

ABSTRACT

Early Post-fire Successional Stages at the Melajo Nature Reserve,
Trinidad, West Indies.

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Tropical moist forests are declining worldwide at a rapid and apparently irreversible rate. Reforestation efforts in Trinidad have generally been insufficient and focussed on non-native species, and particularly at the Melajo Forest Reserve, was continued partly due to the work of Bell in 1969. Some of these species however, for example, *Pinus caribaea*, appear ecologically inappropriate but have been used extensively on sandy soils after fires or harvesting have degraded the original vegetation. Little attention has been given to basic research on natural regeneration as a potential for future timber production.

The objectives of this study were to identify and record the post-fire successional species, to note the changes in species richness and abundance, to determine the abundance of commercially important regenerating species and to provide suggestions for an appropriate management strategy.

The field research was conducted over four consecutive years at the Melajo Forest Reserve in northeast Trinidad, where a fire in 1987 had devastated a mature mora (*Mora excelsa* Benth.) forest. Seven 400m² plots were set up in the pre-fire unexploited Nature Reserve in 1988. An additional eight 400m² plots were set up

in 1991 for comparison in pre-fire exploited areas within the Forest Reserve adjacent to the Nature Reserve. Data on plant species richness and abundance were collected each year and sorted and analysed using classification and ordination methods.

In 1988 the number of plant species recorded was 126. However, 103 of these species persisted to 1991 where they contributed 51.2% of the total number of species present in the Nature Reserve plots. The most abundant families were Fabaceae, Rubiaceae, Asteraceae, Araceae, Cyperaceae, Euphorbiaceae, Poaceae, Melastomataceae and Arecaceae. These contributed 15% of the total families and 42.8% of the total species in 1991. The increase in the abundance of herbaceous and woody species in each succeeding year was accompanied by an increase in species diversity. The dramatic decrease in the abundance of the Asteraceae family as well as *Pityrogramma calomelanos* and *Cecropia peltata* signalled the end of early succession. The post-fire sites had retained and acquired much of the initial species composition (54.3%) of the mature mora forest. In the time period examined here, the mora forest therefore does not revert to any of the other mixed crappo-guatecare forests as previously suggested by Beard in 1946. The structure and composition of the regenerating vegetation in the pre-fire unexploited and pre-fire logged plots were similar and there was no significant difference in the quantity of commercially important species recorded. Many environmental non-governmental organisations often debate on the destructive effect of current logging operations in Trinidad on future timber crops. This study provides some

evidence to the contrary.

Many commercially important species were regenerating in abundance especially *Byrsonima spicata*, *Mora excelsa*, *Sterculia caribaea* and *Terminalia amazonia*, which should be considered as natural alternatives for reforestation efforts at Melajo. This does not agree with the assessment reported by Bell in his 1970 Working Plan for the Melajo Forest Reserve, that too many worthless weed species appeared after a fire and hence conversion to pine plantation was recommended by him.

Classification of the plots by cluster analysis provided consistently separate classes for the least and most fire damaged plots which were characterised by the presence and absence of exclusive species. Multidimensional scaling gave results which correlated with the change in plant population and species richness, and illustrated a temporal pattern that suggested a tendency for succession towards multiple stable points.

It is recommended that natural regeneration of fire-devastated natural forests be encouraged. The planting of native commercially important species should replace the planting of pine (*Pinus caribaea*).