

# Relationships Among Seed Germination, Lithological Substrate and Growth in Two *Quercus* Species

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## Abstract

In Romania, *Quercus* is represented by five to nine species, depending on their taxonomic classification. The purpose of this study was to determine the seed germination rate and seedling growth of *Quercus robur* and *Quercus petraea* species in different soil conditions. The results obtained show that there are differences between trees growing and development. Our results show that seed quality and lithological substrate have an influence on seed germination of *Quercus robur* and *Quercus petraea* species. This fact has an important role in forest resource management.

**Keywords:** *Quercus robur*, *Quercus petraea*, seed germination, growth

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## Introduction

The *Quercus* genus is taxonomically assigned to the *Fagaceae* family, one of the richest families in terms of dendrology, with about 1.000 species all across the globe, separated into seven genres, spread across the northern hemisphere, from boreal to tropical or even equatorial (Kremer et al., 2007). Șofletea and Curtu (2007) describe the existence of nine species of *Quercus* in our country.

## Aims and Objectives

The aim of this study was to determine the seed germination rate and tree growth of *Quercus robur* and *Quercus petraea* species in particular soil conditions. Germination is the most sensitive stage of the plant life cycle so we tried to evaluate plants behavior in soils with different pH.

## Materials and Methods

There have been collected 200 acorns of *Quercus robur* L. and *Quercus petraea* (Matt.) Liebl. in Hoia forest, Cluj-Napoca (Fig. 1), 100 of each species. Acorns have been sown in pots with two soil types with different pH (Fig. 2), as follows: 50 acorns of *Quercus robur* and 50 acorns of *Quercus*

*petraea* were sowed in soil with pH 4 and the other part of the acorns were sowed in soil with pH 6. After sprouting, the first observations on seedling growth were made in three weeks, then other six measurements have been performed from three to three weeks until the plants reached approximately five months (21 weeks).

## Results and discussions

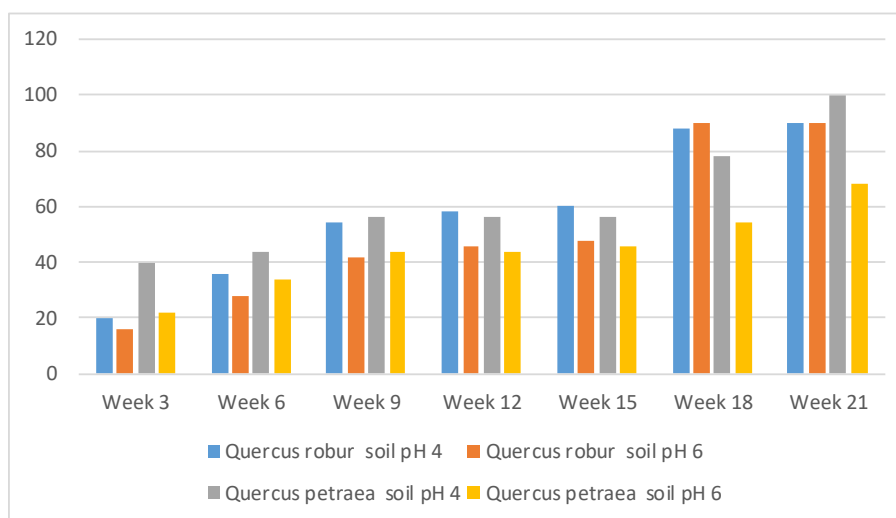
The results obtained show that there are major differences of seedling growth on the two soil types (Fig. 3) studied. The most spectacular difference has been observed between *Quercus petraea* already after three weeks of growth on soil with pH=4 (40 cm) and the other three studied variants (about 20 cm). *Quercus robur* grown on soil with pH=4 presented a rather constant rate of growing in three, six and nine weeks after sprouting. For other six weeks there had been observed a stagnation and then a significant growth until the end of our experiment both on pH=4 and pH=6. A similar development in seedling growth can be observed in *Quercus petraea*, on soil with pH=6 but with a slow rate of growing after 15 and 21 weeks. The highest growth level was reached by *Quercus*



**Figure 1.** Hoia forest, *Quercus robur* and *Quercus petraea* seed harvesting site



**Figure 2.** Acorns sown in pots containing soil with pH=4 and pH=6



**Figure 3.** Oak plant growth in different soil conditions

*petraea* after 21 weeks (100 cm) while the lowest rate of growth (68 cm) of all studied variants has been observed in the same *Quercus petraea* on a soil with pH=6.

### Conclusion

Understanding the germination capacity of seeds is important for forest restoration and forest nurseries in order to set up new forest plantations. Our results show that seed quality and lithological substrate have an influence on seed germination of *Quercus robur* and *Quercus petraea* species.

As general aspect there can be concluded that both studied species presented a more constant and better growth on soil with pH=4. Consequently, for a greater success of sprouting and seedling growth it is recommended to use acidic germinating substrates.

This fact has an essential role in forest resource management.

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