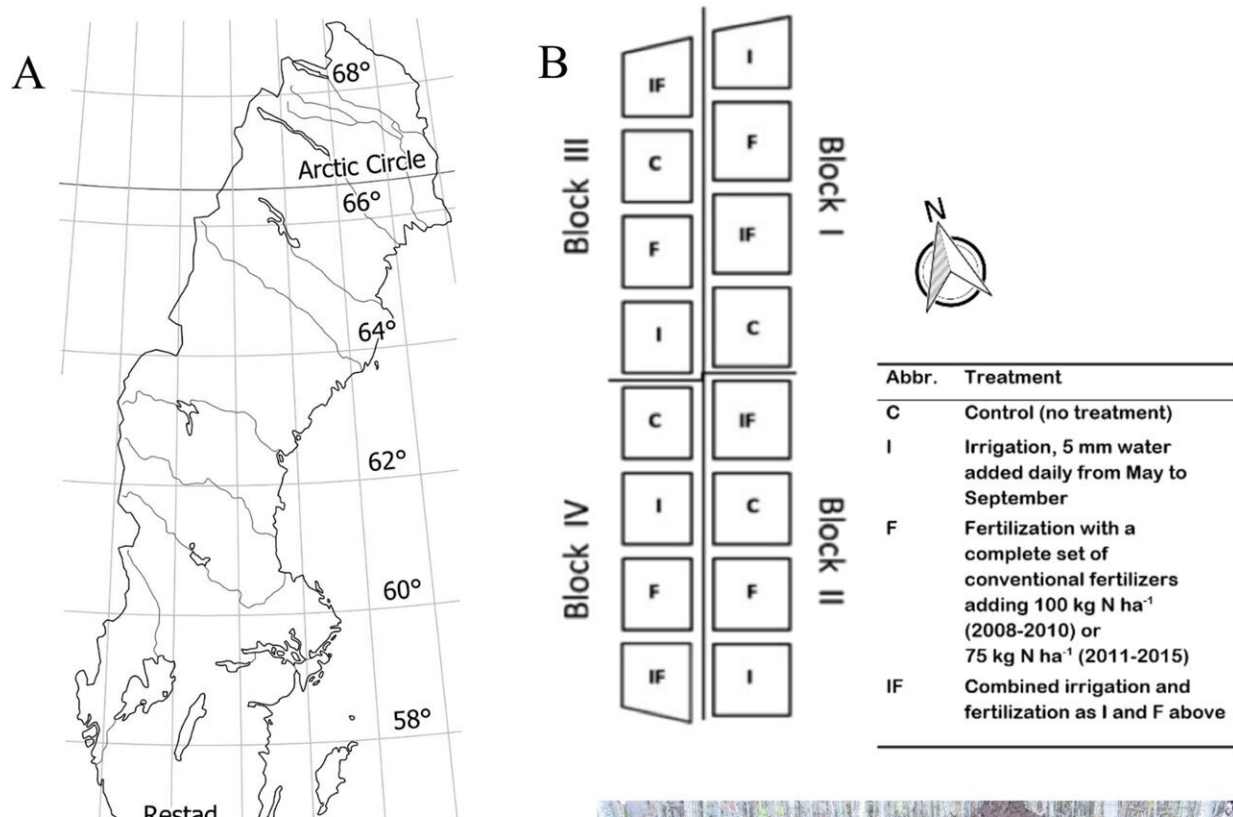


Study: Fertilization unnecessary in oak forests planted on former agricultural land

February 17 2023, by Ulrika Bergström



(A) Study site location in SW Sweden (GSD-Maps of Sweden 1:10 million © Lantmäteriet, 2017), (B) illustration of the experimental design and description of the treatments (Block I and II *Q. petraea*, Block III and IV *Q. robur*), (C) soil profile. Credit: *Forest Ecology and Management* (2022). DOI: 10.1016/j.foreco.2022.120700

Low availability of nutrients often limits productivity in northern forests. In a trial with nutrient optimization, researchers at Linnaeus University have studied the effects of fertilization and irrigation in 25-year-old stands of pedunculate and sessile oak that grow on former agricultural land in southwest Sweden.

The results, which have been published in *Forest Ecology and Management*, show that fertilization does not lead to increased production and it does only cause a small increase, or none at all, in the water uptake of the oaks.

The main reason to use fertilization is to make the trees grow faster and become thicker. Increased growth in oaks and other ring-porous deciduous trees also leads to harder wood, which is favorable in, for instance, the flooring industry. However, for our coniferous trees, like spruce and pine, increased growth leads to somewhat softer wood. Though a new study shows that fertilization does not always result in a higher production.

Nutrients from the soil fully sufficient

"The results indicate that nutrient supply in oak stands with precipitation levels similar to that of the trial stand, does not require simultaneous irrigation. Fertilization on this type of land does not lead to any increased growth. The [soil nutrients](#) from former agricultural use is sufficient to maximize productivity in oak stands on former [agricultural land](#), which is a common type of land for planting new oak stands in southwest Sweden," explains Carl Svensson, doctoral student in silviculture, whose research focuses on the [nutrient](#) dynamics of the forest.

Foliage not affected by irrigation

It is well known from previous studies that fertilization increases the uptake of water, and this is directly linked to increased growth, in particular to an increase in green leaves.

"However, in our study, the foliage did not increase, and, to some extent, this can be explained by the fact that the trees are now so big that there is not enough space in the canopy for the foliage to continue to develop. However, our measurements of tree growth in height and stem diameter, as well as measurements of soil water content, we claim show that the main explanation is that the soil is already rich in nutrients, thanks to historical fertilization during the long era when it was used as agricultural land," Svensson continues.

Useful for forest owners

The results can be used primarily when counseling forest owners in southern Sweden who own abandoned agricultural land. This land can be used for high production of oak, without having to add any nutrients, as fertilization during former land use has given the [soil](#) a consistent increased level of nutrients, making it fully sufficient to provide for a new generation of oak [forest](#).

"In the long term, this could lead to a greater offer of oak floors and oak furniture. In the short term, planting new oak stands on abandoned agricultural land would increase the sequestration of carbon, which contributes to mitigating climate changes. And that affects us all," Svensson concludes.

More information: Carl Svensson et al, Fertilisation and irrigation have no effects on growth of oak (*Quercus robur*, *Q. petraea*) stands on abandoned farmland in southwest Sweden, *Forest Ecology and Management* (2022). [DOI: 10.1016/j.foreco.2022.120700](https://doi.org/10.1016/j.foreco.2022.120700)

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