April 2005

AAR-NEWS

E D I T O R I A L

Greetings for 2005! May you grow wiser each year!

Interest in rubber has recently resurfaced mildly as price of the commodity and especially rubberwood has escalated. The average price per kg of SMR CV has moved up from RM3.50 in 2002 to RM 4.50 in 2003, RM 5.50 in 2004 and appears likely to breach the RM 6.00 mark in 2005. Global demand for the commodity is set to exceed supply over the next decade as economies expand in China and India as reported in the International Rubber Research and Development Board Conference held in Kunming, China in September 2004. Owing to the high demand for rubber, rate of replanting of trees has reduced slightly, whilst downstream demand for furniture manufactured from rubberwood continues to grow at a steady pace. As a result of this imbalance in supply and demand of rubberwood, price of rubber trees at replanting has leaped to above RM 20,000 per hectare. This exceeds the cost of replanting rubber to maturity, implying zero cost at time of opening of the trees for rubber to rubber replants.

In view of the above, it may be worthwhile to consider returning to rubber in steep terrain and dry areas where oil palms have not yielded well. Rubber trees with their deeper root system, are able to withstand harsher conditions than oil palms. Hurrah for the dying breed of rubber agronomists!

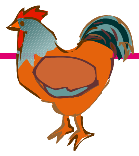
With the advancement in Information Technology, many self- help devices have surfaced in the market. Our computer buffs, Tey Seng Heng and Heng Yong Choon advocate the use of the user-friendly Mobile GIS to enhance field management.

Finally our newest recruit, Dr. Goh You Keng has been given the daunting task of looking into the dreaded Ganoderma problem in oil palm. He has written a short note on the disease as a prelude to his awesome task!

Happy reading!

Chan,W.H.

Inside this issue:



Use of Mobile GIS to enhance estate management
By Tey Seng Heng & Heng Yong Choon

Introduction

In Malaysia, a single oil palm estate typically covers several hundred to a few thousand hectares of land. However, there seems to be a trend towards larger development in Indonesia lately with complexes that spread across several thousands of hectares of land in a single project. Proper maps are therefore indispensable for efficient management of estates.

Technological advancements have not only changed the way maps are produced but have also greatly increased the usefulness of maps in plantation. The advent of computing technology has enabled maps to be produced from satellite, digitized and kept in computers. This has enabled maps to be corrected, updated and reproduced easily and conveniently. The greatest advantages of digital mapping are the flexibility in scale and reproduction capability. In a digital format, maps of various scales and sizes from various sources can also be superimposed, allowing available information on soil, land use, terrain condition etc. to be quickly and precisely retrieved.

Digital maps that were scanned or digitized without a true ground reference are currently limited in use. In recent years, GPS (Global Positioning System) has been used by a few large plantation groups for mapping their estates (Tey et. al. 1997). To-date, BEA and KLK are among the very few plantation groups that have had all their estates digitally mapped using a GPS to a true worldwide ground reference system know as World Geodetic System 84 (WGS84). The unique advantage of a geo-referenced digital map is that it allows real-time navigation in the fields. Thus immediate positions and movements on the ground are instantly displayed and revealed on the maps. Important features and events can therefore be accurately and permanently recorded on a map for reference. Problems associated with identification of field and property boundaries will no longer exist. All this can now be achieved with the aid of an affordable GPS-enabled PDA (Personal Digital Assistant) known as Mobile GIS, a system that will stimulate interest to expand control and management skills beyond the conventional style in estates.

What is Mobile GIS?

Required changes and updates of features and information on an estate map are usually made using temporary sketches and notes scribbled on paper maps and then manually edited back in the office for reproduction either by printing or photocopying (for those who do not maintain their maps in a digital format). This can lead to inaccuracy, loss of important details and delays in decision-making.

In the plantation sector, the GPS system was introduced in the early 1990s whereby locality and movement on the ground can instantly be revealed and recorded. Accurate digital maps that can be updated and reproduced quickly have since been produced. Advances in computer technology have resulted in the introduction of the Mobile GIS, a system that integrates the unique functions of a Pocket PC and a Pocket GPS, enhancing the usefulness of our digital maps and GIS database. The most useful function of a Mobile GIS is that it allows digital estate maps to be brought into the fields, instantly displaying positions in relation to the fields and also enabling access to or update of useful information while on the move.

Potential Uses

Some of the uses of a Mobile GIS are :-

- It allows instant access to important information and data on estate fields.
- It provides an option to record location-based observations and information on features and events for future reference.
- Quick surveys can be conducted to determine sizes of land parcels without having to engage costly land survey.
- Location of nutrient deficiencies can be demarcated and recorded and corrective measures taken and changes/improvements monitored over time.
- Positions of broken bridges for repair/maintenance, location of uncollected crops, diseased palms, pest infestation, flood prone areas, damaged roads, weed infestation, areas identified for EFB mulching etc. can be highlighted.
- New routes can be planned, layout of drains and lay pegs along the proposed routes and new drainage network marked out for final evaluation prior to construction.

