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AAR NEWS

E D I T O R I A L

Welcome to the new millenium! The year 2000 is special to AAR as its first Head of Agricultural Research, Mr. Chew Poh Soon would be retiring at the end of February after a long and illustrious career. His successor, Dr. Soh Aik Chin in his speech at Poh Soon's farewell dinner provided us with a rare insight of the man who contributed so much to AAR. Aik Chin's speech is reproduced below. We wish Poh Soon a happy retirement.

The new millennium is expected to be extremely challenging for the Malaysian Plantation Industry as our country pushes itself towards industrialization. There is little doubt that only the innovative and competitive plantation companies can survive in the ever-competitive environment. We all know that research is an integral part of our pursuit for excellence and to be ahead of others in the game. We are indeed fortunate that our principals have the foresight of investing in research. Some of the findings of AAR's research efforts will be presented at the May 2000 International Planters Conference on **Plantation Tree Crops in The New Millennium: The Way Ahead** organised by ISP. Read on to find out what AAR has to offer on **Planter's Toolbox in The 21st Century, Towards a Practical Framework for Land Evaluation for Oil Palm in The 21st Century, Water Cycling and Balance in Mature Oil Palm Agro-ecosystem in Malaysia, Advances in Oil Palm Agronomic Recommendations, Digital Elevation Model (DEM) for Management in Plantation Crops** and **The Potential of Landsat TM Remote Sensing Images for Oil Palm Estate Management** in this issue of our News. If you require further information, please do not hesitate to contact us.

Over to you !

Happy Reading!

SUCCESS

There are no secrets to success. It is the result of preparation, hardwork and learning from failure.

Speech by Aik Chin at Poh Soon's Farewell Dinner

Good evening friends and colleagues

It is sometimes said, which is particularly true for Asians, that among close or old friends or colleagues there is no need for words to express our feelings but for this occasion some words are appropriate.

We're here this evening to honour and express our appreciation to Poh Soon for being a great boss and leader, a very good leader and a very good friend. To use an analogy from sports, which he is so fond of, after a very strong and successful long first lap he's about to hand me the baton to continue the race.

To some who do not know Poh Soon well enough, I would like to say some words about the man, although he is a modest person. Poh Soon has always been an achiever and had done well in whatever he did and still does. In the schooldays, he was better known as a hockey and cricket player for the state and nation, but when he took to the field in soccer and rugby for the school, he also excelled. This achievement streak continued in his university and working life. He was a super-fresh student (entry direct into second year) in the B.Ag.Sc. course and graduated with honours, the rare few if not the only one, in those days when honours were not freely given. He was also the youngest to head a plantation research station. And for the past 30 years, he progressed professionally with the oil palm industry. There are few in the Industry who can surpass him in his knowledge, skills and experience in oil palm agronomy and running a plantation research station.

Many may not be aware that the SYP/INFERS programme is a documentation of much of his knowledge, skills and experience developed over the 30 years. As one of our younger colleague commented, this has simplified much of the system of agronomic recommendations to the estates. It has taken out the "mystery" and the subjectivity in this business and replaced them with a more objective and

scientific basis. AAR is probably the first to develop it to this extent for oil palm. It is not a cook book by any means but rather a guide of how to approach and find solutions to a problem. Full utilisation and appreciation comes with further knowledge, skills and experience developed in using the programme and refining it

Our older colleagues will agree with me, that when Poh Soon leaves, much of his strong guiding principles in our work place will remain with us.

To list a few :

1) A strong commitment and dedication to serve the Estates and the Industry who are our employers.
2) Professional integrity – as technical people, to base decisions/judgements on technical grounds as the first basis, which is usually the best basis.
   And not to confuse what is convenient with what is right.
3) To excel in everything that we do and never stop learning.
4) To be forthright and fair to all we associate and work with and to treat them with respect for their feelings and concern for their welfare.

Poh Soon has developed a research team from a 2 research officer effort to 20 plus RO team, a leading R&D team in the Industry and a force to be reckon with.

As you would know by now, Poh Soon has big feet. None of us can hope to fit his shoes. But he also has broad shoulders. So with the help of our bright young colleagues, we can stand on his shoulders and take AAR to greater heights.

Poh Soon, we're proud and honoured to have worked with you!

