

# Effects of Resin Tapping on Growth, Reproduction and Physical Status of *Agathis philippinensis*

**Kellie Gerarda Bocxe**

Wageningen University and Research Centre  
Center for Sustainability

In the Philippines 90 million people are directly or indirectly depending on the natural resources the forest ecosystem provides (Conservation International, 2011). One of the most direct ways is the people that live of non-timber forest products (NTFP). The ancient coniferous tree *Agathis philippinensis* (conspecific *A. dammara*) (Ella, 2000; Pers. Comm. A. Ella, 2015) is a tree species that produces the NTFP product resin. This tree species grows in Palawan, including the proposed Cleopatra's Needle Forest, and is locally known as the Almaciga. This area is home to several communities of indigenous people, called the *Batak*. The resin from the Almaciga is harvested by the *Bagtikan* and covers about 80 percent of their income (Ella, 2008; CS, 2014). However, Almaciga trees are vanishing rapidly (Halos & Principe, 1978; Ella & Domingo, 2012; CS, 2014) and according to Westphal & Jansen (1989) and Ella & Domingo (2012) this is due to unsustainable resin tapping methods. Generally, wood exudates, consisting predominately of carbohydrates, are assumed to protect the plant by sealing of injured tissues (Phillips & Croteau 1999; Rijkers et al., 2006). Additionally, plants allocate carbohydrates for multiple purposes such as growth, reproduction, assimilation of resources, and the protection of stored resources (Rijkers et al., 2006). The regular extraction of resin could potentially deplete trees of carbohydrates, which under non-tapped conditions would be used for purposes that maintain the vitality of trees. This studies aims to find whether there is a relation between tapping intensities and the vitality of the tree, thereby focusing mainly on the physical status and the reproduction of individual trees. Another objective is to fill a knowledge gap on this specific *Agathis* species, as very little research on *Agathis philippinensis* is available. This includes a study on the dendrology and wood structure of this species. The data is collected in the area of the proposed Cleopatra's Needle Reserve. Overall 257 are measured, where 209 living and 48 dead trees. Multiple multinomial Regressions are conducted with the most important result that the physical status of the tree is highly related to the tapping intensity ( $p < 0.05$ , R-squared 0.623). The reproductive results show that the DBH is the explaining variable for the presence of cones ( $p < 0.05$ , R-squared 0.424) and the amount of cones ( $p < 0.05$ , R-squared 0.391). The tapping intensity does not significantly affect the reproductive state. The pilot study on the dendrology of *Agathis philippinensis* shows that it is difficult to make a chronology for this species. There are a lot of false and missing rings. The false rings occur because of irregularities in the growth season like droughts. Missing or partial rings can occur because this species is always found growing on a slope. To grow strongly the tree compensates on the valley side and thus might miss a ring here.

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