
Decreasing dominance of the endemic tree *Uapaca bojeri* drives the spread of *Pinus* in the sclerophyll *Tapia* forest, Madagascar

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Abstract

The sclerophyll *Tapia* forest, which is dominated by the endemic tree *Uapaca bojeri* (Phyllanthaceae), is the last remaining highland forest of Madagascar. The *Tapia* forest contributes food, wood fuel, medicine and more than 7% of the local population income. However, the forest is threatened by the spread of *Pinus spp* (primarily *P. kesiya*), which were introduced as a timber source. Well known as a soil acidifier, pine causes the exclusion of several species. The aim of this study was to determine which factors influence the spread of *Pinus* in the *Tapia* forest. This was achieved by observing the natural spread of pine in the area of Arivonimamo II. One hundred and twenty-five transects, each containing 3 plots of 100m², were inventoried. In each plot, an inventory was done and environmental (biophysical and topographic) conditions were recorded. Generalized linear models were used to identify the explanatory variables linked to the spread of *Pinus* and to create an appropriate modeling framework. The results showed that the presence and abundance of *Pinus* is highly influenced by the importance value of *U. bojeri*, then by the propagule pressure. The invasion rate of *Pinus* increased i) as the dominance of *U. bojeri* decreased and ii) as the distance between the *Pinus* source and the nearest forest fragment decreased. Other factors, such as high cover of the herbaceous layer and slope, also contributed moderately as explanatory variables. Thus, the model obtained demonstrates the importance of considering the dominance of *U. bojeri* and the location of the pine source for improving predictions of pine invasions. However, invasive pines present a special challenge for management, as they are locally important forestry trees. To manage this landscape efficiently, the *Tapia* forest needs to be reforested with *U. bojeri* and the pine source should be removed when close to the forest.

Keywords: Exotic tree invasion, *Pinus* sp., Sclerophyll *Tapia* forest, Madagascar.

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