FOREST4EU

ITHub 2 - Forest Adaptation to climate change

FOREST4EU partner: ANSUB
OG: GO REGACORK
OG's country: Portugal
Type of Innovation: Process

Precision fertilization of Cork Oak (*Quercus suber* L.) in intensive cork production stands.

Introduction

This project had as an objective the study of irrigation and fertilization in young and old Cork Oak stands, to decrease mortality in new plantations, and increase the vitality, growth and cork production of the trees. Using the least amount of water and fertilizer in function of the site and stand characteristics.

In the case of new plantation, irrigation should only be done where water is easily available. If necessary, a ripper can be used to break deep impermeable soil layer, using one tooth until one meter of depth. The density of the plantation should be between 625 trees/ha (4m x 4m) and 1111 trees/ha (3m x 3m).

The installation of the irrigation system should be done before the plantation. The plants used should be grown in container deeper than 20cm and should be planted with a maximum of 1 year old.

The irrigation and fertilization can be used for at least 15 years, so it is recommended the use of durable materials. Quality materials may be more expensive, but they will decrease the maintenance costs. Drip irrigation is recommended because it is the most efficient method of irrigation. The irrigation can be superficial, optimal in the first years and when the soil is sandy, or it can be underground, more expensive to install but there is no waste of water to evaporation and makes easier the operations of spontaneous vegetations control. Underground systems should be buried at 40 cm of depth, and between 30 to 60 cm way from the plantation line.

The water flow of the emitters should be 2 L/hour, in the cases that the soil composition is very sandy the flow should be 4 L/hour. Until the subjects reach 5 years old, the water used should be between 20 and 45 m3/ha/week, after that age it should be between 45 and 90 m3/ha/week. The frequency of the irrigation should be between 3 and 4 times a week, in the initial phase it can be applied more frequently in smaller periods of time. The frequency should increase with the percentage of sand in the soil. After the first couple of years the frequency of irrigation should decrease, as an incentive to grow the radicular system. The period in which irrigation should be applied is normally 16 weeks, the summer months, but it can also be applied during the spring, when the precipitation is lower than usual, or it is the first year of the plantation.

It is suggested the installation of a monitoring system, continuously sampling the field in different points with a soil moisture profile probe. In general, sandy soils should have higher than 6% relative humidity and clayish soils should have higher than 25% relative humidity.

The fertilization should be done closer to the end of the irrigation, as it decreases the leaching of the nutrients, finishing the irrigation with only water for about ten minutes to clean the irrigation pipes. Until the tree reaches 5 years it should be applied 2kg of N/ha in each irrigation.

The operations of spontaneous vegetation control should never be done by moving the soil layers. The pruning operation should be done annually and from early ages because the fertigation will increase the growth rate of the plants. The pruning objective is to create trees with a single straight trunk increasing the profitability of the tree cork extraction.

The cork produced by the stand submitted to fertigation, is thicker, has higher porosity, and thinner cell walls. However, after processing the cork, it has very similar technological properties when compared to the control samples.

Lessons learned

In plantations the selection of the plants is of extreme importance, never using plants older than 1 year and their root should be well developed. The plantations should only be done after the irrigation system is already in place.

The dripping system can be with fix or attachable emitters. Fixed emitters normally are less prone to leak and have less space between them than the distance between the trees, which can lead to an initial waste of water but as the trees develop their radicular system horizontally it will be advantageous to not only irrigate near the tree trunk. For this reason, it is advisable to use fixed emitters.

The subjects irrigated when compared to the control subjects have a 12% increased diameter growth in the period which they were irrigated. In the case of sandy soils, the efficiency of irrigation is linked to the frequency and not to the quantity of water used. The irrigation allowed the debark, of some subjects, for the first time in only 8 years after their plantation, which shorter than the normal 12 years. The properties of cork produced by irrigated trees are different from the control, however after processing the cork it has similar characteristics."

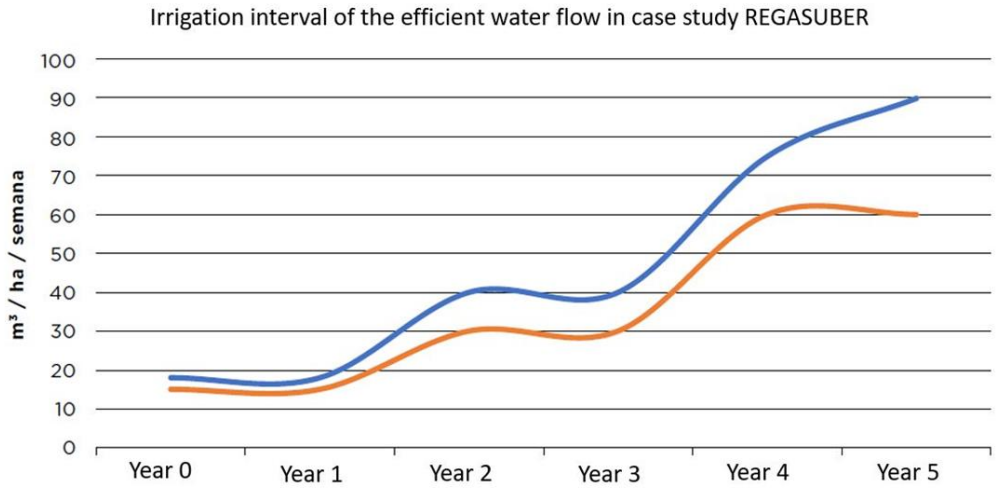

Figure 1. Irrigation interval of the efficient water flow in case study REGASUBER

For further information contact

goregacork@uevora.pt

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

https://www.goregacork.uevora.pt/

Funded by the European Union

Funded by the European Union (Grant n. 101086216). Views and opinions expressed are however those of the authors only and do not necessarily reflect those of the European Union or REA. Neither the European Union nor the granting authority can be held responsible for them.