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

JULY - DEC 1995 MEMBERS ONLY Vol. 11 No. 2

EDITORIAL

Early issues of the ISOPB newsletter would give brief accounts of the oil palm breeding work of various centres, mostly Malaysian, though this need not be so, but such accounts have since became less frequent. The write up on the EPA Programme, we hope could spark a small revival, especially from newcomers such as Sime Darby and IOI in Malaysia and others both new and old in Indonesia, S. America and Africa. The one day visit report to Dami, mentions their breeding programme in passing but a more comprehensive account is welcome.

The second feature article in this issue is about refreshingly imaginative breeding work on a key problem in oil palm cultivation; collecting the loose fruits. The present solution is to harvest at minimum loose fruits with the attendant danger of unripe bunches and low OER while the push to mechanisation is looking at vacuum suction contraptions. The breeding option, if possible, is clearly the better.

CONTENTS

FEATURE ARTICLE I

THE EPA OIL PALM BREEDING PROGRAMME

by

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The Company

EPA Management Sdn. Bhd. formerly known as Eastern Plantation Agency, is a plantation Agency house managing plantations, principally oil palm, controlled by Johor Corporation, the state Economic Development Corporation of Johor State in South Peninsular Malaysia. EPA currently manages about 70,000 ha of oil palms in Johor with ambitious expansion in Indonesia and Papua New Guinea now underway.

Oil Palm Breeding Programme

Foundations

Though the idea of an oil palm breeding programme to produce planting materials, mainly for in-house use, was mooted in the late eighties actual foundations were only laid in 1991 with the recruitment of a senior plant breeder and procurement of breeding materials, both from PORIM.

Prior to this EPA had one large planting of very poor quality Elaeis oleifera x E. guineensis which was removed in 1993, and small quantities of germplasm palms (Tanzanian and Nigerian) released by PORIM from its prospections.

The EPA breeding programme can probably claim the distinction of fastest start up time, largely due to considerable assistance and cooperation from PORIM. Indeed commercial DxP seed production, for in house needs, commenced in 1992 through a lease arrangement of PORIM palms. This arrangement provided the impetus for the quick setting up of seed production and breeding laboratory facilities at Rengam near Kluang, Johor. Breeding work itself was given a jump start through a) Purchase of one year old breeding seedling from PORIM which were excess to their own 1990 trial plantings; these were of Sabah Breeding Programme and SOCFIN

origins b) Procurement of 8 AVROS TxT crosses for pisifera sources c) 12 D selfs and 5 DxD crosses from trial 0.212 of PORIM which consists of Banting, Ulu Remis and Elmina duras derived from the Sabah Breeding Programme, and d) 12 D selfs and 15 DxD intercrosses 14 T selfs and 8 TxT interfamily crosses and 45 DxT crosses from population 12 of PORIM's Nigerian germplasm. In addition bare root TxT seedlings were received from DoA Sabah.

The materials in a) to c) above coming from, selections over a few generations, were truly advanced breeding materials which could be readily used for the production of high yielding DxP seeds.

The materials in e) above formed the second arm of the EPA breeding programme, a longer term programme to breed for dwarf palms. Rao and Rajanaidu (1988) had found that Population 12 of the Nigerian germplasm collection was exceptional in being the shortest and highest yielding among the vast genetic collection at PORIM and wherever elsewhere it had been planted in Malaysia and in NIFOR as well. Oil/bunch was average to good. The best palms in this population were selected and duras and teneras selfed and intercrossed to a classical Reciprocal Recurrent Scheme (RRS); This should allow the eventual production of high yielding dwarf commercial DxP materials, if more rapid options such as introgressing into existing advanced lines, as in the creation of PORIM PSI result in loss of dwarfism, if the genes are recessive for example. The materials in this programme are in PORIM - EPA trials at EPA estates and some in PORIM stations in East Malaysia.

