

Abstract of thesis entitled

**DIRECT SEEDING OF NATIVE SPECIES FOR REFORESTATION ON
DEGRADED HILLSIDES IN HONG KONG**

Submitted by

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Planting nursery-grown seedlings is the commonest but costly method for reforestation today. As pressure grows to restore and rehabilitate degraded forest lands throughout the tropics, the development of other cost-effective methods is needed. Direct seeding is an inexpensive and flexible alternative for reforestation and enrichment planting in exotic plantations or even spontaneous forests. However, this method has not been adequately tested for native species in the tropics, including Hong Kong. The aim of this study is to evaluate the practicality of using direct seeding of native woody species for reforestation on degraded hillsides in Hong Kong.

Most native woody species in Hong Kong fruit in the dry season, and their seeds do not germinate until the onset of the next wet season in late March. Proper short-term seed storage of the dry season fruiting species is therefore necessary for the direct seeding operation. Seeds stored by the dry storage method in this study led to 40 to 100% reduction in germination rate for some species. The wet sand storage method maintained seed moisture contents and lowered seed deterioration rates particularly of the Fagaceae species, as they tend to be affected by desiccation very rapidly.

Seed predation is a key problem in direct seeding. Laboratory and field tests were conducted to evaluate the effectiveness of two commercial rodent repellents against seed predation. Thiram 42S proved effective under laboratory conditions at deterring the two major local rodent seed consumers, *Rattus sikkimensis* and *Niviventer fulvescens*. Inconsistent results were obtained in the field tests,

suggesting that conditions such as alternative food availability and rainfall might reduce the effectiveness of the repellent. The practical use of Thiram 42S is in doubt as it was also found to have phytotoxic effect on seed germination of several native species.

Twenty-three native species were tested in three direct seeding field experiments on two degraded grasslands and an artificially restored hillside slope in a rock quarry in Hong Kong. The effects of site preparation, vegetation control and repellent treatments on early seedling establishment were investigated. Results indicate that the direct seeding of certain native species for forest rehabilitation on typical degraded hillside grasslands in Hong Kong has considerable potential. *Cyclobalanopsis edithiae*, *C. neglecta* and *Rhaphiolepis indica* had high germination and seedling survival rates, while several other species were moderately successful on the two degraded grasslands. All species used on the restored slope failed, primarily due to water stress and compacted soil. Direct seeding is thus not recommended for man-made slopes. Mulching in weeded plots was found to significantly enhance seed germination, while intact vegetation cover provided extra protection to emerged seedlings from strong sunlight and insect herbivory. However, a much higher seed predation rate for *C. myrsinifolia* was found under vegetation cover. This suggests that nurse vegetation is potentially useful in direct seeding if seed predation is under control, but future field experiments with longer monitoring periods are necessary to assess its effect on seedling growth. Further development of seed storage method and seed predation control is also needed.