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

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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%iPAR, L_{27}) or well lit (~59%iPAR, L_{59})
  Competition (C) : oak alone, with 3 *D. cespitosa* tufts in mixture or 3 *D. cespitosa* tufts alone
  } 1 pot = N x L x C
- ^{15}N supply 17d before harvesting. Oak and *D. cespitosa* organs were separated for allocation analyse.



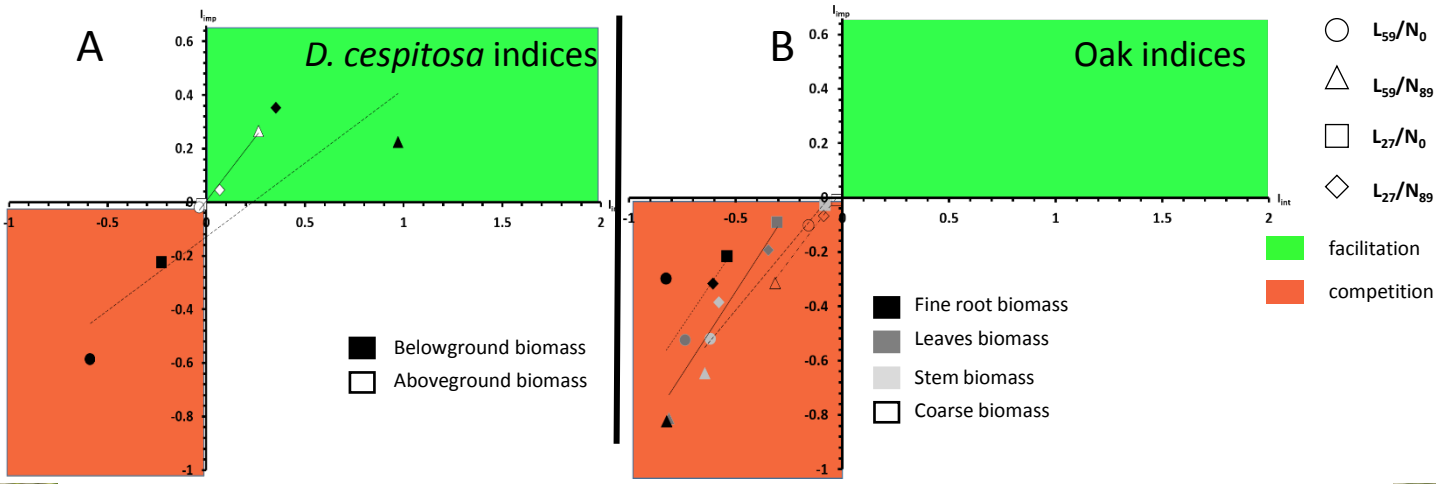


Fig. 1. Relationship between importance (I_{imp}) and intensity (I_{int}) of interaction by *D. cespitosa* on oak (Fig 1A) and by oak on *D. cespitosa* (Fig 1B).

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.

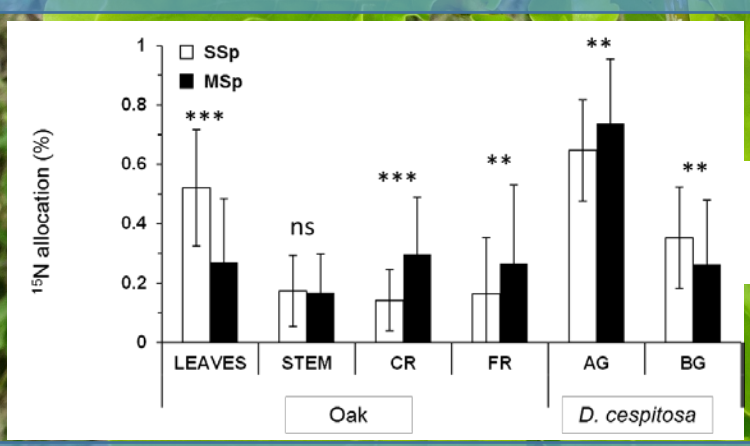


Fig 2: Relative allocation of ^{15}N among leaves, stems, coarse (CR) and fine roots (FR) in oak seedlings and *D. cespitosa* (above ground biomass (AG) and below ground biomass (BG)) when sole- (SSp) or mixed-grown (MSp)

Results:

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

Conclusion:

- When N-fertilised oak seedlings facilitate *D. cespitosa* growth. 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.