ISOPB

THE INTERNATIONAL SOCIETY FOR OIL PALM BREEDERS
PERSATUAN AHLI-AHLI PEMBIAK BAIK KELAPA SAWIT ANTARA BANGSA

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EDITORIAL

To those of us who attended the ISOPB Workshop On Prospects of Interspecific Hybrids, the most striking anomaly in experiences with the hybrids, was the contrasting O/B % results obtained by United Plantations and Sime Darby with the former reporting values in the 20's, close to those of DxP, while the latter reported figures in the low single digits. The latter's low figures, who were mill extraction figures, could be attributed to inefficiences in the milling and related processes. As pointed out by Meunier, United Plantation's figures, as common with many reported laboratory figures, were likely to be overestimates due to inadvertant bias in sampling bunches and fruits for bunch analysis using the usual procedure adopted for Guineensis bunches. This was because of the varying levels of fertility and parthenocarpy in the hybrid bunches. Use of the usual bunch analysis procedures without modification would lead to over-estimation of the O/B % especially with bunches having higher percentage of parthenocarpic fruits which generally have lower oil content. Meunier did mention in passing IRHO's bunch analysis procedures for OxG hybrid bunches which they believe give a better estimation of the bunch oil content. As many of us are not familiar with their method, we decided to publish their procedures as a feature article in this issue.

Congratulations are in order to two of our members, Dr. V. Rao and Dr. K. Breure for obtaining their doctorate degrees from Birmingham and Wageningn universities respectively. Incidentally both of them did their doctoral dissertations on oil palm. Dr. Rao's thesis was on genetic variability of yield related traits in the Nigerian prospected materials. The abstract will appear in this issue. Dr. Breure's dissertation was a compilation and collation of his studies and publications done at Dami Oil Palm Research Station, Papau New Guinea. Abstracts of some of his journal publications have appeared in previous issues of ISOPB Newsletter. Abstracts of some of the other publications which have yet to appear or are just appearing in the journals will be featured in the following issues of ISOPB Newsletter. His thesis has been published in full by Harrison Fleming Advisory Services Ltd. of London, U.K.

Feature Article

A. IRHO's BUNCH ANALYSIS PROCEDURES FOR E.MELANOCOCCA & E.MELANOCOCCA x E.GUINEENSIS HYBRIDS.

INTRODUCTION

The poor fertility of E. mel. and especially of the E. mel. x E. guin. hybrids makes it difficult to evaluate the average extraction rate of a family or a tree.

The analysis of one bunch/tree/year, as practised on the E. guin. overestimates the average extraction rate of a family to the extent that poorly-set bunches are not taken into account. Furthermore, the constitution of a sample is difficult 'a priori' and would require too many analyses.

On the level of the tree itself, the % F/B, % P/F, and % O/B characters are affected by the rate of fruit-set of the bunch analysed and the variable proportions of the different types of fruits which result (more or less continuous graduation between true parthenocarpic fruit to pseudo-parthenocarpic fruit with shell, pseudo-normal with nuts of variable size, normal ...).

I - ANALYSIS OF A FAMILY OR A TYPE OF CROSS - GLOBAL ANALYSIS

1.1 Bunch harvesting - Day 1

- The bunches are harvested the day before the analysis, in the late morning or in the afternoon by a clerk, one or two cutters, and collectors.

- This harvest must occur the day before the industrial harvesting round, to obtain enough bunches and to avoid biased sampling.

- For one family, the clerk has all the bunches harvested:

  . which were pollinated: he must check for the presence of the mark made on the stem of the corresponding leaf at the time of assisted pollination;

  . which are really ripe: 1 or 2 loose and completely red fruit per kg of bunch.

- The bunches are cut like those of E.guin., put individually into jute bags with their loose fruit. They are identified by a label with the number of the family and the field number of the tree.

- When all trees of one family have been visited on all replications, the harvested bunches are grouped together.

  1) If there are fewer than 6 bunches for the family, analysis will not be done, but the bunches harvested must be weighed, and the data given to the department responsible for recording the harvest (weighed in field or in the laboratory).

  2) If there are 6-30 bunches for the family, they are taken to the laboratory for analysis. On arrival, they are weighed on a balance reading to the nearest 50 g, and the weight recorded on the harvest note-book, which will be given to the office responsible for recording the harvest. The analysis sheet also records (see Annex) the number of bunches and total weight of bunches per family (1).

  3) If there are more than 30 bunches, 30 of them should be chosen from trees little represented in previous analyses (0 bunches already taken from a tree, then 1, then 2 ....)

