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► **To cite this version:**

C. Bonnot, A. Hénocq, C. Gaumétou, Emmanuelle Morin, Annegret Kohler, et al.. Regulation of ectomycorrhizal symbiosis by nutrient signalling in poplar. 3rd MPIterMic - ARBRE workshop on Molecular Plant Fungal Interactions, Nov 2018, Cologne, Germany. hal-04187772

**HAL Id: hal-04187772**

**<https://hal.science/hal-04187772>**

Submitted on 25 Aug 2023

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# Regulation of ectomycorrhizal symbiosis by nutrient signalling in poplar

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## Rationale

Ectomycorrhizal fungi (ECM) provide mineral nutrient to trees in exchange for organic carbon.

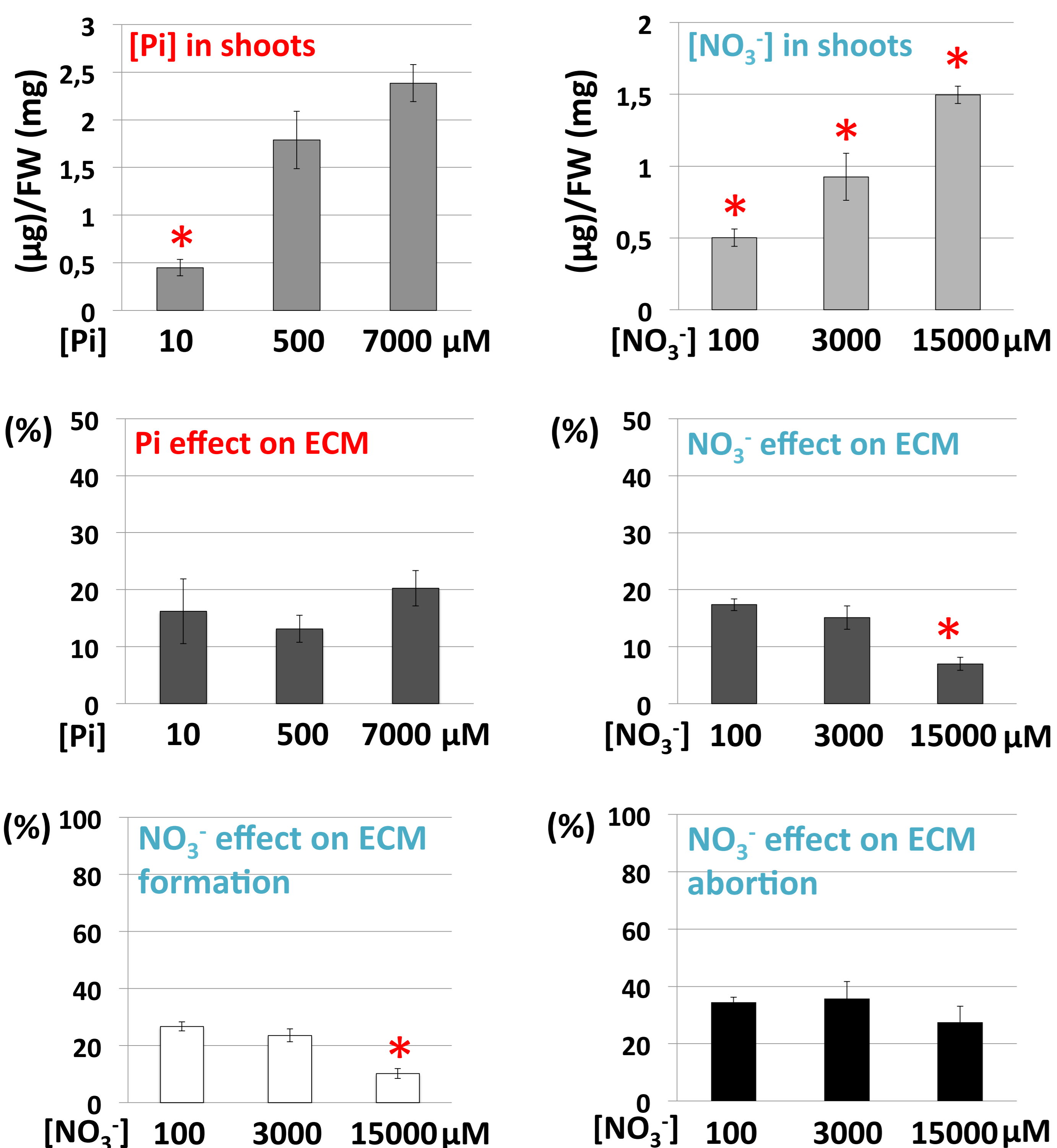
Not to spend resources inefficiently, trees should integrate nutritional cues to regulate these symbiotic associations.

