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**PERFORMANCE OF SELECTED FOREST SPECIES
PROVIDING NON-TIMBER FOREST PRODUCTS
IN SINHARAJA MAB RESERVE, SRI LANKA**

A THESIS PRESENTED

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**Performance of Selected Forest Species Providing Non-Timber Forest Products
in Sinharaja MAB Reserve, Sri Lanka**

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ABSTRACT

The Sinharaja forest, Sri Lanka's only, natural World Heritage Site, was selectively logged from 1972 to 1977, when the logging was banned. Since then it has been declared as a conservation forest and *Pinus caribaea* was planted in the buffer zone around it. This study conducted between 2000 - 2002 covered three main aspects. Firstly, the evaluation of the growth performance of selected primary forest species introduced to a part of the *Pinus* buffer zone and secondly the regeneration of same species in a selectively logged part of the forest were carried out. Thirdly, a preliminary community survey was carried out to examine the potential to develop a community based management system in the buffer zone of Sinharaja.

In 1991 a field trial was initiated to enrich a part of the *Pinus caribaea* buffer zone of Sinharaja, using selected timber and non-timber primary forest species after creating different size gaps by thinning the *Pinus* trees. Since then, the pine trees as well as the species used for enriching the *Pinus* stand have grown and the initial light environment in the gaps had gradually changed. In this restoration field trial the selected enrichment species were also planted in the understorey of the *Pinus* stand which was not thinned. This served as the control.

In the present study, the light variations at different canopy levels in the different size gaps and the control in this restoration trial were examined. The adaptability of six selected non-timber forest species (*Shorea disticha* (Thw.) Ashton, *Shorea megistophylla*

(Thw.) Ashton *Caryota urens* L., *Calamus ovoideus* Thw., *Coscinium fenestratum* Colebr. and *Elettaria cardamomum* var. *major* Thw.,) to the different light levels in the treatments and the control were also investigated.

The present vertical gradient of total daily photosynthetic photon flux within the treatments and the control, at the top of the crown of the enriched species and at ground level, during both rainy and dry periods ten years after initial establishment of the trial was observed.

After 10 years (1991-2001) of growth, the following observations were made. The endemic, late successional canopy dominants, *S. disticha* and *S. megistophylla* performed well under the 3 rows and 1 row removed canopy gaps. *Elettaria cardamomum* var. *major* showed its best height, height increment, number of fronds/plant and net photosynthetic rates in the 3-pine rows intact treatment (144 cm, 11.5 cm/yr, 17 fronds/plant and $1.8 \mu\text{mol m}^{-2} \text{s}^{-1}$ respectively) and the closed canopy control (140 cm, 9 cm/yr, 18 fronds/plant, $2.9 \mu\text{mol m}^{-2} \text{s}^{-1}$ respectively). Both liana species *C. ovoideus* and *C. fenestratum* grew poorly in the *Pinus* understorey compared to that in the other canopy removal treatments. The best height (12.5 m) growth for *C. ovoideus* was recorded in the three-row canopy removal treatment. In contrast to cane, the growth performances and physiological features of *C. fenestratum* showed only a smaller variation among the canopy removal treatments. This suggests that they can tolerate the light levels in the 3 pine rows removed, 1 pine row removed and 3 pine rows under planting treatments. After 10 years, the growth performance and net photosynthetic rates of *C. urens* were significantly higher in the 5 rows removed and the 2 rows removed treatments compared to the closed canopy control treatment.

The population structures of this selected non-timber forest species except *C. urens* in disturbed sites, indicating that these species could survive and regenerate naturally in the selectively logged disturbed sites. The better growth performance of these species in gaps of the *Pinus* enrichment trial, corroborate that the intensity of selective logging was at a level favourable for the regeneration of these species.

The findings of the preliminary community survey showed that there is a great potential to initiate a community participatory management program within the buffer zone of Sinharaja forest with native non-timber forest species. Among the study species tested (*Caryota urens*, *Calamus ovoideus*, *Coscinium fenestratum* and *Elettaria cardamomum* var. *major*), *C. urens* and *Elettaria cardamomum* var. *major* could be introduced to initiate such a project in the buffer zone by using the traditional knowledge and the resourcefulness of local community in the periphery.

The silvicultural, biological, ecological and physiological information gathered on each study species in this investigation enable us, to recommend the optimal growing conditions for each species in reforestation and enrichment planting programs in the buffer zones of protected areas throughout the lowland wet zone of Sri Lanka. These findings could also be used as a guideline to recommend the intensity of selective logging that would encourage advanced regeneration in the forest.