To know the origin of the bunches in each analysis, the bunches sampled and analysed per analysis should be noted by keeping a sheet for each family, making it possible to see which trees were analysed on each round.

1.2 Bunch analysis - Day 2

1.2.1 Stripping of spikelets

- complete removal of spikelets from the bunch with a hatchet.

- weighing on a Berkel balance of all spikelets, with or without fruit (3).

1.2.2 Removal of fruit

- complete stripping with a knife, taking care not to damage the fruit.

- the spikelets and any white or dry parthenocarpic fruit are eliminated. All the remaining fruit are weighed (5).

NOTE : If the harvest to be analysed exceeds 15 bunches, only half the spikelets will be stripped. Separation into two equal heaps is done by taking 2 similar spikelets, one in each hand, and placing one on each heap, carrying on in this way until no more spikelets are left. Then the heap chosen is weighed and adjusted until its weight is exactly half that of all the spikelets together.

The loose fruits are passed through the sampler to separate them into 2 similar samples, which are adjusted so that each weighs exactly the same. One sample is eliminated, the other is added to the spikelet sample retained, and the whole is weighed (4). After stripping, the fruit are weighed (5).

1.2.3 Fruit Sample

All the fruit obtained are mixed and put through the sampler so as to obtain 2 samples of 500 g each (6A and 6B). It is very important to mix thoroughly so that there is a good mixture of fruit from the different bunches; if there is a large volume of fruit, they can be mixed with a spade.

The fruit of both samples are counted (7A and 7B) and put separately into plastic bags until depulping. The 2 samples are depulped only every 5th. analysis.

1.2.4 Depulping

- Depulping of all fruit with a knife on a tempered steel plate 3 mm thick; no trace of pulp should remain on the nut.

- Weighing and recording of weight of nuts (8) and their number (9) on the analysis sheet.

- Chopping with a knife of part of the pulp into pieces 0.5 cm at most in length.

- Taking of a 40-g fresh pulp sample immediately to analyse in the oleometer.

- The rest of the pulp is sterilised and pressed to determine the iodine value.

1.2.5 Kernels

- Dry the nuts for 8 days in the shade on drying trays.

- Crack the nuts.

- Count the number of nuts with kernels (10). Weigh the kernels (11).

- Count the kernels with embryos (12).

- Count the kernels with normal embryos (13).

II ANALYSIS OF A TREE

II.1 Bunch harvesting - Day 1

- The bunch is harvested the day before analysis, in the late morning or in the afternoon.

- The clerk chooses only ripe bunches with good fruit-set. Once the bunch is cut, he records the field number of the palm on a harvest notebook, and on the bunch stalk. The bunch is placed into a closed jute bag, after all loose fruit have been collected.

- The bunches to be analysed are transported directly to the laboratory where they are weighed immediately on a balance to the nearest 50 g. Their weight (1) is recorded on the harvest notebook, and the analysis sheet, where the field number of the tree, the analysis number and the date are also noted. The harvest notebook is given to the Plant Breeding office for recording.

II.2 Bunch analysis - Day 2

II.2.1 - Stripping of spikelets

- The bunch is completely stripped with a hatchet.

- If the bunch weighs over 14 kg, the spikelets (with or without fruit) are divided randomly in 2 samples A and B. Both samples must weigh about the same.

Weighing is done on the Berkel balance and the following are noted on the analysis sheet:-

. the weight of the rachis (2)
. the weight of sample A (3)
. the weight of sample B (4)

- The rachis, and eventually sample B, are eliminated.

II.2.2 - Stripping of fruit

Stripping to be done entirely by knife, taking care not to damage the fruit.

Spikelets and white or dry parthenocarpic fruit are eliminated. All remaining fruit are weighed (5).

II.2.3 - Fruit sample

All the fruit obtained is mixed and put through the sampler until 2 samples weighing about 500 g of fruit each (6) are obtained. Check that the number of fruit is the same.

- The fruit is counted (7) and placed into a plastic bag until depulping.

II.2.4 - Depulping

- All fruit is depulped with a knife on a tempered steel plate 3 mm thick; no trace of pulp should remain on the nut.

- Weighing and recording the weight of the nuts (8) and their quantity (9) on the analysis sheet.

- Chopping with a knife of part of the pulp into pieces 0.5 cm at most in length.

- Taking of a 40-g fresh pulp sample immediately to analyse in the oleometer.

- The rest of the pulp is sterilised and pressed to determine the iodine value.

