**Introduction**

Increased atmospheric nitrogen (N) deposition could increase productivity of temperate forest ecosystems. However, excess of N could promote N saturation process (Aber et. al, 1998). Ecosystem response to increased N deposition depends in large share on the fate of N into the different compartments. Most of the studies performed so far simulated increased N availability by adding fertilizer directly to the forest ground, neglecting the role of canopy in regulating the N pathways trough the ecosystem. We propose the following methodology in which we compare above-canopy fertilization (N_{AB}) with ground fertilization (N_{BL}). To describe the fate of the applied N, stable isotope techniques have been adopted: δ\( ^{15} \)N values permit to calculate the recovery of N-fertilizer in tree tissues, soil and litter, allowing us to understand how N allocation varies under these two fertilization strategies and how this affects C sequestration potential.

**Hypothesis**

Adsortion of N by plants is higher when fertilization is applied on the canopies in comparison to ground application.

**Experimental design**

In Monticolo fertilization treatment started on May 2015, providing 20 kg N ha\(^{-1}\) in 5 applications per vegetative season. On July 5\(^{th}\), 2016, a pulse labelling with 4 kg N ha\(^{-1}\) of \( ^{15} \)NH\(_4\)/\( ^{15} \)NO\(_3\) (\( ^{15} \)N = 893 \( ± \) 10 \( \%\)) was performed. Three sampling of ecosystem compartments have been performed: T\(_{1}\), 29/02/2016 / T\(_{2}\), 27/07/2016 / T\(_{3}\), 07/03/2017 to determine N content and δ\( ^{15} \)N. The recovery of applied N was calculated using an isotopic mass-balance:

\[
FN = \frac{\delta^{15}N_T - \delta^{15}N_C}{\delta^{15}N_F - \delta^{15}N_C}
\]

In Cembra fertilization started in summer 2017. No labelling was added so far.

**Fertilizer recovery in Monticolo**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>T(_{1})</th>
<th>T(_{2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>N(_{BL})</td>
<td>10.6±1.2%</td>
<td>8.9±1.5%</td>
</tr>
<tr>
<td>N(_{AB})</td>
<td>5.2±2.0%</td>
<td>6.6±2.0%</td>
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Preliminary results:

The fate of the applied N was different according to the fertilisation approach. In fact, at T\(_{1}\) plant N recovery was 10.6\% in N\(_{BL}\) treatment, almost the double than in N\(_{AB}\) (vs. 5.2\%). However at T\(_{2}\) plant N recovery was higher in the N\(_{BL}\) than in N\(_{AB}\) possibly due to loss of foliage (becoming litter) in the N\(_{AB}\) that accounted for most of the plant recovery at T\(_{1}\). The soils and the litter on the forest floor were the most important sink for N in both treatments.

**References**


References. Final version. 10/03/2020.