CLE and CEP Small-Secreted Peptides mediate the nutrient stress signals regulating symbiosis with nitrogen-fixing bacteria in Legumes.

We want to investigate whether and how trees nutrient signals control ECM associations by:

- Characterizing the effects of nutrient stresses on ECM symbiosis in *Populus canescens* associated to the fungus *Laccaria bicolor*
- Identifying CLE and CEP members in *Populus*
- Assessing their role in the transduction of nutrient signals regulating *Populus-Laccaria* ECM by transcriptomics and secretomics.

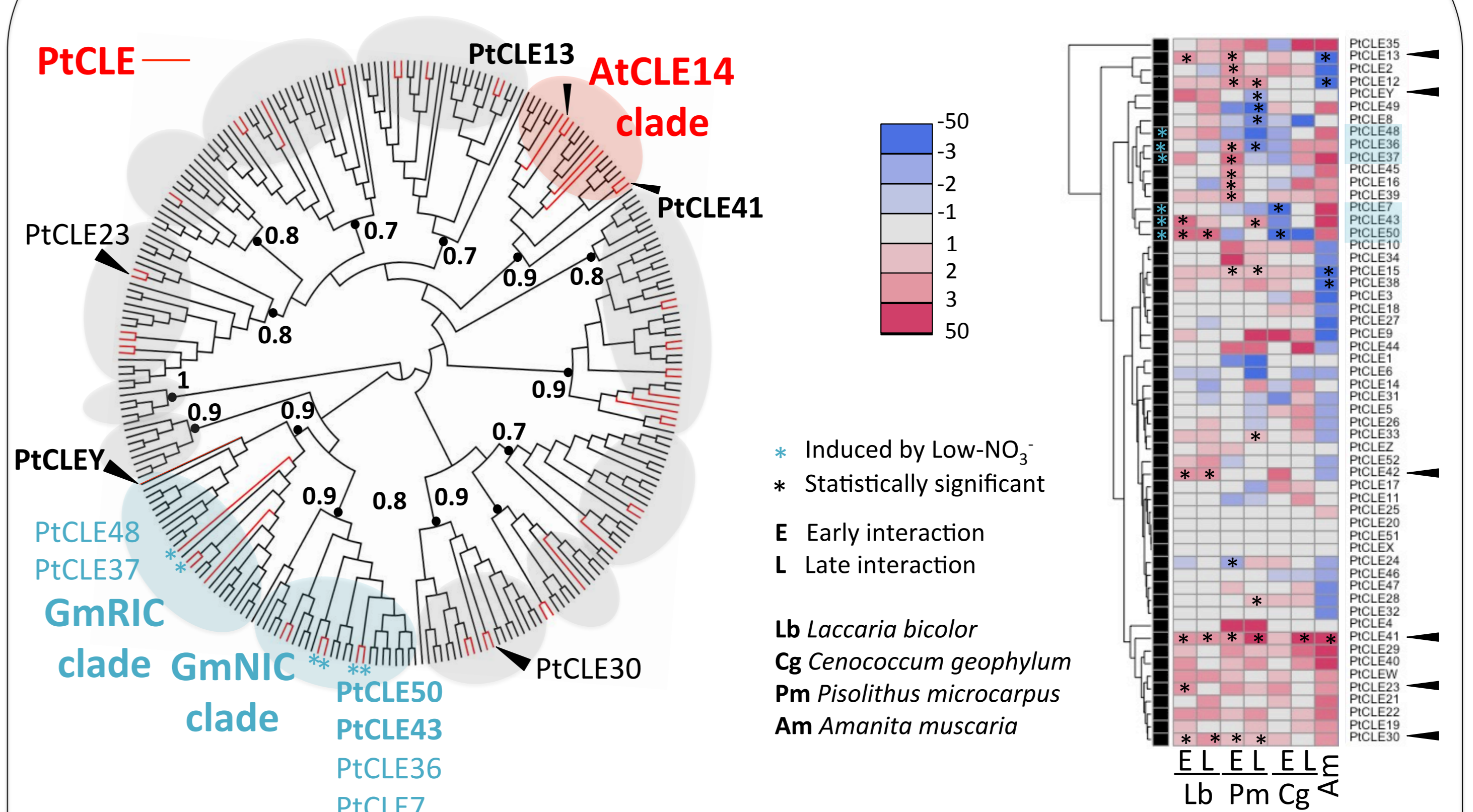
## Nutrient availability regulates ECM



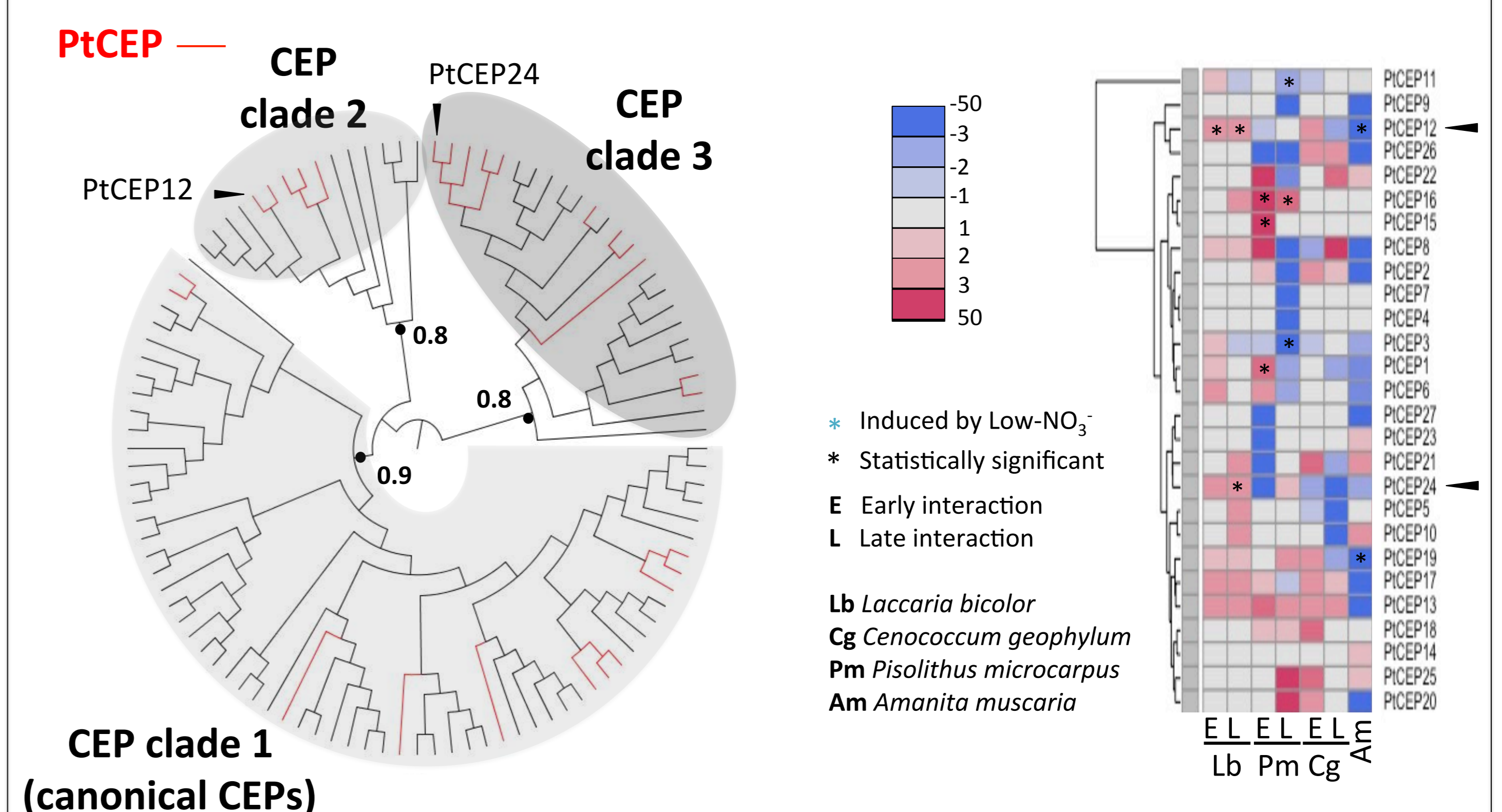
\* Significativement different p>0.05

- NO<sub>3</sub><sup>-</sup> and Pi availability in soil affect their concentrations in poplar
- ECM symbiosis is regulated by [NO<sub>3</sub><sup>-</sup>] BUT NOT by [Pi] availability
- [NO<sub>3</sub><sup>-</sup>] availability represses ECM formation

## Poplar CLE and CEP families



- The expression of some poplar CLEs (\*) is enhanced by low [NO<sub>3</sub><sup>-</sup>]
- Some poplar CLE genes are upregulated by ECM (-)



- Some poplar CEP genes are upregulated by ECM (-)

## Conclusion

- *Populus canescens* regulates its association to *Laccaria bicolor* in response to NO<sub>3</sub><sup>-</sup>.
- Poplar CLEs transcriptionally upregulated by N stresses and orthologous to legumes CLEs mediating N stresses signals could mediate the transduction of the signal repressing ECM symbiosis in response to NO<sub>3</sub><sup>-</sup> excess in poplar.
- In legumes, pre-existing nodules repress the formation of new nodules, through action of CLE peptides. The ECM-mediated transcriptional induction of poplar CLEs and CEPs suggests similar auto-regulation of ECM symbiosis.

