

A COMPARATIVE STUDY
BETWEEN NATURAL REGENERATION
AND PLANTING TECHNIQUES
OF *Rhizophora apiculata* FAHME
IN CLEAR FELLED MANGROVE AREAS

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OF *Rhizophora apiculata* Blume IN
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DEDICATION

In the name of Allah, We praise Him, seek His help and ask for His forgiveness. Whoever Allah wishes none can misguide, and whoever He shows to fall wrong, none can guide them right. We bear witness that there is no one (no deity, no person, no prophet, no imam, no dai, nobody) worthy of worship but Allah Alone, and we bear witness that Muhammad (saw) is His slave, His gift and the seal of His Messengers.

ABDULLAH MOHAMED

THIS THESIS IS DEDICATED TO MY PARENTS, MY FAMILY (ESPECIALLY MY WIFE, SONS AND DAUGHTERS), SISTERS AND BROTHERS, AND FRIENDS WITH HEAVY THANKS AND GRATITUDE FOR ALL THEIR COOPERATION, CONSTRUCTIVE MATERIALS, ENCOURAGEMENT AND KINDNESS.

**Thesis Submitted in Fulfilment of the Requirement for the
Degree of Master of Science in the Faculty of Science and Technology
Kolej Universiti Sains dan Teknologi Malaysia**

October 2003

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DEDICATION

In the name of Allah, We praise Him, seek His help and ask for His forgiveness. Whoever Allah guides none can misguide, and whoever He allows to fall astray, none can guide them aright. We bear witness that there is no one (no idol, no person, no grave, no prophet, no imam, no dai, nobody!) worthy of worship but Allah Alone, and we bear witness that Muhammad (saws) is His slave-servant and the seal of His Messengers.

**THIS THESIS IS DEDICATED TO MY PARENTS, MY FAMILY
(ESPECIALLY MY WIFE, SONS AND DAUGHTERS), SISTERS AND
BROTHERS, AND FRIENDS WITH TRULY THANKS AND GRATITUDE
FOR ALL THEIR COOPERATION, CONDUCTIVE MATERIALS,
ENCOURAGEMENT AND KINDNESS**

Abstract of thesis presented to the Senate of Kolej Universiti Sains dan Teknologi
Malaysia in fulfilment of the requirement for the degree of Master of Science

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AND PLANTING TECHNIQUES OF *Rhizophora apiculata* Blume IN
CLEAR FELLED MANGROVE AREAS**

ABDULLAH MOHAMED

October 2003

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Planting trials of *Rhizophora apiculata* Blume with various methods and naturally regenerated plot in 2 to 3 years of clear felled areas were carried out in compartment 17 of the Sungai Merbok Mangrove Forest Reserve. The study was conducted to evaluate the volume and biomass basis of the *R. apiculata* seedlings between natural regeneration and planting methods. Three planting methods were introduced namely Matang Direct Planting, Potted Seedling Planting and Enclosure Planting Methods all with equal distances of planting (1.2m x 1.2m).

The results indicated that the Potted Seedling Method showed the highest growth and survival rate (81.15%) of *R. apiculata* seedlings. The highest volume of survived seedlings and biomass rate for a period of 8 months were

3,315.7cm² and 3,890.8gm respectively. No crab attacks was observed but the natural enemies were the snails *Litterina* spp, that crawled up into the foliage and chewed the young leaves. The naturally regenerated seedlings outside plot ranked second in volume and biomass basis, thus reflected that the seedlings were not well distributed but grew gregariously within a highly competitive area near the mother trees. The Matang Direct Planting method suffered the highest mortality rate of seedlings (98.64%). The observation might be due to natural enemies including crabs, snails, and monkeys, and inability of the seedlings to establish themselves in the bare condition without replanting. Crabs particularly *Sesarma taeniolata* and *Uca* spp have been identified to pose the most threats to planted propagules.

