



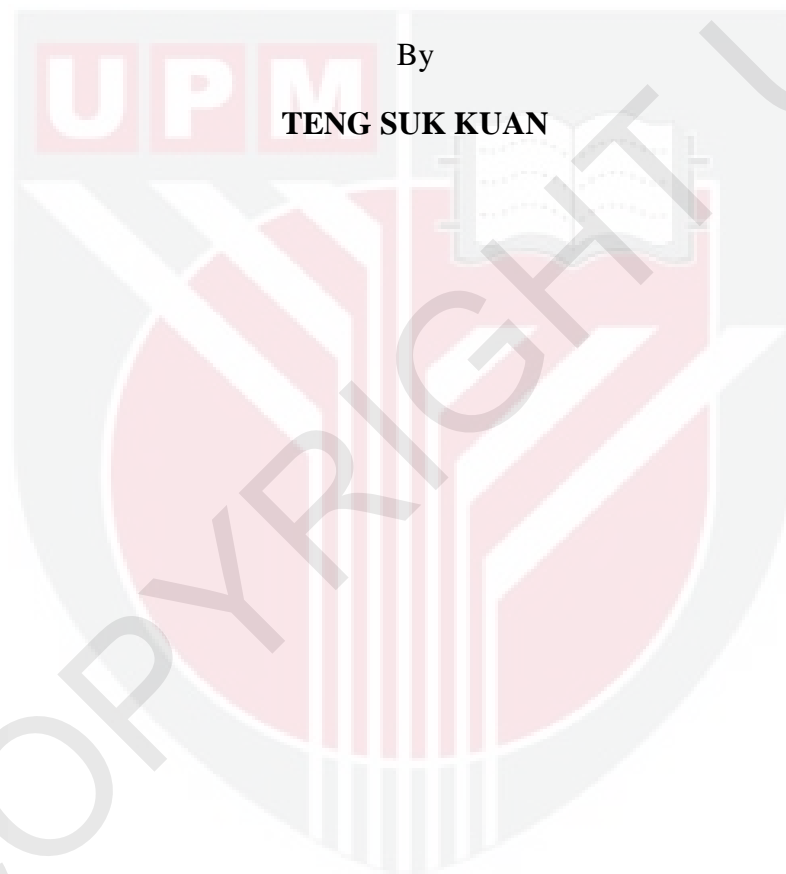
**UNIVERSITI PUTRA MALAYSIA**

**BIOLOGY AND CAST PROPERTIES OF SOIL-DWELLING  
EARTHWORM OF KAKI BUKIT, PERLIS, MALAYSIA**

**TENG SUK KUAN**

**FS 2012 37**

**BIOLOGY AND CAST PROPERTIES OF SOIL-DWELLING EARTHWORM  
OF KAKI BUKIT, PERLIS, MALAYSIA**



By  
**TENG SUK KUAN**

**Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in fulfillment of the Requirements for the Degree of Master of Science**

**January 2012**

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

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**January 2012**

**Chairman: Nor Azwady Abd Aziz, PhD**

**Faculty: Science**

Soil dwelling earthworms have close association with soil and plant root systems. They promote organic matter decomposition and nutrient cycling in soils. Present study was carried out to examine the physico-chemical parameters which may influence the diversity, density and biomass of earthworm community in Kaki Bukit, Perlis. The area is mainly planted with rubber and fruit trees and is surrounded by limestone hills, thus serves as an unique agroecosystem to be explored. Earthworms and soil samples were collected for identification and analyses in the laboratory. Both morphology and molecular techniques were adopted to identify earthworms up to species level. In molecular identification, the primers used are from COI (cytochrome c oxidase I) and 16S rRNA genes. The area was found to be dominated by *Metaphire tschiliensis tschiliensis*, a relatively large-sized soil dwelling earthworm that showed active surface casting activity. Its density has positive correlation with soil pH ( $r = 0.645$ ), clay content ( $r = 0.801$ ), total N ( $r = 0.596$ ) and total Ca ( $r = 0.415$ ) whilst

negatively correlated with Fe. In addition, earthworm biomass was found to be positively correlated with K concentration ( $r = 0.374$ ). Present study demonstrated that surface casts produced by *M. tschiliensis tschiliensis* contained higher total carbon, humic acid, N, Ca, S and Zn contents compared to worm worked soil and bulk soil. Earthworm casts also have higher microbial (bacteria and fungi) populations than worm worked soil and bulk soil which in turns led to higher nutrient contents in earthworm casts. The study highlighted the beneficial effects of *M. tschiliensis tschiliensis* onto soil and to be potentially serves as soil bioconditioner in tropical agroecosystem.

Abstrak thesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Mastar Sains

**BIOLOGI DAN ANALISA TINJA CACING TANAH DARI KAKI BUKIT,  
PERLIS, MALAYSIA**

Oleh

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Cacing tanah merupakan komuniti yang mempunyai hubungan rapat dengan tanah dan akar tumbuhan. Cacing tanah mempercepatkan proses pereputan organik dan menyumbang dalam kitaran nutrien tanah. Penyelidikan ini dijalankan untuk mengkaji ciri fisiko-kimia tanah yang mempengaruhi taburan dan biomas komuniti cacing tanah di Kaki Bukit, Perlis. Kawasan tersebut ditanam dengan pokok getah dan buah-buahan dan diselubungi oleh kawasan bukit batu kapur. Justeru itu ia menjadi suatu ekosistem unik yang berpotensi untuk dikaji. Kaedah morfologi and molekul digunakan dalam proses identifikasi specimen cacing tanah. Bagi kaedah molekul, primer yang digunakan adalah dari COI (*cytochrome c oxidase I*) dan 16S rRNA. Kawasan kajian tersebut didominasi oleh cacing tanah, *Metaphire tschiliensis tschiliensis* yang mendeposit tinja secara aktif di permukaan tanah. Taburan cacing ini mempunyai korelasi positif dengan pH ( $r = 0.645$ ), tanah liat ( $r = 0.801$ ) dan Ca ( $r =$

0.415) selain mempunyai korelasi negatif dengan Fe. Di samping itu, biomas cacing mempunyai korelasi positif dengan K ( $r = 0.374$ ). Kajian ini menunjukkan tinja cacing mempunyai jumlah karbon, jisim organik, asid humik, kandungan N, Ca, S dan Zn serta populasi mikrob (bakteria dan fungi) yang lebih tinggi berbanding dengan tanah yang didiami oleh cacing tanah dan tanah tanpa cacing. Kajian ini merumuskan kesan baik kehadiran *M. tschiliensis tschiliensis* dalam tanah dan ia berpotensi untuk dijadikan agen biopemulihan tanah dalam ekosistem pertanian tropika.



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I certify that an Examination Committee has met on 13 January 2012 to conduct the final examination of Teng Suk Kuan on her degree thesis entitle “Biology and cast properties of soil-dwelling earthworm of Kaki Bukit, Perlis, Malaysia” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The committee recommends that the student be awarded the Master of Science.

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## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



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TENG SUK KUAN

Date: 13<sup>th</sup> January 2012

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