II.2.5 Kernels

- Dry the nuts for 8 days in the shade on drying trays.
- Crack the nuts,
- Count the number of nuts with kernels (10). Weigh the kernels (11).

III PULP ANALYSIS

For both families and trees, the following is to be determined:-

- oil content of the pulp (see IGK 9 - 4,5,6)
- iodine value of the oil

IV RECORDING AND CALCULATIONS

The data are noted on analysis sheets, of which models appear in Tables 1 and 2.

		Family	Tree
% F = $\frac{\text{Weight of fruit A}}{\text{Bunch weight}}$	(together)	$\frac{(5)}{(1)}$	$\frac{(5)}{(1)}$
" "	(½ sample)	$2 \times \frac{(5)}{(1)}$	$\frac{(5)}{(3)} \times \frac{(3) + (4)}{(1)}$
% P = $\frac{\text{Pulp weight}}{\text{Weight fruit sample}}$		$\frac{(6) - (8)}{(6)}$	
% K = $\frac{\text{Kernel weight}}{\text{Weight fruit sample}}$		$\frac{(11)}{(6)}$	
F = $\frac{\text{Weight fruit sample}}{\text{Number of fruit}}$		$\frac{(6)}{(7)}$	

V NUMBER OF ANALYSES

V.1 - Crosses

One analysis should be made per quarter and per cross.

V.2 - Trees

4 bunches per year should be analysed for each tree.

TABLE 1

CROSS ..... BUNCH ANALYSES E.O. x E.G. HYBRIDS

Family									
Plot									
Variety									
Planting year									
Harvesting date									
Analysis No.									
Number bunches									
Bunch weight	(1)								
Weight sample A	(3)								
Weight sample B	(4)								
Fruit weight A	(5)								
Weight fruit sample	(6-1)	(6-2)							
Number fruit	(7)								
Weight of nuts	(8)								
Number of nuts	(9)								
Nuts with kernel	(10)								
Kernel weight	(11)								
Kernels with embryo	(12)								
" " normal embryo	(13)								
Number oil analysis									
Density									
Temperature									
Iodine value									

- To act as a channel for mutual help, encouragement, and training among curators of germplasm collections, and their subordinate staff.

- To represent Malaysia in international germplasm activities.

- To advise the Agricultural and Strategic Panels of MPKSN on the management and status of Malaysia's Plant Genetic Resources.

- To promote knowledge of plant genetic resources through research, evaluation, description and publication.

Membership of Committee

Consists of representatives of all agencies dealing with the economic and scientific management of plant genetic resources in Malaysia.

Funding and Management

With the centralization of research funds under MPKSN, the mechanism is now available for germplasm management to be funded from a national pool, and distributed to various implementing agencies in a coordinated manner.

Communicated by RATNAIDU, PORIM

PORIM Reorganisation

In the March 1987 issue of the Newsletter, the reorganisation exercise at PORIM was alluded to. Below is the reorganisation chart of PORIM effective from 1.10.1987.

(Refer sheet attached)

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Jean-Marie NOIRET has been promoted Scientific Director of IRHO on 1st October in replacement of Michel OLLAGNIER.

J.M. NOIRET joined IRHO in 1964 and remained devoted to oil palm breeding since that time.

In charge of the breeding service of the LA ME station in Ivory Coast till 1970, he went, then, to Indonesia for one year and a half, as an adviser for the reorganization of oil palm breeding in North Sumatra under a World Bank Contract.

As Deputy Director of the Breeding Division of IRHO, based in Paris (1972 - 78), then in Montpellier, he was particularly involved in the development of new techniques like mitochondrial activity, electrophoresis and, of course, in vitro tissue culture, and used to visit regularly breeding centers in Africa, South America and the Far East where he keeps durable links.

TABLE 2

TREE ..... BUNCH ANALYSES E.O x E.G. HYBRIDS

Plot									
Row									
Tree									
Variety									
Family									
Harvesting date									
Analysis number									
Bunch weight	(1)								
Weight sample A	(3)								
Weight sample B	(4)								
Fruit weight	(5)								
Weight fruit sample	(6)								
Number fruit	(7)								
Weight of nuts	(8)								
Number of nuts	(9)								
Nuts with kernel	(10)								
Kernel weight	(11)								
Number oil analysis									
Density									
Temperature									
Iodine value									

B. National Plant Genetic Resources Committee

Under the umbrella of Jawatan Sains Pertanian, Majlis Penyelidikan dan Kemajuan Sains Negara (MPKSN) of Ministry of Science and Technology, a National Committee on "Plant Genetic Resources" has been formed under the Chairmanship of Director General, Forest Research Institute of Malaysia (FRIM) on 1st September 1987.