I don't know exactly what he'll do after this other than helping ISP with the International Conference and PORIM with the Programme Advisory Committee in the immediate term, but what I do know is that whatever he does, he will do on his own terms and will do it well.

I would also like to take this opportunity on behalf of the Company to express our appreciation and thanks to Chris and his two sons, Meng Ean and Ching Ean, who are Poh Soon's number one fans and supporters and vice versa and have been also our good friends.

Finally, we'd like to convey to Poh Soon and family our very best wishes and bid them good journey or Bon Voyage on their next part of their journey in life.

PLANTER'S TOOLBOX IN THE 21st CENTURY*

By P. H. C. Ng, P.S. Chew, K.J. Goh ,
H.H. Gan, and Y. C. Heng

ABSTRACT

In the new century, the plantation industry must improve its productivity and efficiency to remain profitable and sustainable. It appears that yields have stagnated at well below site yield potentials, principally due to managerial constraints. The latter includes the frequently quoted labour shortage and quality problems leading to inability to implement planting practices well and on time. This problem is compounded by the increased responsibilities of planters nowadays in terms of cultivated area, range and quantity of work but with reduced staff and worker resources compared to previously. The industry and planters have therefore to review and improve the current work systems, practices and tools where possible. The key factor in the industry's success to-date probably has been its bureaucratic organisation and structure, which enabled the extensive land areas, large labour force and field performances to be closely monitored. Loss of the ability to procure, analyze and monitor performance parameters would definitely jeopardize the control and action to respond to problems arising in the estates. Managing people and resources used to be the principal role of a planter. However, an effective planter nowadays has also to manage technology useful to his field. This paper discusses the available technologies, techniques and tools, which could significantly increase the productivity of planters and their estates, taking into account what they need and meeting these needs with available and future tools and technologies. The personal digital assistant (PDA) and use of information technology are vital to assist the planter in providing him the necessary knowledge and information required to plan, monitor and make sound decisions quickly. In view of scarce and expensive human resources, heavy responsibilities and the increasing estate sizes, better communication tools are also essential. With improved information and data analysis along with the possibility of translating these decisions into instructions quickly and precisely, the planter should be able to increase efficiency, productivity and profitability in his estate. The advances in management in future will depend on development of the necessary technology and systems and mastering of these technologies. The industry therefore needs to attract and retain talented and interested planters and other personnel who can master the new technologies to meet the tough challenges expected in future.

Key words: *Plantation management; information*

TOWARDS A PRACTICAL FRAMEWORK FOR LAND EVALUATION FOR OIL PALM IN THE 21ST CENTURY.

By Paramananthan, S.[1], Chew, P.S. and Goh, K.J. ([1]Param Agricultural Soil Survey Sdn. Bhd.)

Extended Abstract

Mankind has always depended on the land, either directly or indirectly for food, clothing and shelter. Inappropriate land use can lead to inefficient utilisation of natural resources, adverse environmental impact, poverty and other social problems. In fact, history has shown that many civilisations have disappeared because they overextended their demands on nature. Society must therefore ensure that land is not

degraded and it is used according to its capacity to satisfy human needs for present and future generations while also sustaining the earth's ecosystems. A prior step to proper land use is correct land evaluation technique that balances our increasing needs with the supply from nature in both time and space.

Land evaluation is the process of estimating the use potential of land on the basis of its attributes. Therefore, it is concerned with the assessment of land performance when used for specific purposes such as oil palm cultivation. Land evaluation for oil palm has traditionally been "pedocentric" since it is generally developed by soil scientists. Most of these systems only evaluate the climate and soil suitability for oil palm growth and production. Thus, land evaluation for oil palm becomes almost synonymous with soil suitability classification particularly in Malaysia.

New land that can still provide sufficient sustenance with minimal or no human manipulation to grow oil palm in a sustainable manner is getting scarce. Under this situation, suitable growing conditions have to be created by modification of the natural physical resources such as draining, fertilising and irrigation. This has caused some concerns in regard to the sustainability, environmental impact and even potential social problems in cultivating oil palms on the land. Thus land evaluation for oil palm must include measurements of these factors, which is the primary objective of this paper.

We propose a new practical framework for land evaluation for oil palm which incorporates the appraisal of environmental impact, social factors, infrastructure and economic criteria into our present soil suitability assessment. In this framework, the physical factors are assessed first followed by the environmental, social and economic factors.

