Evaluation of the root traits in sugarcane - legume intercropping under contrasting nitrogen and water availability in Reunion Island

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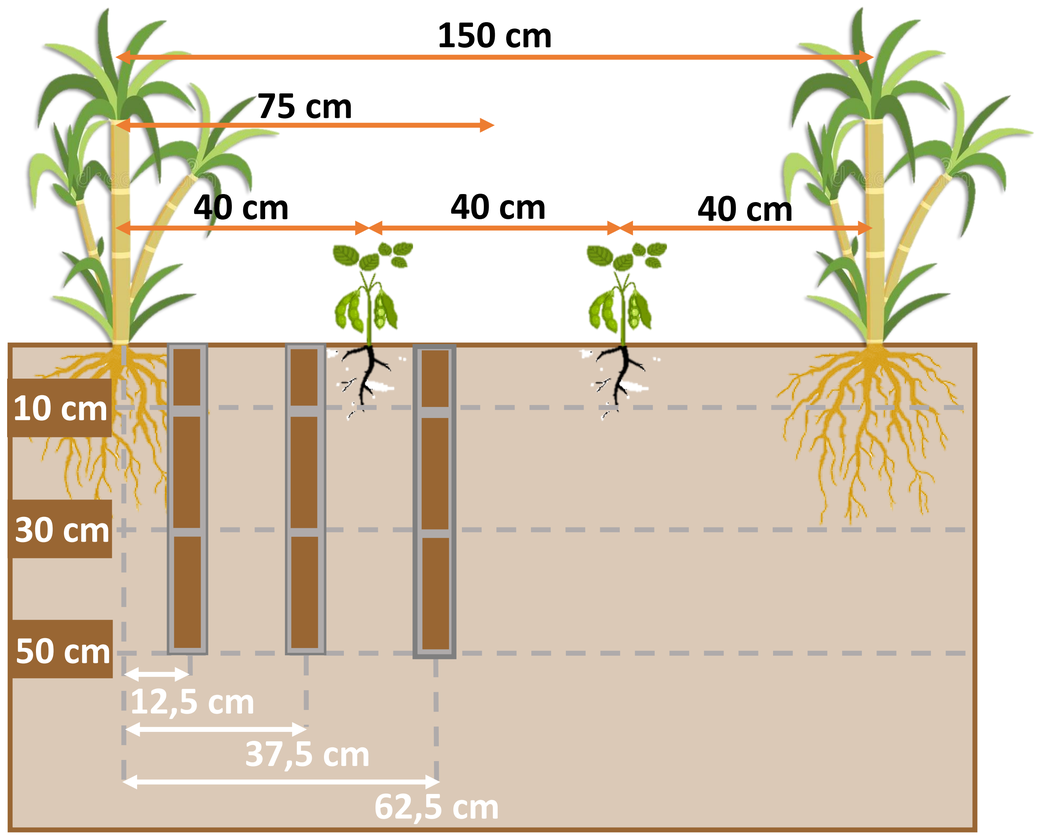
Introduction

- ✓ In Reunion Island, **sugarcane - legume intercropping** is increasingly studied as an **herbicide alternative** to reduce weed growth[a,b].
- ✓ **Few studies** have focused into the **belowground competition** between plant species, which will be a determining factor in resources distribution[c].