The Dura Programme

The P91 trials have provided duras that could be used for seed production. Initial bunch analysis data of a sample of the palms is given in Table 1. Some of the families have to be discarded because of contamination, the crosses being created in the mid-late eighties. Pedigree drawings of duras with potential for seed production are shown in Figure 1.

The P92 trials include descendants of some of the duras in trial 0.212 at PORIM Kluang leased by EPA for seed production. The 17 dura self and inter-cross family are planted to a high number of 160 palms per cross. This should provide for sufficient high quality mother palms for EPA seed requirements. As mentioned previously, trial 0.212 at PORIM Kluang is planted with SBP materials. The pedigree of their descendants at EPA is shown in Figure 2.

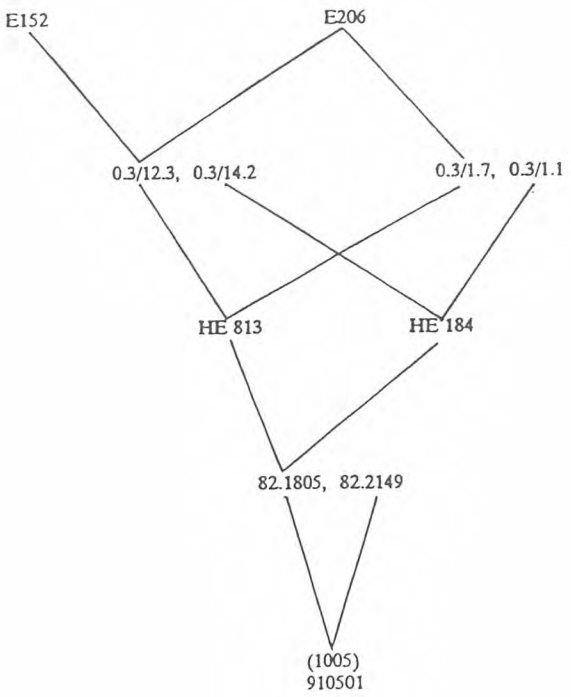
The Pisifera Programme

The pisifera programme at EPA consists of two groups of advanced materials. The smaller collection which is presently used limitedly until full progeny test results are available consist of SBP descendants and E 206, S27B, Nigerian Pisifera originating pisiferas (Figures 3 and 4). Of these potentially most interesting would be the handful that are 2nd generation selfs of W(T) 1 of NIFOR, because of very high M/F of their tenera sibs, and those with Dumpy E 206 blood for dwarfness.

The larger collection and of more immediate use are the AVROS pisiferas whose pedigree is shown in Figure 5. The tenera palms chosen in trial 0.174 of PORIM Kluang came from

TABLE 1. BUNCH ANALYSIS DATA OF A SAMPLE OF EPA DURA MOTHER PALMS

Trial	Family Code	Palm No.	% F/B	% M/F	% S/F	% K/F	% O/WM	% O/DM	% O/B	No. Analysis
910501	1002	1.12	72.3	66.4	23.0	10.6	50.4	79.0	24.2	3
	1002	2.18	74.7	67.3	24.6	8.1	49.0	79.3	24.7	2
	1005	1.11	76.9	64.9	28.0	7.1	40.6	76.1	20.3	1
	1005	2.12	79.0	60.6	29.9	9.5	46.1	78.8	22.1	2
	1013	1.02	75.3	61.0	29.3	9.6	48.2	77.1	23.2	3
910507	1032	3.09	75.5	62.9	28.9	8.1	35.3	71.4	16.7	2
	1032	11.03	71.2	68.2	24.6	7.2	36.1	72.1	17.5	1
	1032	14.11	71.4	67.5	25.0	7.5	41.0	71.8	16.6	2
	1036	12.11	76.9	64.7	29.4	5.9	46.2	77.2	23.0	4
	1050	16.06	74.7	61.9	31.6	6.4	45.6	75.8	21.1	3
	1052	5.02	71.2	63.9	29.0	7.0	48.4	74.8	22.0	3
	1052	2.07	72.1	61.6	28.4	10.0	44.1	75.7	19.6	2
	1053	4.04	77.9	62.7	27.4	9.9	43.3	78.1	21.2	1
	1039	13.06	75.6	61.1	29.7	9.2	40.9	75.8	18.9	2
910512	1089	20.01	72.9	62.7	28.9	8.3	42.2	73.9	19.3	1
	1092	24.02	74.7	61.3	29.8	8.8	41.9	71.9	19.2	2
	1092	8.04	78.9	61.6	28.1	10.3	47.0	76.6	22.8	1
910513	1094	10.06	71.9	67.0	23.7	9.2	52.9	79.9	25.5	1
	1094	7.02	78.8	60.9	30.2	8.8	45.9	76.9	22.1	2
	1095	6.01	75.9	63.9	27.8	8.2	32.5	68.6	15.8	1
	1097	3.04	75.3	63.0	26.3	10.7	55.8	80.2	26.4	2
	1098	9.03	75.9	60.3	29.9	9.7	42.1	73.2	19.3	1



