

STUDY ON ANTHELMINTIC
POTENTIAL OF A TROPICAL PLANT,
KETAPANG (*Terminalia catappa*) LEAVES
AGAINST *Haemonchus contortus*
INFECTION IN GOATS

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**STUDY ON ANTHELMINTIC POTENTIAL
OF A TROPICAL PLANT, KETAPANG
(*Terminalia catappa*) LEAVES AGAINST
Haemonchus contortus INFECTION IN GOATS**

MOHD AZRUL BIN LOKMAN

THIS THESIS DEDICATED TO:

TO MY FAMILY

AND MY MUM

TO MR. MOHD AZRUL BIN LOKMAN

MRS. SITI HANIMAH AZRUL

MY BROTHERS:

AZIM, AZLAN, HARAFI, AHAR

AND ALSO TO SOMEONE THAT ALWAYS SUPPORT ME,
NO MATTER WHERE YOU ARE

**Thesis Submitted in Fulfillment of the Requirement for the
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Universiti Malaysia Terengganu**

January 2012

MOHD AZRUL BIN LOKMAN
MSc (Zoology)
05K 0505

Thesis is being submitted to the Senate of Universiti Malaysia Terengganu
in fulfillment of the requirement for the degree of Master of Science.

**STUDY THE ANTIMICROBIAL POTENTIAL OF A TROPICAL PLANT,
SETURANG (Ternstroemia cuneata) LEAVES AGAINST
Mycobacterium avium IN GOATS**

MOHD AZRUL BIN LOKMAN

January 2012

Chairperson : 1. Professor Mohd Zafwan Abd. Wahid, Ph.D.
Members : 1. Adjunct Prof Arshad, Ph.D.
2. Hafiza Husna, Ph.D.
Institute : 1. Institute of Marine Biotechnology

Antimicrobial resistance is a worldwide problem including Malaysia. This

THIS THESIS DEDICATED TO:

❖ **MY FAMILY**

ABAH & MAK;

TN. HJ. LOKMAN SAMSURI

MRS. SALMIAH HJ. ABSAR

MY SIBLINGS;

AZAM, AZLAN, HANAFI, AMAR

❖ **...AND ALSO TO SOMEONE THAT ALWAYS SUPPORT ME,
NO MATTER WHEREVER YOU ARE**

MOHD AZRUL BIN LOKMAN
MSc. (ZOOLOGY)
GSK 0905

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu
in fulfilment of the requirement for the degree of Master of Science.

**STUDY ON ANTHELMINTIC POTENTIAL OF A TROPICAL PLANT,
KETAPANG (*Terminalia catappa*) LEAVES AGAINST
Haemonchus contortus INFECTION IN GOATS**

MOHD AZRUL BIN LOKMAN

January 2012

Chairperson : **Professor Mohd Effendy Abd. Wahid, Ph.D.**
Members : **Adzemi Mat Arshad, Ph.D.**
Marina Hassan, Ph.D.
Institute : **Institute of Marine Biotechnology**

Anthelmintic resistance is a worldwide problem including Malaysia. This situation has been limiting the effectiveness of anthelmintic drugs that are normally used to treat helminth infection in ruminants. In this study, the ethnoveterinary medicine has been applied as an alternative method in order to overcome this problem. Thus, the study was conducted to examine the preliminary anthelmintic effect of *Terminalia catappa* leaves against natural infection of helminth in goats as well as to measure the amount of targeted anthelmintic property in *T. catappa* leaves by quantification method. The safety dose and clinical side effects of *T. catappa* leaves by acute toxicity test in rats has also been determined. For the last objective, the study evaluates the *in vitro* anthelmintic effect of *T. catappa* leaves against helminth parasite, *Haemonchus contortus* by selected modified bioassay.

Fresh leaves of *T. catappa* were administered to the goats as a preliminary test for four weeks. Another fresh leaves group were quantified to measure the total phenolics and total tannins. Determination of safety dose was conducted in rats by acute toxicity test and followed by determination of delayed toxicity symptoms in post-treatment period. Nutritional behavior and clinical side effects were also observed daily. Then, liver and kidney of the rats were processed for histological works and histopathological changes were examined. Modification of larval motility assay was conducted to evaluate the *in vitro* anthelmintic effect. The bioassay was done to the targeted helminth parasite, *Haemonchus contortus* and was repeated with another two important helminth species, *Trichostrongylus colubriformis* and *Cooperia curticei* for a comparison.

