

Ecophysiological study in three sites of natural Aleppo pine forests.



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Keywords

Aleppo pine

climate change

gas exchange

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Water status

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NWFP

Wild Nuts & Berries

Scale

National

Context

At the national level, the market for "zgougou" products from Aleppo pine seeds is booming, therefore, prevention is needed for climate change effects that significantly modify the physiological response of trees and profoundly affect the seed yield. In this context, the purpose of this work is to compare the water status of natural Aleppo pine from different bioclimatic stages, Djebel Zaghuan(DZ), Djebel Mansour (DM) and Djebel El Sarj(DS), based on soil-plant-atmosphere continuity. The experimental approach is based on monitoring soil water behavior, gas exchange, and hydraulic conductivity with climatic variability.

Objective

The main response of natural Aleppo pine trees to drought has been studied in three sites on the North-western of Tunisia, in order to assess their capacity to adapt to climate change and overcome the water challenge. This research was based on the evaluation of some physiological traits (xylem conductivity, water potential..), the soil moisture, the water content, and the foliar gas exchange (photosynthesis, transpiration, and stomatal conductance).

Results

Baraket *et al.*, 2019, had shown the extreme forest water stress following the rainy season and the very low physiological activity of pine forest throughout the summer and autumn and that (DZ) site is physiologically more tolerant to the effects of climate change than Djbel Mansour and Djbel Sarj sites. Therefore, (DZ) had a significant relative humidity in the soil of the order of 26% and a xylemial conductivity 16.3% of embolism compared to (DM) and (DS) which had the highest percentages in relation to the increasing rate of the dryness.

Recommendations

The comparison of the three sites Djbel Zaghouan, Djbel Mansour and Djbel Sarj requires a good knowledge of the soil-plant-atmosphere system during the same periods of study. Indeed the measurement variations are positively correlated with climatic factors such as the rainfall decrease in summer and the increase of the daylight period.

These results showed that the measured of eco-physiological parameters can be adopted as an indicator of better water management in order to manage a drier future climate. For instance, the species of Djbel Zaghouan site could be the sustainable alternative for future reforestation in Tunisia and the extreme weather conditions.

Impacts and weaknesses

Climatic factors affect several tree functioning variables, such as stomatal conductance (Yagoubi, 1993) and photosynthesis (Moran *et al.*, 1994). Several studies have shown the existence of a linear relationship between these variables (Yuan *et al.*, 2004).

However, during the measurement of these different parameters, it is important for the preservation of the main characteristic of these samples. As an example, if the stomata are closed (for conservation reasons) the gas exchange measurements in the laboratory would not be correct.

Future developments

The natural regeneration of Aleppo pine presents difficulties on some soils (Djbel Sarj), because of their dryness and, in particular, the hardening of the surface horizons in summer, which creates an unfavorable environment for seed germination and where the competition for water is very important. A reforestation program in Jebel Sarj seems to be needed in the future.



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Further information

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INCREDIBLE project aims to show how Non-Wood Forest Products (NWFP) can play an important role in supporting sustainable forest management and rural development, by creating networks to share and exchange knowledge and expertise. 'Innovation Networks of Cork, Resins and Edibles in the Mediterranean basin' (INCREDIBLE) promotes cross-sectoral collaboration and innovation to highlight the value and potential of NWFPs in the region.



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