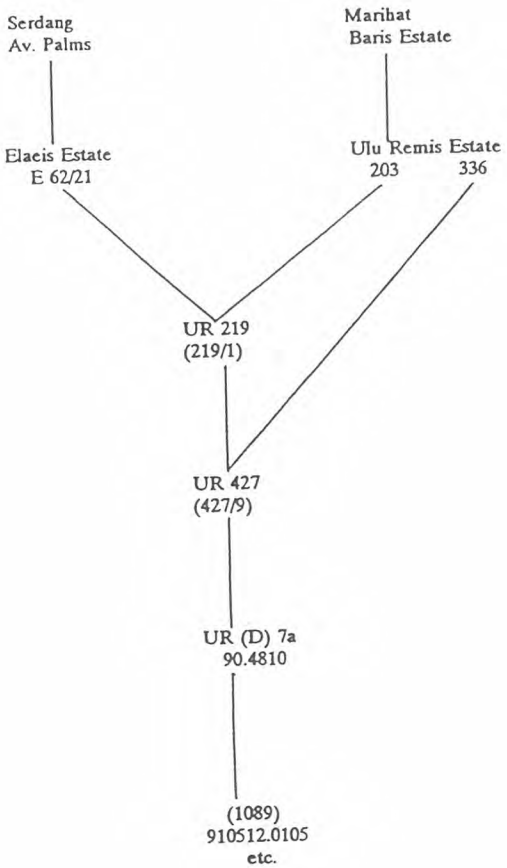


Figure 1. Pedigree of EPA mother palms

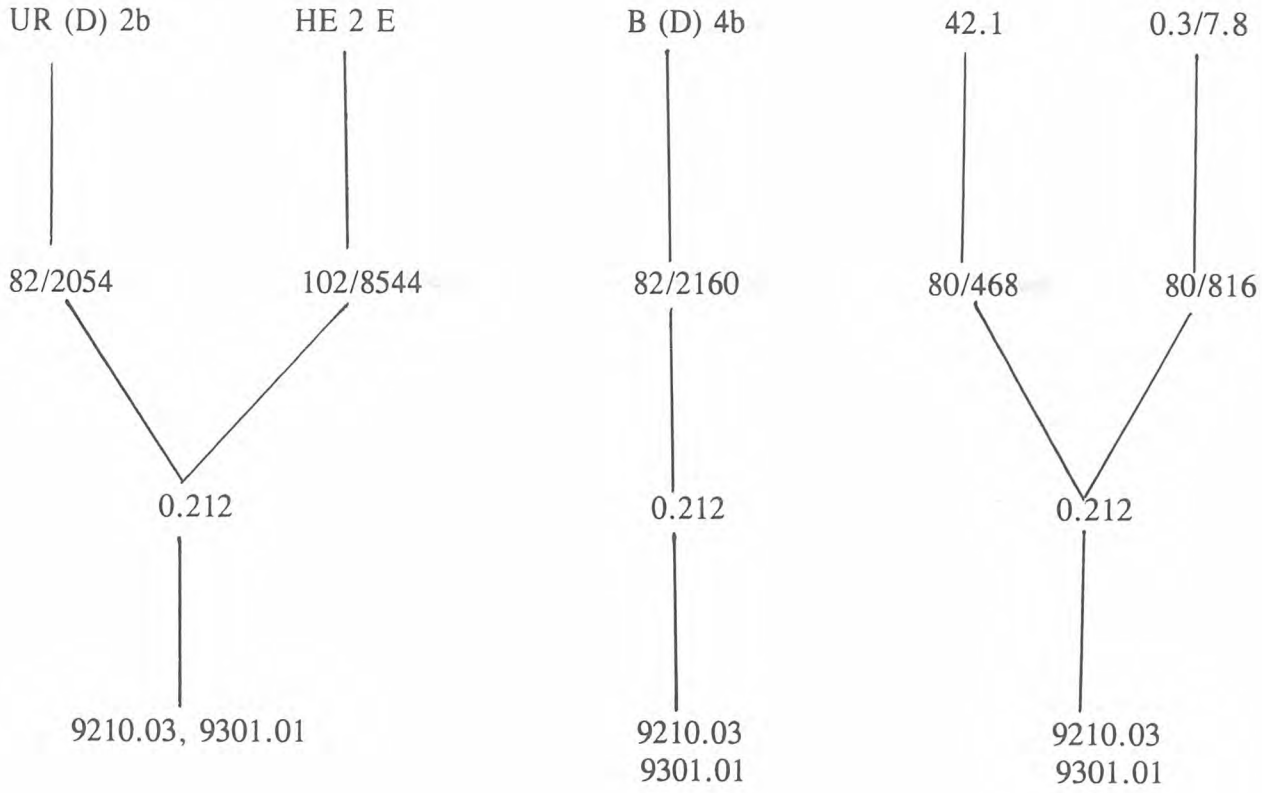


Figure 2 : Pedigree of EPA duras from Trial 0.212 of PORIM.

