LONG TERM DEVELOPMENT OF ASPEN STANDS IN GEORGIA BASED ON ANTHRACOLOGY ANALYSIS

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INTRODUCTION

Aspen (*Populus tremula* L.) is one of trees with a wide geographical distribution, large ecological amplitude, and high biological value. Therefore, it is mentioned more and more often as an important component of forest stands and landscape e.g., for reforestation of clearcuts after bark beetle outbreak logging. However, long-term development of aspen stands was not fully described despite its current popularity. Long-term development of aspen stands in Georgia was the goal of this IGA project.

The project is focused on long-term development of aspen communities in the Greater Caucasus region in the Aragvi River basin, where the current species composition is relatively close to nature and aspen is a common species. This long-term development is described based on pedoanthracological analysis, which uses macrocharcoals accumulated in a soil from forest fires to reconstruct the historic species composition. The specific objective of the project was to describe whether aspen can form long-term stable communities (such as the closely related aspen in North America), or whether it creates only temporary (seral) communities that are subsequently replaced by a community with a different species composition.

Aspen stand in Georgia (AR 149)

METHODOLOGY

Forest stands where aspen has been currently dominant were communities of interest.

Samples for a subsequent pedoanthracological analysis were taken from a soil profile, which was divided into layers. Each 10 cm thick layer comprised a sample of 10 litres of a fine soil. Separation of charcoal fragments were done by a wet sieving procedure. The sieve mesh was of 1 mm in size so that we were able to separate charcoal fragments greater than 1 mm. Samples were identified using a standard identification key using the microscope Olympus SZ 61. Determined charcoal pieces were weighed for an accuracy of 0,1 mg.

Empirically selected charcoals will be sent to Radiocarbon Laboratory in Prague for radiocarbon dating using the C 14 Accelerator Mass Spectrometry. Attention will be paid to *Populus* charcoal pieces.

Obtained data will be evaluated on:

a) Stable aspen community- aspen will often repeat itself in individual (consecutive) layers, its representation will be similar across individual horizons, and the species composition of the following (younger, higher-lying) horizons will not be directed towards successionally higher communities (towards potential vegetation). Stable aspen stands (*Populus tremuloides* Michx.) are described in North America, where aspen stands have been found in mountainous locations for millennia.

b) Temporary (seral) aspen community - in the species composition, it is evident that the aspen community is replaced by a successionally higher stage in time. The representation of aspen in individual horizons is not constant and has a long-term downward trend. This seral function is described in the climatic conditions of Central Europe, and in Southern Carpathians.

RESULTS

Based on partial results from Georgia, it follows that in these localities aspen behaves like a pioneer species, which is subsequently replaced by a different species composition. It is evident from the results of the AR 149 site (Fig. 1) that a certain representation of aspen was present in almost all soil layers. The results from the lower part of the soil profile (6th layer, 51-60 cm) indicate that aspen was even one of the dominant stands at this time. Radiocarbon dating determined the age of this charcoal to the turn of the Atlantic and Subboreal climatic periods. However, this similar occurrence of aspen was not evident at the other localities (AR 008; AR 126). On these plots, we can see the increase of anthracomass in layers where aspen occurred. This fact can have a connection with the former inhabitants converting “unusable and worthless forests” into pastures or fields.

The results are based on the microanatomical analysis of 805 pieces of determined charcoal pieces taken at different soil depths. A total of 8 pieces of charcoal pieces were sent to determine the age, for which the age was derived using radiocarbon methods.

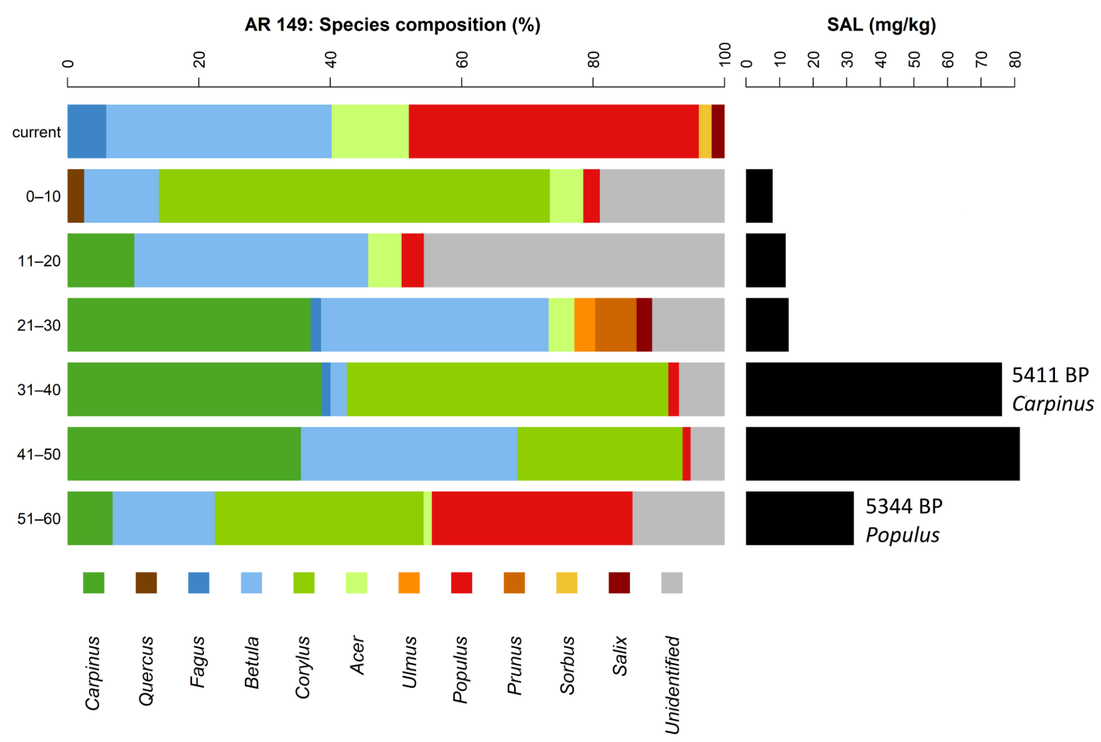

Fig. 1: Results from AR 149

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