System Components

To set up a Mobile GIS, an accurate geo-referenced digital map of the estates is required initially. Estate maps which have already been accurately digitized and correctly geo-referenced can benefit from the technology immediately. Many may have already owned a basic Pocket PC and may likely have invested in a Bluetooth compatible Pocket PC/phone hybrid. With an additional investment of around RM 700 for a Pocket GPS, Pocket PC can be converted into an intelligent Mobile GIS, taking advantage of the advent in wireless telecommunication and the ever-advancing GPS technology. However, computing technology is changing fast and relevant tools or gadgets can become obsolete fast. It will therefore be worthwhile to have a look at the system components, requirements and the products available in the market carefully before investing to avoid disappointment. The following review hopefully can shed some light and assist in making the best possible decision to optimize investment.

Pocket PC

A Pocket PC (Figure 1) is referred to as a Window CE, Palm OS or Symbian mobile-based handheld personal computer.

Among the common Pocket PCs available in the market are products from HP (iPAQ Series), PalmOne, Sony (Clie Series), (Dell (Axim Series), ASUS (MyPal Series) etc. Most of the Pocket PCs use Window CE as the platform while the PalmOne and Sony Clie Series are the only two products running on Palm OS. Symbian is only popular among the PDA users in Europe at the moment.

In general, the Palm OS-based PalmOne may be cheaper and more stable but provides less functionality than a Window CE-based Pocket PC. However, the latter appears to be more popular and should stand out in terms of compatibility and expects to enjoy similar preferences accorded to Windows-based PC against Macintosh.

For GPS navigation, software compatibility and availability do count and therefore Window CE-based Pocket PC is also recommended. The CF-based (Compact-Flash Card) Pocket PC, which is expected to become obsolete soon should be ignored and a newer Bluetooth-enabled device should be chosen.

Just for navigation, it will be sufficient to get a compatible Pocket PC (either Bluetooth-enabled or built in CF-slot) that costs around RM 1000 to RM 1500. Most Pocket PCs will have sufficient memory for typical use but it is advisable to opt for an expandable one, which allows the use of memory expansion cards when required. A high-end Pocket PC/phone hybrid with a good built-in digital camera and a cell phone for between RM 2600 to RM 3600 (depends largely on the memory capacity, processor speed and battery power) for personal use may also be considered for additional advantages.

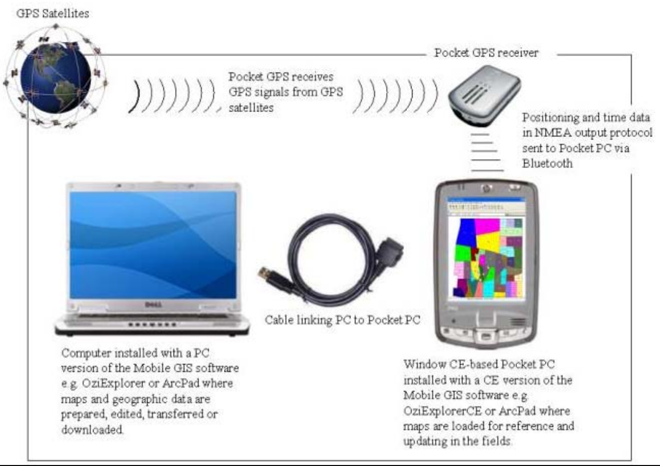


Figure 1. Basic components of a Mobile GIS

Pocket GPS

CF-based (Compact-Flash) Pocket GPS receiver was common when Pocket GPS was first introduced (Figure 2). However it has quickly been replaced with Bluetooth compatible Pocket GPS and is expected to become obsolete soon. The advantage of a CF-based Pocket GPS is that no battery is required as it draws power from the Pocket PC when slotted. However this will quickly deplete the battery power of the Pocket PC itself. Using a CF-based Pocket GPS receiver, the Pocket PC should be appropriately held (in front of the car windscreen or outside window) for the attached GPS to

Figure 2. A CF-based PCMCIA Type II Pocket GPS receiver

receive adequate signals. In a vehicle, external antenna may be attached to overcome weak signal problems but this could be cumbersome.

With a Bluetooth GPS receiver (Figure 1), the receiver will have its' own built-in battery (disposable or rechargeable) and can be placed in front of a car dashboard or on the car rooftop (with a magnetic mount) and free the user from having to hold and expose the GPS receiver in an opened space in order to get adequate signals. It is therefore more suitable for use in vehicles. The only drawback of a Bluetooth GPS receiver is that its battery has to be replaced or charged up from time to time (if rechargeable battery is used). A plus point however is that both the Pocket PC and Bluetooth GPS receiver can be recharged via a car cigarette lighter adapter.

