



HAL
open science

Unexpected impact of N availability on the interaction between *Quercus* and *Deschampsia*

Antoine Vernay, Philippe Malagoli, Marine Fernandez, Thomas Perot, Thierry Ameglio, Philippe Balandier

► **To cite this version:**

Antoine Vernay, Philippe Malagoli, Marine Fernandez, Thomas Perot, Thierry Ameglio, et al.. Unexpected impact of N availability on the interaction between *Quercus* and *Deschampsia*. Conférence Ecologie fonctionnelle et environnement, Jul 2017, Castanet Tolosan, France. 10.13140/RG.2.2.12352.84489 . hal-01603184

HAL Id: hal-01603184

<https://hal.science/hal-01603184>

Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - ShareAlike 4.0 International License

Unexpected impact of N availability on the interaction between *Quercus petraea* and *Deschampsia cespitosa*

VERNAY Antoine¹, MALAGOLI Philippe¹, FERNANDEZ Marine¹, PEROT Thomas², AMEGLIO Thierry¹, BALANDIER Philippe²

¹PIAF, INRA, Univ. Clermont-Auvergne, 63100 Clermont-Ferrand, France

²Irstea, Research Unit on Forest Ecosystems (EFNO), Domaine des Barres, F-45290 Nogent-sur-Vernisson, France

Introduction :

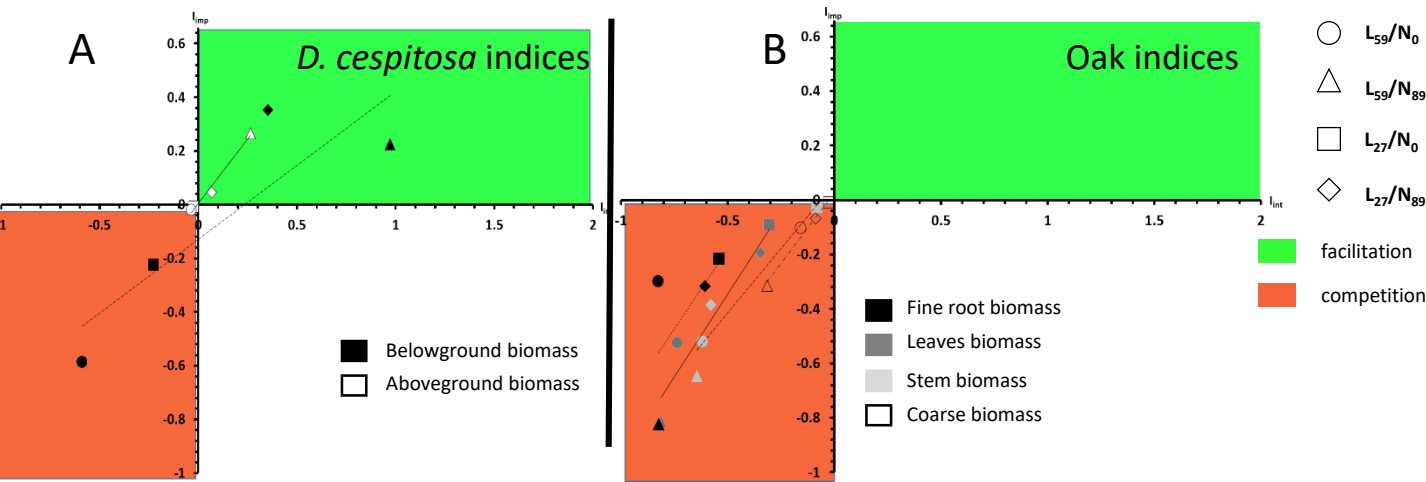
The influence of resource quantity on plant – plant interactions has not led to a consensus. This study aimed to understand how oak tree seedlings and tussock grass interaction evolve among different N×L availability combinations.

Objectives :

- Determine how were early oak / *D. cespitosa* responses affected by abiotic environment
- Assess importance and intensity of the interactions, either competition or facilitation
- Highlight plant strategy to face interactions with other species

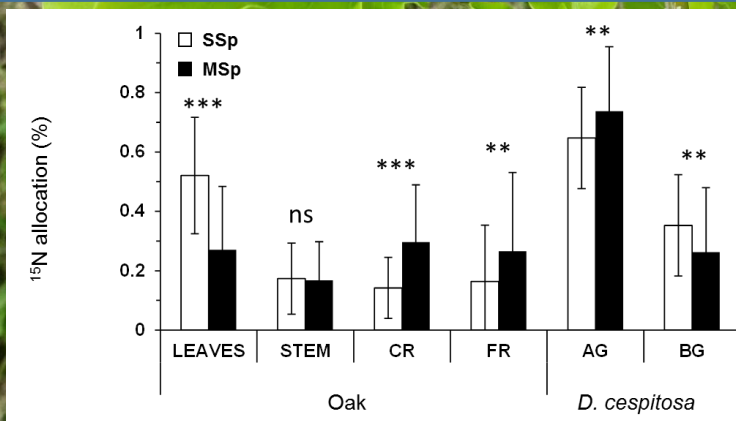
Materials & Methods

- Nitrogen (N) : no N supply (N_0) or 89 kg.ha⁻¹ (N_{89})
- Light (L) : pot under light shelter (27%PAR, L_{27}) or well lit (~59%PAR, L_{59})
- Competition (C) : oak alone, with 3 *D. cespitosa* tufts in mixture or 3 *D. cespitosa* tufts alone
- ¹⁵N supply 17d before harvesting. Oak and *D. cespitosa* organs were separated for allocation analyse.



Results:

- Fig 1A: In N_{89} treatment, positive I_{int} and I_{imp} → oak seedlings facilitated *D. cespitosa*.
- Fig 1B: I_{int} and $I_{imp} < 0$ for all oaks organ → *D. cespitosa* competed with oak seedlings. Competition was the highest in L_{59} compared to L_{27} . N supply increased competition inside each L treatment.



Results:

- More ¹⁵N allocated to oak storage organs, and particularly coarse roots, when mixed with *D. cespitosa* (Fig 2)
- *D. cespitosa* preferentially allocated ¹⁵N resource to aboveground organs (Fig 2)

Conclusion:

- When N-fertilised oak seedlings facilitate *D. cespitosa* growth. We hypothesize that oaks seedling would produce more exudates available for fast capture by *D. cespitosa*.
- In every cases interaction is negative (competition) for oak. Higher resource availability (L or N) increased competition.
- The two species display different strategies, capture strategy for grass and conservative strategy for oak.

Perspective:

- Integrate other resources as water or phosphorus.
- Assess a potential impact of allelopathic compounds
- Determine role of tree seedling reserve to face competition with grass.