Is there a place for alley cropping in the European forest areas?

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Fig: Forest intercropping experimental plot in Hajdúhadház (Photo by K. Kovács)

Forestry intercropping is an old-age land use practice whicjh is still in use today in the rainforests of Africa and South America as well as in some European forests. The forestry alley cropping systems have several advantages (improving tree survival rates and the nutrition supply, protecting the soil from erosion, improve mesoclimate and climate adaptation etc.), but there potential disadvantages, too (eg. extra labour costs, special technical requirements). The Hungarian research results and observations in poplar, oak and mixed stands prove, that this traditional agroforestry practice is worth for applying in the Carpathian Basin .

- Parameters measured in the experimental plantation with mixed tree species intrecropped with corn:
- • Soil conductivity (HANNA HI 98331)
- • Soil temperature(HANNA HI 98331)
- • Growth parameters (measuring tape)
- • Observation of game damage
- • Costs and benefits

Research method

Examined parameter	Soil temperature	Soil conductivity	Growth parameter
Period	01. Aug. - 02. Sept.	01. Aug. - 02. Sept.	02. Sept.
Sampling points	2 points/plot (2016) 17 points/plot (2017)	2 points/plot (2016) 17 points/plot (2017)	5x10 meters/plot
Test method and equipment	Soil temperature and conductivity meter (Hanna HI 98331)	Soil temperature and conductivity meter (Hanna HI 98331)	Height measurement with measuring tape

LER – Land Equivalent Ratio

The result of the first assessment of LER for the experimental forestry alley cropping system takes above 1,0 values, that means excess yield of total biomass per unit area in the agroforestry system in comparison with the reforestation areas without intercropping.

Results

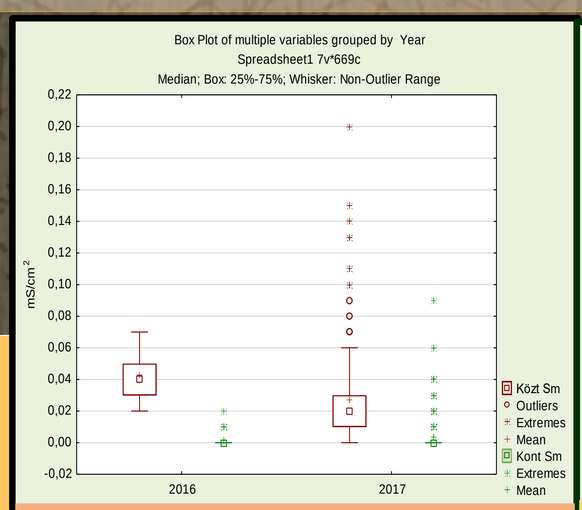

Figure 2: Soil conductivity

Observations on better plant conditions in the AF plot are confirmed by the box chart showing significant difference between the two afforestation systems in both years.

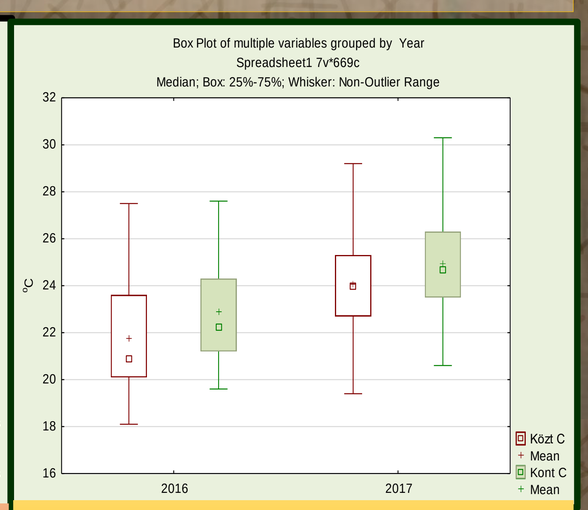

Figure 1: Soil temperature

The soil daily average temperatures of alley cropping system were consistently and significantly lower than the values of the control area in the driest period (August) of 2016 and 2017.

- The water balance of agroforestry system proved to be better than the control area
- The daily mean temperatures of the alley cropping area in the arid period are significantly smaller than the values of the control area
- The more favourable microclimate resulted in a significantly stronger growth of seedlings in the alley cropping area.
- There was no draught damage in the agroforestry plot, while trees of the same age of control suffered losses of 50%
- Although the damage to the game appeared in both systems, we experienced lower game damage in the agroforestry plot due to the presence of the intercrop.

Conclusion

- Due to its benefits the use of agroforestry (intercropping) practice can significantly increase the efficiency of (artificial) afforestation while maximises the utilisation of the available area and serve other purposes (crop production, ecosystem services)
- Due to its advantages proved by our experiments, it is still worth considering the use of this old technology in the European forest areas.

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