

HOW CAN AGROFORESTRY IMPROVE THE SUCCESS OF AFFORESTATION AND CONTRIBUTE TO MEETING THE GROWING DEMAND FOR WOOD?

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Introduction

The major part of the European green energy production accounts for biomass. In the decentralized energy production, the biomass used in combustion technologies is largely derived from woody biomass (dendromass). The steadily growing demand for wood in the industry, transport and energy production requires a change in land use and more intensive use of trees out of forests. Both the widespread introduction of agroforestry in agricultural areas and the re-introduction of intercropping in young forest plantations could make a significant contribution to meeting the future needs of woody biomass. This paper discusses the results of a Hungarian experiment which confirms that the use of intercropping in reforestations can significantly reduce the climate sensitivity of the system, and thus improve the success of afforestation and thereby promote qualitative and quantitative growth in wood production.

Agroforestry

Agroforestry system is a dynamic, ecologically based natural resource management system that integrates trees into farms and the agricultural landscape, thereby diversifying them and maintaining production for land users through enhanced social, economic and environmental benefits.

Among its main types of landscape elements in Europe, green protective elements (e.g. riparian buffer strips, shelterbelts, windbreaks and hedgerows), tree plantations combined with crop production and alley cropping could play a greater role in agriculture. Introduction of woody components into livestock keeping systems (e.g. wood pastures and grazed tree plantations) is equally important.

The role of agroforestry in the growing demand for wood

A well-established and operated agroforestry system can produce up to 30-40% higher total biomass yield compared to the system with plant cultures grown separately. This is due to the use of woody vegetation, which provides protection to crop and livestock, a more favourable microclimate and diversity and at the same time produces wood that complements the yield of the agricultural crop. (Gál, 1963, Dupraz et al., 2005). Complex yield and site studies were performed in a Hungarian experimental area and in the associated control area. Intercrop - typically corn in Hungary - if well-chosen (e.g. crop variety with below average growth), creates a competitive and partial shade, thus stimulating the growth of young trees.

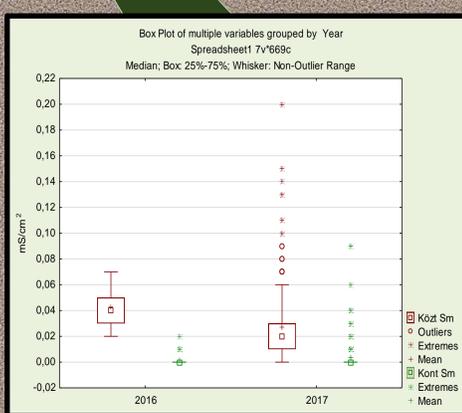


Figure 2: Soil conductivity

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. (red: agroforestry, green: kontrol) (Vityi & Kovács, 2018)

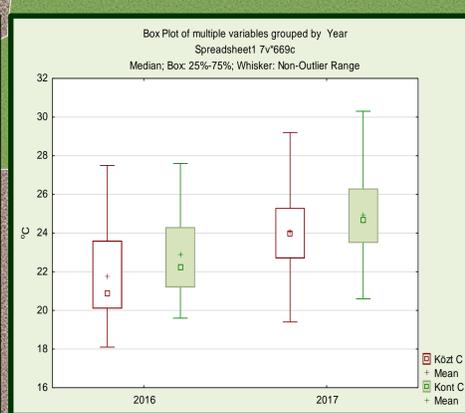


Figure 1: Soil temperature

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. (red: agroforestry, green: kontrol) (Vityi & Kovács, 2018)

Examination of the growth parameter revealed that the saplings in the intercropped area brought stronger growth, with the same characteristics of the two areas. (Vityi-Kovács 2018) In the agroforestry area, soil temperature and water balance were much more balanced than in the control.

The positive effect was particularly strong in drought periods; the drought damage loss was significant in the control area, while no loss was observed in the intercropped forest plantation. The daily average temperatures of the intermediate area during the arid period were significantly lower than the values of the control area. (Vityi-Kovács 2016) (Fig 1 and 2)

Conclusion

Hungarian experiment confirm that the use of intercropping in reforestations can significantly reduce the climate sensitivity of the system, and thus improve the success of afforestation. Greater supportive government measures for a more widespread use of both practices (introduction trees to agricultural crop systems and introduction of crops in forest cultivation) can be recommended, which in the long run may result in improved qualitative and quantitative parameters of wood production.

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