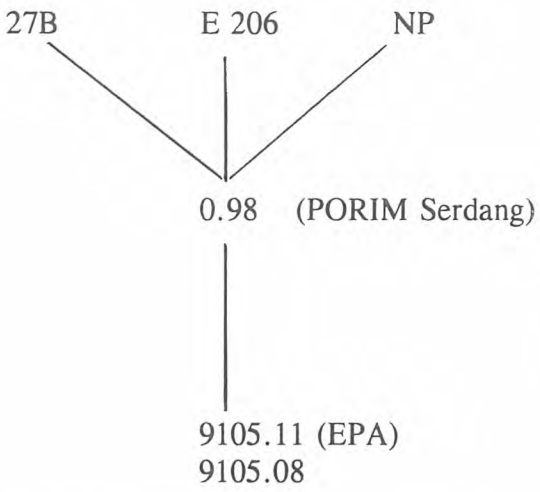


Figure 3. Pedigree of E 206 blood Pisiferas at EPA.

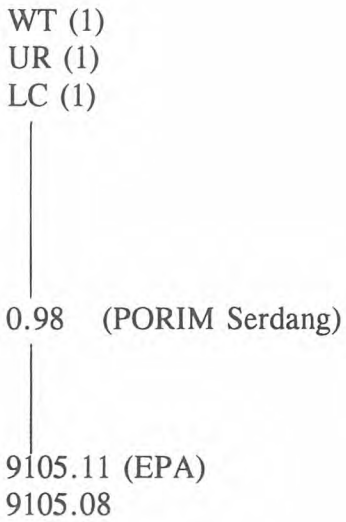


Figure 4. Pedigree of SBP pisiferas at EPA.