The physical (P) factors are similar to the traditional soil suitability assessment. It primarily relates the climate and qualities of the land with oil palm production. Thus, it includes attributes such as rainfall, temperature, soil texture, structure, depth and chemical properties.

The Environmental (E) impact of oil palm cultivation is likely to be in the area of soil and water resources. Attributes which measure the hazard of soil erosion, landslides and sedimentation, and security of water supply and water quality within and beyond the planting area are included in the land evaluation scheme. Land that causes a negative environmental impact will receive a heavy penalty in the scoring system.

The analysis of social (S) change compares the present social situation with anticipated results of the conversion of the land to oil palm. The social factors include the population supporting capacity and displacement, basic needs such as food security and opportunity for employment, land tenure and customary rights, and community stability.

Cultivation of crops will not be sustainable without reasonable economic returns to the investment and the community as a whole. The economic and financial (F) analysis should include the income per capita (gross margin analysis), income per unit area, return on capital investment (e.g. benefit-cost ratio) and risk analysis.

The land suitability index (LSI) is then a function of the above four factors as follows:

$$LSI = f\,(w_pP \times w_eE \times w_sS \times w_fF)^{1/4}$$

where "w" is the relative weight of each main factor

The proposed framework for land evaluation for oil palm may seem to be data intensive and daunting but it reflects the needs to satisfy multiple objectives in the 21st century. Fortunately, most of the data required to assess the environmental and economic factors are obtained from the physical factor. Also, the use of new tools and technologies such as remote sensing, geographical information system, automatic monitoring sensors and computerised land evaluation systems will reduce the laborious and tedious task of data collection and interpretation.

A case study of the potential development of a jungle to oil

WATER CYCLING AND BALANCE IN MATURE OIL PALM AGROECOSYSTEM IN MALAYSIA.

By KK Kee, KJ Goh and PS Chew

ABSTRACT

Despite generally high annual precipitation, rainfall distribution is often uneven. In both East and West Malaysia, distinct climatic differences occur and periodic droughts lasting several months are not uncommon in some regions. Continued expansions of oil palm plantings into marginal drought prone areas in Malaysia and other oil palm growing areas and the recent severe El Nino experience, highlight the importance of rainfall and water conservation in oil palm plantations. Distinct differences in yield potentials and yield profiles have been reported for oil palm in the various climatic zones in Malaysia.

Research from AAR and published data on the various components and pathways of the water cycle in the mature oil palm ecosystem and their implications are discussed. Practices to improve water management and enhance the efficiency of water use and conservation are identified to improve performances of oil palm plantations.

Water balance computation for 3 climatic zones in Malaysia was carried out using data from 3 runoff trials. Results indicated that runoff accounted for about 22% of the annual rainfall in Sri Kunak Estate (Tawau, Sabah), in a zone with a short but fairly regular dry season. Nett surplus (percolation) was ~ 13%. The balance 65% was crop ET demand. In contrast for Balau Estate (Selangor) where there is no regular dry season, nearly 30% of the rainfall was lost as runoff and another 11% as deep

percolation. ET demand was 60% of annual precipitation. In Lepan Kabu Estate, representing a zone with a clear regular dry season, annual precipitation was high due to very high rainfall during the NE monsoon months. Runoff and deep percolation accounted for 32 and 28% of annual rainfall respectively. Both relative (%) and absolute crop ET demand were low compared to the other 2 zones. ET was limited by moisture stress during the dry season and reduced by excessive rain and lower water requirements during the wet season. These 2 factors combined to limit crop ET and thus also limit the crop potential yield in such an environment.

There is still a lack of field data to enable reliable estimates of the water balance for oil palm on upland soils. For improved assessment of oil palm water requirements and deficits, more research is required including the determination of deep drainage, runoff losses for various soils, slopes and the impact of management practices and vegetation on soil water. However, there are adequate results to show that under rainfed conditions, water conservation practices to reduce or minimise water losses via surface runoff and improvement of the soil water-holding capacity hold the most promise in improving water use efficiency and crop production in the oil palm system.