There are many types of Bluetooth compatible GPS receivers in the market but only few are available in Malaysia. Pretec was one of the most reliable products tested so far in plantation environments but it is relatively more expensive (~RM 1000) and the local distributor in Malaysia has apparently stopped marketing it due to poor demand. Holux and Ambicom, costing below RM 750 are another two reliable but cheaper products being marketed by only a few independent IT distributor in Malaysia. The latest Holux GR-231 is very sensitive to GPS signals (upgraded with the latest XTrac 2.0.2software), extremely low in battery power consumption and is housed in a robust casing. It was found to work reasonably well in heavily shaded estate conditions and is therefore recommended.

Geo-referenced Digital Estate Map

A geo-referenced map is a raster or vector digital image that has coordinates conforming geographically to the real world locations on the earth. A geo-referenced digital estate map must first be prepared and loaded into the Pocket PC to serve as the background image for navigation. Without a background map image, only the positions and movements on the screen of the Pocket PC may be seen without knowing the positions in relation to the set location (e.g. fields in the estate). Geo-referenced digital maps of estates were produced about 10 years ago using GPS receiver and currently most of the maps of TPSB and BEA estates have already been geo-referenced to between 2 to 5 m accuracy. The maps are being updated to lower than 2 m in position accuracy from time to time and are readily available in digital form for distribution and use.

Mobile GIS Software

Finally, a software should be installed in the Pocket PC to communicate with the Pocket GPS receiver for display of the background maps and set positions on the screen. Many such software are now available, ranging form a simple navigation software such as OziExplorer that costs below RM 500 to some that costs above RM 3000 which will allow you to collect data, update your map and survey the areas of interest on the ground (e.g. ArcPad) and also packed with GIS database and features for Variable Rate Application (e.g. Farm Site Mate).

Figure 1 presents the hardware components of a Mobile GIS. Examples of some applications in the plantations using OziExplorer are given in Figure 3.

Similar systems can also be used for navigation in any town in the world as long as the geo-referenced digital maps of the town are available in a format (which are fairly standard currently and can be obtained through the Internet) compatible with your Mobile GIS.

Conclusion

Mobile GIS is no doubt still new to the plantation sector but the components of the system are getting more apparent and readily available. Many industries are gaining a better understanding of how mobile GIS can be used to increase their productivity and effectiveness. Among those expected to benefit from the system are the environmentalists, mariners, law enforcers, foresters, tourists, politicians etc. It should be useful to the oil palm planter who has to deal with several thousand hectares of crop worth over RM 50,000/ha across variable topography, geological regions, soil types and growing conditions.

In terms of accuracy, a major upgrade by the vendors will take place between 2005 and 2008. Upon completion, general users of GIS can expect accuracy of 1 m; which will definitely simplify and greatly reduce the cost of land surveying work and boost the usefulness of Mobile GIS.

A more advanced Mobile GIS that integrates Wide Area Protocol (WAP) and WiFi for real-time data access and update of map features via GSM (Global System for Mobile Communication) or GPRS (General Package Radio Service) in the fields will soon become a standard feature of Mobile GIS. However, while wireless technology will increase the usefulness of mobile GIS in the future, it is not an essential component for the successful operation of mobile GIS currently.

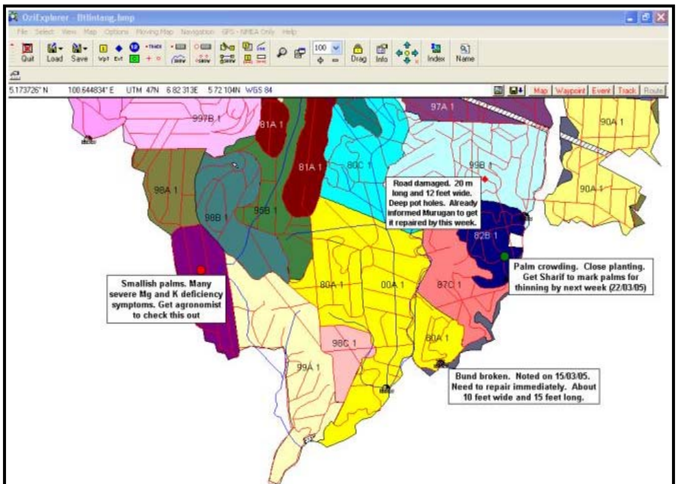


Figure 3. An example of the interface of OziExplorer showing observations and events recorded with a Mobile GIS, including the locations and dates of observation made in the field.

