UNIVERSITI PUTRA MALAYSIA

ECONOMIC VALUATION OF INTEGRATED PEST MANAGEMENT AMONG RICE FARMERS OF MUDA AGRICULTURAL DEVELOPMENT AUTHORITY, MALAYSIA

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DOCTOR OF PHILOSOPHY
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By

HAIRUDDIN BIN MOHD AMIR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree Doctor of Philosophy

December 2012

This Thesis is Specially Dedicated

Family,

Beloved wife (Norhani Jaafar), Children (Eliyana the student of Medical Surgery Dental, Shahmir the student of Techno Entrprenuer, Nadia, Lukman Hakim) and the rest of my family, without whose

support and trust this study could never have been completed.

To my beloved parents,

Father (Hj Mohd. Amir Osman passed away in 1991),

Mother (Hjh. Fatimah Abdullah passed away in 2010), and

Son (Muhammad Iqbal Hj. Hairuddin passed away in 2000).

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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December 2012

Chairman: Professor Mad Nasir Shamsudin, PhD

Faculty : Agriculture

Concerns over the impact of pesticide use have prompted Malaysia and other countries to develop a program of integrated pest management (IPM) which seeks to address the effects of excessive use of pesticides. The program is beneficial to the communities at large and can be measured in economic terms. The benefits include improvements in food safety, water quality, pesticide application safety, and long run sustainability of pest management systems.

This study aims to investigate the health and environment benefits of the IPM practices in paddy (Oryza sativa) cultivation. Primary data were collected from 454 paddy farmers in four regions of the Muda Agricultural Development Authority (MADA) located in the states of Kedah and Perlis. The survey which included areas in Kuala Perlis as Region 1, Kuala Jitra (Region 2), Pendang (Region 3) and Kota Sarang Semut (Region 4) was undertaken to identify farm and farmer characteristics, pesticide usage, pest management practices, awareness and perceptions about pesticide hazards, and willingness to adopt specific IPM technologies. A double-

bounded dichotomous choice of contingent valuation approach survey was used to evaluate farmers' choice of willingness-to-pay (WTP) to avoid risks of pesticide use in different environmental categories namely human, beneficial insects, aquatic species, avian, and livestocks.

The adoption rates for each of the IPM technologies, were predicted as follows: 97.8% for agronomic practices, 59.91% for complementary weed control strategies, 55.29% for biological control, 54.85% for the optimal use of pesticides, and 30.40% for economic threshold level. A contingent valuation survey approach to reduce pesticide risks by their "bids" on various price of "safer pesticide" each category were RM 170.01 for human safety, RM 164.58 for animal safety, RM 161.24 for aquatic safety, RM 160.96 for beneficial insect's safety and RM 158.66 for avian safety.

Combining WTP bids each farmers and the risks percentage reduction/avoided, the benefits of the IPM adoption for one paddy season were estimated to total RM442.76. The aggregate environmental benefits to the paddy community in MADA, Malaysia (454 farmer in four region) totalled RM201,014. On top of the benefits in environmental value, the reduction in pesticide use also reduced operating expenses. Calculated aggregate cost savings per season were RM756,393 for insecticides, RM40,537 for fungicides and RM94,753 for herbicides. The cost savings of the IPM practices to 454 farmers in the four regions amounted to RM 891,683 per season. The results of this study can contribute to a better targeting of health policies and design of IPM programmes aiming to reduce negative effects of excessive pesticide use.