Figure 5. Pedigree of AVROS materials in PORIM-EPA trials at EPA

The Dwarf Palm Programme

Evaluation of the Nigerian germplasm collection had shown Population 12 to be the highest yielding and shortest. Quite remarkably the same was found in the prospected materials retained at NIFOR. Futher, Population 12 families were high yielding and the shortest among the samples provided to OPRS Banting, Chemara and FELDA. The only disadvantage appeared to be % O/B which was average. However, of the 10 families in this population famillies 12.04 and 12.06 were particularly impressive for yield and dwarfism and some individual palms in these families having % O/B > 28%.

Hence, PORIM commenced a programme of outcrossing selected duras with AVROS (PS1) for short term exploitation and a RRS scheme within Population 12 for long term exploitation. Some of the materials in the latter were planted by EPA in collaborative trials. The DxT trials include known crosses from UP and Pamol and samples of commercial material from Golden Hope, IOI, Chemara, FELDA, PORIM, HRU and AAR. The DxT trials have also been planted in 27', 28' and 29' spacing blocks with a long term second objective of seeing if any of these dwarf progenies could be planted to higher densities.

The Population 12 TxT trials (selfs and inter family crosses) also include two AVROS TxT progenies while the DxD trials have some 0.212 descended progenies for comparisons. All the Dura, Tenera and DxT trials are planted at two locations. In anticipation of segregation in the first generation of germplasm derived progenies, family sizes are large i.e. 160, 96 and 64 for dura, DxT and tenera progenies respectively. The list of Population 12 parent duras and teneras for these trials are given in Table 2.

TABLE 2. LIST OF POPULATION 12 SELECTIONS FOR PORIM - EPA DWARF PALM PROGRAMME

DURAS	TENERAS
150.2036	149.1140
149.11399	150.1440
149.14484	149.14324
149.13130	149.2704
149.14292	150.1544
149.1446	150.1714
149.14483	150.655
149.14512	150.1967
149.14673	150.711
149.14674	150.1969
150.1477	150.2360
150.1908	150.2334
150.2036	150.5275
150.2194	150.289
150.2356	150.4384
150.484	150.4951
150.499	150.5376
150.5112	150.501
150.5278	150.5115
150.5375	150.711
150.5973	150.1661
150.1276	150.665
150.498	150.7403
150.1968	149.11526
	150.500
	150.2241
	150.1910
	150.4858
	150.5974

FEATURE ARTICLE II

"NON-SHEDDING" VARIANTS OF THE OIL PALM

by

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Harvesting and the collection of loose fruits is a major problem in Malaysian oil palm plantations in these days of labour shortage. In the last decade, there has been a move towards lowering of minimum harvesting criteria e.g. one loose fruit is now often enough for a bunch to considered "ripe". In recent years, oil extraction rate of Malaysia palm oil mills have steadily declined, of late even in East Malaysia.

More than two decades ago, work was first carried out on the possibility of delaying fruit abscission using plant growth regulators (Chan, Corley & Seth, 1972). Of late, there has been renewed interest in the subject (Somasundram, Tung & Nair, 1994).

Unilever Plantations & Plant Science Group (UPPSG), which operates oil palm and tea plantations in Africa, India and Southeast Asia, has sponsored a long term research programme on oil palm fruit abscission in Oxford University. Some results of this work have been published (Henderson & Osborne, 1990; Osborne, Henderson & Corley, 1992) and presented (Osborne & Henderson, 1991) in recent years.

In support of the work, field observations have been carried out Pamol Plantations Sdn Bhd (Pamol), a company within UPPSG. Part of the field work included looking for palms in which bunches did not shed fruits as they ripened. The focus of early efforts was on clones derived from tissue culture. Although there was variation between clones in the rate of fruit abscission as well as oil content in bunches, none of the clones studied were "non-shedding".

