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Fire in the Tropical Biota

Ecosystem Processes and Global
Challenges

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12 Prescribed Fire in Industrial Pine Plantations

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12.1 Introduction

Industrial plantations of non-indigenous tree species (exotics) can be defined as even-aged stands established outside of their natural habitat. These plantations play a vital economic role in the developing countries of the tropics and subtropics. The ecological benefits of afforestation, however, go far beyond local and regional considerations: the increase in atmospheric CO₂ and its expected negative influence on the global climate may partially be averted through large-scale afforestation with fast-growing species (Maryland 1988). The take-up of carbon in woody matter could potentially balance the discharge of CO₂ from fossil fuel burning and from the vast amount of uncontrolled forest destruction and biomass burning in the tropical and subtropical biota. Although prescribed burning is itself an emission source of CO₂, its main function in plantation management is to increase stability and to protect against destructive wildfires, which are a much larger source. The same is true for particulate matter emissions. Thus, although at first glance it may seem contradictory, prescribed burning is indeed an important link in global fire ecology.

Of the estimated 9,968,000 ha of industrial plantations established in the tropics by the end of 1985, 41% were in softwoods (mainly pines) (Table 1).

Even though almost 60% of the industrial plantations are composed of hardwoods such as eucalypt and teak, most prescribed burning has taken place in pine stands. This chapter will thus be restricted to a discussion of fire in pine plantations. The information needed to plan and safely conduct prescribed fires beneath standing trees (referred to as underburning) and the ecological effects of these fires will be emphasized. The importance of fuel and weather parameters is explained, and techniques of setting fires and monitoring their behavior are described. Some facets of post-harvest burning are also discussed.

The major species used in pine afforestation activities are *Pinus caribaea*, *P. elliottii*, *P. patula*, *P. pinaster*, *P. radiata*, and *P. taeda*. According to McDonald and Krugman (1986), the leading species are *P. elliottii* and *P. taeda*. They estimate that over 450,000 ha are planted to these two species outside their native

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