Forests for Sustainable Development
The Role of Research

IUFRO Regional Congress for Asia and Oceania 2016

Abstracts

Hosts:
International Union of Forest Research Organizations (IUFRO)
Chinese Academy of Forestry (CAF)

Organizer:
Chinese Academy of Forestry (CAF)

Co-Organizers:
Chinese Society of Forestry (CSF)
State Key Laboratory of Tree Genetics and Breeding (SKLTGB)

China National Convention Centre, Beijing, China

October 24-27, 2016

Effects of different forest management treatments on microclimate. An experimental study

Bence Kovács[1,2], Flóra Tinya[1], Péter Ódor[1]

1. MTA Centre for Ecological Research, Institute of Ecology and Botany, Vácrátót, Hungary

2. Eötvös Loránd University, Department of Plant Systematics, Ecology and Theoretical Biology, Budapest, Hungary

Several forest dwelling organism groups are strongly influenced by stand structure and forest management types. The different structural elements primarily affect through microclimatic variables. The moderating effect of forest canopy on microclimate is essential for these taxa, thus it is important to study to what extent could forestry practices alter the below-canopy microclimate.In a mature sessile oak – hornbeam forest in Hungary, five treatments (preparation cutting, gap, micro clear-cut, retention tree group within the clear-cut, control) were carried out using six replicates in a complete block design. Light, air temperature, relative air-humidity, soil temperature and soil moisture were measured in the center of each treatments. For data analysis, 24-hour-data were collected monthly by temporally synchronized data loggers.The amount of light was largest in the clear-cut, lowest in the control plots and intermediate in the other treatments. Air and soil temperature were also highest in the clear-cuts, but retention tree groups had very similar thermal pattern. The increase of soil water content in connection of tree-removal was the highest in the gaps, while it was also detectable in the clear-cuts. Differences between treatments were more noticeable in the full leaved period. We found that groups of 10-12 retention trees appeared to be a stressed environment due to the higher thermal input and water loss by evapotranspiration. The most humid and buffered microclimate was measured in the gaps, that could help the appearance of new, light demanding species as well as the survival of species that needs continuous moderate forest environment.Gap-based management methods provide moderate forest microclimate, enhance the natural regeneration and help the survival of forest dwelling organism groups in managed forests.The study was supported by the OTKA 111887 project and the Pilisi Parkerdő Ltd.

Email: kovacs.bence@okologia.mta.hu

The effects of forestry treatments on enchytraeid worms (Annelida, Oligochaeta) in a Hungarian sessile oak-hornbeam forest.

Gergely Boros[1], Bence Kovács[1,2],Péter ódor[1]

1. MTA Centre for Ecological Research, Institute of Ecology and Botany, Vácrátót, Hungary

2. Eötvös Loránd Tudományegyetem, Department of Plant Systematics, Ecology and Theoretical Biology, Budapest, Hungary

Forest microclimate and soil conditions are essential regarding soil invertebrate communities. Enchytraeid worms (Annelida, Oligochaeta) are important decomposer organisms in forested landscapes, but very little is known about the effects of forest site conditions on their assemblages. This experiment investigates the effect of different forest management practices through forest site conditions on the abundance and diversity of enchytraeids. The following treatments were carried out in a mature temperate sessile oak – hornbeam forest using six replicates in a randomized complete block design: preparation cutting, gap creation, micro clear-cut, retention tree group within the clear-cut and control. Microclimate and soil conditions were measured in the experimental plots. It is hypothesized that applying a less intensive forest harvesting method, lower changes will be observed in this belowground decomposer community. Enchytraeid worms were monitored two times per year in the plots collecting soil samples divided to three vertical layers (0-4 cm, 4-8 cm, 8-12 cm). Each mature enchytraeid individuals were identified on species level. The field survey was carried out before (in 2014) and after (in 2015) the forestry treatments.

One year after the treatments serious decrement of abundance was found in clear-cuts and retention tree groups. The latter phenomenon means that retention groups of 10-12 trees were not able to buffer the original assemblage for these small sized Annelids. The abundance of worms decreased in the upper and middle soil layers related to drier and warmer topsoil conditions. The proportion of small geophages species (eg. Achaeta) increased, while that of bigger sized, litter consumer species (eg. Fridericia) decreased in these treatments. The study was supported by the OTKA 111887 project and the Pilisi Parkerd Ltd.

Email: boros.gergo@okologia.mta.hu

Soil respiration responses to throughfall reducation shift with interannual precipitation in a mesic warm-temperate oak forest

Lu Haibo, Liu Shirong, Wang Hui
Key Laboratory of Forest Ecology and Environment, China's State Forestry Administration, Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry

Drought is predicted to be likely more intensive and frequent in future and has huge implications on soil respiration and regional climate feedbacks. Our study is aimed to examine the effects of reduced precipitation on soil respiration (R_s) and its two components, heterotrophic respiration (R_h) and autotrophic respiration (R_a), in mesic forest at climatic transitional zone. Here, a 3 years growing season throughfall reduction(TFR, -50%) experiment was conducted in mesic warm-temperate oak forests starting in 2013. The results showed that throughfall reduction affected R_s through significantly changed R_a, but had negligible effect on R_h. Moreover, the responses to throughfall reduction shifted with interannual precipitation. In the dryer year 2014, TFR significantly stimulated R_a (+48%); but the R_a of TFR treatment were profoundly lower (-42% and -44%) than Control in wetter years 2015 and 2016. Fineroots data suggest that the contrast results were likely attributed to the changes of soil fineroots biomass and plant internal carbon allocation. Our observations imply that under the future reduced precipitation patterns, soil CO_2 emission response to drought will depend on the precipitation variation in the mesic forest ecosystem at the climatic transitional zone.

Email: luhb87@163.com

Comparison of litter water retention capacities and soil water holding capacities between *Pinus tabulaeformis* and *Quercus aliena* var. acuteserrata stands

Chen Shujun[1,2], Cao Tianjian[1], Zhang Shuoxin[1,2]
1. Northwest A&F University
2. Shaanxi Qinling National Forest Ecosystem Research Station

The capacity of litter and soil to hold water plays an important role in controlling the storage and release of water for a forested watershed. We quantified the soil physical and hydrologic properties, the litter depth, total mass for *Pinus tabulaeformis* and *Quercus aliena* var. *acuteserrata* stands, which are two of the main forest types in the Qinling Mountains. The rate of water absorption, maximum water retention capacity, and net water retention capacity of semi-decomposed layer was higher than non-decomposed layer for both vegetation types. For a given parameter, it was higher for *P. tabulaeformis* stand than for *Q. aliena* var. *acuteserrata* stand. The non-capillary water holding capacity, capillary water holding capacity, and maximum