

The recovery processes after an experimental forest fire: growth of *Betula platyphylla* var. *japonica* and soil characteristics

(実験的火災後の森林回復過程: シラカンバの成長 と土壌特性)

北海道大学大学院 環境科学院

環境起学専攻人間・生態システムコース

RAKOTONOELY Harisoa

Fire is a factor of change in terrestrial ecosystems, known to be damaging, occasioning nutrient loss and alteration of soil structure but also as a forest management tool to favor desired species over others. Changes after mild fire include typical burst of nitrogenous nutrients, charcoal deposition on soil surface and removal of understory. The present research addresses interactive growth response of *B. platyphylla* trees and biomass recovery of the understory *S. senanensis* after fire and the long-term changes in soil nutrient status. The main questions were if NO_3^- and NH_4^+ fluctuations still show effects of fire five years later, charcoal maintained NO_3^- and NH_4^+ concentrations elevated and how beneficial was the combined effect of nutrient burst and charcoal deposition after fire with removal of dwarf bamboo to tree growth. Following-up an experimental fire in 2007, NO_3^- and NH_4^+ concentrations, biomass of *S. senanensis*, tree growth in terms of height, diameter at breast height and tree ring width were measured five year afterwards and compared between treatments: burnt (BURN), burnt then the charcoal was removed (REM) and control (CON) and between 2007 and 2012. Relative growth in height showed significant difference between REM and CON, with higher values in REM and height growth tended to be higher in BURN than in CON. However, for dwarf bamboo, biomass was lowest in REM, intermediate in BURN and lowest in CON. Annual radial growth of trees showed no difference among treatments. Fluctuations of NO_3^- concentrations still showed deviation to higher level in REM treatments, indicating that traces of fire remain visible five years later. Fire reduced aboveground biomass of *S. senanensis*

and charcoal removal was detrimental to its recovery. Conversely, the pattern of tree growth suggested that the burst of NO_3^- and NH_4^+ and the temporary elimination of competitive understory species boosted tree growth and charcoal removal impacted tree growth positively. In conclusion, nutrients levels still shows traces of fire five years later when charcoal is removed and fire combined with charcoal removal was beneficial to *B. platiphylla* while unfavorable to *S. senanensis*, and therefore can be used to promote tree growth and control less desirable species.