Abstrak tesis yang di kemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PENILAIAN EKONOMI AMALAN PENGURUSAN SERANGGA PEROSAK BERSEPADU PESAWAH LEMBAGA KEMAJUAN PERTANIAN MUDA, MALAYSIA

Oleh

HAIRUDDIN BIN MOHD AMIR

Disember, 2012

Pengerusi: Profesor Mad Nasir Shamsudin, PhD

Fakulti : Pertanian

Keperihatinan kesan penggunaan racun perosak telah mendorong Malaysia dan negara-negara lain untuk membangunkan program pengurusan perosak bersepadu (IPM) yang bertujuan menangani kesan daripada penggunaan racun perosak secara berlebihan. Program ini bermanfaat kepada masyarakat dan boleh diukur dari segi ekonomi. Manfaat termasuk tambah-baik dari aspek keselamatan makanan, kualiti air, keselapatan aplikasi racun perosak, dan kemampanan jangka-panjang sistem pengurusan perosak.

Kajian bertujuan menilai manfaat kesihatan dan persekitaran dari amalan IPM dalam penanaman padi (Oryza sativa). Data primer dikumpul daripada 454 penanam padi di empat wilayah daripada Lembaga Kemajuan Pertanian Muda (MADA) yang terletak di negeri Kedah dan Perlis. Kaji selidik di empat wilayah tersebut iaitu Kuala Perlis sebagai Wilayah 1, Kuala Jitra (Wilayah 2), Pendang (Wilayah 3) dan Kota Sarang Semut (Wilayah 4) telah dilaksanakan untuk mengenal pasti ciri-ciri petani dan ladang, penggunaan dan amalan pengurusan racun perosak, kesedaran dan persepsi

bahaya racun perosak, dan kesediaan menerima pakai teknologi tertentu IPM. Satu piliha berganda melalui pendekatan penilaian kontigensi diguna untuk menilai kesanggupan membayar untuk mengelakkan risiko racun perosak dalam kategori alam sekitar yang berlainan iaitu manusia, serangga berfaedah, spesis akuatik, burung, dan ternakan.

Keputusan kajian mendapati tahap amalan teknologi IPM adalah seperti berikut: 97.8% bagi amalan agronomi, 59.91% untuk strategi pelengkap kawalan rumpai, 55,29% untuk kawalan biologi, 54.85% bagi pengunaan optimum racun perosak, dan 30.40% untuk aras ambang ekonomi. Nilai kesanggupan membayar petani terhadap tawaran harga formulasi baru "racun perosak yang selamat" adalah sebanyak RM170.01 untuk keselamatan manusia, RM 164.58 untuk keselamatan haiwan, RM 161.24 untuk keselamatan akuatik, RM 160.96 untuk keselamatan serangga bermanfaat dan RM 158.66 untuk keselamatan burung.

Hasil gabungan kesanggupan membayar dengan peratusan pengurangan risiko, manfaat pengunaan IPM untuk satu musim padi di anggarkan berjumlah RM442.76 semusim. Manfaat alam sekitar dan masyarakat padi di MADA, Malaysia (454 petani di empat Wilayah) secara agregat berjumlah RM201,014. Manakala penjimatan kos perbelanjaan bagi setiap musim adalah sebanyak RM756,393 bagi racun serangga, RM40,537 untuk racun kulat dan RM94,753 untuk rumpai. Jumlah agregat keseluruhan penjimatan kos kepada 454 petani di empat wilayah adalah RM891.683 semusim. Keputusan kajian ini boleh menyumbang menyokong dasar pembangunan kesihatan dan program IPM untuk mengurangkan kesan negatif pengunaan racun perosak berlebihan.

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May Allah bless all who have kindly helped me.

I certify that a Thesis Examination Committee has met on 3 December 2012 to conduct the final examination of Hairuddin bin Mohd Amir on his thesis entitled " Economic Valuation of Integrated Pest Management Among Rice Farmers of Muda Agricultural Development Authority, Malaysia" in accordance with the Universities and University Colleges Act 1971 and Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

Members of the Thesis Examination Committee were as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The Members of the Examination Committee were as follows:

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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 or concurrently submitted for any other degree at Universiti Putra Malaysia or other institutions.

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HAIRUDDIN MOHD AMIR

Date: 4 December 2012

TABLE OF CONTENTS