



## Post-clearcutting changes in herbaceous understory and forest litter quality

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Clear-cutting is one of the most common land-use practices that lead to the massive disturbance in forest ecosystems of South Siberia. As any other disturbance it changes rate and volume of carbon and nutrient turnover. The one of the reasons of these changes can be its influence on the composition and mass of herbaceous understory. The composition and abundance of herbaceous understory plants determine volume and quality of litterfall and can leads to the changes in stock and rate of forest litter decomposition.

The composition and mass of herbaceous understory plants, the depth and mass of forest floor, and concentration of microbial biomass were measured in an old-growth fir (*Abies sibirica* Ledeb.) and Scots pine (*Pinus sylvestris* L.) forests (ca.300 years-old and 160- years-old, accordingly) and in an adjacent chronosequence of clear-cut sites ranging in ages from 3- to 24-year-old for fir and from 0- to 60-year-old for pine forest.

Mean species richness in old –growth forests ranged from 30 species in fir to 45 species in pine forest stands. After the clear-cutting the mean species richness decrease to 20 species in fir forest and to 30 species in the pine forest plots. Only a few species become the dominant. These species are *Calamagrostis langsdorfii* (Link) Trin. in fir cutting and *Chamerion angustifolium* (L.) Holub in pine clear-cut plots.

Total mass of herbaceous understory on the clear-cut plots can more than twice exceeds that mass in the old-growth forests. At most it is a result of rich herbaceous

cover on the opening after cutting area. At the 3 years-old age after cutting it can produce mass equal to  $260 \text{ g m}^{-2}$  in that herbs contribute about 40-100%. Herbaceous understory in old-growth forests on 87-100% consists of shrubs biomass.

The depth of forest floor can reach up to 7cm in the old-growth fir and pine stand and on the cut strips of 24 years-old age clear-cutting but does not exceed 2-4cm on the wood transportation strips of clear-cut plots. Total storage of forest floor makes up  $150\text{-}240 \text{ g m}^{-2}$  on the clear-cutting of different age and reach up to  $360 \text{ g m}^{-2}$  in old-growth forests.

Forest floor after the clear-cutting contains a lot of woody residues that degrade the quality of forest litter to decomposition. It causes some decreasing in concentration of microbial biomass in forest floor of that plots (from 751 mg in forest floor of old-growth forests to 100-200 mg per 100g in litter of cutting plots). But concentration of microbes substantially increases in forest floor of 24-years-old age after clear-cutting that due to the input of large amount of herbs residues.

Herbaceous stage is very important for recovery of all functional bonds in forest ecosystem disturbed by clear-cutting. It leads to faster restoration of forest community provided that enough numbers of underwood of the main coniferous species have been reserved.

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