Malaysia has a very rich and diverse flora; more than 8000 flowering species in the Peninsular Malaysia alone. These plants are valuable source of products such as timber, pharmaceuticals, fibres, resins, dyes, perfumes, species, fruits, carbohydrates, proteins, oils, etc.

These genetic resources are taken for granted without realising that these are disappearing at a rapid rate. Now a real danger has arisen that much of this diversity will be lost forever because of destruction of large tracts of lowland forests to agriculture and human settlement. These forests are "libraries" of innumerable species which are of great benefit to man.

For species that are important to Malaysia, but with genetic roots elsewhere e.g. rubber, oil palm, cocoa, pepper, are also equally in danger of disappearing in their native habitats.

The objectives of the Committee are:

- To review the state of existing germplasm resources in the country, and to carryout continuous review.

- To identify neglected areas of work, endangered living collections, endangered species, endangered cultivars, and to arrange for proper attention including collection, replication, funding, staffing, wherever heeded.

2/...

Biotechnology Update

Companies in developed countries are researching into new technologies which have potential to overturn oils and fats markets by reducing reliance on imported oils e.g. cocoa butter, palm oil, coconut oil, by producing similar oils from domestic source and in the process creating new oils.

Scientists at CALGENE have succeeded in demonstrating the expression of a bacterial gene marker only in seeds, using a rapeseed transcription initiation signal.

In Indiana University, researchers using the transcription signal from a seed storage protein gene tagged the gene with a bacterial marker and altered its sequence to increase methionine content in the product, were able to achieve expression only in the seeds. Now researcher's are trying to express the acyl carrier protein (ACP) gene, one of the genes governing biosynthesis of fatty acids from glucose and under the control of the same promotor, in seeds. Plans are also underway to isolate other promotors and use them to manipulate other fatty acid biosynthesis genes. The ultimate goal is to modify plant vegetable oils which could e.g. extend their use to specially applications such as sufactants or fragrances, areas in which palm and coconut oil are presently used.

Glyphosphate resistance gene has been inserted in poplar trees via Agrobacterim tumefaciens in Wisconsin. The gene was inserted in the bacterium, which was then used to infect poplar leaves. Then by tissue-culture of the transformed plant tissue, plants have been regenerated. The genetically altered trees were undergoing tests for herbicide resistance.

From Bioprocessing
Technology. April 1987

Vengeta Rao (1987). Genetic Variation in populations of oil palms (Elaeis guineensis Jacq.) from Nigeria. PhD thesis. University of Birmingham, U.K.

SYNOPSIS

The main objectives of the experimental work presented in this thesis were :

i) to determine the genetic structure of populations of oil palms (Elaeis guineensis Jacq.) in Nigeria with respect to yield and its principal components;

ii) to examine the nature of the variation in these characters in material derived from these populations;

iii) to examine the performance of a sample of the Nigerian derived oil palms at four sites and at three planting densities and,

iv) to assess the value of the Nigerian derived materials to the oil palm breeder.

The first experiment consisted of two-hundred open-pollinated familes grown in two independent and completely randomised blocks of six palms per family each. The families were raised from the seeds collected from each of five palms at each of forty sites in Nigeria. The annual yield of fruit bunches from 1982 - 1985 and the composition of bunches were examined in the present thesis.

Considerable phenotypic variation was found in these characters in the Nigerian derived materials. Differences between palms within families and populations were the single largest source of variance, contributing some 50 - 90% of the total variation. Such differences arise from both genetic and non-genetic causes. The rest of the variation is genetically determined and is manifest as differences between families and differences between populations. The latter were more important than the former for fruit bunch yield, the average bunch

weight and the amounts of mesocarp, kernel and shell in the fruit and, hence, mean fruit weight as well. Differences between families were, however, the more important for bunch number, bunch oil content and the amount of oil and moisture in the mesocarp. In general, the heritabilities of these production characters were higher than those reported from the same experiment for early vegetative characters and the component fatty acids of palm oil. They were also higher than previous estimates for the same characters from breeding populations.

In the second experiment fifty families from the Nigerian derived materials were grown at four sites to study genotype x environment interactions. At each site a family was represented by six palms in each of two independant and completely randomised blocks. Annual fruit bunch yields from 1983 - 1985 were presented for three sites and from 1983 - 1985 for the fourth. Significant G x E effects were detected for average bunch yield, average bunch number and average bunch weight but their contribution to total variation was less than 13% at most. These effects, however, amounted to some 18% - 40% of the variance of family means.

