Understanding the Contribution of Agroforestry to Landscape Resilience in Europe

Day 2. Field trip to visit agroforestry demonstration plots in Hungary

10 October, 2018

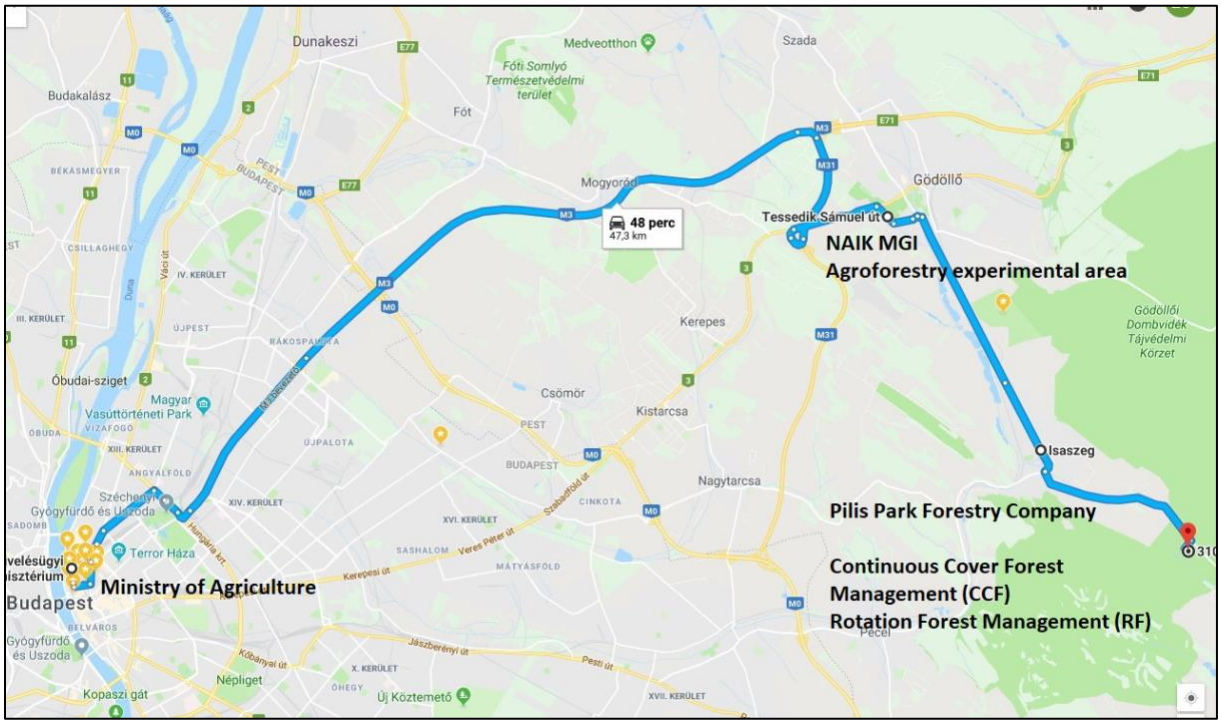
13.30 – 15.30 h

Bus transfer from the Ministry of Agriculture to the demonstration plots

Agroforestry experimental area

NAIK Institute of Agricultural Engineering (NAIK MGI)

2100 Gödöllő, Tessedik Sámuel 4.



Route of the field program

Speakers:

István Bácskai, head of department, NAIK Institute of Agricultural Engineering

Veronika Honfy, assistant junior scientist, NAIK Forest Research Institute

Zsolt Keserű, head of department, NAIK Forest Research Institute

The intercropping trial is located in the area of the NARIC Institute of Agricultural Engineering (NARIC MGI) in Gödöllő. From the Ministry of Agriculture (Budapest, Kossuth Lajos tér 11) it takes about 35 minutes to get there (34 km). The experiment was established in cooperation between the two institutes (NARIC MGI and NARIC ERTI).

The experiment formerly was an energy tree plantation with the species of hybrid poplar and black locust. The planting spacing was 3.0 x 0.5 m.

This short rotation energy tree plantation has been converted to an intercropping agroforestry trial for two years. Based on the existing stand we established the current row and in-row spacing:

- The planting spacing for black locust is the following:
  row spacing: 9, 15, 21 meter; in-row spacing: 1, 2, 3 meter

- The planting spacing for hybrid poplar is the following:
  row spacing: 9, 12, 15 meter; in-row spacing: 2, 4, 6 meter

In the experimental area triticale was sowed as companion crop in 2017.

In this experiment we will investigate mainly soil moisture, carbon cycle, light capture and root growth, as these factors are remarkable in researching and mitigating climate change. It is important to investigate and determine the relation between the trees and the companion crops including agroecology, yield (production) and economy.

The Hungarian National Agricultural Research and Innovation Centre's (NARIC) Forest Research Institute (FRI) Department of Plantation Forestry started to study agroforestry systems and constructed its first trials in 2014. Since then further experiments have been set up and the institution has started to spread the knowledge of agroforestry, its characteristics and specialities, through agricultural and forestry forums and conferences, based on international literature, and examples. The aim is to establish trials across the whole country, to be able to study different sites where profitable plantation forestry and agroforestry technologies can be tested under the ecosystem of Hungary, providing models, and options to forestry and agriculture in marginal areas.

16.00 – 18.00 h

Excursion – Pilis Park Forestry Company, Valko Forestry Unit

Theme: According to the research continuous cover forest management (CCF) can achieve at least the same economic efficiency as traditional rotation forest management (RF) in Turkey oak stands.

