

2nd INTERNATIONAL SYMPOSIUM ON
MAGNESIUM

IN CROP PRODUCTION, FOOD QUALITY AND
HUMAN HEALTH NOVEMBER 4 – 6, 2014, SÃO PAULO, BRAZIL



Impacts of magnesium-deficiency on growth of two cultivars of coffee

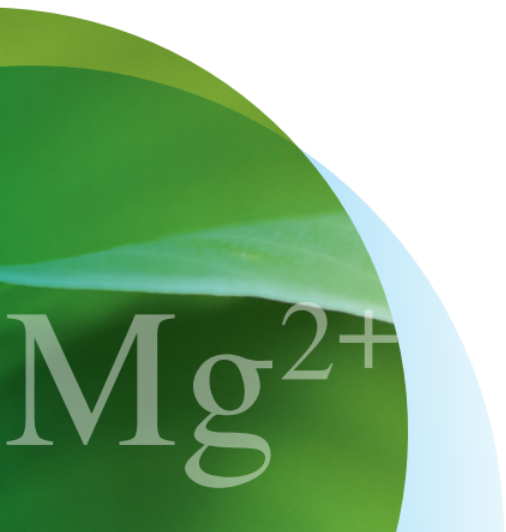
Dayane Meireles da Silva

Universidade Federal de Lavras/Brazil



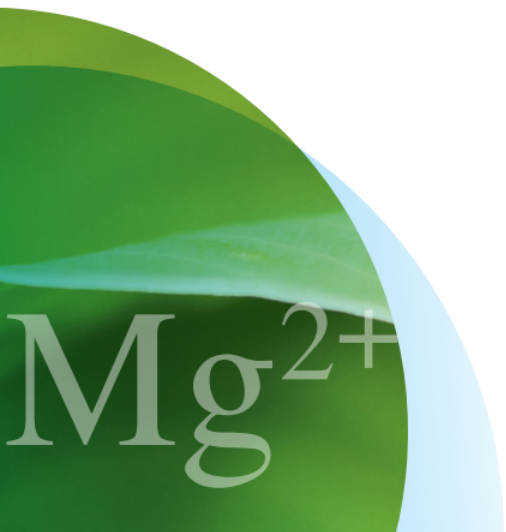
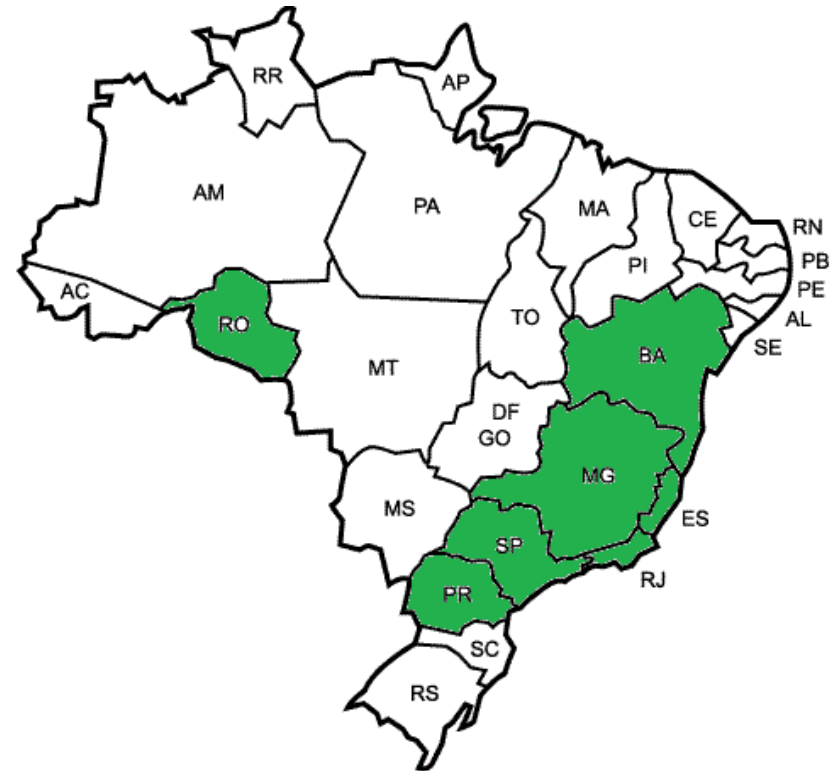
Commodity:

- ✓ Produced in large scale
- ✓ Has a great importance in the world economy
- ✓ Raw materials



INTRODUCTION

- ✓ 98.2% of national production
- ✓ Minas Gerais: 54.2% of the coffee produced in Brazil



Large cultivated areas

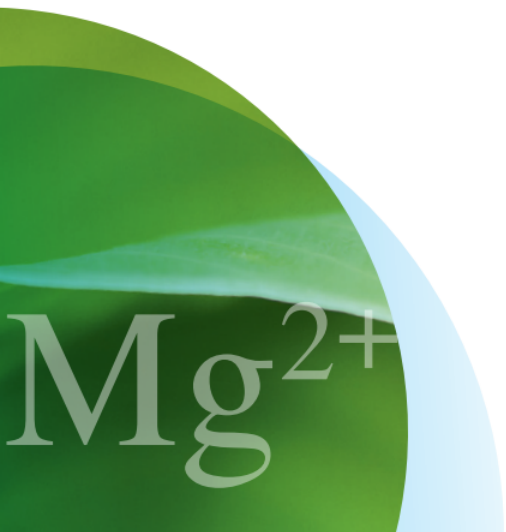


Diversity of problems associated with edaphoclimatic adversities



Nutritional deficiencies

Adequate supply of nutrients has major importance for growth and development of plants



INTRODUCTION

C

H

O

N

Mg

P

Ca

K

S

Growth and development of plants

Mg²⁺

Mg:

