

# Optimal joint production of timber, seeds and carbon sequestration of oleaginous trees: a study in *Pistacia chinensis*

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## Abstract

Forests provide a range of ecosystem services, among them bioenergy supply and carbon sequestration, which contribute to the climate change mitigation. However, there is always a trade-off between harvesting trees for bioenergy production and leaving trees to maintain and build up carbon stock. The oleaginous trees can provide these two ecosystem services at the same time. The seed production of this kind of trees is important because the seeds contain oil, which can be used as feedstock for biodiesel. This production is particularly interesting in countries like China and India, but also elsewhere. The seeds can be collected every year without harvesting the trees, meaning that the forest growth can continue, including sequestration of carbon. This means that a synergy between bioenergy supply and carbon sequestration can be a win-win situation for developing forest bioenergy. This study will focus on one specific oleaginous tree: *Pistacia chinensis*.

The first aim of this paper is to analyse whether harvesting seeds and obtain the seed value of the oleaginous trees will affect the optimal rotation period of these forests. The second aim of this paper is to examine how the social value of carbon sequestration will affect the optimal rotation period. We calculate the joint value of timber, seed and carbon sequestration. This joint value will change the optimal rotation period compared to optimal rotation without these considerations, but to what degree it affects the optimal harvesting time depending on factors such as the harvest of seeds and the carbon price.