Palms in the breeding programme were the next focus. This has proven to be an enormous task for Pamol's Research team, as the existing breeding programme includes over 36,000 palms. This work continues with the help of Pamol's estates staff and workers. In 1992, three "non-shedding" palms were found in a 1987 planting of Deli dura x AVROS pisifera material at Pamol Sabah. In 1993, a similar mutant was discovered at Pamol Kluang, in a 1987 planting of Deli dura x Ulu Remis pisifera material.

Preliminary bunch analyses have shown that the oil content in bunches from these "non-shedding" mutants is as good as other normal palms in the same plantations (Pamol Plantations' Research & Advisory Department, *unpublished data*). Detailed studies of spikelets from these mutants by the Oxford University team have since revealed that the abscission process in these palms is abnormal, with certain enzyme reactions absent.

Selfs as well as crosses between the palms have since been made to study if this "non-shedding" trait is heritable, and if so how it is inherited. DNA samples of the mutants are already in cold storage in the UK laboratory of UPPSG while waiting for similar samples from their progeny in the coming years. By that time, biochemical analysis, coupled with the use of the oil palm gene map already developed by UPPSG, will hopefully reveal ways of exploiting this unique character.

The "non-shedding" character itself is not easy to exploit in current oil palm plantation material which are predominantly the *nigrescens* type. For if such *nigrescens* bunches do not shed their fruits when ripe, harvesters will have considerable difficulty recognising when a bunch can be cut.

Thus, in anticipation that the "non-shedding" character is heritable and exploitable by breeding (conventional or otherwise), a programme has started at Pamol in which these mutants are being crossed with green-fruited *virescens* palms, to see if *virescens* **and** "non-shedding" progeny can be produced. If such progeny are produced, and if ways can be found to reproduce enough of such material for commercial-scale exploitation, the days of harvesting and loose fruit collection problems may be over.

Acknowledgement

Permission to publish was granted by Pamol Plantations Sdn Bhd and Unilever Plantations & Plant Science Group.

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NOTES FROM A ONE DAY VISIT TO DAMI OPRS, WEST NEW BRITAIN, PNG.

by

V. Rao

WEST NEW BRITIAN

Oil palm industry of PNG started here in 1967 with a 50:50 JV between H & C and PNG Government. New Britain Oil Palm Development (NBPOD) has a planted area of 15,919 ha and is just now opening another 5,000 ha.

The other plantation on this island, Hargy, involving Sipef (Belgium) was started in 1973 and is 4.301 ha large.

Smallholders/village plantings, each with about 6.5 ha, make up another 28,000 ha of oil palms on the island.

NBPOD (Harrisons & Grossfield and PNG)

NBPOD has 9 estates and 3 mills and is centered around Kimbe which has a deep sea port and bulking installation, most of the CPO is exported direct to UK.

Soils and climate are excellent for oil palms with mature yields in the 9 estate raging from 21.2 - 29.3 tons/ha; the lower yields are from an estate on terraced, hilly terrain. For the 3 last years(93-95) the average yields were 25.5 T/ha for FFB and 7.3 T/ha for oil and kernel.

HARGY (SIPFF and PNG)

Has 2 estates Navo and Hargy with a total of around 4,000 hectares. The average yields for the 2 estates are 21.1 and 13.6 tons per ha respectively.

Since last year a major replanting programme has been initiated.

There is one palm oil mill and exports are through Bialla which is also a deep sea port.

DAMI OPRS

Dami Oil Palm Research Station of NBPOD is a breeding and seed production centre. Started soon after the plantation, the initial work was mainly on Agronomy through seed gardens were planted in 1968, a year after the plantation commenced.

Breeding material came from H&C's Banting OPRS in the form of Deli duras and AVROS pisiferas and these have been their sale source of parents of commercial DxP seeds.

Seed production and sales started in 1975, reached about 2 m in 1982, 5 million in 1990 and last year Dami sold just under 9 m seeds, mainly to Indonesia.

The breeding populations used for commercial seed production are those derived from the original H&C Banting OPRS i.e. AVROS TxT and banting Deli Duras. These were planted in 1968 and are still in use. These have been some later introductions from Zaire through a combined breeding programme with Unilever plantation and Cameroon and some of those Teneras are introgressed into AVROS.