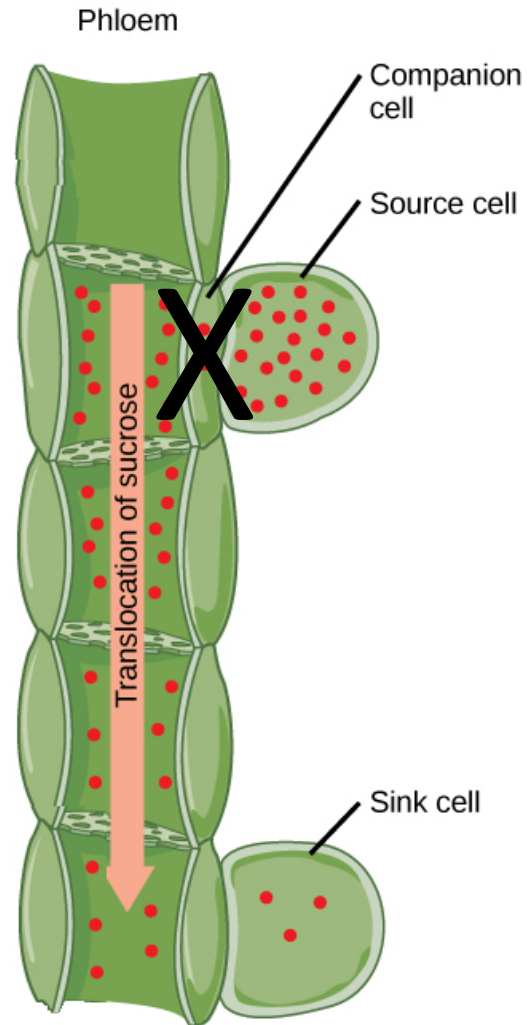
- ✓ Large radius of hydration
- ✓ Weakly adsorbed by soil colloids
- ✓ Highly prone to leaching

This occurs mainly in soils with high acidity and low cation exchange capacity (CEC), such as those that predominate on agricultural frontiers where coffee has been established

A decorative graphic in the bottom-left corner consisting of overlapping green and blue curved shapes. The chemical formula Mg^{2+} is written in a light grey serif font over the green area.

Mg^{2+}

INTRODUCTION



Mg-deficiency



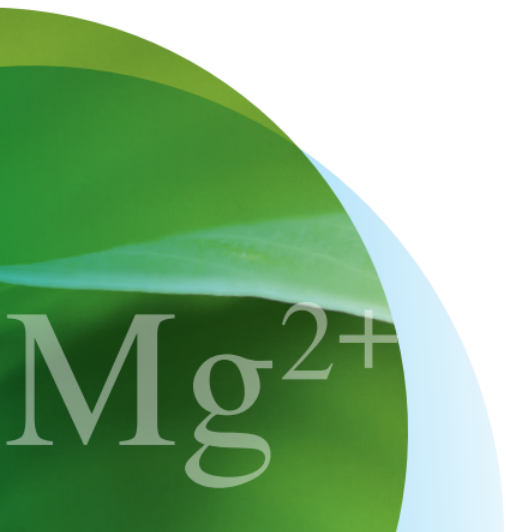
Inhibition of phloem loading of sucrose



↓ Carbon flow to sink organs



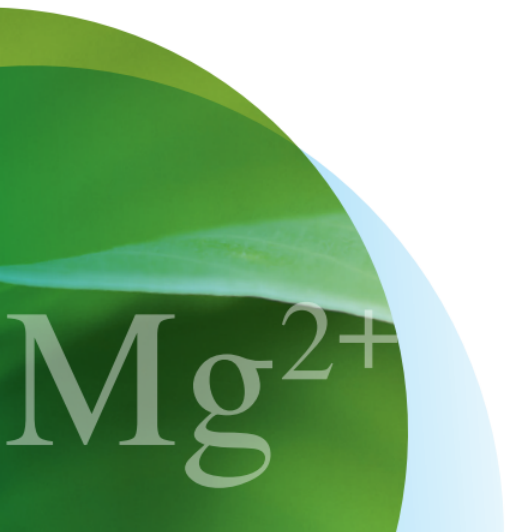
↓ Growth of sink organs



INTRODUCTION

To our knowledge there have been no studies showing the adverse effects of Mg-deficiency on growth of *Coffea arabica* L. seedlings

To address this research gap, this work had intended to evaluate growth parameters of two cultivars of coffee seedlings, submitted to Mg-deficiency

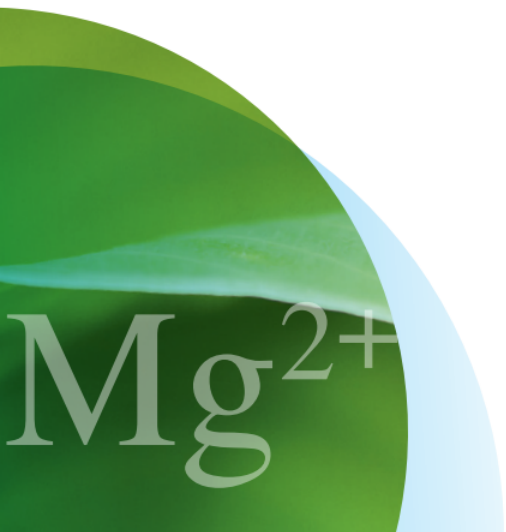
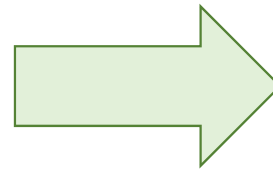


METHODS

- ✓ *Coffea arabica* L. six months old
- ✓ Catuaí 144 and Acaiaí 474/19



Uniformity in size
and vigor



Acclimatation:

- ✓ ¼ strength for 7 days
- ✓ ½ strength for 7 days
- ✓ Full strength for 14 days



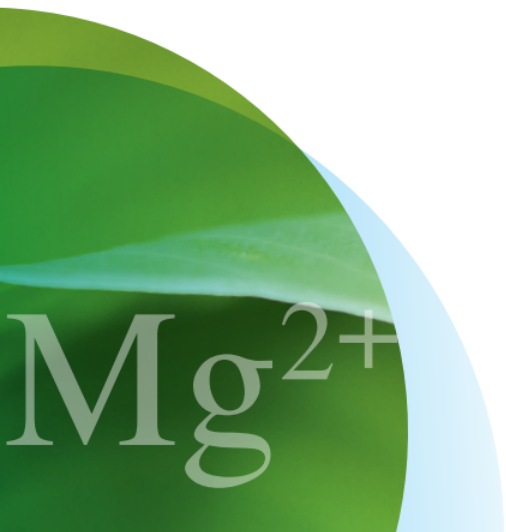
Treatments:

- ✓ Control
- ✓ Mg-deficiency

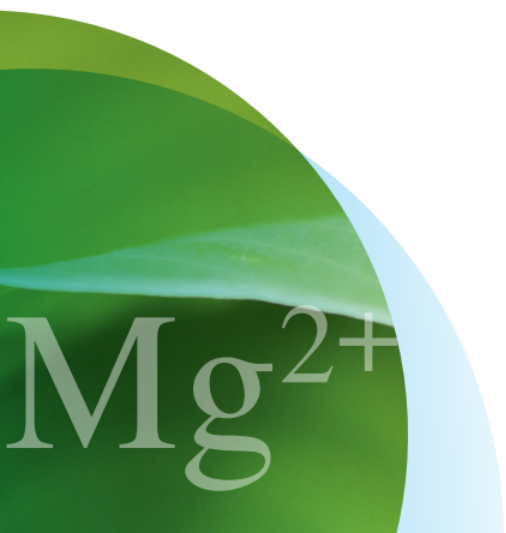
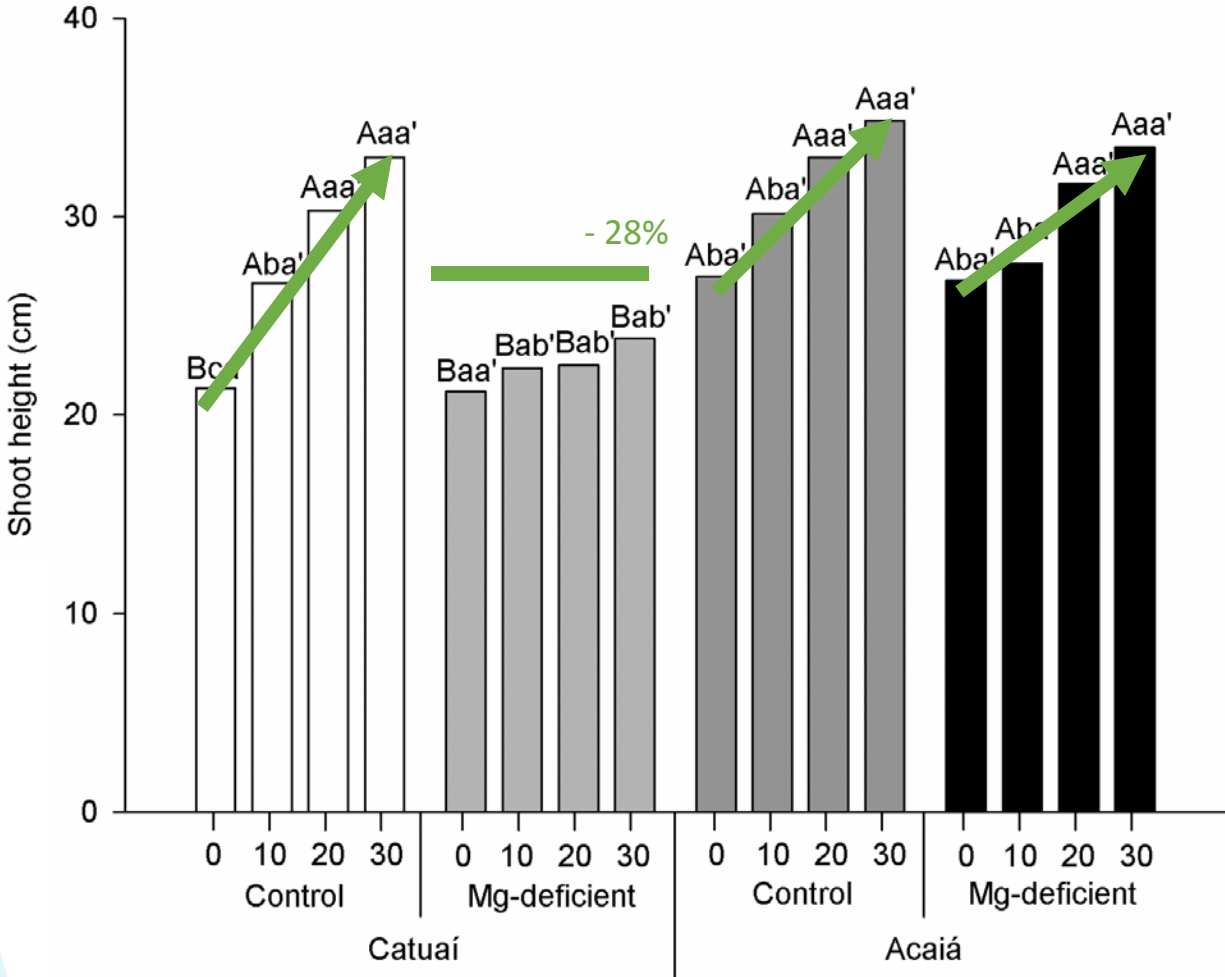


Evaluations:

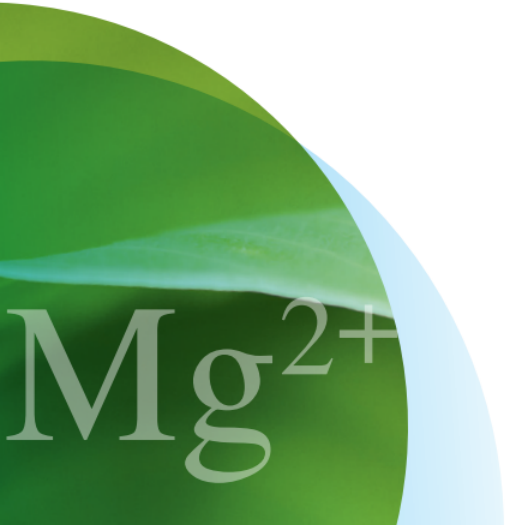
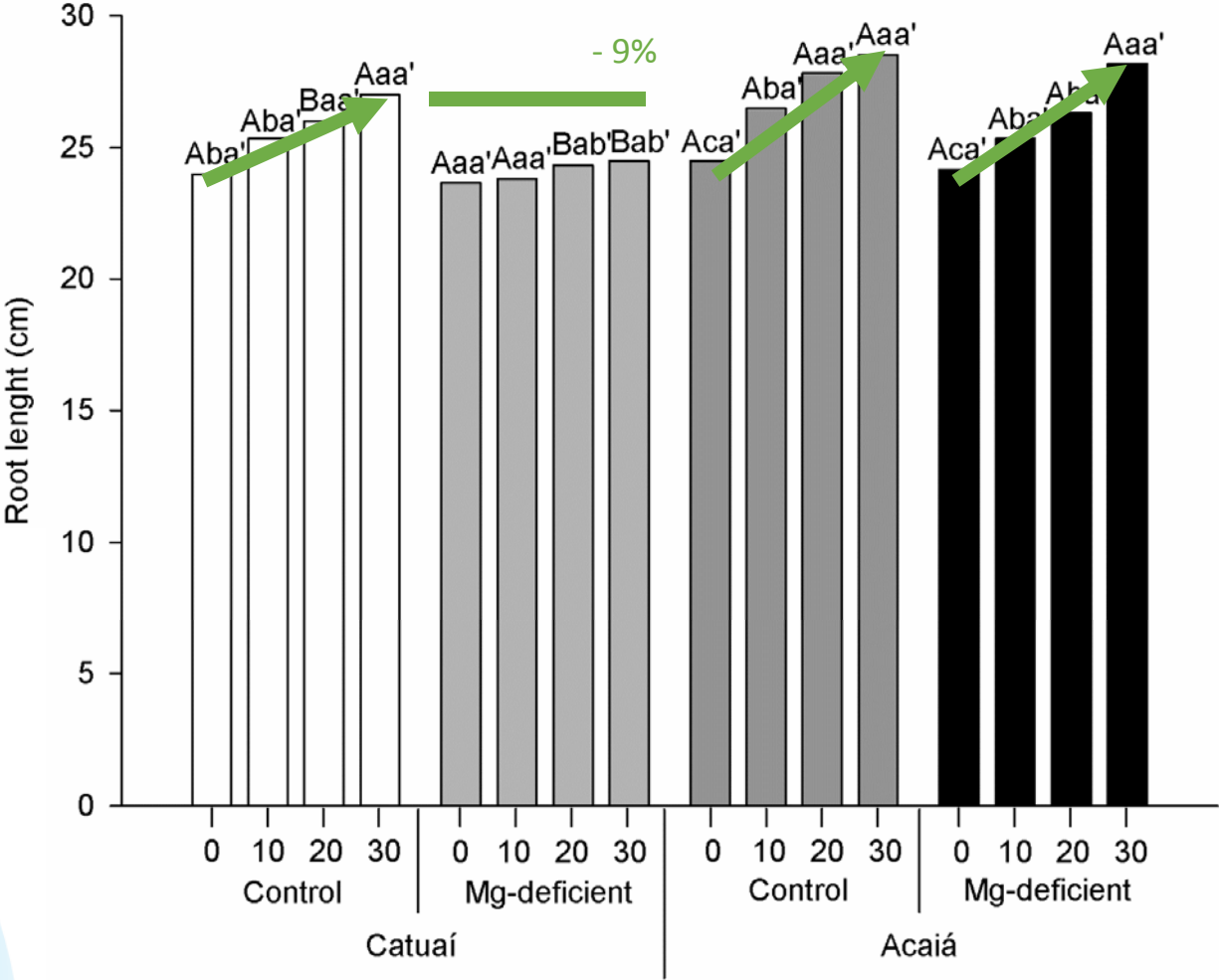
- ✓ Shoot length: 0, 10, 20 and 30 days
- ✓ Root height: 0, 10, 20 and 30 days



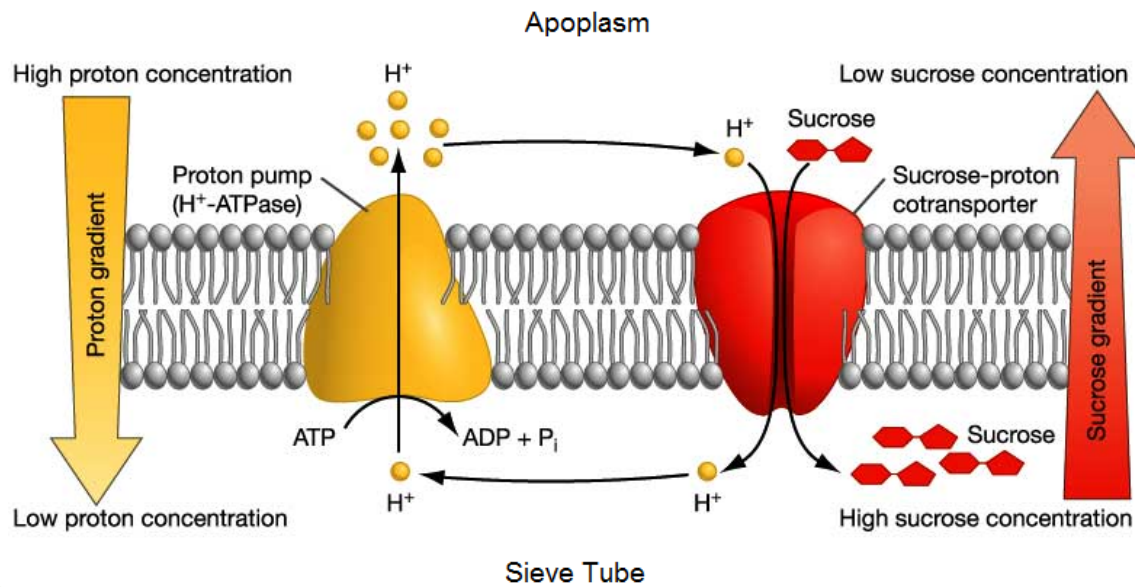
RESULTS AND DISCUSSIONS



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↓ Concentration of Mg-ATP at the phloem-loading sites