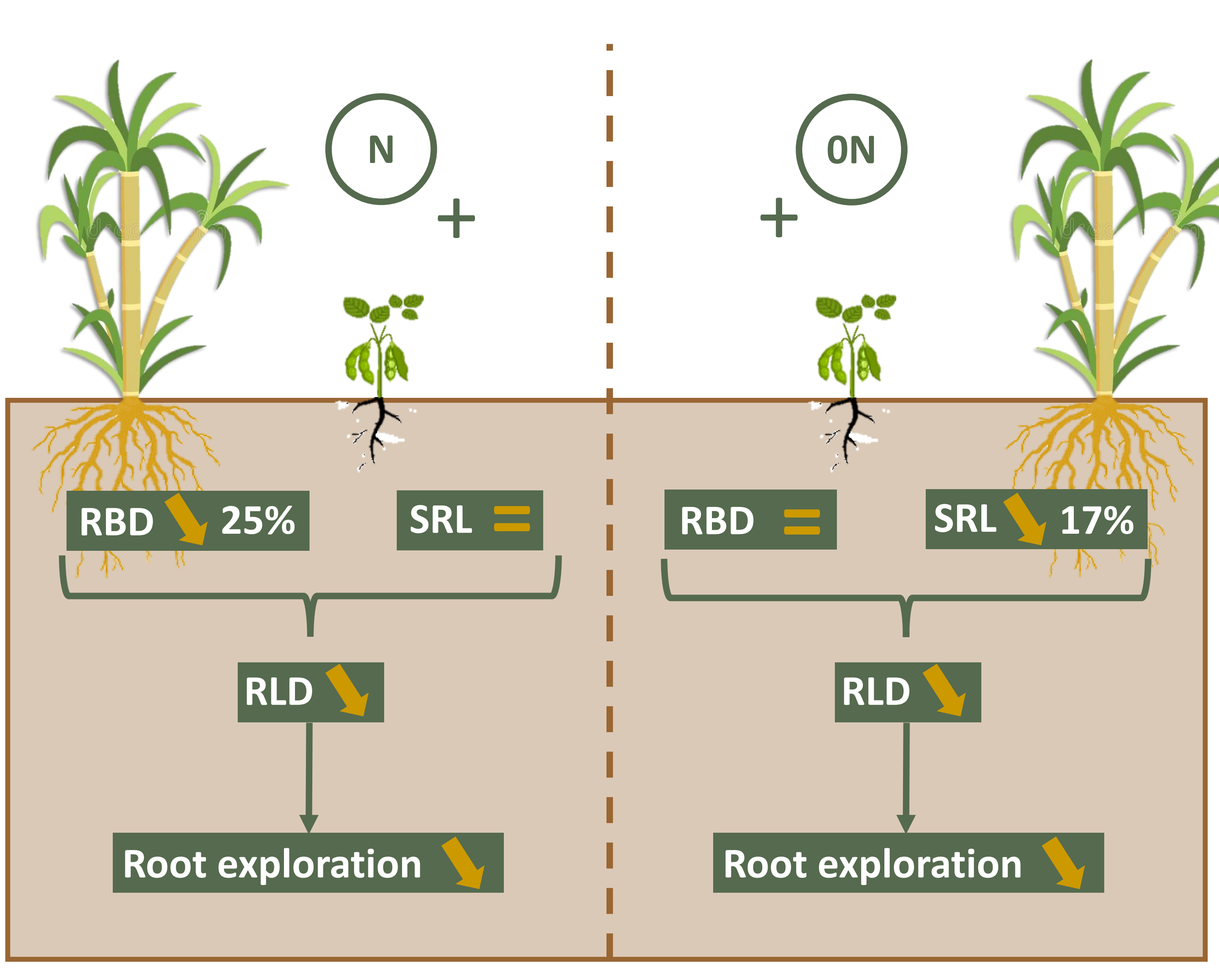
→ Understanding the below-ground interactions in multi-species intercropping agroecosystems is critical to improve the cropping system's sustainability. This work aimed to understand how the introduction of a legume crop could affect the root distribution of sugarcane under contrasted nitrogen fertilization and irrigation conditions.