Dami OPRS have 6 seed gardens, the oldest being the 1968 planting from Malaysia and the youngest is now 2 years old. The seed gardens are based on complementary crosses between selected palms, but the latest is a selfings.

Pollen for DxP seeds now comes from 5 pisifera palms from the original AVROS introduction. These 5 have been extensively progeny tested and their pollen also supplied to Bah Lias in Indonesia, Murgas & Lowe in Colombia and Pamol in Malaysia. A second generation AVROS TxT has been created and more recently AVROS x Zaire/Cameroon selections.

Because of the genetic background and intense selection for yield in earlier periods, Dami DxP is noted for precocity and high oil yields. The major disadvantage is rapid height increase. However, even PNG under good agro-climatic conditions harvesting is still carried out at 23 years. Dami materials in PNG are planted at 120-135 palms/ha, with slightly better yields at 120 palms/ha.

Dami OPRS have good laboratory facilities but seed production premises tent to be over-strained. Laboratories are very similar to those in Malaysia. A new state of art tissue culture facility was in final phases of construction with design and technical advice from Unifield TC of U.K.

Work on a similar integrated seed production facility was about to begin at time of visit.

CONCLUSIONS

A near ideal agro-climatic environment makes West New Britain an ideal location for breeding and growing oil palm. The local population is more amenable to oil palm cultivation than those on the mainland but vexations from them persist. NBPOD and Hagry have built the necessary infrastructure for CPO extraction and export.

Dami OPRS are an important producer of high yielding, DxP seeds and sold about 9 m last year. Laboratories are adequate and the new tissue culture lab is impressive. A similar facility is planned for seed production.

SOCIETY NEWS

International Conference on Oil and Kernel Production in Oil Palm - A Global Perspective

Jointly organised by ISOPB and PORIM and to be held from 27-28 September 1996 at the Istana Hotel, Kuala Lumpur, Malaysia.

(note : both dates and venue are also those of the 1996 International Palm Oil Conferences).

Programme : Session I

27 September 1996 - Friday

- Physiology and biochemistry of oil synthesis in oil palm.
- Theoretical estimation of oil and kernel content in oil palm bunches.
- Breeding materials and oil and kernel content in bunches.
- Oil and kernel content in long term breeding/ agronomy trials.

Session II

- Effect of fertilizers on oil and kernel content in bunches.
- Effect of densities on oil and kernel content in bunches.
- Effect of age and development of factors on oil and content in bunches.

Session III

28 September 1996 - Saturday

- Country reports on oil and kernel contents in oil palm bunches.
- Influence of environmental factors (rainfall, sunshine hours, temperature) on oil and kernel content in oil palm bunches.

Interested ? Contact : ISOPB Organising Secretary,
C/O PORIM
P.O. Box 10620
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OTHER NEWS

1. Seminar on Sourcing of Oil Palm Planting Materials For Local and Overseas Joint Ventures.

Organised by ASGARD Information Services and endorsed by ISOPB, seminar will be held from 22 - 23 July 1996 at Holiday Villa, Subang Jaya, Selangor, Malaysia.

Seminar to cover :

- o Overseas oil palm joint ventures.
- o Oil palm industry in selected countries.
- o DxP planting materials world wide.
- o Planting materials in major planting materials producer countries.
- o Quarantine aspects.
- o Quality of planting materials.
- o Practical experiences in overseas oil palm developments.

Limited places still available.

Apply to :

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2. ASRU Course & Training

The Applied Statistics Research Unit (ASRU) of the University of Kent, U.K. has been conducting courses for statisticians and research scientis to from Developing Countries since 1979.

The following courses are offered for 1996.

- o Data processing course (8 July - 16 August)
- o Sample survey course (19 August - 27 September)
- o Individual tuition for design and analysis of experiments.

For more information :

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