↓ Export of sucrose by the phloem from source to sink organs



↓ Carbon flow to sink organs

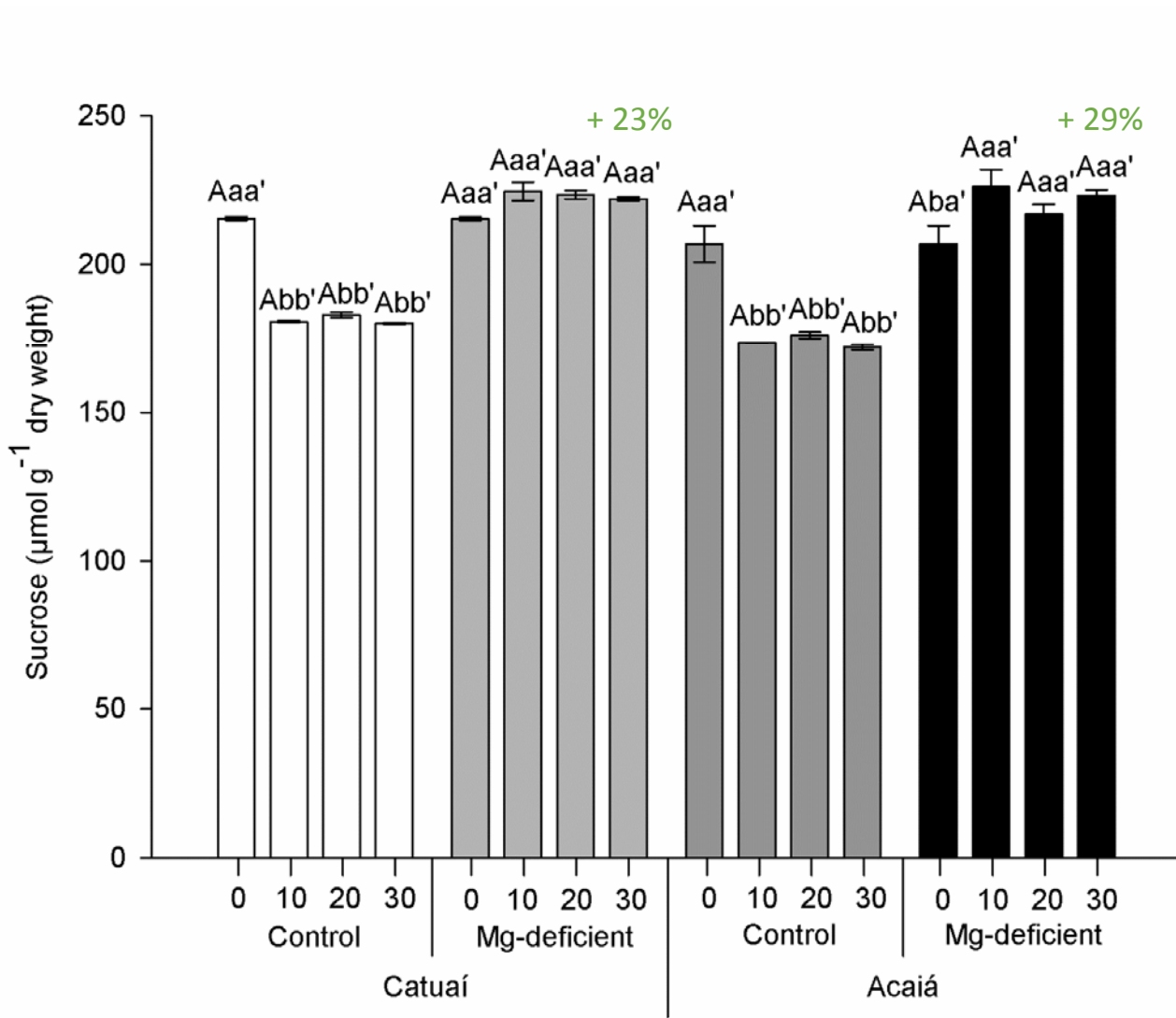
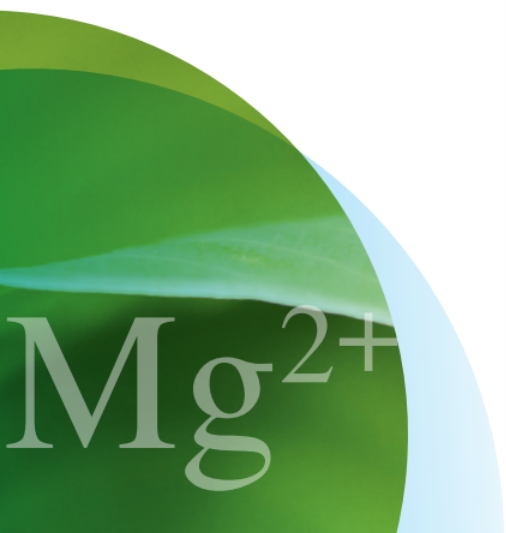


