

Fire management on *Imperata* grasslands as part of agroforestry development in Indonesia

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Abstract. Fire is an important factor in the *Imperata* grassland ecosystem. It prevents or slows down the natural succession to shrubs and/or secondary forest vegetation and is a major threat to (agro)forestry options for *Imperata* grassland rehabilitation. Forest fires can also be a primary cause of the extension of *Imperata* grasslands. In this review an attempt is made to integrate biophysical and socioeconomic aspects of the causation of fires in a conceptual model. Fire effects on vegetation are examined. The management options at the level of a farmer, a village community and a national government are analyzed.

Introduction

Fire is well known as an inexpensive tool for land management, such as land clearing for farming and forestry. However, in the forest, fire can become a cause of destruction. A severe forest fire in East Kalimantan burnt about 3.2 million ha of tropical rain forest in 1982–1983. Smaller forest fires occur almost every year in Indonesia. Sumardjo et al. (1990) reported an annual average area of 21,000 ha of forest fires.

Fire in the forest is caused by the combination of three elements: oxygen, heat and fuel. Oxygen is always available in the forest. The heat can be developed naturally through a prolonged dry season and/or by human activities, on purpose or by accident. In the forest, fuel can be litter, under-growth vegetation, slash, and even the tree canopies. In the grasslands, fuel mostly consists of surface litter and dead leaves.

Imperata cylindrica (alang-alang, cogon) is an important fuel type for bush and (secondary) forest fires in Indonesia. Its ability to survive in poor soils and to colonize open areas has caused this species to spread extensively in response to fires. The area of *Imperata* grasslands in Indonesia is about 8 to 10 million ha (Garrity et al., this issue). Extensive areas of *Imperata* grasslands can be found in Sumatra and Kalimantan. *Imperata* occurs in mosaics with broad-leaved herbs, shrubs, and trees, or as vast areas of nearly mono-specific vegetation.

During the dry season, *Imperata* is very dry and highly flammable.