

Establishment of new agroforestry systems in northern Greece

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Introduction

Silvoarable agroforestry that comprises widely-spaced trees intercropped with arable crops, is an old practice in Greece and cover an area of about 1,000,000 ha. According to tree species, silvoarable systems are divided into spontaneous (800,000 ha) and cultivated trees (200,000 ha). The most important systems with cultivated trees are those that combine olive, fruit and nut trees with arable crops (cereals, vegetables, grapes). Although there are many traditional silvoarable systems, there is a lack in new (modern) ones used for the production of high quality timber. The aim of this study was to investigate the function of new silvoarable systems established in a mountainous area of northwestern Greece.

Results

Trees at the plot with maize had a fast growth the first 2 years due to summer irrigation. After that period the farmer changed the crop to cereals without irrigation resulting in a reduced growth for a period of 4 years (Figures 2 and 3). In the last 3 years, an increased growth in height and diameter at breast height (DBH) was observed. Trees did not affect the crops due to their young age and the specific shape formed by branch cutting in order to produce clear and good quality stems in a height more than 3 m. Regarding the cereal plots, there was a slow growth (height and diameter) in all tree species the first 6 years (Figures 4-6). A faster growth appeared in the last 3 years. This is, probably, due to good tree establishment. Trees were not affected by the cereal crops and the cultivation activity all these years. On the other hand, trees did not affect the crops due to their age (9 years old). All tree species had similar growth in height and diameter.

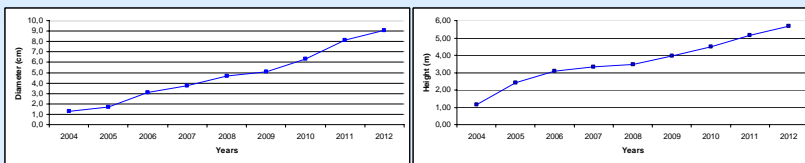


Figure 2. Diameter at breast height and tree height during the 9 years of the plantation with rotation crops (hybrid walnut trees)

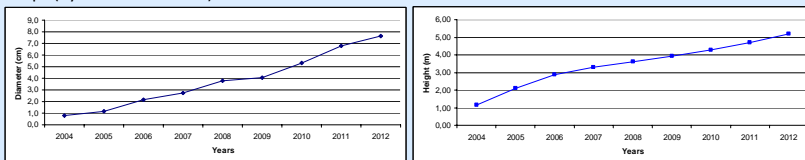


Figure 3. Diameter at breast height and tree height during the 9 years of the plantation with rotation crops (wild cherry trees)

Materials and Methods

Under the European research project SAFE, experimental plots were established at the Municipality of Askio, a mountainous area in northwestern Greece. Specifically, 3 plots covering an area of 2 ha were established in collaboration with local farmers. The tree species used were hybrid walnut, cherry tree and the local species *Celtis australis*. Two of these plots were cultivated with cereals and the other with a rotation of maize and cereals (Figures 1, 7).



Figure 1. New agroforestry systems with cereal crops (a, b) and maize (c)

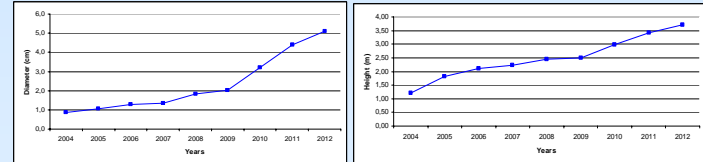


Figure 4. Diameter at breast height and tree height during the 9 years of the plantation with cereal crops (hybrid walnut trees)

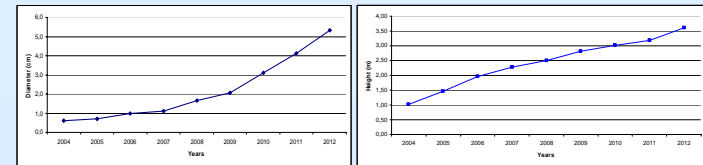


Figure 5. Diameter at breast height and tree height during the 9 years of the plantation with cereal crops (wild cherry trees)

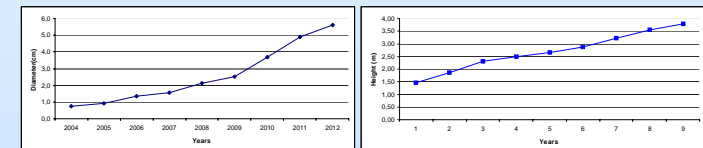


Figure 6. Diameter at breast height and tree height during the 9 years of the plantation with cereal crops (*Celtis australis* trees)



Figure 7. New agroforestry system with 9 years old trees of wild cherry and hybrid walnut intercropped with rotation crops

Conclusions

- Summer irrigation at the establishment phase speed up the growth of trees.
- Trees are established and speed up their growth after the sixth year.
- Experimental plots can serve as demonstrations of modern agroforestry systems so that farmers are considered to get involved in the new practice.

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