↓ Growth of sink organs

Mg²⁺

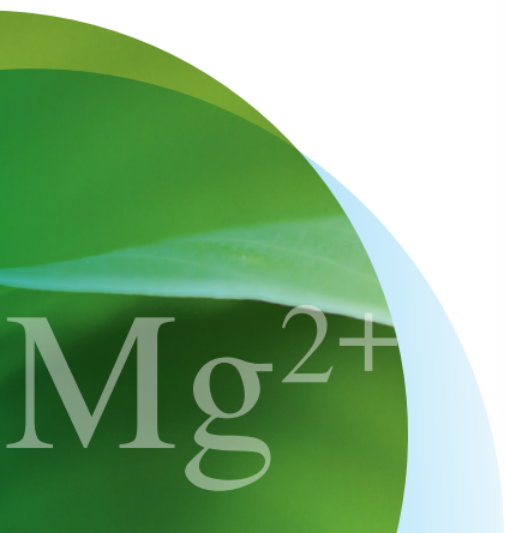
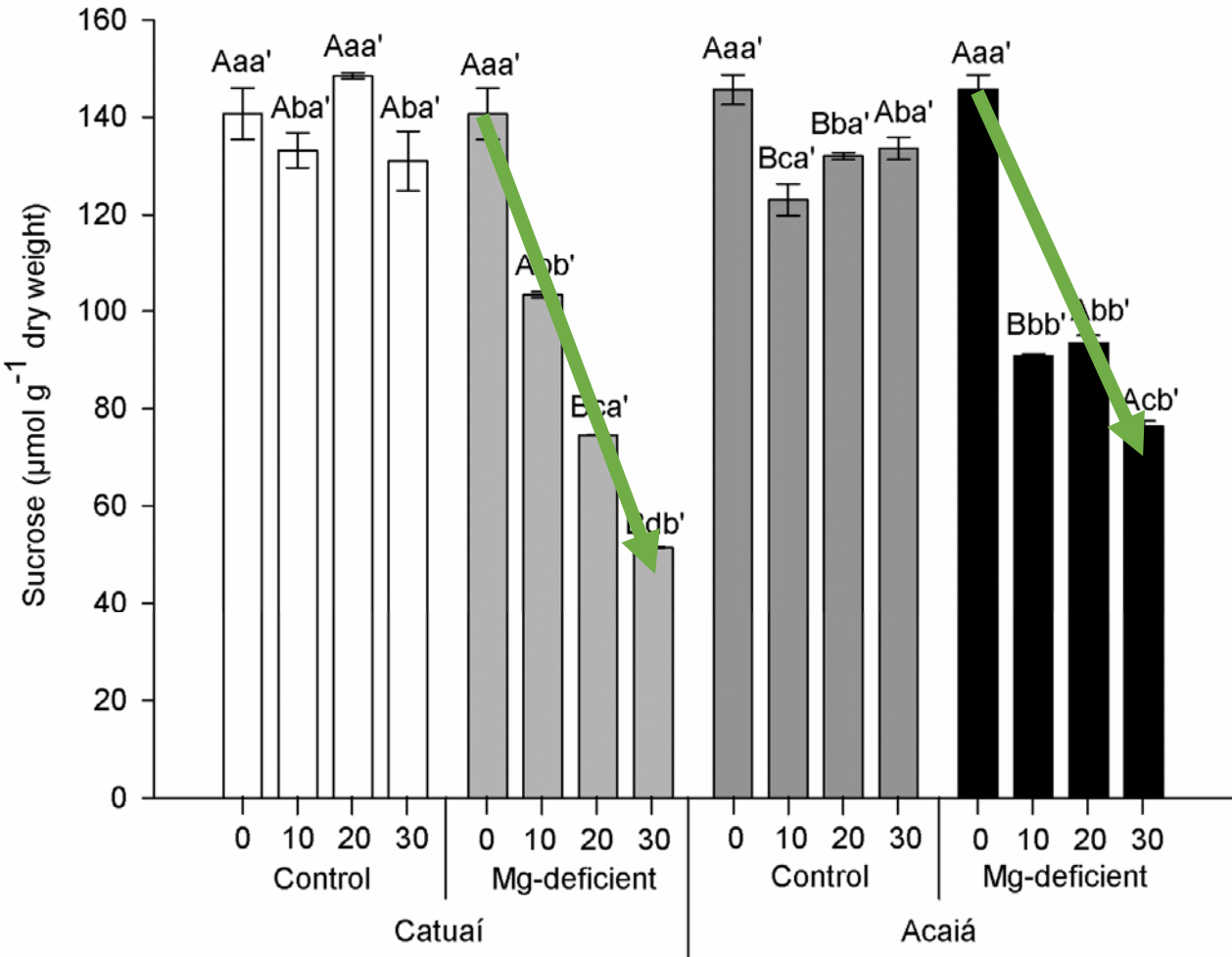
RESULTS AND DISCUSSIONS