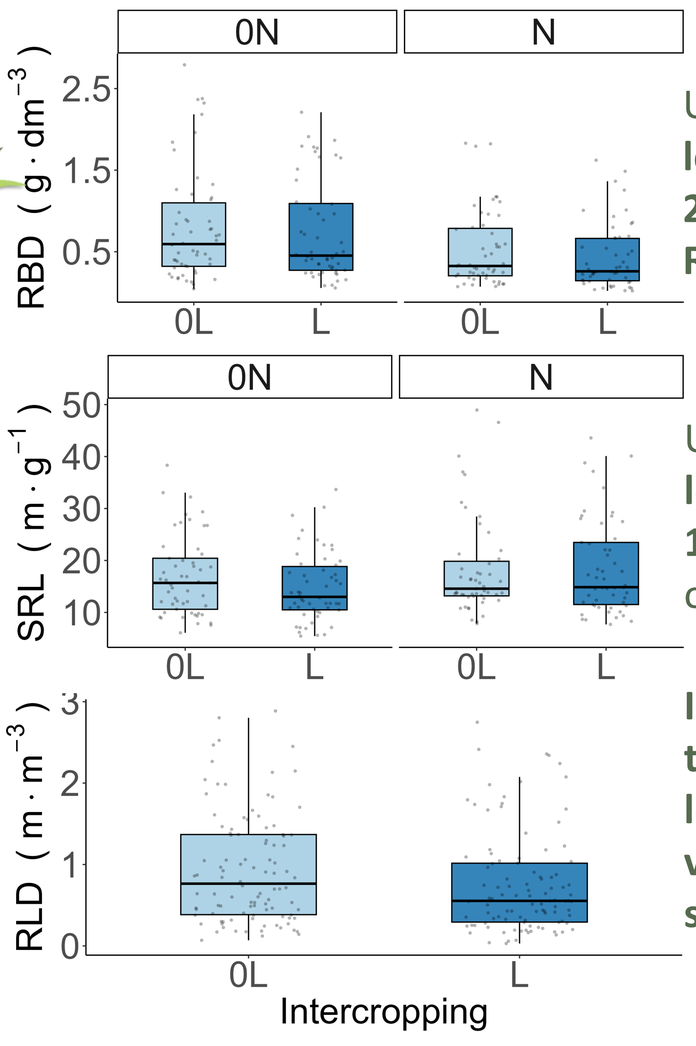
Material and methods

- ✓ Roots were sampled using a 9cm **mechanical auger at 6 months after harvest** at the 4th regrowth at **3 positions** and **depths down to 50 cm.**
- ✓ **3 randomized treatments**: with (N) or without (0N) urea application, irrigation and with jack bean as companion crop (L) or without (0L).
- ✓ Measurements were **root biomass density (RBD), fine root length density (RLD), specific root length (SRL).**
- ✓ Only results **on sugarcane root traits** were presented.



Results and discussion





Under **N conditions**, when a **legume crop** was introduced a **25% decrease in sugarcane RBD** was observed.

Under **0N conditions**, when a **legume crop** was introduced a **17% decrease in SRL** was observed.

In both cases, a decrease in the RLD was observed which led to a reduction in the volume of soil explored by the sugarcane roots.

Conclusion and perspective

- ✓ The presence of other competitive plants influences the growth of the sugarcane root system depending on nitrogen availability that impacts the soil resources available for plant growth.
- ✓ No interaction with irrigation was observed this year.
- ✓ This study must be carried out over several years of sugarcane regrowth cycles to confirm these findings

References:
[a]Ngaba, B., Christina, M., Mansuy, *A., Chetty,* J., Soulé, M., Schwartz, M., Auzoux, S et al,. (2023). Experimental dataset of sugarcane-cover crop intercropping trials to control weeds in Reunion Island. Data in Brief, 48, 109244.
[b]Chabalier, M., Arhiman, E., & Marion, D. (2013). Inter-cropping legume and sugarcane, a way to reduce treatment frequency index?.
[c]Christina, M., Chevalier, L., Viaud, P., Schwartz, M., Chetty, J., Ripoche, A., & Mansuy, A. et al,. (2023). Intercropping and weed cover reduce sugarcane roots colonization in plant crops as a result of spatial root distribution and the co-occurrence of neighboring plant species. Plant and Soil, 1-17.

International Society of Root Research 12th international Symposium – 2-7 June 2024