UNIVERSITI PUTRA MALAYSIA

PHENOTYPIC AND GENOTYPIC VARIATION IN *TENERA* PROGENIES DERIVED FROM DIFFERENT SOURCES OF *DURA* CROSSED WITH AVROS *PISIFERA*

MOHAIMI BIN MOHAMED

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By

MOHAIMI BIN MOHAMED

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Agricultural Science

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

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May 2012

Chairman : Associate Professor Mohd Rafii Yusop, PhD

Faculty : Agriculture

This study was executed to search for new breeding strategies to be employed towards the improvement of elite Deli duras populations from Breeding Population of Restricted Origin (BPRO). The objectives for the study were (i) to estimate phenotypic and genetic variances and heritabilities (broad-sense and narrow sense) in various dura populations crossed to AVROS pisifera, (ii) to estimate phenotypic and genotypic coefficients of variation of the characteristics measured, (iii) to estimate phenotypic correlations among quantitative traits, and (iv) to identify for the characteristics that are unique to each of these dura sources crossed with AVROS pisifera.

Three experiments each consisted of 17, 45 and 15 duras crossed with AVROS pisifera progenies. The Deli duras originated from various sources of Deli

dura BPROs consisted of Ulu Remis dura, Johor Labis dura and their derivatives. Experiment 1 and Experiment 2 utilized North Carolina Mating Design I while Experiment 3 utilized the bi-parental crosses. All experiments were laid out in Randomised Completely Block Design (RCBD) with four replications and were planted at 8.8m triangular on coastal clay-loam soil in East Estate, Carey Island.

Due to high selection pressure in most of the dura populations during their early improvement programmes certain characters found to be more concentrated in different dura populations. It is possible to combined two different desirable characters from two different dura populations and combinations of more than two characters can be carried out by utilizing a three-way crosses. The proposed strategies were supported by the analysis that showed some of these characters can result in the improvement of desirable economic characters. The improvement of dura population was proposed based on results that showed low male effect in females parents in most of the economic characters indicated there was higher genetic control in female parents for most of the traits. The strategies can be more viable and the improvement can be made faster by combining characters based on the heritabilities and correlation results from the studies. Results obtained in all experiments showed that different selection and breeding objectives can accumulate different set of characters and intercrossing among these duras can be carried out towards further yield improvement in oil palm.

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

VARIASI FENOTIP DAN GENOTIP DALAM PROGENI *TENERA* DIHASILKAN DARI SUMBER *DURA* YANG BERLAINAN DIKACUKKAN DENGAN *PISIFERA* AVROS

Oleh

MOHAIMI MOHAMED

Mei 2012

Pengerusi : Profesor Madya Mohd. Rafii bin Yusop, PhD

Fakulti : Pertanian

Kajian ini dilaksanakan untuk mengenalpasti strategi biakbaka baru yang akan dijalankan ke arah peningkatan elit Deli dura berasal dari Pembiakbakaan Populasi Asal-usul yang Terhad (BPRO). Objektif bagi kajian ini (i) untuk menganggarkan varians fenotip dan genetik, dan keterwarisan (luas dan sempit) di dalam pelbagai populasi dura dikacukkan dengan AVROS pisifera, (ii) untuk menganggar pekali variasi fenotip dan genotip untuk semua ciri yang diukur, (iii) untuk menganggarkan korelasi fenotip di kalangan ciri kuantitatif, dan (iv) untuk menentukan ciri yang unik untuk setiap populasi dura yang dikacukkan dengan pisifera.

Tiga percubaan yang masing-masing mengandungi bilangan kacukan 17, 45 dan 15 progeni yang berasal dari kacukan elit Deli dura BPROs dengan

pisifera AVROS. Percubaan 1 dan Percubaan 2 menggunakan rekabentuk pengawanan Reka bentuk Carolina Utara I (NCM I) manakala Percubaan 3 menggunakan rekabentuk pengawanan dwi-induk. Semua percubaan ditanam menggunakan rekabentuk blok lengkap rawak (RCBD) dengan empat replikasi dan di tanam mengikut 8.8 meter tiga segi penjuru di tanah jenis tanah liat pantai di East Estate, Carey Island.

Oleh kerana tekanan pemilihan yang tinggi ke atas kebanyakan populasi dura semasa diperingkat awal program didapati lebih tertumpu ciri tertentu di dalam pelbagai populasi dura. Adalah mungkin untuk menggabungkan dua ciri yang berbeza dari dua populasi dura dan kombinasi lebih dari dua ciri yang baik melalui penggunaan kacukan tiga hala. Strategi yang dicadangkan disokong oleh analisis yang menunjukkan ciri-ciri tersebut dapat memajukan ciri ekonomi yang dikehendaki. Di dalam memajukan populasi dura, berdasarkan keputusan kajian ini, induk jantan mempunyai kesan yang sangat rendah dalam kebanyakan ciri ekonomik yang dikaji, ianya menunjukkan pengaruh induk betina tinggi dalam ciri tersebut. Strategi yang boleh berjaya dan kemajuan yang lebih cepat adalah dengan menggabungkan beberapa ciri berdasarkan keputusan keterwarisan dan kajian korelasi yang dijalankan. Keputusan yang didapati dalam kesemua percubaan menunjukkan pemilihan dan objektif pembiakbakaan yang berbeza boleh menyatukan ciri yang berbeza serta kacuksilang di antara dura ini boleh dilakukan untuk penambahbaikan ciri hasil di dalam kelapa sawit.

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I certify that a Thesis Examination Committee has met on 3 May 2012 to conduct the final examination of Mohaimi bin Mohamed on his thesis entitled "Phenotypic and Genotypic Variation in *Tenera* Progenies Derived from Different Sources of *Dura* Crossed with Avros *Pisifera"* in accordance with the Universities and University College Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

Members of the Thesis Examination Committee were as follows:

Mihdzar Bin Abdul Kadir, PhD
Associate Professor
Faculty of Agriculture
University Putra Malaysia
(Chairman)

Siti Nor Akmar binti Abdullah, PhD
Associate Professor Datin
Faculty of Agriculture
University Putra Malaysia
(Internal Examiner)

Wan Mohamed Noordin bin Wan Daud, PhD
Associate Professor
Faculty of Agriculture
University Putra Malaysia
(Internal Examiner)

Abd Rahman Milan, PhD
Horticultural Research Centre
MARDI
(External Examiner)

SEOW HENG FONG, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 23rd July 2012

This thesis was submitted to the Senate of Universiti Putra Malaysia has been accepted as fulfillment of the requirement for the Master of Agricultural Science. The members of the Supervisory Committee were as follows:

Mohd Rafii Yusop, PhD
Associate Professor
Faculty of Agriculture
University Putra Malaysia
(Chairman)

Nur Ashikin Psyquay Abdullah, PhD
Senior Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

Mohd Said bin Saad, PhD
Sime Darby R&D Centre,
42700 Banting, Selangor
(Member)

_____

BUJANG BIN KIM HUAT, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

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 other institutions.

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MOHAIMI BIN MOHAMED

Date : 3 May 2012

TABLE OF CONTENTS