Speakers:

Mr. Peter Csépányi, Chief engineer of production and nature conservancy, Pilis Park Forestry Company
Mr. Ferenc Magyar / Leader of Valkó Forestry Unit / Pilis Park Forestry Company
Mr. Bence Kiss / Forest manager / Valkó Forestry Unit / Pilis Park Forestry Company

The regeneration problems occurring in poor quality sites in Turkey oak stands made visible the economic differences between the two management systems investigated. Silvicultural regimes in the light of climatic changes.

- RF in Turkey oak stands (clearcut, artificial regeneration)
- CCF in Turkey oak

The assessment area in 4th yield class Turkey oak stands between CCF and RF systems was situated at the Valkó Forestry Unit in the Gödöllő Hills, 150-250 m above sea level. The annual mean temperature here is 10.2 °C and the annual precipitation is 540 mm. Severe heat and drought occur here annually in July and August; artificially planted seedlings are often scorched at this time. The six subcompartments were in the administrative area of the Dány settlement and the total area was 43.4 ha. The RF system in the clearcutting with artificial regeneration in the Dány 25B, 40A, 40C subcompartments has an assessment area of 15.1 ha. The RF system in regeneration cutting with natural regeneration has an assessment area of 16.3 ha in the Dány 11C, 44E subcompartments, and the CCF system has a 12.0 ha area in the Dány 28A subcompartment. The subcompartment data originate from the management plan of Valkó Forestry Unit 1990-2011.

Turkey oak stands in RF system – clearcutting with artificial regeneration

Subcompartments: Dány 25/B (4,59 ha), Dány 40/A (5,54 ha) Dány 40/B (4,37 ha) Dány 40/C (5,23 ha)

In the case of Turkey oak clearcutting, the regeneration was intended to start naturally, but the seedlings completely perished because of cockchafer grub damage. Therefore, a total soil preparation was done and artificial regeneration was initiated. The soil was sterilized with pesticide concurrently with a deep ploughing. A further goal of the total soil preparation was to improve the hydrology of the dry sand. Primary planting was done with one-year-old Turkey oak seedlings mixed with sessile oak and small-leaved linden. On top of this, grey

poplar (Populus x canescens Sm.) was planted as a shading layer because practice showed that grub damage ends after the closure of the regeneration. Due to the faster growth rate of grey poplar and interrow discing, the shading layer became established in the second year, which prevents the sand from heating up lessening the damage of heat demanding grubs. Soil sterilization was done in a part of the area in the fourth year; during the replacement of grub damaged seedlings, pesticide was applied to the root zone. Root development of the rapid growing poplars is more intensive as well, so they can provide an alternative food source under the ground, thereby protecting the target species of the stand from total destruction. The shading layer of grey poplar is gradually cleaned out during the development of the reforestation; the grey poplar can also disappear completely by the age of 15–20 years. Continuous soil cultivation between the rows of the reforestation is important as it aids the growth of trees by supressing weeds. Establishment regeneration cost values in the case of RF systems exceed the national average on a bigger scale in the case of artificial regeneration because of the site conditions and different damage types (Nagy 2013). Based on the references, the establishment cost value of reforestations on terrain accessible with machines was 522,000 HUF/ha in case of acorn planting (7th year). In our examination the cost of artificial regeneration with seedlings was 1,680,000 HUF/ha (in 7th year). These values can be found elsewhere as well, mainly in cockchafer grub damaged areas (Babics 2014).

Turkey oak stands in RF system – regeneration cutting with natural regeneration

Subcompartments: Dány 11/C (6,66 ha), Dány 29/B (16,56 ha) Dány 39/A (13,32 ha)

In the Turkey oak regeneration cut with the shelterwood system, seedlings disappeared after the completion of the first preparatory cut (resulting in a 70–75 % closure). A grub exploration was done; sample ditches showed a high number of larvae (2–4 pcs/m2). An artificial replacement was also essential with acorn and seedlings, as well as soil sterilization. The first preparatory cut was done very early compared to the time of the final cut (normally 3-5 years); the reason for this was the annual development and recession of the regeneration layer. This experience showed more mother trees in a shelterwood system had to be maintained as they are necessary until the regeneration layer reaches high closure; otherwise, it is possible that the seedlings disappear due to cockchafer grubs. Accordingly, the harvesting of the mother stand was carried out in several steps considering the development of regeneration. Establishment regeneration cost values in the case of RF natural regeneration is higher than the national average in a smaller scale (Nagy 2013), which in the case of natural regeneration was 510,000 HUF/ha in the 9th year old regeneration. For natural regeneration, we got a reduced initial cost of 721,500 HUF/ha (in 9th year) due to the extremities of our sites.

Turkey oak stands CCF system

Subcompartments: Dány 26/C (2,74 ha), Dány 28/B (11,96 ha)

The Turkey oak CCF management at the beginning of the 1990s was started as a natural regeneration with the shelterwood system. Afterwards, however, the regeneration under the stand disappeared almost completely in more opened up areas due to drought and cockchafer grub damage; in more closed spots it became thinner, so the natural seedling cover decreased significantly. Due to these conclusions in the early 2000s, the continuation of further operations used CCF principles in order to minimize risks. A few years later, new seed produce appeared and regeneration patches in smaller openings showed improvement and development. A regeneration patch is only opened up fully if a dense, well developed, and closed Turkey oak regrowth is present. Nursing of the regeneration patches and cleaning-like intervention in more developed groups, removal of wolf-trees, or non-native and invasive tree species like black cherry (Prunus serotina) are only required in some parts of the area. In the CCF system, trees in the upper layer were harvested gradually one by one or in small groups (2-3 trees) of single-tree and group selection, which results in spontaneous establishment of natural regeneration. It can be proved that by using this method the high additional costs caused by cockchafer grubs and drought damage can be avoided in the permanently present shelter of the mother stand, which provides protection through shading and seed production.