From the result, the helminths egg reduction rate for both treatment groups were more than 60%. Quantity of total tannins was in medium range, 1.1475% in 100 mg leaf sample. There has no lethality occurred in rats for toxicity test. No side effects were detected towards nutritional behavior of the rats. Body weight of the rats were also in normal increment and there were also no abnormalities occurred to the physiological aspects based on the daily clinical observation. For the *in vitro* anthelmintic bioassay, the reduction for the number of infective larvae (L3) of *H. contortus* after 3 hrs and 5 hrs incubation period were 73% and 80% respectively. All these findings were successfully provided the scientific proof on the capability and effectiveness of *T. catappa* leaves as a natural anthelmintic for ruminants.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk Ijazah Sarjana Sains.

**KAJIAN TERHADAP POTENSI ANTICACING DAUN TUMBUHAN
TROPIKA, KETAPANG (*Terminalia catappa*) MENENTANG
JANGKITAN *Haemonchus contortus* DALAM KAMBING**

MOHD AZRUL BIN LOKMAN

Januari 2012

Pengerusi : **Profesor Mohd Effendy Abd. Wahid, Ph.D.**
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Kerintangan anticacing adalah masalah yang berlaku di seluruh dunia termasuk di Malaysia. Situasi ini menyebabkan terbatasnya keberkesanan ubat anticacing yang biasanya digunakan untuk merawat jangkitan cacing dalam haiwan ruminan. Dalam kajian ini, perubatan etnoveterinari diaplikasikan sebagai kaedah alternatif bagi mengatasi masalah ini. Jadi, kajian ini dijalankan untuk memeriksa kesan awal anticacing dalam daun tumbuhan *Terminalia catappa* untuk menentang jangkitan semulajadi cacing dalam kambing dan menyukat jumlah bahan anticacing yang disasarkan dalam daun *T. catappa* dengan menggunakan kaedah kuantifikasi. Dos yang selamat dan kesan sampingan secara klinikal daun *T. catappa* terhadap tikus juga ditentukan menggunakan ujian keracunan akut. Untuk objektif terakhir, kajian ini juga menilai kesan anticacing secara *in vitro* dalam daun *T.*

catappa menentang cacing parasit, *Haemonchus contortus* dengan menggunakan modifikasi bioassai yang terpilih.

Daun segar *T. catappa* telah diberi makan kepada kambing sebagai ujian awal selama empat minggu. Daun segar yang lain telah dikuantifikasikan untuk menyukat jumlah fenoliks dan tannins. Penentuan dos yang selamat telah dijalankan pada tikus dengan ujian keracunan akut dan diikuti dengan penentuan tanda-tanda keracunan yang tertanggung dalam tempoh pasca-rawatan. Tingkahlaku pemakanan dan kesan sampingan secara klinikal juga diperhatikan setiap hari. Seterusnya, hati dan ginjal tikus diproses untuk kerja-kerja histologi dan perubahan histopatologi diperiksa. Modifikasi assai pergerakan larva dijalankan untuk menilai kesan anticacing secara *in vitro*. Bioassai ini dijalankan terhadap cacing parasit sasaran, *Haemonchus contortus* dan diulang dengan menggunakan dua lagi spesis cacing yang penting, *Trichostrongylus colubriformis* dan *Cooperia curticei* sebagai perbandingan.

Daripada keputusan, kadar penurunan telur cacing untuk kedua-dua kumpulan rawatan adalah lebih dari 60%. Kuantiti jumlah tannins adalah dalam julat sederhana, 1.1475% dalam 100 mg sampel daun. Tiada kematian berlaku pada tikus dalam ujian keracunan. Tiada kesan sampingan dikesan terhadap tingkahlaku pemakanan tikus. Berat badan tikus juga meningkat secara normal dan juga tiada ketidaknormalan berlaku terhadap aspek-aspek fisiologi berdasarkan pemerhatian klinikal setiap hari. Untuk

bioassai anticacing *in vitro*, penurunan jumlah larva *H. contortus* yang bersifat boleh menjangkiti (L3) selepas 3 jam dan 5 jam tempoh inkubasi adalah 73% dan 80%. Semua penemuan ini telah berjaya memberikan bukti saintifik terhadap kebolehan dan keberkesanan daun *T. catappa* sebagai anticacing semulajadi kepada haiwan ruminan.

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