An improvement method of selective logging criteria for dipterocarp timber species to maintain healthy tropical rainforests

Production ▶ Demonstration ▶ Item: Dipterocarp timber

Resource management
Forest conservation

Outline

To maintain healthy tropical rainforests (Fig. 1), it is necessary to set appropriate selective logging criteria‡ to maintain healthy seed production through outcrossing pollination*. A method based on tree diameter was developed to estimate the ratio of outcrossing pollen of four timber species in Dipterocarpaceae. This method enables desirable selective logging criteria for each timber species, and thus promoting sustainable forest management.

‡Selective logging criteria: Criteria for tree diameter, etc., to determine whether or not trees can be felled.
*Outcrossing pollination: Pollination by pollen from the same species but different individual.

Background/effect/note

The minimum cutting size of the selective logging criteria for dipterocarp timbers in Malaysia is 50 cm in diameter; however, it remains unknown whether healthy seed production occurs in secondary forests after harvesting according to this criterion. Therefore, we have developed a method to estimate the ratio of outcrossing pollen after selective logging using simulation with pollen dispersal pattern and the amount of flowering of the four timber species as parameters. The current minimum cutting size maintains approximately 30–80% of outcrossing pollen ratios in fast-growing species, while that in slow-growing species is reduced to < 20% (Fig. 2, Table 1). Thus, it is necessary to establish a more stringent selection criterion for the slow-growing species.

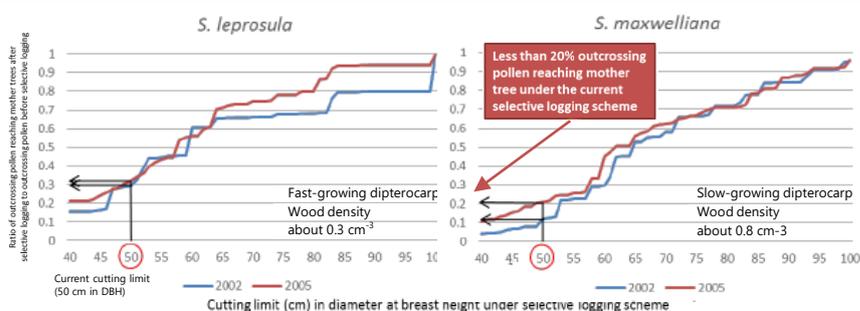Fig. 1 Malaysian lowland dipterocarp tropical rainforest

Fig. 2. Simulating the ratio of outcrossing pollen reaching mother trees after selective logging to outcrossing pollen without selective logging for four dipterocarp timber species. The simulation was conducted using the selective logging criteria (tree diameter cutting limit) of 40 cm and at every 1-cm increment thereafter.

Table 1. Ecological difference between the experimental timber species and improvement plan in response to the simulation results

Timber species		Ecological feature		Healthy seed production		Simulation results
Classification	Example	Wood density	Longevity	Current criteria	Improvement plan	Percentage of outcrossing pollination
Fast-growing sp.	*S. leprosula, S. parvifolia*	Low	Short	Healthy mating	Current criteria	Approx. 30% Approx. 80%
Slow-growing sp.	*S. curtisii, S. maxwelliana*	High	Long	Reducing healthy mating	More strict criteria	Less than 20% Less than 20%

Technical details:

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Contact
info-greenasia@jircas.affrc.go.jp

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