In the genotype x density experiment, six seedlings from each of ten Nigerian derived families were grown, completely randomised, at each of three spacings in each of three blocks. Annual bunch yield and bunch composition data from 1981 - 1985 are presented. Genotype x density effects, though significant for yield and bunch number in most years, were a relatively small source of variation, being less than 10% at most. No such effects were detected for average bunch weight and for any of the bunch composition characters.

Overall, the performance of the Nigerian derived materials and the extent of genetic variability are very promising with regard to oil palm breeding. The families and individuals which compared very favourably with current breeding and commercial materials are, obviously of great potential. The best natural hybrids could be multiplied immediately by tissue culture methods for commercial growing. The best parental types could be introgressed into current breeding stocks and other bc used a source of new breeding populations.

LAMPIRAN

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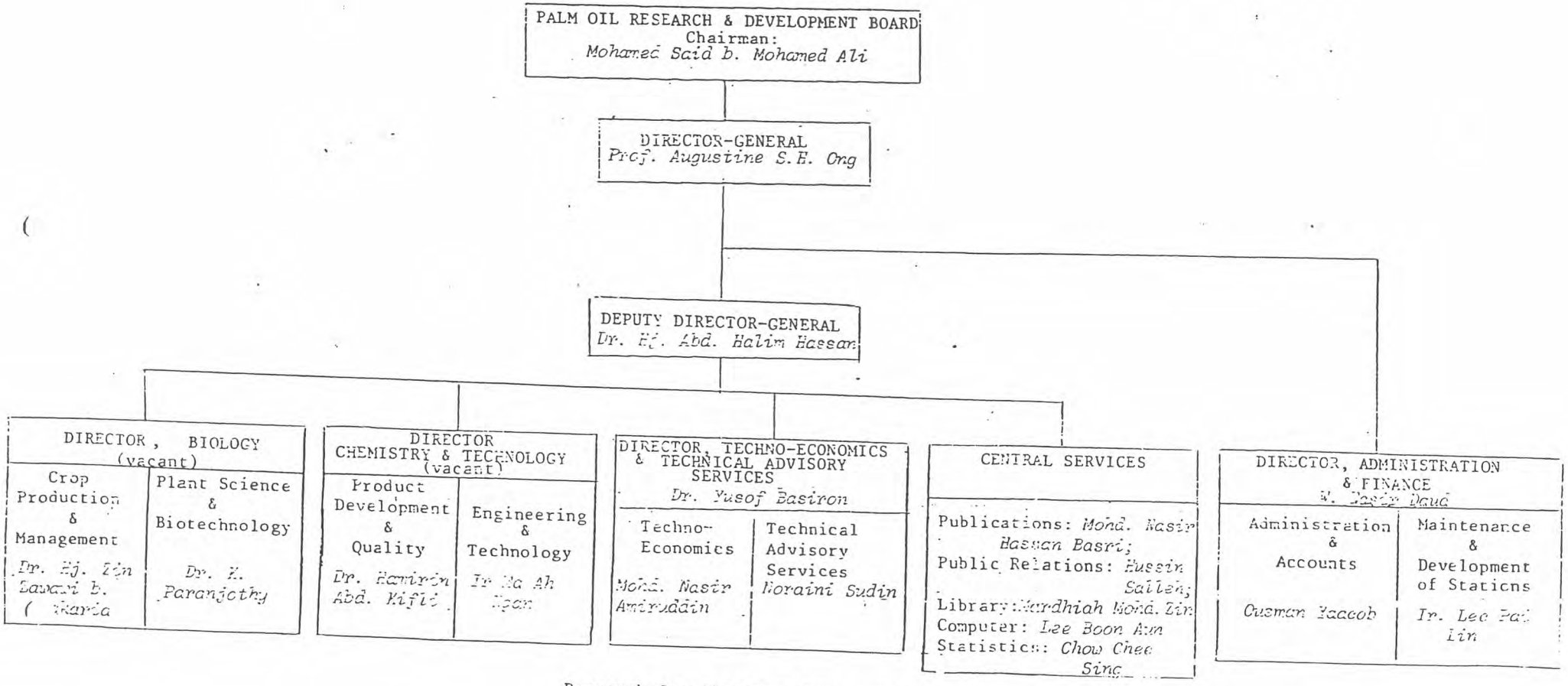
PORIM

ORGANISATION CHART

as at 1.10.1987



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