Current Understanding of Basal Stem Rot Infection
By Goh You Keng

Basal stem rot (BSR) is the most significant yield limiting disease in the Malaysian and Indonesian oil palm industry (Singh, 1990; Turner, 1981). In Malaysia, the disease is mainly caused by the fungus *Ganoderma boninense* but, *G. miniatocinctum* and *G. zonatum* have also been found in diseased palms (Idris et al., 2000). Much is unknown about the biology and the spread of the disease although the disease was first reported in Malaysia in the early 1930s. The disease was confined mainly to palms older than 25 years until the mid-1950s, when it started attacking 10 to 15-yr-old palms (Turner, 1981). Infection on palms as early as 1-2 years after planting has been observed more recently (Singh, 1990). Once considered a problem only in the coastal marine clay areas of western Peninsula Malaysia (Navaratnam, 1964), the disease is now frequently found in coastal (Khairudin, 1990), peat, and localized inland soils (Ariffin et al., 1989; Rao, 1990).

BSR is thought to spread mainly by root-to-root contact within a field, primarily based on the anecdotal evidence that the disease occurs loosely in patches of palms (Hashim, 1994; Singh, 1990). Stumps and roots are thought to be the primary sources of infection (inocula) for the disease. Palms planted in/around excavated diseased stump areas had low disease incidence but high incidence occurred where palms were planted in/around areas where stumps had not been removed (Ariffin and Idris, 2002; Khairudin, 1990). However, the root-to-root spread theory recently has been confronted by recently available information.

DNA analyses (Miller 1995) and vegetative-compatibility-group (VCG, a group of individuals that are compatible and capable of fusing their hyphae) studies (Ariffin et al., 1996) showed that neighboring or even individual palms could be infected by different individuals of the fungus, each having different genetic composition. If the spread is root-to-root, then its genetic composition should be uniform, since each individual spreads out from one focal point to infect neighbouring palms. One explanation could be that the diverse individuals were there in the first place. Therefore, the diversity detected in the current oil palm system is a reflection of the diversity of the initial population. However, this cannot be ascertained without the diversity data prior to the current planting.

Another complication in understanding the spread of the fungus is its detection in healthy palms that are without apparent infection symptoms. In a census, *Ganoderma* was detected in 16% of healthy palms (Ariffin et al., 1993). Also, *G. boninense* can be detected (using molecular technique, PCR) in 10-15% of frond bases (Bridge et al., 2001). It seems logical to assume that they originated from basidiospores since the palms were without any trunk or root symptoms (Bridge et al., 2001). Furthermore, the fungus is also the purported causal agent of upper stem rot (USR), which is not linked to BSR and does not show trunk or root symptoms (Flood et al., 2002). Though appearing to fault basidiospores for these observations, such assumption can be flawed since the presence of above ground fungal materials does not prove they originate from basidiospores.

Various attempts to infect oil palms directly with basidiospores were unsuccessful (Bah Lias Research Station, 1997 and 2000; Flood et al., 2002). Indirect infection using rubber wood and oil palm blocks (substrates) colonized by only selective *G. boninense* mycelia, before being placed under young seedlings, was capable of causing infection (Hassan and Flood, 2003). Individual monokaryotic (n, single nucleus) mycelia derived from single basidiospores were capable of colonizing the substrates but incapable of infection. When two individual monokaryotic mycelia which are compatible (therefore, belonging to the same VCG) occur at the same time and space, plasmogamy (fusion of the hyphae) takes place, generating dikaryotic (having 2 nuclei [n + n], each originating from separate sources) mycelia (Figure 1). These dikaryotic mycelia can then either continue to colonize dead tissues (saprophytic life cycle) or infect healthy palms (pathogenic life cycle). Each life cycle is effectively completed when the fungus produces fruiting bodies and basidiospores (Figure 1).

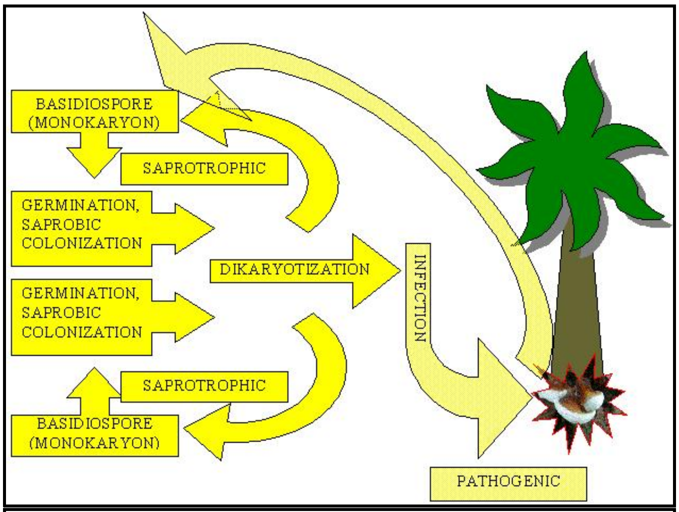


Figure 1. Proposed life cycle of *Ganoderma boninense* in relation to BSR, based on Hasan and Flood (2003), re-drawn by AARSB

