



## Use of Keyline for planting cork oaks and holm oaks in agroforestry systems

### Introduction

The implementation of the Keyline system consists in the design of curves, slightly uneven (about 1%), in relation to the level curves, towards the ridge. In this way, the water is forced out of the valley area and distributed to areas where it normally does not accumulate. The Keyline system also includes the use of a Yeomans plow, which opens furrows in the soil without any mobilization, so as not to disturb soil life and reduce the rate of mineralization of organic matter to a minimum.

The furrows can have depths of 10 to 40 centimeters and are made with passages

successive, each year in areas close to the previous furrow, in order to create soil and open space for the roots of plants to develop. The purpose of this system is to improve water distribution at ground level both horizontally and in depth, reducing areas of waterlogging and low infiltration.

With more humidity, the functions of the soil improve, the amount of soil life, the levels of organic matter and consequently the capacity to support vegetation, like vegetables, aromatic hedges, fruit trees or cork oaks and holm oaks.

The first step towards the implementation of the project was the carrying out, in 2017, of the topographical survey of the land, for the design of the Keyline project to be implemented. This project was executed in AutoCad and later marked on the ground.

On the other hand, native species were planted according to the agroecology model, taking advantage of the Keyline lines, where there is a greater infiltration of water, to install the trees. This operation had, in the first year, a low success rate, so in the following years it was repeated again, reviving the Keyline lines.

As a result of the activities of these campaigns, a good survival rate of the installed plants was observed, which was around 80% in these test plantations. There was also a better germination rate of the sown acorns and an improvement in productivity between the rows, with higher levels of organic matter.

## Lessons learned

Tree plantations are very dependent on the characteristics of the land and weather conditions. To help the plants survive, a hole of about 20 cm was made next to each plant, which was filled with a mixture of soil and well-cured organic compost. The plant was installed and small boilers were made, for better water retention. The boiler was covered with ground plant material ("mulch") in order to prevent evaporation, maintain soil moisture and beneficial microorganisms. Once the plant material has been crushed, it is incorporated into the soil, enriching it with nutrients. These techniques led to a higher survival rate of the planted trees.

What was observed, after several years of intervention, was the preferential survival of the trees planted and germinated in the mid-slope areas facing north and east. In the top and bottom areas there was high mortality, both because conditions of strong exposure to the sun and wind were maintained in the top areas, and because of the high levels of waterlogging in the bottom areas. Given the high clay content of the soils in this plot, the poor drainage of the low areas was not properly solved by Keyline, leading to the waterlogging of the roots of some of the installed plants. In locations with greater waterlogging, the recovery of the old water line, already destroyed several years ago, should prove to be a more effective solution for this type of soil."

## For more information contact

[alfredosendim@herdadedofreixodomeio.pt](mailto:alfredosendim@herdadedofreixodomeio.pt)



*Figure 1. View of the keylines used to plant oaks.*









Figure 2. The implemented keylines to plant oaks.

The information presented in this factsheet was developed by the FOREST4EU partner, drawing on the innovations and knowledge generated by the indicated operational group with their explicit authorization.

### Further information

<http://www.ecomontadoxxi.uevora.pt/>



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