Shoot

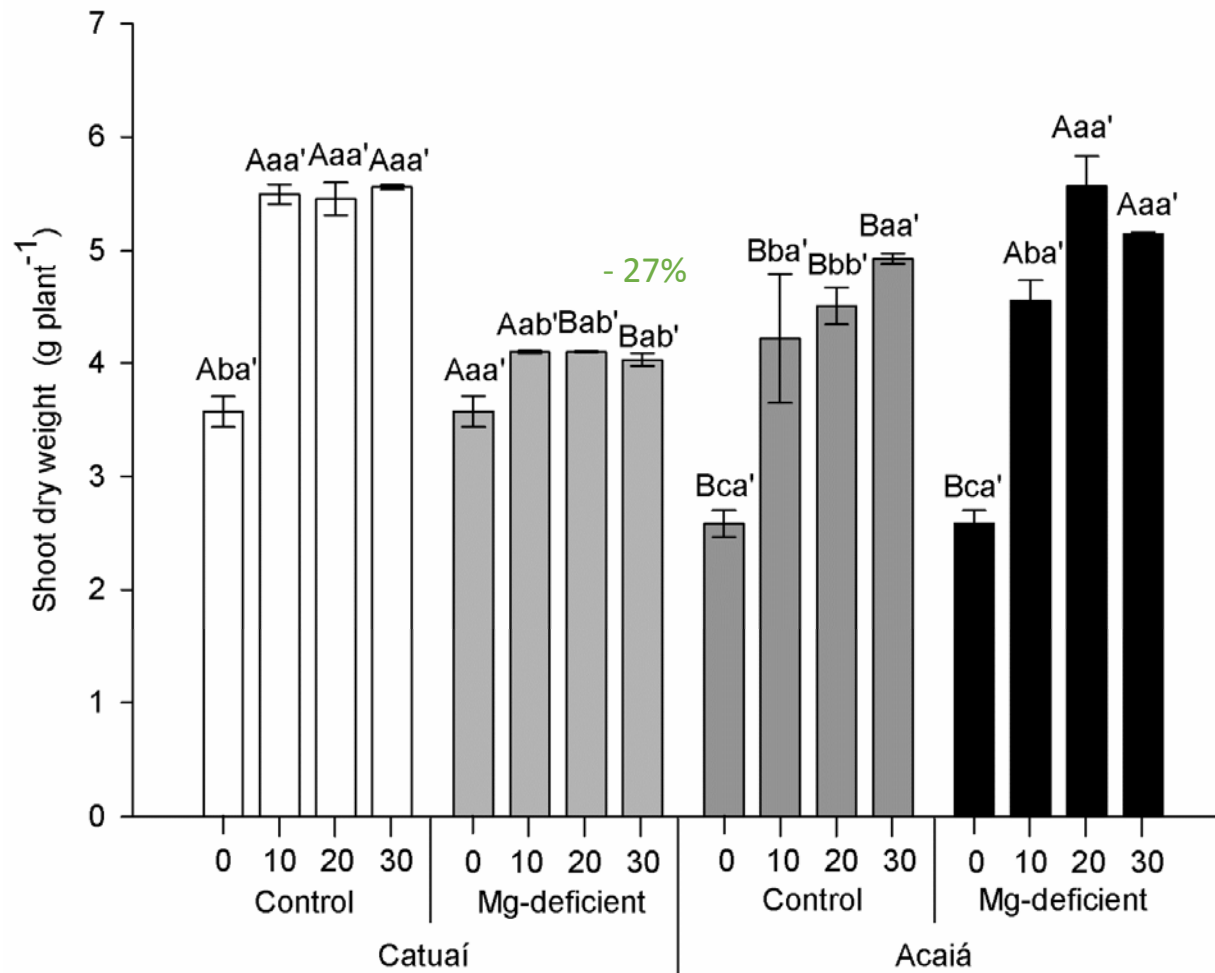


RESULTS AND DISCUSSIONS

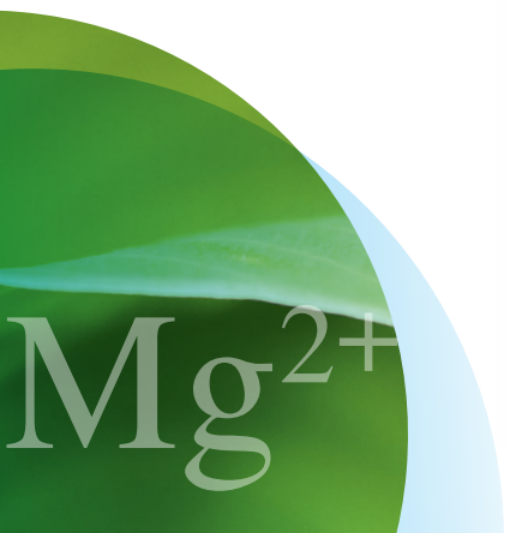
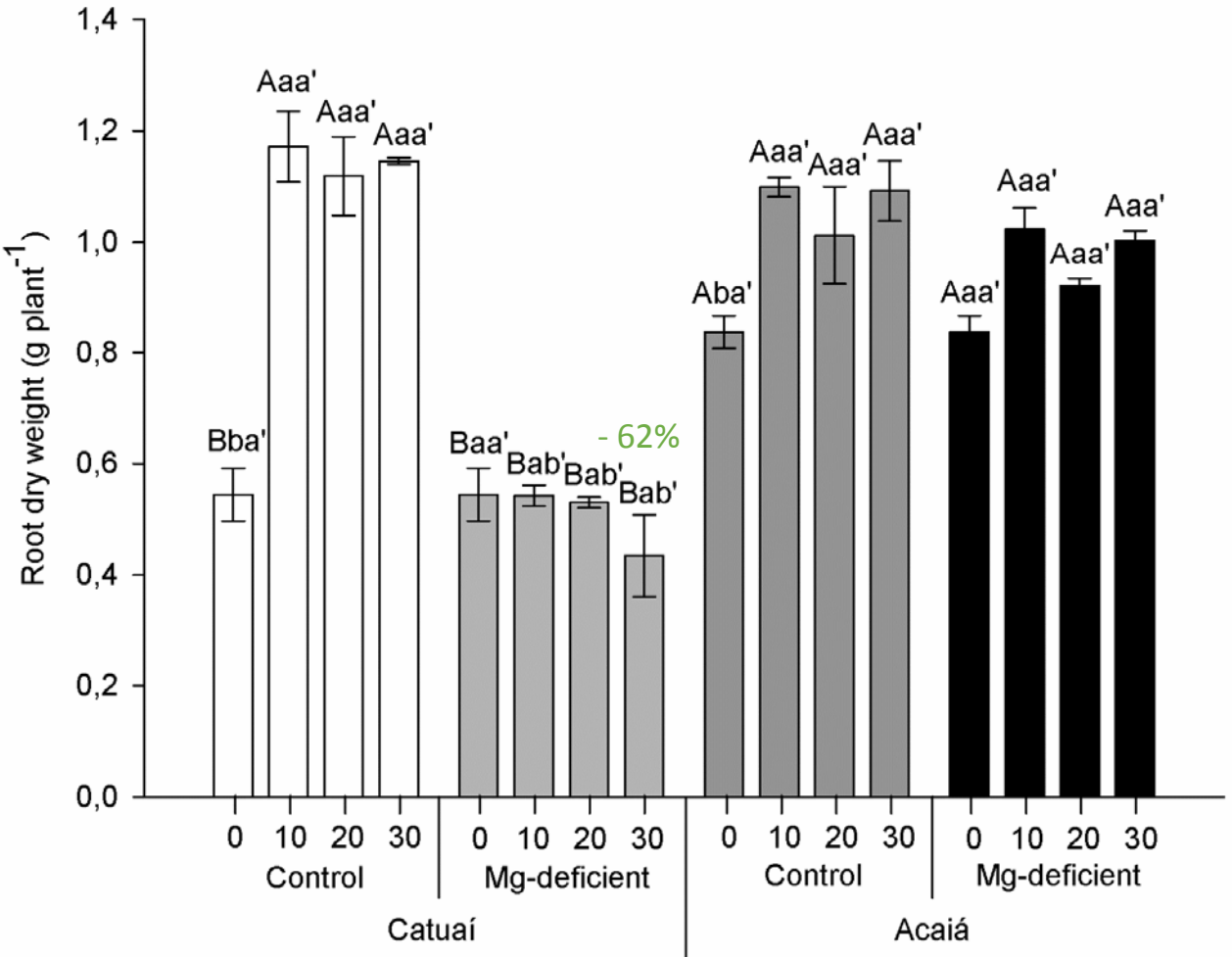
Root