Based on Hassan and Flood's (2003) study, *G. boninense* derived from individual basidiospores appears capable only of colonizing dead tissues. Another individual of the same VCG is required before fusion can occur to generate dikaryotic mycelia. Only then can the fungus infect its living host. VCG studies of individuals collected from 40 infected palms in a 6 ha. area showed that the individuals were rarely compatible (9 out of 780 possible combinations) (Ariffin et al., 1996). Thus, chances for dikaryotization occurrence, even within the same field, does not appear to be high. Basidiospores blown in from elsewhere could provide the means for encountering compatible mycelia. This model of life cycle, if verified and proven to be true for *G. boninense*, can help explain a number of phenomena. Firstly, it can explain the genetic diversity of the fungus that are found in nearby palms as it needs to encounter compatible individuals before fusion of their hyphae can take place. Only then does infection of host tissues occur. This also explains why it sometimes takes a long time before the disease becomes evident in the field. Finally, it explains why the fungus can be detected on healthy palms that do not show any visible symptoms. Such fungal material could be monokaryotic and thus living saprophytically on dead tissues on palm exterior. A survey on isolates collected from healthy palms can verify the validity of this explanation.

For most biological systems, diverse factors may be involved in any particular event. In the case of BSR spread, root-to-root contact and basidiospores probably play important roles at different points in time. It is of utmost importance to understand the biology of the pathogen and the epidemiology of the disease in order to devise a plan to manage the problem. The life cycle study of *G. boninense* by Hassan and Flood (2003) is by far the most appealing in the understanding of its biology and disease epidemiology. Swift verification of the study is needed to ensure the phenomenon is applicable to other areas affected by the pathogen. Only then can recommendations be made to bring the disease threat below the economic threshold.

Figure 2. Basal stem rot caused the collapse of an eight-year-old palm.

Figure 3. Basidiocarp (fruiting body) of *Ganoderma boninense* at the base of a severely infected palm

References

Ariffin, D. 1996. Current status of *Ganoderma* research in PORIM. In: *Proceedings of the 1st International Workshop on Perennial Crop Diseases Caused by* Ganoderma. 28 November – 3 December 1994. Serdang, Malaysia: UPM. Wallingford, UK: CAB International.

Ariffin, D. and Idris, A.S. 2002. Progress and research on *Ganoderma* basal stem rot of oil palm. Paper presented in the Seminar Recent Progress in the Management of Peat and *Ganoderma*. 6-7 May 2002. MPOB, Bangi. 50 pp.

Ariffin, D., Idris, A.S., and Azahari, M. 1996. Spread of *Ganoderma boninense* and vegetative compatibility studies of palm isolates in a single field. In: *Proceedings of the 1996 PORIM International Palm Oil Congress- Competitiveness for the 21st Century*. Ariffin et al. eds. PORIM, Malaysia.

Ariffin D., Idris, A.S., and Khairudin, H. 1993. Confirmation of *Ganoderma* infected palm by drilling technique. In: *Proceedings of the 1993 PORIM International Palm Oil Congress "Update and Vision" (Agriculture), 20-25 September, 1993*. Jalani et al. eds. pp 735-738. Palm Oil Research Institute of Malaysia, Bangi, Selangor, Malaysia.

Bah Lias Research Station. 1997. Annual Report. Pp 168-169.

Bah Lias Research Station. 2000. Annual Report. Pp 247-248.

Bridge, P., Pancahl, G., Sanderson, F., and Pilotti, C. 2001. Environmental sampling for *Ganoderma* in oil palm: a molecular tool for elucidating epidemiology. In: *Proceedings of the 2001 PIPOC International Palm Oil Congress. Cutting Edge Technologies for Sustained Competitiveness*. Kuala Lumpur. August 2001. MPOB. 734 Pages. Pp 649-652.

Flood, J., Hasan, Y., and Foster, H. 2002. *Ganoderma* diseases of oil palm- an interpretation from Bah Lias Research Station. The Planter 78(921):689-710.

Hasan, Y. and Flood, J. 2003. Colonisation of rubber wood and oil palm blocks by monokaryons and dikaryons of *Ganoderma boninense*- implications to infection in the field. The Planter 79(922):31-38.

Hashim, K.B. 1994. Basal stem rot of oil palm caused by *Ganoderma boninense*- an update. In: *Proceedings of the PORIM International Palm Oil Congress- update and revision*. Sukaimi et al. eds. PORIM. Malaysia.