The enclosure planting method showed poor performance of growth (58% mortality) and concluded as low yield. There was no sign of crab or monkey attacks or being washed away by swift current. But most of the seedlings were observed to be inadaptable to the trapped condition of PVC. They became easily overheated that led to retarded growth of the seedlings. The Potted Seedling Planting Method ranked the best method with the highest survival rate, volume and biomass of seedlings in a short duration (eight months) at a reasonable cost (RM6,125.00/ha). Eventhough the Matang Direct Planting Method was the cheapest (RM3,625.00/ha), it showed the poorest survival (without replanting) compared to other methods.

Abstrak tesis yang dikemukakan kepada Senat Kolej Universiti Sains dan Teknologi
Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

**KAJIAN PERBEZAAN ANTARA REGENERASI SEMULAJADI
DAN TEKNIK-TEKNIK TANAMAN *Rhizophora apiculata* Blume
DALAM KAWASAN TEBANG HABIS**

ABDULLAH BIN MOHAMED

Disember 2003

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Tanaman percubaan *Rhizophora apiculata* Blume dengan beberapa kaedah dan regenerasi semulajadi dalam kawasan 2 hingga 3 tahun tebang habis telah dijalankan dalam kompartmen 17 Hutan Simpan Paya Laut Sungai Merbok. Kajian ini dijalankan untuk menilai perbandingan isipadu dan jisim hayat anak pokok *R. apiculata* antara regenerasi semulajadi dan kaedah-kaedah tanaman. Terdapat tiga kaedah tanaman iaitu Kaedah Matang Tanaman Terus, Kaedah Anak Tabung dan Kaedah Pagaran PVC pada jarak tanaman yang sama (1.2m x 1.2m). Keputusan menunjukkan tumbesaran dan kehidupan *R. apiculata* adalah terbaik dengan kaedah tanaman anak tabung iaitu pencapaian isipadu anak pokok hidup ialah 3,315.7cm³ dan kadar jisim hayat ialah 3,890.8gm dalam jangka masa 8 bulan. Peratus kehidupan bagi kaedah tanaman anak tabong

adalah 81.15%. Tiada kesan serangan ketam tetapi siput dikenali *Litterina* spp didapati memanjat daun muda dan mengunyahnya. Anak pokok regenerasi semulajadi di luar petak didapati kedua terbaik berdasarkan isipadu dan jisim hayat. Walaubagaimanapun, taburan anak pokok regenerasi semulajadi tidak sekata dan tumbuh berkelompok di tepi pokok ibu.

Kaedah Matang Tanaman Terus mengalami kadar kematian yang tertinggi pada kadar 98.64%. Kadar kematian yang tinggi ini disebabkan terdapat banyak serangan ketam, siput, beruk dan tidak berupaya untuk tumbuh dalam keadaan yang terdedah tanpa sulaman. Ketam khususnya *Sesarma taeniolata* dan *Uca* spp telah dikenal pasti sebagai serangan paling ketara ke atas anak-anak pokok ini. Kaedah Tanaman Pagaran PVC, menunjukkan prestasi tumbesaran yang lembab dan mengalami kadar kematian 58% . Tiada kesan serangan oleh ketam atau beruk atau dibawa arus yang deras, tetapi didapati kebanyakan anak-anak pokok tidak berupaya untuk membesar dalam keadaan kurungan PVC, kerana kepanasan seterusnya membantut tumbesaran anak benih. Kaedah Tanaman Anak Tabong adalah kaedah terbaik dari segi peratus kehidupan dan isipadu anak pokok hidup dan juga jisim hayat anak pokok dalam tempoh yang singkat (8 bulan) pada harga yang berpatutan (RM6,125.00/ha). Walaupun, Kaedah Tanaman Terus menunjukkan kos penubuhan yang terendah (RM3,625.00/ha), tetapi kadar kehidupan anak pokoknya adalah terlalu rendah berbanding dengan kaedah yang lain.