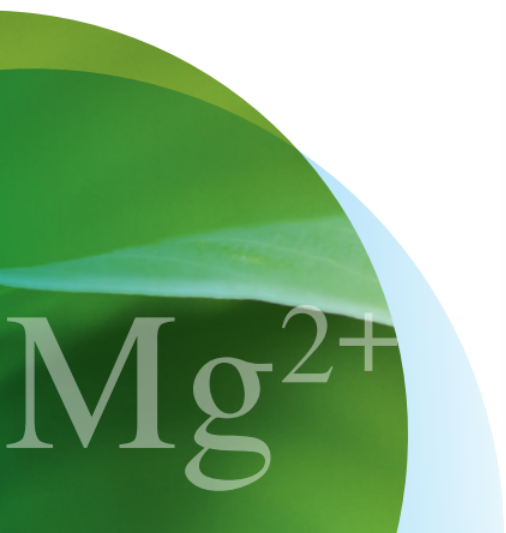
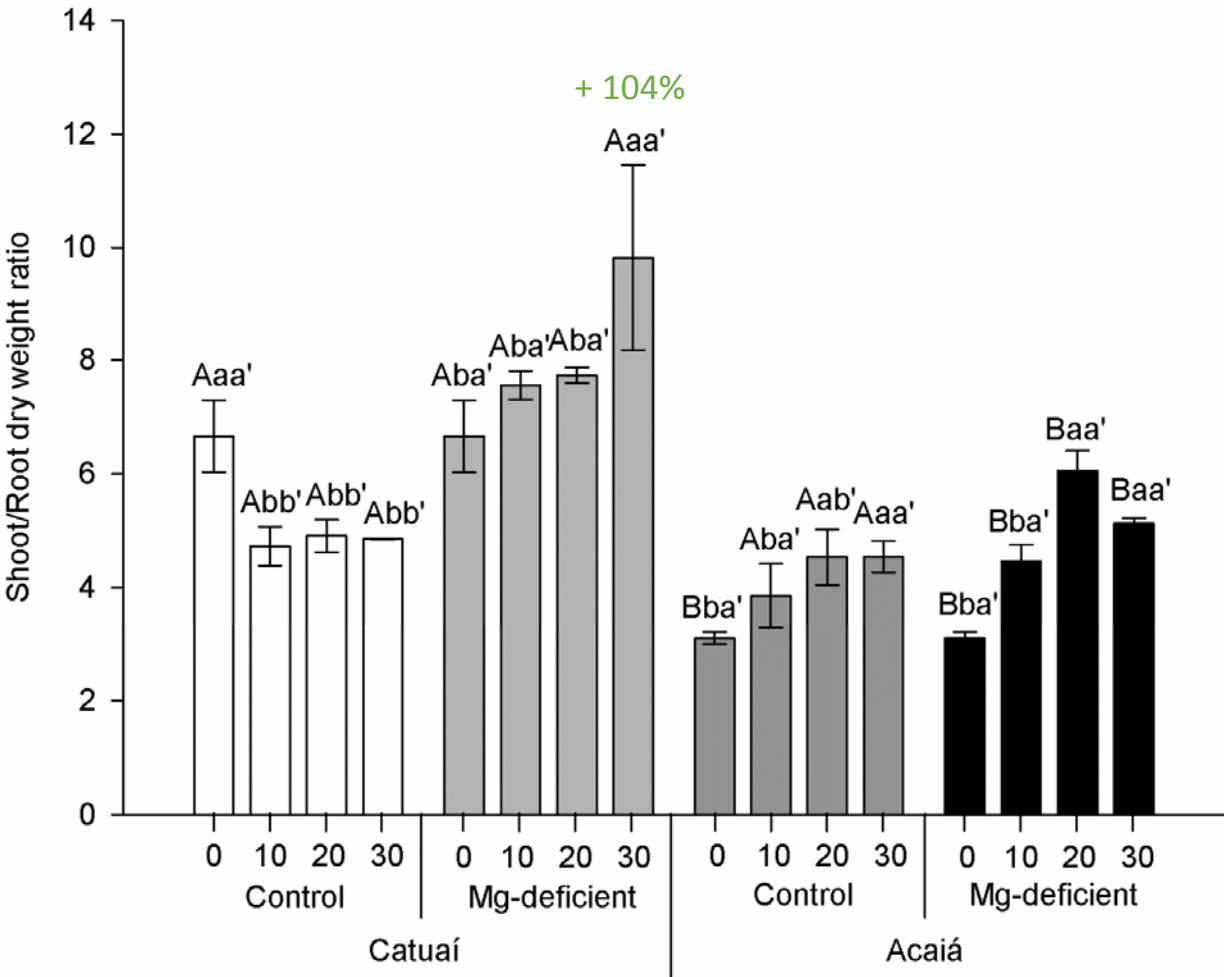
RESULTS AND DISCUSSIONS



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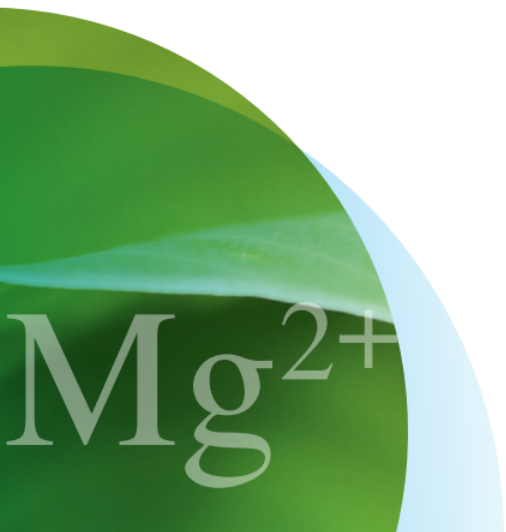
CONCLUSIONS

Impairments in maintenance of phloem transport of sucrose by Mg-deficiency may affect the growth of Catuaí seedlings

The growth of Acaiá seedlings was not affected by Mg-deficiency

These findings suggest that Catuaí cultivar is more sensitive to Mg-deficiency than Acaiá cultivar

Very early impairments in root growth by Mg-deficiency may have serious impacts on the acquisition of mineral nutrients and uptake of water by roots





Thank you...

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