Idris, A.S. and Ariffin, D. 2004. Basal stem rot- biology, detection, and control. In: *International Conference on Pests and Diseases of Importance to the Oil Palm Industry. Fostering Global Cooperation in Instituting Quarantine Shield. 18-19 May 2004. Mutiara Hotel, Kuala Lumpur, Malaysia. MPOB.*

Idris, A.S., Ariffin, D., Swinburne, T.R., and Watt, T.A. 2000. The identity of *Ganoderma* species responsible for basal stem rot (BSR) disease of oil palm in Malaysia- morphological characteristics. MPOB Information Series No. 102, MPOB TT No. 77a, August, 2000. 4pp.

Khairudin, H. 1990. Results of four trials on *Ganoderma* basal stem rot of oil palm in Golden Hope estates. In: *Proceedings of the* Ganoderma *Workshop. 11 September 1990*. Ariffin, D. and Jalani, B.S. eds. p. 67-80; 113-131. PORIM, Bangi., Selangor, Malaysia.

Miller, R.N.G. 1995. The characterization of *Ganoderma* populations in oil palm cropping systems. Reading, U.K. University of Reading. Ph.D. Thesis.

Navaratnam, S.J. 1964. Basal stem rot of oil palm on ex-coconut states. The Planter 40:256-259.

Rao, A.K. 1990. Basal stem rot (*Ganoderma*) in oil palm smallholdings- IADP Johore Barat experience. In: *Proceedings of the Ganoderma Workshop*, Ariffin, D. and Jalani, S. eds. 11 September 1990. Palm Oil Research Institute of Malaysia, Bangi, Selangor, Malaysia. Pp. 113-131.

Singh, G. 1990. *Ganoderma*- The scourge of oil palms in the coastal areas. In: *Proceedings of* Ganoderma *Workshop*, Ariffin A., Sukaimi, J. eds. Bangi, Selangor, Malaysia, 11 September, 1990. Kuala Lumpur, Malaysia: Palm Oil Research Institute of Malaysia, pp. 7-35.

Turner, P.D. 1981. Oil Palm Diseases and Disorders. Oxford University Press, Kuala Lumpur, Malaysia. pp 88-110.

Highlights of International Rubber Research and Development Board (IRRDB) Conference in Kunming, China (6-12 September 2004) By Chan Weng Hoong

The IRRDB Conference, an annual closed door government to government meeting among rubber growing countries, was opened to the private sector in 2003. In 2004 the Conference was held in Kunming, China from 6-12 September.

Around 200 delegates from China, Malaysia, Thailand, Indonesia, Sri Lanka, India, Vietnam, Kampuchea, France Nigeria, Philippines and Brazil attended the conference.

The theme of the Conference was `Natural Rubber Industry: Responding to Globilisation`.

The Conference proper was divided into

a) 3 Plenary sessions on the first day,
b) 4 parallel sessions on the second day
c) an overnight field visit to state farms in Jinhong prefecture located slightly north of the Indochinese border.

Highlights of Conference

1. Prospects of Natural Rubber (NR)

According to the International Rubber Study Group, current and future growth of both NR and SR(synthetic rubber) appears healthy. The future demand for NR appears well secured by the global tyre industry. The long term supply however appears uncertain due to reduced replanting/ new planting caused by prolonged weak prices in the past.
Consumption of NR is projected to increase to 18.0 million

tons by 2035 and based on current production status of around 8.0 million tons (2003 ~ 7.86 million tons), appears unlikely to meet the demand for NR. Outlook for rubber (both latex and wood) therefore appears extremely optimistic.

2. Globalization: Plant Quarantine and South American Leaf Blight (SALB)

The threat of SALB due to the rapid expansion of International Trade links was highlighted . Many Central and South American countries desire to penetrate the Asean markets, thereby increasing the threat of introducing spores of the deadly disease into these countries. In some of these Asean countries, rubber constitutes only a small percentage of their GDP, and therefore may not provide sufficient preventive measures against entry of the disease. Thailand for example, has a well developed tourism industry and the author of the paper observed a noticeable lackadaisical attitude towards joint effort in SALB control through strict plant quarantine measures. Overall the conference called for greater vigilance against entry of SALB into rubber growing countries.

3. Exploitation

Several papers evaluated low frequency tapping systems cum stimulation on clones GT1, PB86, RRIM 600 and PR107, considered outdated in Malaysia. The results obtained may be considered `old hat` as Malaysia evaluated such systems on these old clones some 20-25 years ago.

4. Tree Panel Dryness (TPD)

Several papers on TPD were presented. Causes identified for increase in tree dryness were accumulation of stress due to moisture deficits, overstimulation and soil compaction. Much research work on the physiology and cytology of latex vessels of dry trees were carried out by Chinese and French scientists.

A researcher reported high dryness on late starter clones, GT1, RRIM 600 in India which is a cause of concern as these clones have a lower propensity to dryness. Incidence of dryness were 7-10 percent on panels BO1/BO2 and 20 percent on B11. The author identified excessive use of ethephon as the cause of the high dryness.

