

Abstract of thesis entitled

NATIVE PLANT REGENERATION IN EXOTIC TREE PLANTATION IN HONG KONG, CHINA

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Most of the artificial plantations in Hong Kong, established since the 1950s, are exotic monocultures which are low in natural floristic regeneration. Previous studies focused mainly on the feasibility of restoration methods, such as direct seeding and seedlings planting, to improve the floristic diversity of artificial plantations. The aims of this research were to reassess floristic diversity and invertebrate composition under exotic monocultures, and to examine the effects of thinning plantation on microclimate, flora and fauna composition, direct seeding and enrichment planting of native tree seedlings.

Multivariate analysis of 15 monocultures showed that understory woody species composition was significantly dissimilar between *Acacia confusa* and *Lophostemon confertus* plantations. *A. confusa* has higher regenerated stem density while *L. confertus* has higher regenerated species richness. Stand characteristics (planted stem density, planted total basal area, canopy closure, age of plantation, slope and plantation type) were found important in shaping the floristic composition. Invertebrate composition was not different between plantation types, but Isopoda, Coleoptera and Orthoptera abundance were higher in *A. confusa* monocultures.

Three levels of thinning treatment (0%, 30% and 60% of basal area removal) were applied in mixed exotic plantations. Natural regeneration of woody plants was not affected by thinning treatments, which may be due to the short experimental period. Invertebrate abundance and composition were not different between thinning treatments which indicated that thinning did not cause significant disturbance to them. Understorey microsite conditions were monitored for 14 months. Significant thinning effect was observed only in canopy closure and PAR, which agrees with similar studies elsewhere. The improved light environment without adding significant temperature and water stress to plants provide optimal environment for plant growth.

Direct seeding of three native species *Castanopsis fissa*, *Choerospondias axillaris* and *Machilus chekiangensis* was applied in the three thinning treatments. All species, except *C. fissa*, germinated in all treatments. *C. fissa* did not germinate in the nursery control which indicated poor seed viability. This was probably due to inappropriate seed storage. Seed germination rate, seedling establishment and growth rates of the other two species were not affected by thinning intensities. Two native seedling species *Cyclobalanopsis edithiae* and *Syzygium hancei* were also planted in the three thinning treatments. The survival of the seedlings of both species was high but it was not affected by thinning treatments. The growth performance of the two species was significantly better in either light or heavy thinning in comparison with un-thinned treatment. The results show that nursery grown seedlings respond to thinning more instantly than those seedlings germinated on site.

This study showed that a combination of thinning, direct seeding and planting seedlings could promote biodiversity recovery in exotic monoculture stands in Hong Kong. Enrichment planting should first be applied in plantations that are low in understorey plant diversity. Thinning would be more appropriate later on when plantation understorey are covered with dense shrub and tree seedlings. Whenever thinning is planned in any plantations, stand characteristics should be assessed in advance so as to prevent thinning from causing the system to collapse.