Key words: *evapotranspiration, moisture stress, oil palm, water balance.*

ADVANCES IN OIL PALM AGRONOMIC RECOMMENDATIONS

By T.F. Kok, K.J. Goh, P.S. Chew, H.H. Gan, Y.C. Heng, S.H. Tey & K.K. Kee

ABSTRACT

The site yield potential of oil palm can be realized only when all the correct agronomic and management decisions and practices are made and implemented. Therefore, even with the best management available, it is still a challenge to agronomists to fully exploit the site yield potentials by understanding the multidisciplinary site-specific factors involved and remove the constraints where possible. The recent advances in information technology and developments have enabled us to develop an agronomic recommendation system for oil palm estates to overcome most practical problems. This system, called AA AeGIS™ , includes a site yield potential (ASYP) model to compute the yield potential for each unique site; an integrated fertilizer recommendation system (INFERS) to provide a balanced nutrition for optimum growth and yield of oil palm; and the Best Months and Timing and Allocation of Fertilizer expert systems to schedule fertilizer applications at reduced risk of nutrient loss. We have also incorporated Global Positioning System (GPS) and Geographical Information System (GIS) to identify areas of interest quickly and accurately, and to display the relevant information spatially for better visualization. It also provides effective communications between the agronomist and estate manager. The historical agronomic records for each manuring block are stored in AA AeGIS™ Database for quick retrieval for effective and timely decision making. AA AeGIS™ also enables a desktop study to be made to prioritize the visit to "problem" fields and maximize time efficiency. It is possible now for an agronomist to make objective and site-specific decisions, and the manager to implement the recommendations with confidence. Thus, advances towards practical site-specific practices, higher productivity and sustainability in a large estate or group of estates have been made.

Key words:Malaysia, oil palm, site-specific practices,

DIGITAL ELEVATION MODEL (DEM) FOR MANAGEMENT IN PLANTATION CROPS

By S.H. Tey, K.J. Goh and P. S. Chew

EXTENDED SUMMARY

In Malaysia, extensive hilly lands have been developed into plantations and future cultivation of oil palms are likely to be on marginal lands e.g. peat swamps or hilly to steep terrain.

With increasing wages and limited human resources, increasing the production per unit land area through good management is essential for sustainability of the oil palm plantations. Besides other measures, this can be achieved through 1) Quick and accurate identification of specific under performing or poorly grown areas. 2) Good planting pattern on terraces to obtain best planting density and spacing. 3) Maintaining optimum density of road and mechanization paths for efficient crop evacuation and field operations as well as to minimise operation costs, and 4) Construction of good drainage system on poorly drained areas.

With the advent of computer and satellite technologies in positioning and imaging, the possibility of achieving the above through the use of remote sensing technique should be explored. Several studies to establish the relationships between oil palm canopy and its spectral responses have been initiated and are being conducted for palm growth assessment. Unfortunately, little progress has been made todate due primarily to difficulties in obtaining good quality images for analysis. Realizing the importance of remote sensing and its potential, AAR had, in 1994, begun to prepare the essential geo-referenced digital maps of its client estates. We updated our client estates' maps with GPS in 1996 and have recently begun to explore the potential of remote sensing with resources available now. This paper presents AAR's exploratory work on the possibilities of building the essential and reliable Digital Elevation Models (DEMs) by photogrammetric data capture technique and the production of high quality contours for planning of good planting terraces and

effective drainage system in oil palm estates.

A DEM is a digital representation of the relief of the earth's surface. The DEM data can be derived from a wide variety of sources including stereo-pair imagery, the digitisation of paper topographic maps and by laser scanning technology. A suitable and affordable geospatial analysis software called TNTmips from MicroImage, US was used in our evaluation. The essential ground control points were obtained with a Trimble ProXR GPS receiver and the results were analyzed and presented with MapInfo.

An orthoimage can first be created to complement the existing GPS mapping work in the estates by applying the elevation information from a DEM to the source imagery. Areas covered with thick canopies e.g. rubber and forest trees, permanent features and areas inaccessible to vehicles e.g. river and unplanted swamps, can be accurately mapped from the orthoimage.