5. Breeding

In China, clones are mainly bred for tolerance to cold and strong winds.

Currently the most popular clone in India is RRII 105, which however has been evaluated to not perform well in Malaysia. Overall, the most popular clones in China, India, Thailand, Vietnam and Cambodia are RRIM 600, GT1, PR107 and PB 86.

AAR`s paper on RRIM 2000 series clones was well received.

6. Field trip to Jinhong state farms

The main clones planted in China are,

GT1 - 40%
RRIM 600 - 35%
PR107 - 7%
PB 86 - 5%

Exploitation of rubber is carried out only 8-9 months of the year with no tapping in the wintering and refoliation months when rainfall is little to nil. During the farm visit, yields of around 2000 kg per ha per year was mentioned for GT1 tapped on two cuts with stimulation.

For the whole of China, a yield of around 800-900 kg per ha per year was computed based on statistics provided in a keynote address.

7. Overall impression

Technically, Malaysia still leads other rubber growing countries in research and management of rubber including breeding, agronomy and exploitation of the crop. However whilst research in Malaysia is slowing down, countries like China, India and Thailand are expanding their research programmes. With their many scientists working on the crop, other countries are likely to catch up with Malaysia in the near future.

Special advisory note on production of budsticks from mature rubber trees By Chan Weng Hoong

Budsticks are normally obtained from source bushes established 1 year earlier from 2 whorled buddings. The source bushes are usually carefully marked and labelled to prevent any possible mistakes in budding the wrong clone.

Budsticks may also be harvested from young immature fields where source bushes have inadvertently been destroyed or supply of budsticks from source bushes is insufficient.

Choice of clone changes with time and every now and then some very high yielding clones albeit planted in small blocks, may have been overlooked. Usually the source bushes of such clones would have been overbudded with some other clones so that their budsticks are no longer available.

Budsticks of such clones may usually still be obtained from either Golden Hope (Prang Besar clones) or the Rubber Research Institute of Malaysia (RRIM clones), albeit at a price.

However if time is of the essence, a simple and less expensive method is to obtain the budsticks from the mature stand of the desired clones.

Assuming budsticks of clone X is required, the following steps should be taken,

1) Request the RRIM to send their clone inspector to authenticate the clone. The inspector would usually advise the estate to select an area where the clone is exposed to sunlight e. g. ex wind-damage, section with vacancies. Boundary trees lining both sides of the road and exposed to the sun are also suitable. Having selected the site, the inspector would mark out trees which are **non clone X** with paint, leaving unmarked trees **(clone X)** for collection of budsticks.

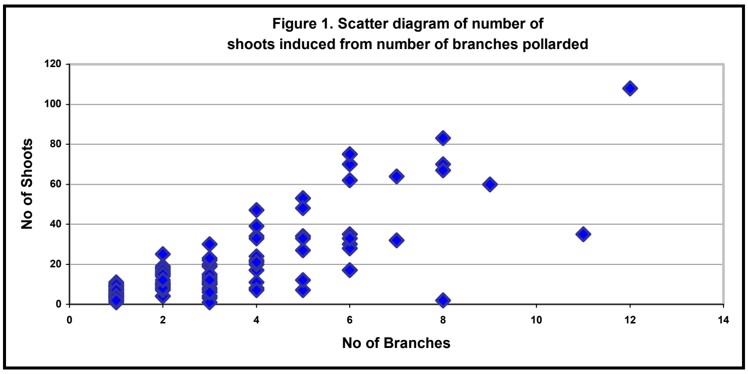
2) A worker with a sharp saw climbs up the tree and pollards the branches as near to the distal end as possibly safe for him. A long pole with a sharp saw may also be employed. The correct technique of pollarding is important so as to avoid branch tearing. The lower part of the branch should initially be lightly cut at an angle. Thereafter the top section should be sawn to meet the lower cut. On meeting, the branch breaks off smoothly, without damage to the subtending branch.

3) Two to three main branches should be left unpollarded to continue with the photosynthetic process.

Buds begin to sprout about 2-4 weeks after pollarding. Two months after pollarding, mature shoots (budsticks) would be available for harvesting.

In a recent exercise to obtain budsticks in this manner, the number of shoots obtained correlated well with the number of branches pollarded per tree (Figure 1).

The highest number at 108 shoots was obtained from pollarding the highest number of branches (12) per tree (Pictures). It was observed that sprouting of shoots was poor to nil where pollarding was carried out on shaded trees away from the road.



SOCIAL AND PERSONAL

AARSB RO's Cookout - Chef Ooi in action

AARSB 2004 Annual Dinner.
The new generation of Ros - beauty with brains.

CONGRATULATIONS!

