

# Release of Oaks in spruce plantations

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## 10 years later...

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### Oak crown

Each of the 33 oaks had measurements about their crown width in 2008 and 2018.

The crown were measured from the stem to the edge of the crown in four cardinal directions. Crown changes within this period were calculated as the growth of the oak crown.

Initially the crown were even sized in 2008. After 10 years, the oak crown became smaller in the control compared to the released treatment. The Crown actually grew and colonized the gap created by the management.



### Beetles

Beetles were sampled in 2018 and 2019 with window traps from May to September.

Species richness and abundance were analyzed for different species group according to their tree association.

We found out that the overall abundance indicated no long lasting effect of release cutting for generalist species. However, for beetles associated to oaks, released oaks had more individuals compare to the control suggesting a more targeted effect of the release cutting on species linked to oak.

Species richness was higher in released treatment compare to the control and for all beetles species!

### Dead wood

We measured dead wood, by drawing each of the 33 oaks. Thanks to this 2D architectural representation of the tree on the field, it was easy to identify alive and dead branches. We obtained a proportion of dead wood for each oak.

We found that released oaks had less dead wood in their crown compare to the oaks in the control.

We concluded that the increased amount of deadwood in the control indicated dieback.

### Ground vegetation

A vegetation inventory was conducted in August 2018. We inventoried both vegetation species richness and vegetation cover. North, south, east, and west cardinal directions were used to delimit four transects from the oak center. Three quadrats of  $0.5 \times 0.5$  m were placed one third of the total distance apart along every transect, with the last plot being at the edge of the oak crown.

We used functional groups to analyse the pattern in species richness and abundance. Cover and species richness of vascular plants in the understory were higher in both treatments compared to the control for all species groups.

The creation of a gap in the canopy can be seen as simulation of natural disturbances at a local spatial scale impacting the understory through the alteration of important resources for plant growth.

### Competition

We inventoried every single tree species within a 15 meters radius of the oak, and measured their stem diameter, height and distance to the oak.

Control had higher density of Norway spruce compare to the 2 other treatments, as expected by the management applied.

Release cutting did not impact spruce production within the sample plot. Spruce trees under the oaks were small and suppressed and contributed very little to the overall growth in the plots.

### ABSTRACT :

This study explores the decade-long effects of release cutting around old retained oaks (*Quercus robur* L.) in a Norway spruce (*Picea abies* L. Karst) stand that was 33 year old when thinned. The impacts on both nature conservation values and spruce wood production were evaluated in a randomized block design. To release oaks from competition, stems of Norway spruce were cut around 33 oaks, in three different treatments: **High release (HR)**, **Medium release (MR)** and **No release (NR)**. Trees within a circular sample plot (15 m radius from the oak) were measured at time of treatment and 10 years after. The treatment effects on stand development, oak vitality and understory vegetation were evaluated after ten years, using tree diameter, height measurements, oak crown and tree structure estimates as well as ground vegetation surveys.

- 1) Release cutting did not impact spruce production within the sample plot.
- 2) Oak crowns in the control plots became smaller after 10 years, while the crowns expanded and colonized the gap in the release treatments.
- 3) Simultaneously, the amount of dead wood in the crown increased among oaks in the control treatment, indicating dieback.
- 4) Cover and species richness of vascular plants in the understory were significantly higher in the released treatments compared to control.