Slope is known to have significant effects on the growth and yield of oil palms and other plantation crops. Efficiencies of fertilisers and field operations are reduced while erosion and run-off losses are increased as the slope increases. Slope data was generated from the DEMs and the accuracy of the estimated slopes was checked against the actual slope data obtained from the ground using a clinometer. A slope map was then produced for the computation of site yield potential and identification of areas susceptible to erosion and run-off losses. The possibility of using DEM to select Raja-lines and plan for terrace cutting to achieve the best possible planting density and spacing as well as to estimate the number of points for organistation of planting purposes was also explored.

Watershed analysis was performed to determine the extent of flood prone areas and possibly the best directions or outlets for discharging excess water with the available technologies and resources.
The stereo-pair aerial photos of the estates are readily available in Malaysia. These are mainly old photos but fairly suitable for DEM generation as the changes in terrain feature were unlikely to be significantly over the past 10 years or so in the plantations. However, these old photos are usually covered either by clouds or thick canopies that will greatly reduce the accuracy of the DEMs and limit their potential for further uses.

The major cost of investment in developing DEMs is in training on remote sensing and learning the software. Improved results can be expected using more accurate and recent stereo-pair photos of the cleared lands or Radar and Laser Altimetry, and Synthetic Aperture Radar (SAR) Interferometry. Cost will however increase greatly with quality of images and accuracy of results.

For our tropical countries, cloud coverage is common and will be a permanent restriction in getting quality satellite images for use. SAR may be the answer but the use may still be limited by high cost of image acquisition and inadequate image resolution in the near future.

In view of the benefits and advantages that we can obtain from high quality DEM and the potential of remote sensing technique for agronomic assessments and other

THE POTENTIAL OF LANDSAT TM REMOTE SENSING IMAGES FOR OIL PALM ESTATE MANAGEMENT

By JULIA MCMORROW[1] AND TEY SENG HENG

[1]School of Geography, University of Manchester, Manchester M13 9PL, UK

ABSTRACT

We assess the suitability of Landsat Thematic Mapper (TM) satellite images for oil palm management at estate level and review possible roles for remote sensing in the palm oil industry. Primary objectives are (a) to investigate the extent to which between and within-block variations can be visually detected on Landsat TM images, and (b) to discuss their causes and practical implications.

TM radiance (brightness) for two Malaysian oil palm estates varies between and within blocks due to real biophysical properties and to unwanted sensor and topographic noise. The most useful bands for visual interpretation are TM3 (red), TM4 (near infrared) and TM5 (short-wave infrared, SWIR). Age explains up to 90% of between-block variation in brightness but after year ten, it becomes difficult to differentiate between blocks. Unlike arable crops, radiance is negatively correlated with stand age in all bands (r 0.61-0.95, $p<0.01$), especially in SWIR bands 5 and 7. Variations in planting density of 125 to 140 palms per hectare had little effect on radiance. Block leaf area index (LAI) is positively correlated with mean block radiance, but ground cover LAI and type and topography are a significant cause of variation within blocks. LAI-radiance relationships should be investigated at plot scale. Ground cover as well as tree leaf area need to be recorded. Images should be topographically corrected, prefrably with a digital elevation model to reduce noise due to differential illumination. Trends remaining are potential information for precision crop management, although it is not possible to diagnose the cause of anomalies. TM's spectral range (visible to SWIR) is appropriate but its 30 m spatial resolution restricts minimum size of stands detectable to 1 ha (3x3 pixels), depending on image contrast. Ikonos and SPOT-4 HRVIR images should also be evaluated.

Key words

Satellite images, Remote sensing, image interpretation, Landsat Thematic Mapper, leaf area index, oil palm age.

1999 AAR SPORTS CLUB HIGHLIGHTS

This year, AAR Sports Club organised the following main events:

a) Annual Trip to Pangkor Island/Lumut/Ipoh
b) Family Day
c) Annual Dinner

The annual excursion, which coincided with the school holidays (28th to 30th May 1999) was attended by about 80 participants. Besides sightseeing and island hopping, most of the members had a gala time shopping for seafood, fruits and etc. Another interesting event for the year was the AAR Family Day held at the office compound on 5th June 1999 where members and their families let down their hair in games and indulged themselves with the variety of food.