PROMOTIONS

No.	Name	Promoted to
1.	Patrick Ng Hong Chuan	Res.Officer
2.	Arif Sugandi	Res.Officer
3.	Heriansyah	Res.Officer
4.	Samsuddin Bin Saleh	Res.Asst.(SG)
5.	Kumar a/l Krishnan	Res.Asst.(SG)
6.	Bacho Bin Ambo Sappe	Res.Asst.(SG)
7.	Isnine Bin Norhasan	Res.Asst.(I)

No.	Name	Promoted to
8.	Rosazaman Bin Mohd Nor	Res.Asst.(II)
9.	Khamis Bin Ambo Sappe	Res.Asst.(III)
10.	Mariayee Kuppusamy	ResAsst.(III)
11.	Masnita Bt Jemali	Res.Clerk(II)
12.	Abdul Rassid Bin Mohd	Res.Tech.(IV)
13.	Segar a/l Ganesan	Res.Tech.(IV)
14.	Umaran Bin Jackery	Res.Tech.(IV)

MARRIAGE

- ♥ En. Mohd Faizul Bin Ibrahim to Cik Norhayati Bt. Husin on 05/05/04
- ♥ En. Ahmad Zulkarnaen Bin Hamdin to Cik Norhayati Bt. Arshad on 23/05/04
- ♥ En. Sakari Bin Musa to Cik Haslina Bt Padawi on 24/11/04

Faizul & wife

Zulkarnaen & wife

Sakari & wife

BIRTH

Name	Name of Baby	Date of Birth
En Amran Bin Abd Rahman	Nur Amira Syaheera (baby girl)	20/02/04
En. Minin Bin Tuboh	Eshahirin (baby girl)	14/05/04
Mr. Patrick Ng Hong Chuan	Rachel Ng Zhi-Wen (baby girl)	01/07/04
Mr. Heng Yong Choon	Heng Lee Yean (baby girl)	09/08/04
Pn.Zurinawati Bt Awang Saad	Muhammad Alif (baby boy)	24/08/04
En.Bacho Ambo Sappe	Nur Aidil Azwan (baby boy)	06/11/04
Mdm Lynda Ann	Kendrick Joachin (baby boy)	18/11/04
Pn. Norlela Nordin	Mohd Iman Fahim (baby boy)	29/11/04
En. Muhamad Bin Abdullah	Mohd. Khairul Hanafie (baby boy)	17/12/04
En.Ahmad Bin Ranjie	Muhammad Sharulnidzam (baby boy)	13/01/05

WELCOME!

Name	Grade	Date joined
Azra Bin Zahari	IV	05/08/04
Mohd. Fadzli Bin Ali	IV	16/08/04
Ahmad Fitri Bin. Halim	IV	16/08/04 (resigned on 15/10/04)

Dr. Goh You Keng originated from Segamat, Johor, where he received his primary and secondary education. Upon completing his pre-university programmes in Melaka High School, Melaka and Setapak High School, Kuala Lumpur, he attended the American degree programme at Stamford College, Kuala Lumpur. In August 1992, he received a non-resident fee waiver scholarship from Louisiana State University and Agricultural and Mechanical College to pursue his bachelor's degree in Horticulture. Upon completing his bachelor's degree in May 1995, he returned to Kuala Lumpur, Malaysia, and worked as a trainee at AAR for two months. In January 1996, he returned to Louisiana State University and Agricultural and Mechanical College to pursue his master's degree in the Department of Plant Pathology and Crop Physiology under the supervision of Dr. J. S. Russin. In August 1998, he was granted permission to switch his master's degree programme to the doctor of philosophy programme and worked under the guidance of Dr. K. E. Damann. He received the degree of Doctor of Philosophy in plant pathology, minoring in biochemistry, in December 2001. Dr Goh served as a postdoctoral fellow at the Southern Illinois University, Carbondale, Illinois, USA from Septermber 2001 to June 2004. He returned to Malaysia late July, 2004 and started his duties at AAR beginning October, 2004.

Understanding Women

A man was walking along the beach in Port Dickson when he saw a bottle bobbing in the sea. He waded into the water, caught the bottle and opened the cap. Out came a genie who told him, `Because you have given me my freedom, I shall grant you one wish.`

The man said, `Please build a bridge from here to Dumai, Indonesia so I can cycle over there any time I want`.
The genie replied, `That is indeed a tall order. Think of the enormous challenges involved from that kind of undertaking; the supports to reach the bottom of the sea, the concrete and steel it would take! It will nearly exhaust several natural resources. I can do it but it will be hard for me to justify your wish. Take a little more time and think of something more practical.

The man thought about it for some time. Finally he told the genie, `I wish to understand my wife. I want to know how she feels inside, what she is thinking when she gives me the silent treatment, why she cries when she is happy, what she means when she says` nothing`s wrong, `and how I can make her truly happy.`

The genie replied, `Do you want two lanes or four lanes on that bridge?`.

Chan,W.H.