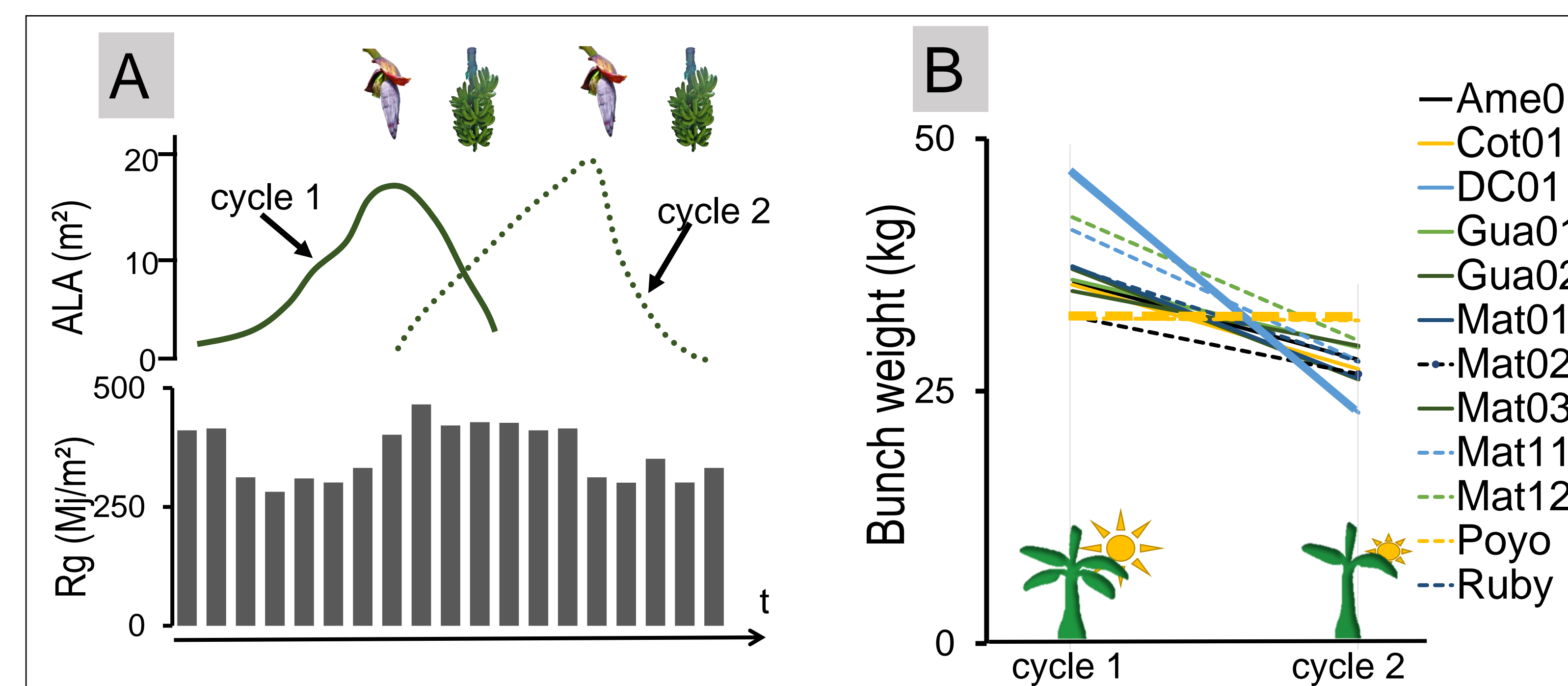


Fig. 2 A) Photosynthesis production variation in 2 crop cycles of the Trial 1. Rg : monthly cumulated global radiation. ALA : Active Leaf Area. B) Bunch weigh in both cycle

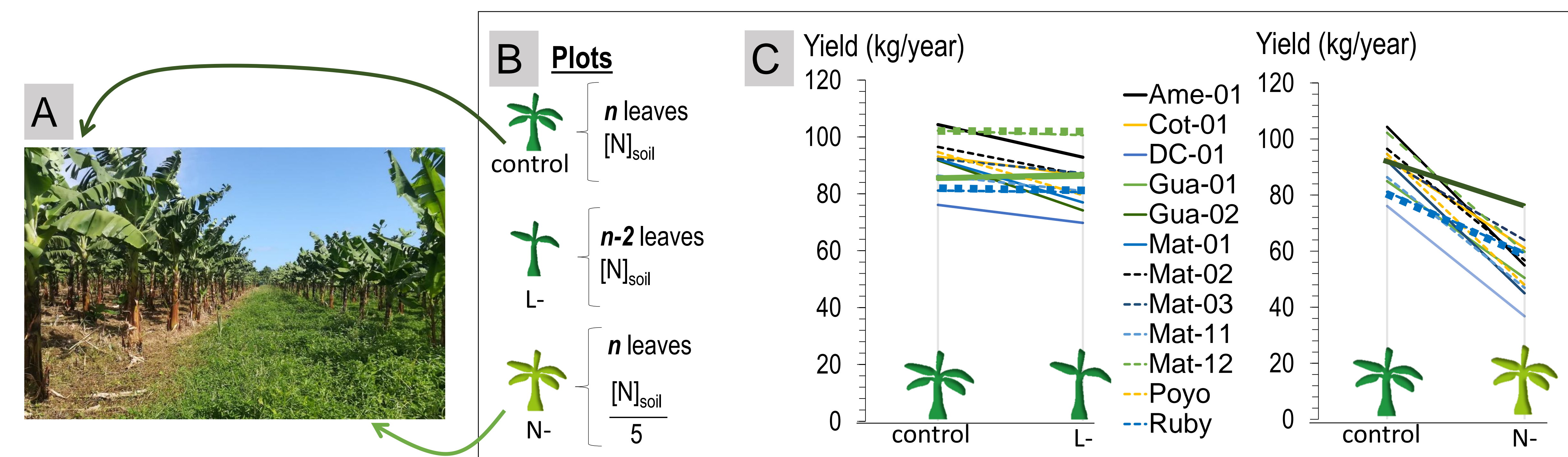


Fig. 3 A) Plots with different  $[N]_{soil}$  because of weed management and fertilizer (control : herbicide + N rich mineral fertilizer; N- : live mulch soil cover + organic fertilizer). B) Description of the plots in the Trial 2. C) Yield stability between the control and L- (left), between the control and N- (right).

## Effect of constant severe deleaving and low N on the yield

We observed the yield stability with the control plot and the yield in the L- and N- plots (Figure 3C).

- **Ruby, Mat12 and Gua01** had the same yield in control plot and L- . Mat12 had the highest yield in L- .
- **Gua02 and Ruby** had the highest yield stability. Gua02 also had the highest yield in N-

## Conclusion and perspectives

We identified **promising dessert banana cultivars** for different cropping conditions without chemical input and for suboptimal conditions.

This work could be extended to **other suboptimal cropping conditions** and to **other banana varieties**.