The event of the year was the much anticipated Annual Dinner 1999 with the theme : "Malam Aneka Ragam". Approximately 300 members, including their family members turned up to enjoy the sumptious dinner and entertained by a professional MC and talented AAR staff members. The night kicked off with a very moving speech by our outgoing Head of Agricultural Research, Mr. Chew Poh Soon who received a standing ovation. After the various awards were presented, entertainment began. It started with an Indian dance followed by Dikir Barat and then more dances followed. Everybody enjoyed the occasion. The highlight of the night was a solo performance by our Mr. Chan Weng Hoong with his enchanting and romantic tune of "Unchained Melody" on his harmonica.

Other events organised by the Sports Club during the year include the Deepavali Durian Fest and AAR Badminton and Football tournaments.

The Committee would like to thank everyone who had contributed both in kind and deed and for all the

AAR's Cocoa Team vs elephants (left) from Taman Negara. AAR won!!!

Our future champions !

Durian Party at AAR

Children having a great time

Patrick Ng and Shahrakbah

1999 ANNUAL DINNER ROLL OF HONOUR

a) Top Student Award for 1998		
Exam/	**Student**	**Employee**
UPSR (3A)	Mohd Izwan Affandy bin	Rosita Mohd Akhir (T.C. Lab)

b) Reward for No Sick Leave/	
Main Office	a) Roslan Mohd@Ariffin
Main Office	a) Norani Mohd Said b) Zurinawati Awang Saad
Caterer	a) Alatipah Husin
Tissue Culture Lab.	a) Jariah Kasmat b) Noraini Ismail
Balau	a) Rosli Hamzah
Paloh	a) Taliu bin Mudah
Batu Lintang	a) Tuan Asmadi bin Tuan Ya

c) Team Effort Award
Jamaludin bin Mohd
Mazlan Mamat
Mohd Fairuz Mohd
Samsuddin Saleh
Rahman Sihing
Khamis Ambo Sappe
Faizul Ibrahim
Saruddin Selamat
Norani Mohd Said
Lynda Anne LourdesNathan
Nora bte Anuar
Umi Kalsum bte Sabran

PROMOTIONS

Names	**Section**	**Designation**
Norimah Mohd	**Tissue Culture**	**Gr. II Res. Asst.**
Jariah Kasmat	**Tissue Culture**	**Gr. III Res. Asst.**
Nagamah Suppiah	**Seed Production**	**Gr. II Res. Asst.**
Mohd Roslan	**Field**	**Gr. II Res. Asst.**
P. Selvam	**Balau**	**Gr. III Res. Asst.**
Rosli Hamzah	**Balau**	**Gr. III Res. Asst.**
Minin Bin Tuboh	**KDC**	**Gr. II Res. Asst.**

RECRUITMENTS

Name	**Date Joined**	**Designation**
Anuradha D/O Uthaya Kamaran	**1/11/99**	**Grade III Gen. Clerk**
Dr. Ang Ba Na	**3/1/2000**	**Agronomist**

d) Employee of the Year Award
Nor Aini bte Abdul Latif (T.C.Lab.)
Taliu bin Mudah (AAR Paloh)
Tuan Asmadi bin Tuan Ya (Bt.Lintang)
Ramesh a/l Balachena (S.P.Lab.)
Zurinawati Awang Saad (Main Office)
Vijaya Kumary a/p Poosari (Main Office)
e) Welfare Award
Shanmugam a/l Paikery (Balau)
Mohkan a/l Sivaperumal (Main Office)
Swaminathan a/l Selvadas (Main Office)
f) Initiative Award
Samsuddin Saleh
g) Service Award (10 years & Above)
Masitta Ramli (T.C. Lab.) Date joined 03/01/89
Norani Mohd Said (Main Office) Date joined 08/04/89

Chen, K.C.

Poh Soon and his mentor

Happy retirement ! Poh Soon and his

Poh Soon's farewell party

A Prototype Oil Palm Trunk "Mulcher" under Evaluation on Tuan Mee Estate

Rotating drum fitted with many small "knives" attached to the excavator boom.

Shredding a standing palm.

Initial results

- Able to shred a palm trunk into fine pieces in 8 to 10 minutes. The projected lifespan of the "knives" is 1000 palms.
- Good potential for land clearing in no-burn tecnique for oil palm to oil palm replanting.
- Hasten decomposition of palm biomass and hence reduce breeding of *Oryctes rhinoceros* beetles.

Shredded palm trunk chips (cigarette lighter on top).

Ooi, L.H.